SENSE.

SENSE. The New European Roadmap to STEAM Education

D3.2 - Report on the Citizen Science and Art-Practices Workshop

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Abbreviations and acronyms

Abbreviation or acronym used in this document	Explanation
STEAM	Science, Technology, Engineering, Arts and Mathematics
CS	Citizen Science
PAR	Participatory Action Research
SDG	Sustainable Development Goals
CSO	Civil Society Organisation

Glossary

Term	Definition used or meaning in the SENSE. project	Reference or source for the definition if applicable
Citizen Science	The term is commonly used to describe different forms of participation in scientific knowledge production and even to describe various forms of participatory action research and digital volunteerism.	Haklay et al. (2021)

Civil Society Organisation	A civil society organization (CSO) or non-governmental organizaiton (NGO) is any non-profit, voluntary citizens' group which is organized on a local, national or international level. Task-oriented and driven by people with a common interest, civil society organisations (CSOs) perform a variety of services and humanitarian functions, bring citizens' concerns to Governments, monitor policies, and encourage political participation at the community level.	https://www.un.org/en/civil-society/page/about-us
Co-creation	Refers to any act of collective creativity, i.e. creativity that is shared by two or more people. Co-creation is a very broad term with applications ranging from the physical to the metaphysical and from the material to the spiritual, as can be seen by the output of search engines.	Sanders and Stappers (2008)
Codesign	Collective creativity as it is applied across the whole span of a design process, as was intended by the name of this journal. Thus, co-design is a specific instance of co-creation. We use co-design in a broader sense to refer to the creativity of designers and people not trained in design working together in the design development process.	Sanders and Stappers (2008)
Community building	Field of practices directed toward the creation or enhancement of community among individuals within a regional area (such as a neighbourhood) or with a common need or interest.	https://en.wikipedia.org/wiki/Community_building
Participatory Action Research	An approach to enquiry which has been used since the 1940s. It involves researchers and participants working together to understand a problematic situation and change it for the better.	https://www.participatorymethods.org/glossary/participatory-action-research

Sustainable Development Goals	The Goals were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.	https://www.undp.org/sustainable-development-goals

The SENSE. project

There is a widespread understanding that the future of a prosperous and sustainable Europe depends to a large extent on the quality of science education of its citizens. A science-literate society and a skilled workforce are essential for successfully tackling global environmental challenges, making informed use of digital technologies, counteracting disinformation, and critically debunking fake news campaigns. A future-proof Europe needs more young people to take up careers in science related sectors.

Research shows that interest in STEM subjects declines with increasing age. This effect is particularly pronounced among girls and young women; even those of them who take up science studies gradually forfeit their motivation. But despite all image campaigns and efforts to remove the awe of science only “one in five young people graduates from STEM in tertiary education” and only half as many women as men, according to the European Skills Agenda.

The disinterest in science is striking and evokes the question of its causes. Stereotypes and lack of female role models seem to be only a part of the explanation. Nor is there a lack of career prospects that could explain a reorientation despite initial interest.

SENSE. has identified two major problems in current science education that need to be addressed: a) A distorted teaching logic that progresses from abstract models to procedural applications (“reverse ontology”) and b) The inability to implement a learner-centred pedagogy linking students’ everyday knowledge to science-based knowledge, thus promoting motivation, self-directed and life-long learning.

SENSE. advocates for the development of a high-quality future-making education that is equally accessible to all learners and promotes socially conscious and scientifically literate citizens and professionals. SENSE. aims at radically reshaping science education for a future-making society. By promoting the integration of all human senses into exploring and making sense of the world around us we will challenge conventional ideas of science and science education. Considering the pitfalls of current science education practices and the advantages of artistic and aesthetic activity, this innovative approach also considers social inclusion and spatial design as core components for a new STEAM education paradigm. With ‘SENSE.STEAM’ future science learning will be moving away from the standardised classroom shapes and furniture layout entering new learning landscapes.

The project seeks to develop an accessible educational roadmap promoting socially conscious and scientifically literate citizens and professionals. It addresses outdated perceptions of current science education as well as gender stereotypes by integrating the arts, social inclusion and spatial design as its core components. SENSE. will establish 13 ‘STEAM Labs’ across Europe to develop and evaluate the

‘SENSE. approach’ to STEAM subjects alongside students, educators, teachers, businesses and other stakeholders.

The ‘New European Roadmap to STEAM Education’ will take the shape of a STEAM learning companion to support tomorrow’s educators and learners – be it in the classroom, in a museum or on a drilling rig. A digital hub will be established, where practitioners from all ages and backgrounds across Europe will be able to access tried and tested educational practices to increase engagement within these subjects.

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Executive Summary

This deliverable seeks to describe and document the approach and the series of activities carried out during the workshop “Citizen Science and Art-Practices into Action”. This document is meant to give an overview of its structure and main results, identify a selection of Citizen Science and Art-related examples of practices valuable to the context of SENSE., and share the working materials and diverse methodologies being used during the workshop. The deliverable is mainly focused on practical issues putting the accent on how the workshop was designed, implemented, and developed. The CS and Art-Practices workshop was part of the activities foreseen Work package 3, which will establish the SENSE.STEAM methodology.

The workshop took place at Musée du Louvre, Paris from 30 to 31 March 2023. It was jointly conceived and organised by Musée du Louvre and Universitat de Barcelona (UB). The workshop lasted 1.5 days and gathered 23 participants from the SENSE. consortium partners. A vast majority of the participants have a scientific background and have worked with local communities although only one of four participants have ever participated in a CS project.

The workshop was structured according to its two main orientations: establishing the context and conditions for participants to actively engage in Citizen Science (CS) and exploring the potential for convergence of Citizen Science and Art practices through the implementation of four research-in-the-field activities inside the Musée du Louvre Galleries. The different activities and sessions were organised in four major blocks and unfolded in a sequential manner: Connecting participants (Presentation), Context, Research-in-the-field, and Final Discussion.

The approach of the CS and Art-Practices workshop aimed to:

- Give a general overview of the goals and approach of Citizen Science.
- Provide the competences, methods, and tools needed to develop key steps of a Citizen Science project.
- Make connections between Citizen Science and Art-related practices, paying particular attention to the notion of participation or the understanding of research practices, considering the Musée du Louvre as a space to develop Citizen Science research-in-the-field practices.
- Ensure that fostering citizen science, artistic and creativity considerations will receive sufficient recognition both in the SENSE.STEAM model and pedagogy.
- Establish alliances and develop cooperation strategies and tools between partners in conducting research to prepare and enrich the upcoming STEAM Labs methodologies.

During the workshop, a survey in three different steps was set to start experimenting with evaluation tools which can be reused when engaging external stakeholders in SENSE.STEAM activities of the STEAM Labs (WP4). The survey shows an increment progressive of the participants' self-perception on several aspects that were

identified to be critical when designing the workshop. By the end of the workshop, participants had a larger agreement on the statement: “I do know what CS is”. Similar increment is seen with the statement: “I feel I have enough tools and skills to carry out a Citizen Science project in my hometown.” During the workshop, participants progressively increment their agreement on “Citizen Science and Art Practices are related to each other.”. The strongest agreements are on the statements: “I think that a Citizen Science project may have a positive impact in my hometown.” and “Citizen Science may have a positive impact in terms of Social Inclusion.” Finally, a mild positive correlation is observed between “Citizen Science and Art Practices are related to each other.” and “Citizen Science may have a positive impact in terms of Social Inclusion.”

The implementation of the workshop allowed the following actions to be addressed, which are key points in the development of the SENSE.STEAM methodological approach:

- Reflect about how Citizen Science can be related to a variety of educational contexts to change the way we approach STEM, and the way we understand and run a scientific research project.
- Reflect on the implementation of Citizen Science and Art Practices in local contexts.
- Build spaces of interaction among the workshop participants, allowing the participants to collect and experiment Citizen Science strategies that might be valuable to the SENSE. project partners and their communities.
- Set the conditions to the consortium and associated partners to further reflect on Citizen Science and Art Practices in a proactive manner.
- Explore and contribute to the essence of the theoretical and practical foundations of SENSE.STEAM.

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1. Introduction

Citizen Science and Art-practices workshop was held inside the Musée du Louvre (Paris) for 1.5 days, the 30th and 31st of March of 2023. It formally received the title "Citizen Science and Art Practices into Action" and it was organised by Louvre and UB consortium members. There were 23 participants from the SENSE. consortium[1].

The organisation and planning initially served to create a fruitful conversation among Louvre and UB partners in periodic meetings between January and March 2023. The effort to prepare the workshop has allowed Louvre and UB to build common visions and even contrast perspectives and understandings of Citizen Science and Art set of practices. Special attention was paid to the notion of participation in both Citizen Science and Art practices or the understanding of research practices. Joint reflections are also expected to bring out critical reflections in relation to Space and Social Inclusion as cross-cutting issues that will be developed in Work packages 5 and 6, respectively.

The workshop transferred some of these reflections in a hands-on manner to the rest of the SENSE. consortium members. On one side, the workshop offered the possibility to learn about Citizen Science and Art practices in different manners. The chosen practices are already exemplifying a position and a perspective to Citizen Science and Art practices. These practices underlie specific strategies, methods and values that are important in the theoretical and practical foundations of SENSE.STEAM broadly. On the other side, the workshop has also set the conditions to the consortium and associated partners to further reflect on Citizen Science and Art Practices in a proactive manner, considering the Louvre as a space to develop Citizen Science research-in-the-field practices. In the exploration of the Louvre, both space and visitors are being observed and put in relation with participatory research methods that were experimented and implemented by the workshop participants.

The final ambition of the workshop was therefore to explore and contribute to the essence of the theoretical and practical foundations of SENSE.STEAM. The workshop thus aimed to ensure that fostering citizen science, artistic and creativity considerations will receive sufficient recognition both in the SENSE.STEAM model and pedagogy. The workshop also opened a space to reflect on the implementation of Citizen Science and Art Practices in local contexts. During the workshop, a survey in three different steps was set to start experimenting with evaluation tools which can be reused when engaging external stakeholders in SENSE.STEAM activities of the STEAM Labs (Work package 4).

[1] Louvre, HVL, UB, Velvet, WECF, Vilvite, Hawkins/Brown, Odyssea, CREDA, GEYC, EFEE, University of Edinburgh, Pädagogische Hochschule Weingarten.

1.1. Purpose of the document

The Deliverable wants to document the set of activities being developed, identify Citizen Science and Art-related examples valuable to the context of SENSE., and share the materials and methods being used during the workshop. The way this information is reported wants to help consortium members and anyone else interested to run the related activities on their own. Therefore, the Deliverable is very much focussed on practical issues putting the accent on how the workshop was designed, implemented, and developed. More elaborated reflections are left to future Deliverables of Work package 3.

1.2. Intended readership

The workshop aimed to ensure that fostering Citizen Science, artistic and creativity considerations will receive sufficient recognition both in the SENSE.STEAM model and pedagogy. Thus, readers should see the Deliverable as a document reporting the effort being made. This Deliverable also aims to promote transparency and openness to facilitate a broader use of the methodologies and adoption of the activities developed during the workshop.

1.3. Structure of the document

After this Introduction, the Section 2 of this Deliverable defines the goals, describes the different methodologies and concepts behind Citizen Science and Art practices and the general structure of the workshop. The description is related to the workshop as a whole and to the specific activities being developed during the workshop. Section 3 brings a context and some background on citizen science and Art practices which will be further developed in future Deliverables. The same section also presents 4 different experiences that combine Citizen Science and Art practices. Section 5 documents the different research-in-the-field themes being developed with Citizen Science methodologies and being inspired by Art practices. Section 6 describes the different research themes and the locations within the museum where the research in groups took place. Section 7 shows relevant results of a short Survey being performed before, during and after the Workshop. Sections 8 and 9 conclude the Deliverable with remarks and reflections that can be of interest to forthcoming tasks in Work packages 3, 4, 5 and 6. Annexes add documentation such as the schedule and agenda of the workshop, the content of the Survey and the work done by some of the groups during the workshop.

1.4. Relationship with other deliverables

The report is a starting point of more elaborated reflections which are planned to be included in the three deliverables to be submitted shortly: (1) D3.3 Report on stakeholders challenges and needs for a New European STEAM education (M10, Responsible: CREDA, Type: R, Dissemination level: PU); (2) D3.4 Report on knowledge and practices for a New European STEAM education (M12, Responsible: CREDA, Type: R, Dissemination level: PU), and (3) D3.5 The SENSE.STEAM educational model and pedagogy (M12, Responsible: HVL, Type: R, Dissemination level: PU). In a broader level, the current deliverable also expected to be an initial contribution to the deliverable D7.5 The New European STEAM Education Roadmap (M36, Responsible: HVL, Type: OTHER. Dissemination level: PU). D7.5 is the most fundamental deliverable of the project.

1.5. Acknowledgments

This report reflects the invaluable contributions of all the following participants:

Among partners

- Daniela Conti and Carolina Bianchi from CREDA.
- Nickolai Birkeland, Lydia Schulze Heuling, Sasha Brown and Laura Colucci-Gray from HVL.
- Hannah-Stella Haaristo and Joseph Sturm from VELVET.
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Among associated partners

- Nils Petter Hauan from VILVITE

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A particular thanks is also to Louvre for their great hospitality and the organisation of the workshop.

Figure 1: Workshop participants at Louvre on 31st of March 2023.

2. Concepts and structure of the workshop

The general aim of the workshop was twofold, and it naturally fit into two big parts of the workshop. First, to set context and conditions for participants to get actively involved in Citizen Science (CS). And second, to explore both Citizen Science and Art practices and how they can converge based on the experience of running four research-in-the-field activities.

To meet these intertwined goals, we built spaces of interaction among the workshop participants, and we together collected and experimented CS strategies that might be valuable to the SENSE. project partners and their communities. Therefore, the workshop provided a general overview of what Citizen Science is and delved into the competences needed to develop a complete CS project.

Figure 2 synthesises the workshop structure in terms of the different activities and sessions performed in a sequential manner. We broadly divided the activities in 4 major blocks. To start the workshop, we stressed the need to work cooperatively in Citizen Science research. We thus intentionally built an activity to discover the diversity of workshop participants profiles (skills, competences, and attitudes). After this interactive session, we started the Context block. Workshop participants were introduced to Citizen Science with an initial plenary talk and then learned about 4 different CS and Art experiences in a conversational mode and in small groups. Those projects were already developed by 4 different consortia members. After a discussion, we started the research-in-the-field block. Participants actively went through the different steps of a CS project with different tools and methods to succeed in the creation and manage their own CS projects, according to their realities. The research topics were selected by Louvre and the topics were motivated by art-inspired perspectives. The research was highly contextualised (as most of the CS projects), inside the Louvre rooms.

A discussion with all participants wrapped up the workshop. After sharing the results of their research-in-the-field, participants critically reflected on the whole experience and shared their own visions about CS and Art practices. This final discussion under the form of a round table helped to offer further guidance to STEAM Labs interested in CS practices and on how they can converge with Art practices.

During the workshop, we also ran a short Survey which was repeated in 3 different moments along the workshop. The Survey was designed to get some additional guidance on the integration of CS and Art practices and to get an idea about the change of perception of the participants during the workshop. The results are summarised in Section 8.

Overall, the workshop was set up to be an experience in which participants can share their own knowledge, where all discussions were open at the same level in a respectful manner, and where all activities were created with the purpose of being hands-on and requiring the participation of all members. Apart from the broad aim and purpose of the workshop, we also considered very practical considerations that were initially set in the preparation of the workshop reported in Table 1. They serve as broad guidelines to design and give the right format to the different activities organised.

Table 1: Objectives and elements being considered when Louvre and UB started to design the workshop.

General considerations related to SENSE project	1. Favouring alliances between partners a. Spaces to better know each other - configuration of the workshop. b. Team building activities approach. c. Group cohesion 2. Setting up basis for next steps in the project
Particular considerations related to CS and Art practices	1. Identifying goals and the approach of CS (context) 2. Learning about the key points of a CS project (main core) 3. Making connection between CS and artistic practices 4. Connecting CS with a variety of educational contexts to change the way we approach science, and the way we understand and run a scientific research project. 5. Creating a space of reflection to adopt CS practices locally (final discussion)
Other considerations when designing the format of the workshop activities	1. Hands-on activities and experiential approach to CS 2. Participation and Inclusion as fundamental elements in CS 3. Sandbox of CS projects which can be of interest to SENSE. 4. Body and Space reflection within the contexts of CS and Art 5. Art and Dance/Body-related practices

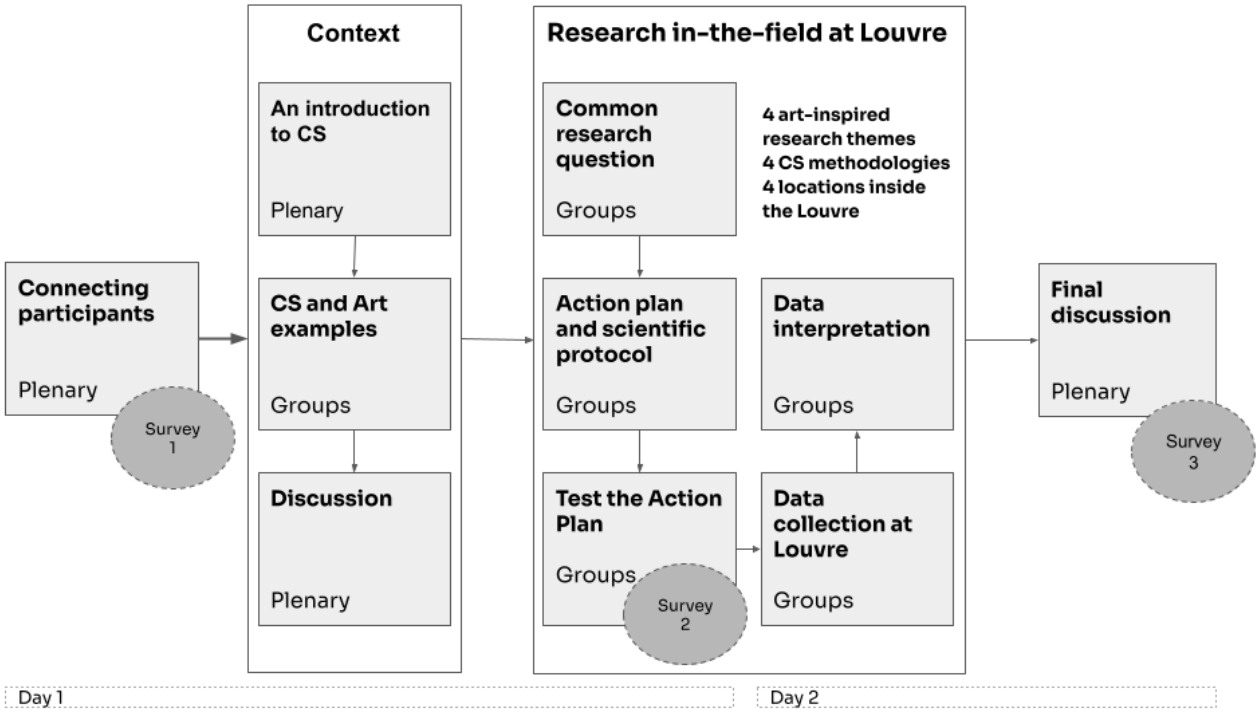


Figure 2: General structure of the workshop with the different sessions.

Figure 2 describes the general structure of the workshop. Context and Research-in-the-field at Louvre were the two major blocks which were preceded by an interactive activity to discover the diversity of skills, attitudes, and competences of the workshop participants. Context block introduced Citizen Science (CS) and provided the opportunity to present and discuss in a conversational mode 4 different CS and Art examples in the 4 corners of the room. Hands-on activities were designed for the second block (Research-in-the field) using co-design tools, exploring 4 different CS methodologies to collect data (Photovoice, Note Taking, Mapping and Low-cost sensors) with the broad aim to explore different Louvre locations and by focussing on 4 art-inspired themes (Bodies, Interactions, Circulations and Soundscapes). The arrows describe the sequence in time. The exact moments when the surveys were performed are also indicated. A final discussion wrapped up the workshop.

Figure 3: Citizen Science presentation session that brought context to CS practices (Auditorium Room). This plenary session opened the set of activities of the Context block.

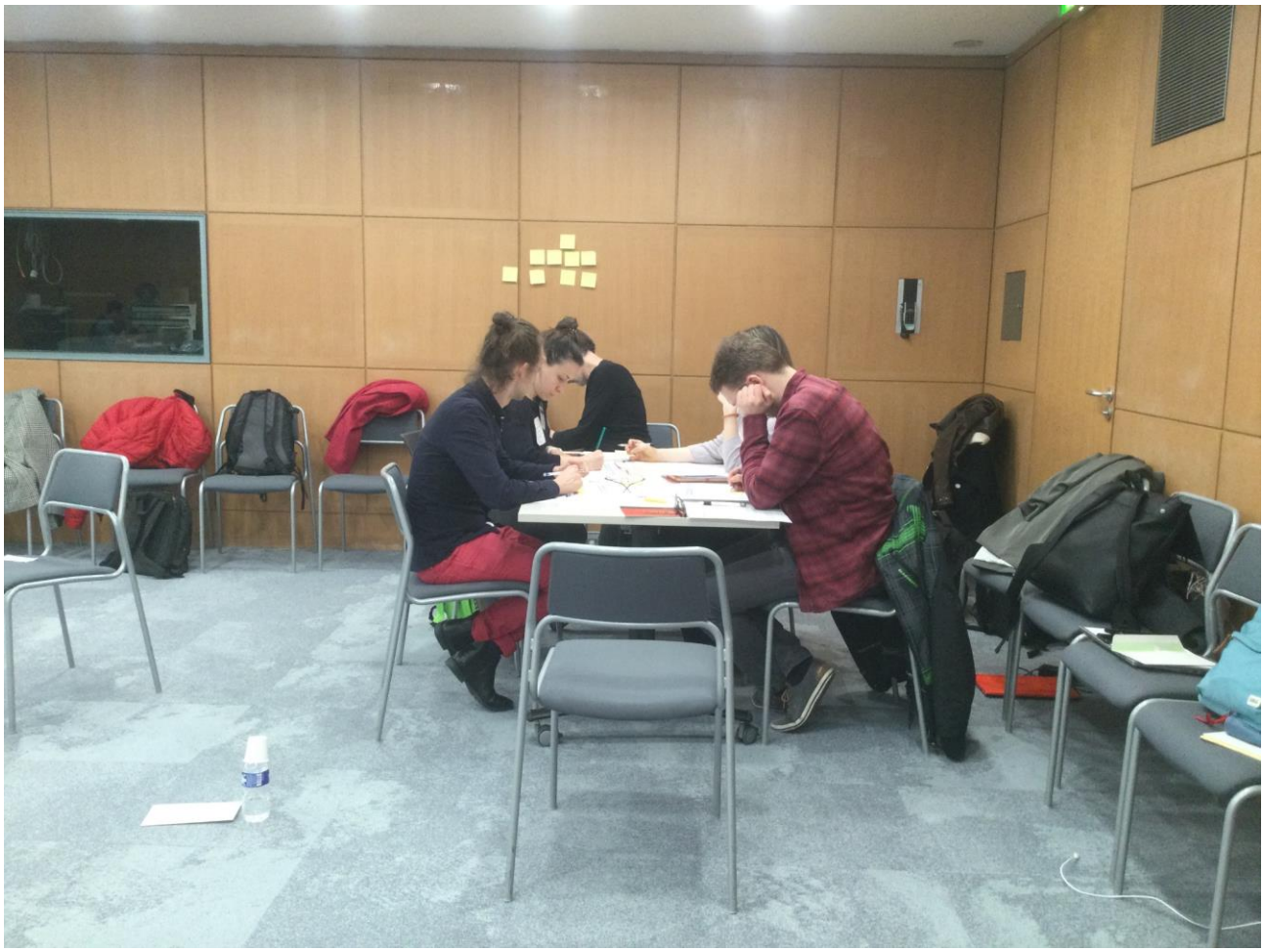


Figure 4: Working groups during the exercise to raise consensus and build common research questions inside one of the four groups (Auditorium Room, Day 1). The four groups were asked to focus on an art-inspired theme and use a specific CS methodology.

Figure 5: Data interpretation session within groups during the Louvre workshop (Studio room, Day 2). Those groups were asked to focus on an art-inspired theme and use a specific CS methodology to collect data. This data was collectively interpreted within each group during this session.

3. Setting a context

3.1. Art practices

In recent decades, the exponential development of projects putting scientific and artistic productions into dialogue has taken place in many spheres of activity such as university programs and educational projects in general, industrial, and technological activity, or the programming of cultural facilities. Considering this context, in the variety of these fields and according to their multiple approaches, the methodological angle seems to be the one with the greatest heuristic potential for the analysis of these phenomena. Limiting these general reflections to the more specific framework of research, whether in the sciences or in the humanities, a growing number of researchers in various disciplines are resorting to methodological choices that involve, for example, the use of artistic devices such as film, performance, theatre, installation, sound art, scores, etc., or that imply the borrowing of artistic strategies, tactics, and protocols.

The range of research methodological options and investigative tools is gradually expanding to respond to the plurality of knowledge and disciplinary frameworks. There are many examples of experimental forms of collaboration or use of experimental protocols from artistic practices. The place of creation in the dynamics of research seems to have acquired a new centrality, which translates, among other things, into the setting up of training programs and specific projects that seek to articulate artistic and scientific research, as well as into the conception of new formats of knowledge production and dissemination. The integration of these new tools is now part of the methodological concerns of many researchers who question the use of artistic formats, its impact on the process of construction of the research subject, the epistemological stakes that this raises while trying to maintain scientific rigour. This methodological permeability between different disciplines, which makes it possible to broaden the potential for capturing, translating, and sharing sensory-based experience, is not without its frictions.

In the French context, these initiatives that seek to explore possible synergies between scientific investigation and different approaches to the creative process sometimes fall under the label of the so-called 'research-creation', the contours of which are not clearly defined, involving a constellation of activities, perspectives, and ways of doing things. From the 2000s onwards, the setting up of the SPEAP[2] programme at Sciences Po founded by Bruno Latour in 2010, the SACRe[3] doctoral

[2] http://blogs.sciences-po.fr/speap/accueil/
[3] https://collegedoctoral.psl.eu/doctorat-psl

programme in 2012 or more recently the Artec[4] programme in 2018, the initiatives set up within the framework of the Diagonale[5] at the Université Paris-Saclay since 2019/20 or the institutional network of TRAS[6] (*Transversale des Reseaux Arts et Sciences*). Within these initiatives aiming to co-construct new approaches to research, design plays a prominent role – its key concepts and practices – especially with regard to issues related to environmental concerns, the decentering of the human perspective as the sole measure of being in the world, or topics such as social innovation.

Throughout its history, punctuated by multiple and recurring crises, the museum as an institution has been the playground (and battleground) of many artists who have established a often complex relationship with it. This relationship seems particularly ambiguous today (Bawin and Mairesse, 2016). Artists have played a leading role in the development of critical studies of the museum and, particularly, in questioning its roles and links with society. Museums and exhibitions are privileged places to observe broader social, political, and cultural processes. Many contemporary art projects have focused on observing and highlighting museum dynamics, its cultural and social practices, its institutional constraints, its specific temporalities, and its modes of interaction and associated rituals. In this sense, performance practices have been a well-suited means of exploring these issues, reconfiguring the functions of the museum and its audiences, reintroducing the place of the body as well as the sensitive and embodied dimension of aesthetic experience.

For a long time, the Louvre has hosted numerous initiatives to put its collections in dialogue with contemporary artistic creation, and an important place is given to the performing arts. A recent example is choreographer Anne-Teresa de Keersmaeker's latest performance, Forêt, which took place in the French and Italian painting galleries in 2022. The museum develops specific research projects and pursues an education and mediation policy that aims to reach increasingly varied audiences. For example, the Louvre Multisensoriel project allows for a multi-sensory and physical approach to the collections to renew the experience of the museum visit and the encounter with the works.

Nevertheless, the way museums are embarking artists and contemporary productions or performances is quite often blurred: they wish to reactivate citizen's interest for the museum vocation and activities with a risk of being a simple decorative frame while striving to make visible the very relation between ancient and contemporary art and practices.

[4] https://eur-artec.fr
[5] https://www.ladiagonale-paris-saclay.fr/
[6] https://www.reseau-tras.eu

Echoing these experiments that the museum has been designing and developing for years, the workshop's aim was to create a dialogue between the specific approaches of Citizen Science and a series of artistic references, particularly at the level of the different methodological perspectives. By integrating, at the very core of the methodological choice, the multiple potentialities, and constraints of a context such as the Louvre.

Figure 6: Tactile device at the Islamic Art department (Louvre Multisensoriel) © MdL/O. Ouadah.

3.2. Citizen Science practices

Scientific knowledge production has been changing across centuries. Initially, we may simplistically assert that scientific production was in the hands of "lords" and "ladies" of science that were amateurs and mostly motivated by curiosity. After the constitution of universities and schools, the XXth century has thus led to an intense professionalisation and institutionalisation of scientific practices where scientists have become experts of very often restricted and limited fields of research.

However, different voices from different places have raised various concerns on the future of scientific knowledge production. In a recent paper in Nature, a marked decline in disruptive science and technology over time is observed and this can be attributed to scientists' and inventors' reliance on a narrower set of existing knowledge (Park, Leaney and Funk, 2023). There are other voices raising the urgent need to address the ethics of inclusion in any scientific practice (Strauss, White and Bierer, 2021). This need may involve the need to build partnerships in science with communities and social groups. For instance, the INVOLVE UK health-research advisory group states "A project that is co-produced is one in which researchers, practitioners and the public together share power and responsibility for the work throughout. The 'whys' of this process are self-evident: patients and the public have the right to be more than just participants in research, and their involvement can lead to better outcomes."[7].

From a policy level, the European research policy envisages scientific research oriented by specific societal goals, such as the Sustainable Development Goals (SDG) of the United Nations[8]. Just for illustrative purposes, a recent report imagines mission-oriented research. The report already includes citizens in this effort stating: "Bold missions can provide new syntheses that are today impossible and thus will hopefully achieve the breakthroughs that are urgently needed to solve some of the most pressing issues facing our citizens." The report also hints that: "Citizens can possibly be mobilised to become active participants in missions, for example by cleaning plastics from beaches or by providing real-time monitoring data as enabling technologies develop and become more universally present in society." (EU, 2018). European Research Executive Agency also supports Open Science which not only favours transparency and accessibility of scientific knowledge but also promotes democratisation of science, knowledge co production or the active involvement of citizens, groups, or communities in scientific research with for instance Citizen Science practices[9].

From an epistemological point of view, the term Citizen Science (CS) was originally used during the 1990s with two very different starting points which however can

[7] https://www.nature.com/collections/nnqkvntryl
[8] https://www.undp.org/sustainable-development-goals
[9] https://www.fosteropenscience.eu

converge. First approach motivates CS as a participatory data gathering (Bonney, 1996) which has multiplied its capacity thanks to the digital revolution of the internet and wide use of mobile phones devices. Alternatively, CS can also be seen as a way to assist the needs and concerns of citizens and as a form of science developed and enacted by citizens themselves (Irwin, 1995).

During the workshop, we adopt a broad understanding of CS: "the term citizen science has been commonly used to describe different forms of participation in scientific knowledge production" and even "to describe various forms of participatory action research and digital volunteerism, including Community Science, Civic Science, People-Powered Science, Participatory Mapping, Participatory Science, Volunteered Geographic Information (VGI), Community Remote Sensing, Citizen Observatories, Crisis Mapping and Citizen Generated Data [...]" (Haklay et al., 2021). The reader is also encouraged to consult the broad monograph (Vohland et al., 2021) where different aspects involved in CS practices are carefully discussed, education included.

However, during the workshop, we aimed to point out the basic aspects involved which already prefigures a specific vision of CS practices. The vision was the one provided by a European H2020 project called CoAct, Co-designing Citizen Social Science for Collective Action. We believed that the approach suggested by this project might be strongly aligned at least with some aspects of key aspects of the SENSE.STEAM model. The project webpage[10] says: "CoAct is proposing a new understanding of Citizen Social Science as participatory research co-designed and directly driven by citizen groups sharing a social concern, in which they become co-researchers in processes commonly dominated by academic researchers. CoAct aims to bring together and further develop methods to give citizen groups an equal 'seat at the table' through active participation in research, from the design to the interpretation of the results and their transformation into concrete actions." A more elaborated discourse can be found in the Deliverable (Scheller et al., 2020).

Figure 7 is indeed directly taken from the CoAct project proposal and describes elements, aspects of relevance in a CS project. We there see CS practices as:

- a situated knowledge co-production activity, a collective effort where citizens and communities also contribute with their expertise to face a shared concern,
- an actionable knowledge which may drive collective action or policy recommendation based on evidence, and
- an effort which can be harnessed in a wide group of experts and policy makers to favour transformative knowledge.

Table 2 identifies three key stakeholders or participants in a CS project: the Co-Researchers, the Citizen Scientists, and the Knowledge Coalition. Figure 8 defines the different phases of a CS project and how participation might be involved in each

[10] https://coactproject.eu

phase, from the project definition to the final effort to transform results into action. The CoAct project has also built a Toolkit[11] with different participatory activities for each of the phases described in Fig. 8.

Finally, Table 3 underlines the ethical values behind any CS project, and which can be comprehended by the SENSE model developed in the Work package 3 and forthcoming Work packages (Work package 6, specially). These values are related to the Social Inclusion cross-cutting issue in the SENSE.STEAM model and it also motivates the need to incorporate co-creation and codesign methodologies when building a CS project, as we will discuss in forthcoming sections.

Figure 7: Key elements in a CS project. The CS research is situated on a theme or place. Participants can bring their expertise and raise a concern. The knowledge co-produced could be actionable and harnessed by a wider number of experts and society actors as a Knowledge Coalition as defined in Table 2. More info: https://coactproject.eu .

Table 2: Actors and stakeholders involved. More info: https://coactproject.eu .

Co-Researchers: persons having a lived experience in relation to the social concerns and thus recognised as experts-in-the-field. They are co-owners of the research data and results.	Citizen Scientists: called for participation through digital platforms in order to collect massive robust scientific evidence to respond to the CoRes concerns.	Knowledge Coalition: network of stakeholders who are informed about the research and play an active role in either participating or co-designing different actions to harness CoRes' efforts and implement policies and measures based on scientific evidence.

[11] https://coactproject.eu/resources/toolkits/tk-landing

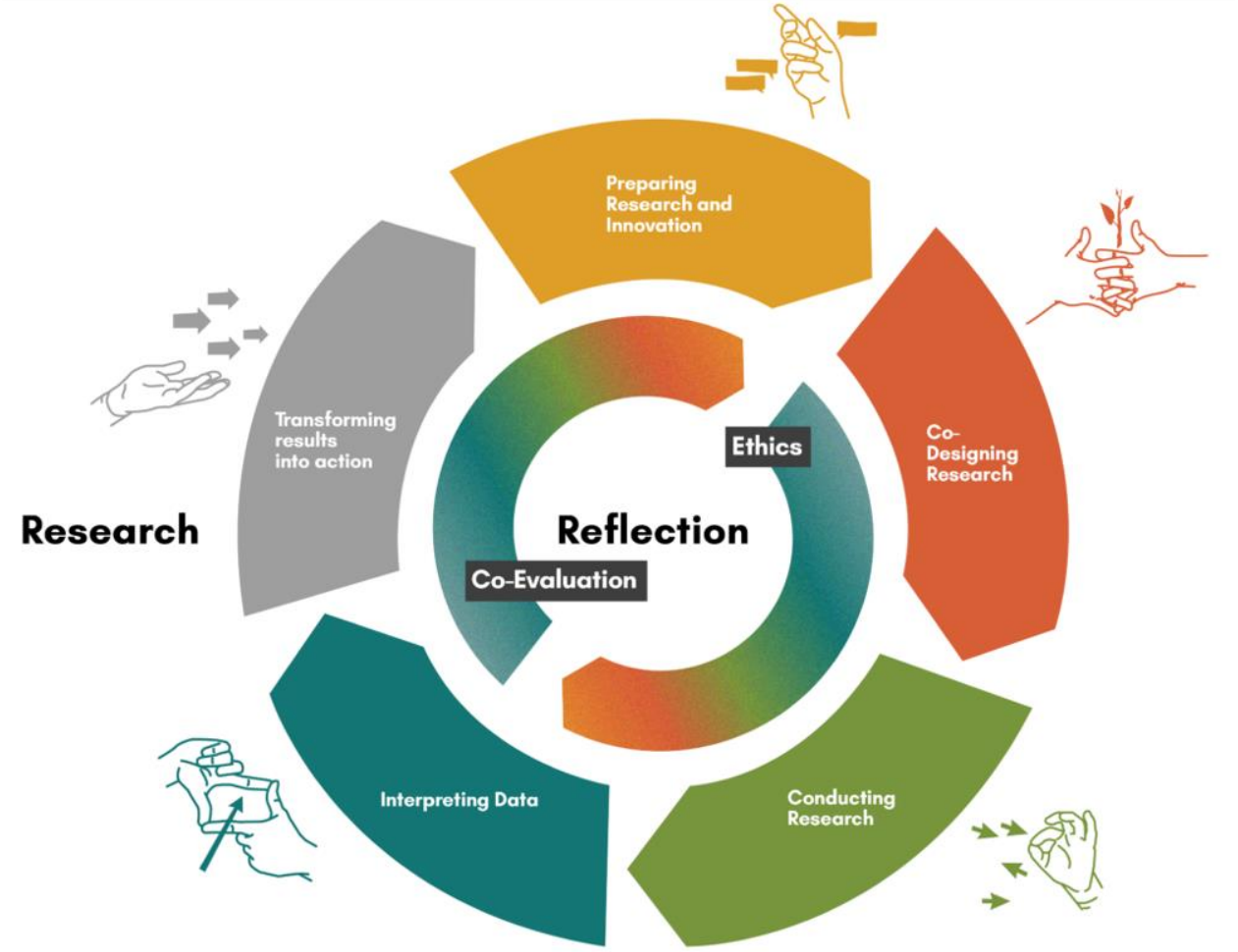


Figure 8: Some CS projects have identified these steps where participation can be further enhanced in participatory scientific research. This figure is taken from the CoAct EU project where it has been aimed to enhance social dimensions in CS. More info: https://coactproject.eu .

Table 3: Values behind CS practices which can be relevant in the context of SENSE.

Inclusiveness	Horizontality	Equity	Trust	Respect
Open Science	Co-ownership	Empowerment	Reflexivity	Reciprocity

3.3. Citizen Science Examples

We have already identified within the consortia members four different experiences related to CS and Art practices and in which they have been intertwined. We summarise them here but during the workshop each experience was shared during the CS Corners activity through informal conversations with small groups and after (See Workshop Agenda in the Annex). We place each in each corner of the room and that's why we call the activity in the Agenda as CS Corners.

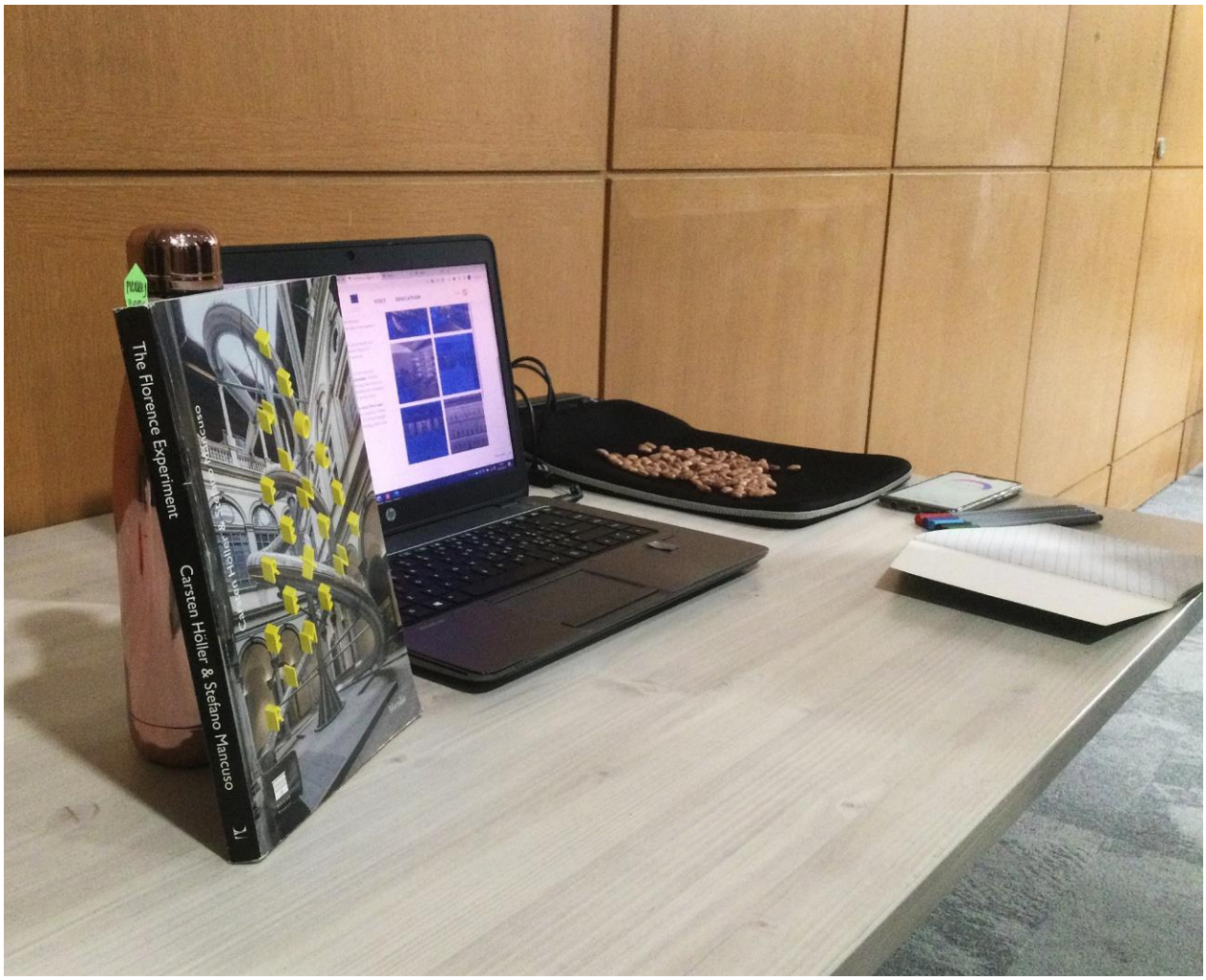


Figure 9: The Florence Experiment presentation in the CS Corners activity (CS examples).

3.3.1. The Florence Experiment[12]

Who was involved?
Visitors of Palazzo Strozzi, but also tourists and citizens who did not take part in the experiment, thanks to the works on the façade of the building and the artworks in the open (public) courtyard.

Where was it conducted?
Fondazione Palazzo Strozzi - Florence, Italy
From 19 April to 26 August 2018

Short description:
Palazzo Strozzi hosted The Florence Experiment, a site-specific project jointly devised by artist Carsten Höller and scientist Stefano Mancuso: an experiment combining art and science to study the interaction between plants and human beings. The public was directly involved in the project thanks to two monumental slides allowing visitors to slide from the 20-metre high loggia, down to the courtyard, and to a laboratory connected to the façade of the Palazzo. The Florence Experiment triggered a reflection on the relationship between human beings and plants. The project aimed to forge a new awareness of the way in which mankind sees, senses, and interacts with plant life and transforming Palazzo Strozzi into a revolutionary space hosting a scientific and artistic experiment that explores all living beings' ability to communicate and to experience emotions. (from The Florence Experiment - Fondazione Palazzo Strozzi)

Materials being shared during the workshop:
Personal experience, pictures, catalogue of the exhibition, results of the experiment.

[12] https://www.palazzostrozzi.org/en/archivio/exhibitions/the-florence-experiment/

3.3.2. BRIDGES

The BRIDGES[13] acronym stands from *Building Reflexivity and response-ability Involving Different narratives of knowledGE and Science*

Who was involved?
A group of Interdisciplinary senior researchers (artists, educators, science communicators, biologists, agronomists) and an Interdisciplinary group of young researchers (doctoral and postdoctoral students from the Italian National Research Council - CNR).

Where was it conducted?
The empirical part of the project was conducted in partnership with the Centre for Research on Arts and Science "Pianpicollo Selvatico", based in Piedmont.

Short description
The project focussed on a specific socio-ecological dimension of the current global health crisis – the fertility of soil. Alternative views exist on what constitutes 'fertile soil' (FAO, 2019) and how it can be measured, according to different disciplines, operating at different levels and time-scales. But it is also a concept that calls into question the nature of decision-making processes involving diverse and heterogeneous communities living on different soils. Considering the complexity of the issue, and the diversity of perspectives involved, we set out to investigate soil first by taking a critical look at how we - as scientists and citizens - approach the process of doing research together, by engaging in a communal activity of soil digging, led by two artists. The digs involved three sites: the meadow; the vegetable patch and the woodland. While digging, we were asked to adopt an 'archeological gaze', that which engages with the changes of horizons; collects and sets aside any object without predefined categories. We used notebooks to annotate observations, draw, make sketches and paint with soil. The process led to a reflection on different ideas of doing research; one that engages the instrumental attitude of extraction, of data, or knowledge; and one that engages the development of artistry, that is, the desire to improve one's own way of looking, sensing and perceiving. The same approach was repeated with community groups working on urban soils across 5 sites in the city of Milan. This second part of the project involved a citizen science experiment, combining data obtained from samples of soil and the stories and narrations of community groups.

Materials being shared during the workshop
Personal experience; the notebook diary of the 'dig'; the project website; pictures; soil samples and fragments of objects. I will give participants the change to 'dig' for things in a bag, paint and respond to the objects as they found them. Participants were asked participants to work with samples of soil to draw or make a little sculpture to engage

[13] https://www.progetto-bridges.it

in sensorial inquiry, linking the specific samples with their own memories and experiences of soil they have had in their own communities.

Figure 10: BRIDGES presentation in the CS Corners activity (CS examples).

Figure 11: CoAct for Mental Health project presentation in the CS Corners activity (CS examples).

3.3.3. CoAct for Mental Health[14]

Who was involved?
Project led by OpenSystems, in the frame of the CoAct[15] H2020 project, in collaboration with the Catalan Federation of Mental Health. The most intense role was taken by the Co-Researchers, 32 people with first-hand experience of mental health, or family members, who co-designed the whole project. The Knowledge Coalition, 65 representatives of organisations involved in mental health care provision (civil society organisations, universities, governments, public agencies, etc.), helped to enhance the research impact. Finally, anyone motivated to improve mental health, acting as Citizen Scientist, can contribute to the research by listening and responding to lived experiences shared by the Co-Researchers through the chatbot.

Where was it conducted?
The chatbot contents were co-created in Catalonia (Spain), mostly in Catalan. As they have been translated to Spanish, English, and German, the chatbot is accessible in Telegram for any citizen fluent in these languages. Participants from 14 countries are registered so far.

Short description
CoAct for Mental Health is a Citizen Social Science (CSS) project that investigates mental health social support through a co-created chatbot, the first one used for Citizen Science research. Social support is a positive factor within mental health recovery, while also acting against social exclusion. However, evidence on how to harness its potential is still lacking. The CoAct for Mental Health project has been co-designed and directly driven by Co-Researchers, people with mental health problems and their families. Their personal lived experiences of mental health problems are at the core of the project. CSS implements an inclusive and multi-level participation model, which includes launching a chatbot to invite all citizens to participate in the research. Collective data interpretation methodologies have also been deployed to involve Co-Researchers in the interpretation of the collected data and in drawing conclusions to make recommendations and support specific demands. Art has always been an important and organic part of the project. A professional graphic artist was present during the co-creation sessions and illustrated most of the microstories. A visual storyteller produced the piece “The Co-Researchers journey in CoAct for Mental Health”, after interviewing 6 of the Co-researchers.

Materials being shared during the workshop
Printed “Research Diary” used for microstories writing. Microstories illustrations. Piece “The Co-Researchers journey in CoAct for Mental Health”. Postcards and posters.

[14] https://coactuem.ub.edu
[15] https://coactproject.eu

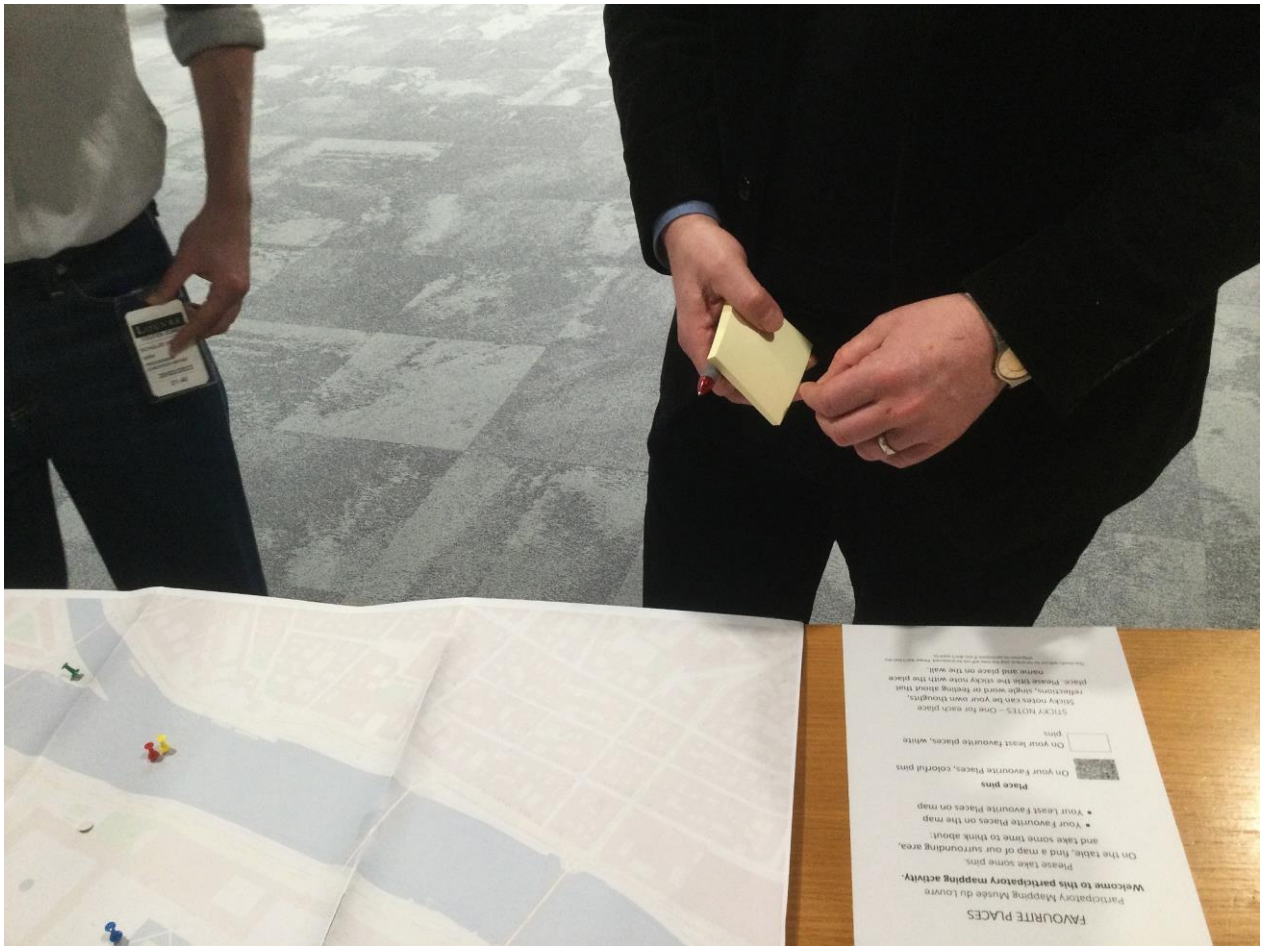


Figure 12: The Traveller Community Mapping Coolock StoryMap presentation in the CS Corners activity (CS examples).

3.3.4. Traveller Community Mapping Coolock StoryMap: Storied places of belonging and unbelonging[16]

Who was involved?
Led by TravAct researchers in Coolock Dublin, Pavee Point Traveller and Roma Centre staff, and supported by research staff and students in the Department of Geography at Maynooth University.

Where was it conducted?
In and around Dublin, Ireland.

Short description
The Traveller Community Mapping Coolock StoryMap depicts the stories and memories of three generations of Irish Travellers, an historically disadvantaged ethnic minority in Ireland, about particular places in their home of Coolock, north Dublin. The research was led by Travellers, with relevant outcomes of benefit to the Coolock Traveller community, in collaboration with Geography researchers. Together, we created a partnership based upon knowledge exchange over the past two years that brought together the best of Traveller community development practice with an ethically-based commitment to publicly-engaged geographical research. Many of the places identified by Travellers in the mapping workshops were not on "official maps;" some no longer exist. But Travellers identified these places as important to their community and everyday lives, with both positive or negative associations, and included them on the map. In the process of making community maps and identifying places of belonging and unbelonging, Travellers reclaimed the right to be on the map.

Materials being shared during the workshop
Laptop and a small tablet to present the research. There is a small amount of video/audio in the project, and headphones can be included. A2 printout of a map of the area around the Louvre with stickers, markers, and sticky notes so that participants can participate in a small demonstration of a participatory mapping session. It would be great to have a table for this map, and a section of wall to hang up sticky notes.

[16] https://arcg.is/0Hryzy

4. Community building and roles in CS projects

Citizen Science practises very often assumes a collective work across the different phases of a scientific research (see Figure 8). Every participant might be different, and it may be necessary to acknowledge the differences based on their expertises, competencies, skills, or attitudes. To introduce this important aspect, we started the workshop connecting the participants (see Figure 1). Furthermore, it will indeed be important to bring value to the diversity of profiles among participants as they may take different roles in the tasks to run a CS project. During the research-in-the-field block, we asked each to decide which role every workshop participant is taking. Further details about the dynamics are provided in the Annex.

4.1. Connecting participants and enhancing diversity

An intense participation may involve the engagement in the co-design of a CS of a group or community. As described in Table 1, they may participate as co-researchers, being experts-in-the-field in relation to the research topic being chosen when running a new CS project. It is thus important that every participant take time to reflect on his/her own interests, skills, and expertise, and then spend sufficient additional time to share them within the group.

This exercise can be done with the support of specific materials such as the one shown in Fig. 12 which is an adaptation of original materials developed inside the EU STEMForYouth project[17] (Senabre, Ferran-Ferrer, Perelló, 2018; Perelló etal. 2017). In this exercise, participants create their own badge in terms of specific skills, competences and attitudes that better define themselves. The exercise can trigger informal discussions about individual potential contributions in the collective research process. It can also help to better reflect on and define individual profiles and skills within a CS project.

In some cases, the exercise can also be useful for promoting heterogeneity when forming groups or to further increase diversity and social inclusion. The CS leaders can also gain interesting insights about individual understandings and opinions about different roles in research during the discussion.

[17] For more information, consult https://www.stem4youth.eu/

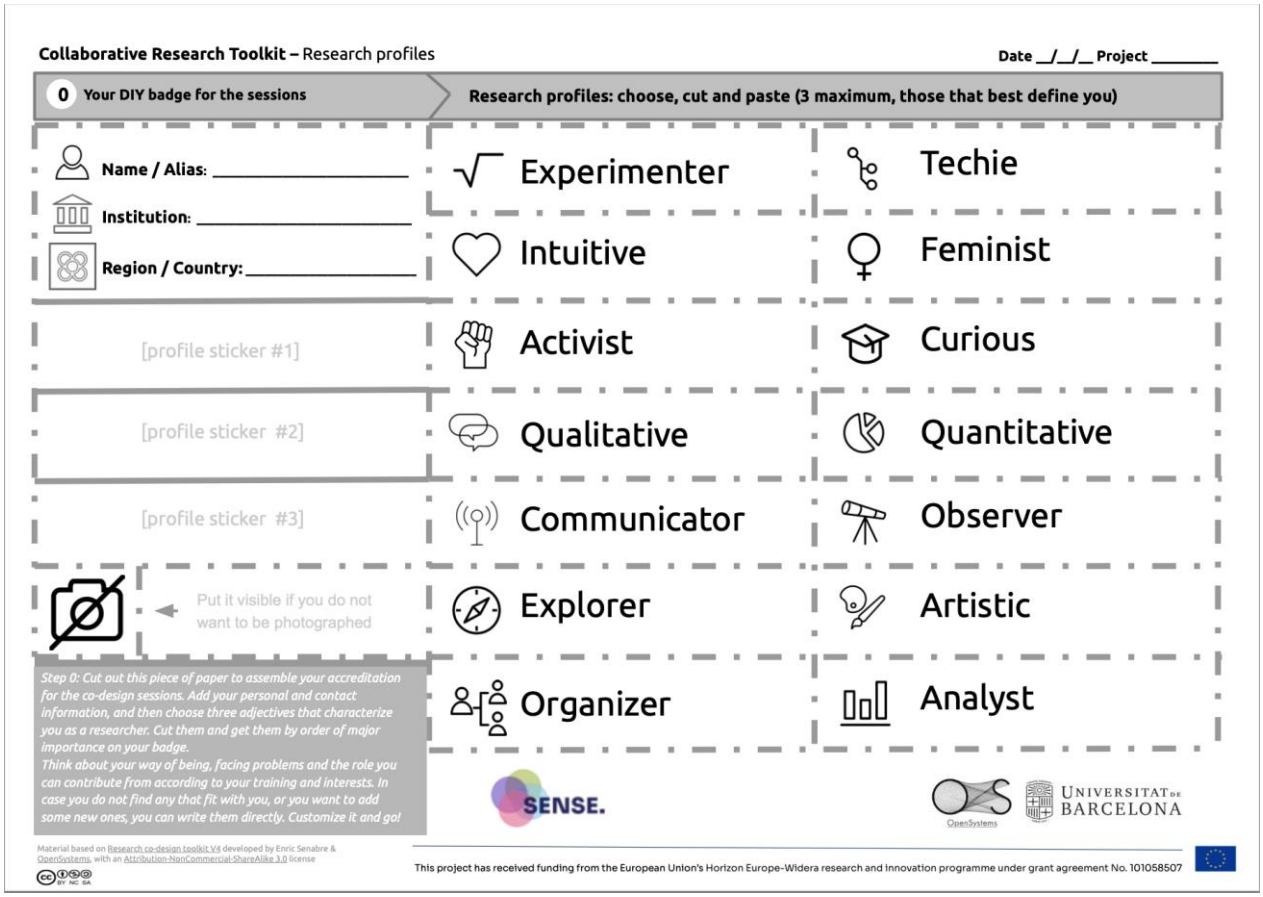


Figure 13: List of profiles (skills, competences, and attitudes) from which each of the workshop participants had to select the three items that better define himself/herself. Adapted material from the EU H2020 STEMForYouth project. See: Perelló et al. (2017).

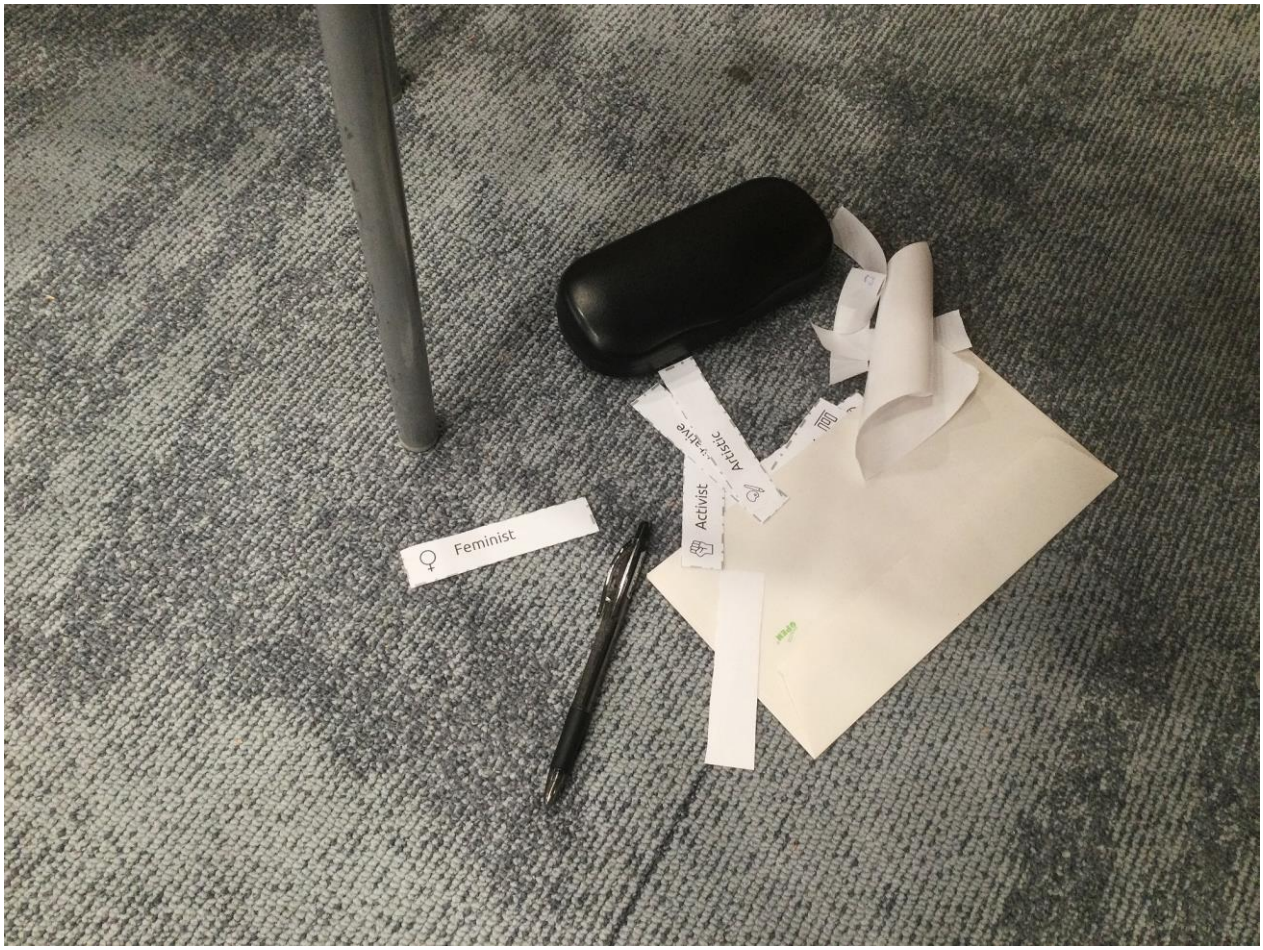


Figure 14: The different stickers to be included in the workshop participants' badge (Auditorium Room). Adapted material from the EU H2020 STEMForYouth project. See: Perelló et al. (2017).

4.2. Roles in a CS project

During the development of a CS project, several co-researchers may take different roles and responsibilities (see definition of co-researcher in Table 2). One can indeed observe great benefits for the group and for each of the individuals involved to take specific roles and take responsibility on specific tasks. See for instance, the experience with class groups when building together a CS project (Senabre, Ferran-Ferrer, Perelló, 2018).

For the workshop, the following roles were experimented in first-person by the participants:

Facilitator & Coordinator
Every CS project needs complex coordination among the different stakeholders and participants. When discussing the RQ and setting the data protocol, they will make sure that discussion is well-guided, that every member of the team can bring its own contribution and that the task that you have been to do is achieved in the time given.

Spokesperson & Notetaker
They will be the ones in charge in terms of transmitting the different decisions that your team has made. They will also make sure that all the things mentioned in the team are written down and collected so that the information is well transmitted, and the information is kept as part of the workshop materials for future SENSE activities.

Research-in-the-wild Coordinator
They are in charge of the planning and coordination of the data collection at the Galleries. They coordinate the team, make sure that all data is well-collected following the shared protocol, and assist others if needed.

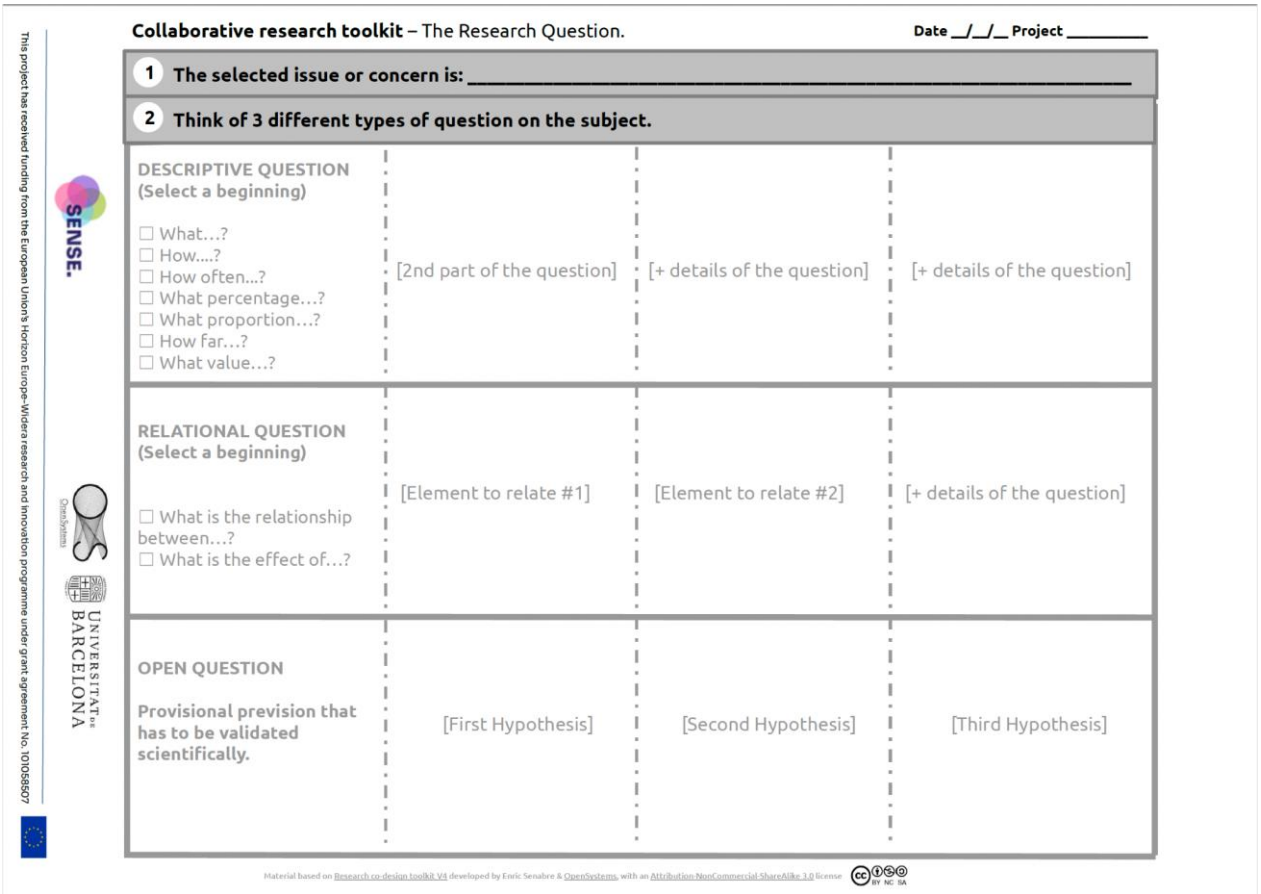
Data Analyst(s)
They are in charge of the data collected and their analysis and interpretation. They should make sure that all the data collected is taken into account, that the analysis is done according to the guidance initially agreed within the group and that it is well presented so that the data can be shared with others'.

5. A common research question

The adoption of participatory methods in research design has long been pursued in CS projects. The CS research design process should be inclusive, flexible, and adaptive in all its stages described in Fig. 8, from research question formulation to evidence-based collective results. Some CS initiatives adopt strategies that include co-creation techniques and methodologies which are traditionally found in public participation in science, including participatory action research (PAR) and the involvement of civil society organisations (CSOs) in research, as well as in mediatory structures, such as science shops.

It is valuable to focus on the reflexivity of the approach during the various phases of CS projects and on the materials needed to co-design CS projects. There are several techniques to co-create and co-design CS practices (Senabre et al. 2021) which might be explored in the context of SENSE. Among many other possibilities, it might be relevant to dedicate effort to raise consensus on certain aspects related to the co-design of a CS project.

During the workshop, one activity was explored: a collaborative research toolkit. Figure 14 shares the material being used to raise consensus on the research questions that the research-in-the-field in Louvre was aiming to answer. The material was used to define the research question around the four Louvre research themes described in the next section.



Collaborative research toolkit – The Research Question.

Date __/__/__ Project _____

This project has received funding from the European Union's Horizon Europe-Widera research and Innovation programme under grant agreement No. 101058507

1 **The selected issue or concern is:** _____

2 **Think of 3 different types of question on the subject.**

DESCRIPTIVE QUESTION (Select a beginning) ☐ What…? ☐ How….? ☐ How often…? ☐ What percentage…? ☐ What proportion…? ☐ How far…? ☐ What value…?	[2nd part of the question]	[+ details of the question]	[+ details of the question]
RELATIONAL QUESTION (Select a beginning) ☐ What is the relationship between…? ☐ What is the effect of…?	[Element to relate #1]	[Element to relate #2]	[+ details of the question]
OPEN QUESTION **Provisional prevision that has to be validated scientifically.**	[First Hypothesis]	[Second Hypothesis]	[Third Hypothesis]

Material based on Research co-design toolkit V4 developed by Enric Senabre & OpenSystems, with an Attribution-NonCommercial-ShareAlike 3.0 license

Figure 15: Material to raise consensus among a specific set of research questions for a CS project. Adapted material from the EU H2020 STEMForYouth project. See: Perelló et al. (2017).

6. Louvre research themes

During the workshop, working groups were created and they were asked to work on four different research themes with a research-in-the-field in four different locations within the Louvre. The thematic axes of the working groups and their corresponding CS methodologies to collect data were chosen to highlight the multisensory dimension of the situations that occur in the context of the museum and to reorient the focus of observation.

The descriptions for each thematic axes contain various sources of inspiration that are associated with Art practices and the selection of CS methods or experiences for data collection. Additionally, as organisers, we have provided some helpful suggestions to assist with task orientation within the group.

Table 4: Research themes, CS methodologies to collect data and Louvre location in the research-in-the-field made by each of the four groups.

Research theme	CS methodology	Louvre locations
Bodies	Photovoice	The Napoleon III Apartments + Denon Wing
Interactions	Note Taking	Antiquités orientales department - The Khorsabad Courtyard
Circulations	Mapping	The Marly Courtyard
Soundscapes	Low-cost sensing	French Painting Section (Rooms 104, 228, 332, 820, 822, 823, 835 + corridor)

6.1. Bodies - Photovoice

General description
The corporeal and spatial dimension of the visitor's experience can tell us a lot about what is happening in the museum and the human behaviour in this context. The multi-sensory dimension of the visit beyond the purely visual and optical aspects helps us to consider space and context within SENSE.STEAM vision in general and the Louvre case of study in particular. This approach wants to collectively explore the gestures, body, and postural attitudes that the museum conditions and prescribes. It will be a question of observing the relationships that can be established between the bodies of visitors, between bodies and the artworks, between bodies and the museum space.

Sources of inspiration
- Xavier Le Roy[18]: Several choreographic projects that take place in exhibition spaces, questioning the visitors' postural and bodily behaviour.
- Dancing Museums[19]: Dancing Museums is an action-research project designed to foster and sustain long-term collaborations between dance and museums.

Data collection: Photovoice
- Heart Healthy foods project[20]: A total of 24 residents participated in this project, taking and discussing a total of 163 photographs. 31 were finally selected, analysed and debated in the group sessions. These photographs were included in a Photobook and were exhibited in different venues. In the last of their sessions, each group classified the photographs in different categories related to food in the neighbourhood. The resulting categories of the 4 groups were finally merged into six main themes, which configured the sections of the Photobook and of the public exhibition.
- Additional reference[21]: Garcia, S., Ordonez, S., Carrillo de Santa Pau, E., & Marcos Zambrano, L. J. (2022). Photovoice methodology to raise citizen awareness about the role of the gut-microbiome in Non-Communicable Diseases: A pilot study. medRxiv, 2022-06.

Ideas and guidance
- Pick 2 rooms and choose specific artworks as observation zones.
- Work individually and pay attention to:
    - Hands movements
    - Head movements
    - Postures and body schemes

[18] https://www.xavierleroy.com/page.php?sp=3ba59954a44fffd653a323fda32d542ee8c9871d&lg=en
[19] https://www.dancingmuseums.com
[20] https://www.hhhproject.es/hhh-sub-studies/photovoice
[21] https://www.medrxiv.org/content/10.1101/2022.06.17.22276351v1.full

- Ways of walking,
- Use of museum furniture and accessories or personal items
- Gaze trajectories
- Observable signs of attention (focus) or distraction
- Observable signs of museum fatigue

- Take pictures having in mind the museum regulations and people's privacy!!! Do not take pictures of museum staff or visitors' faces.

Figure 16: Photovoice practice in action. Louvre, Denon Wing.

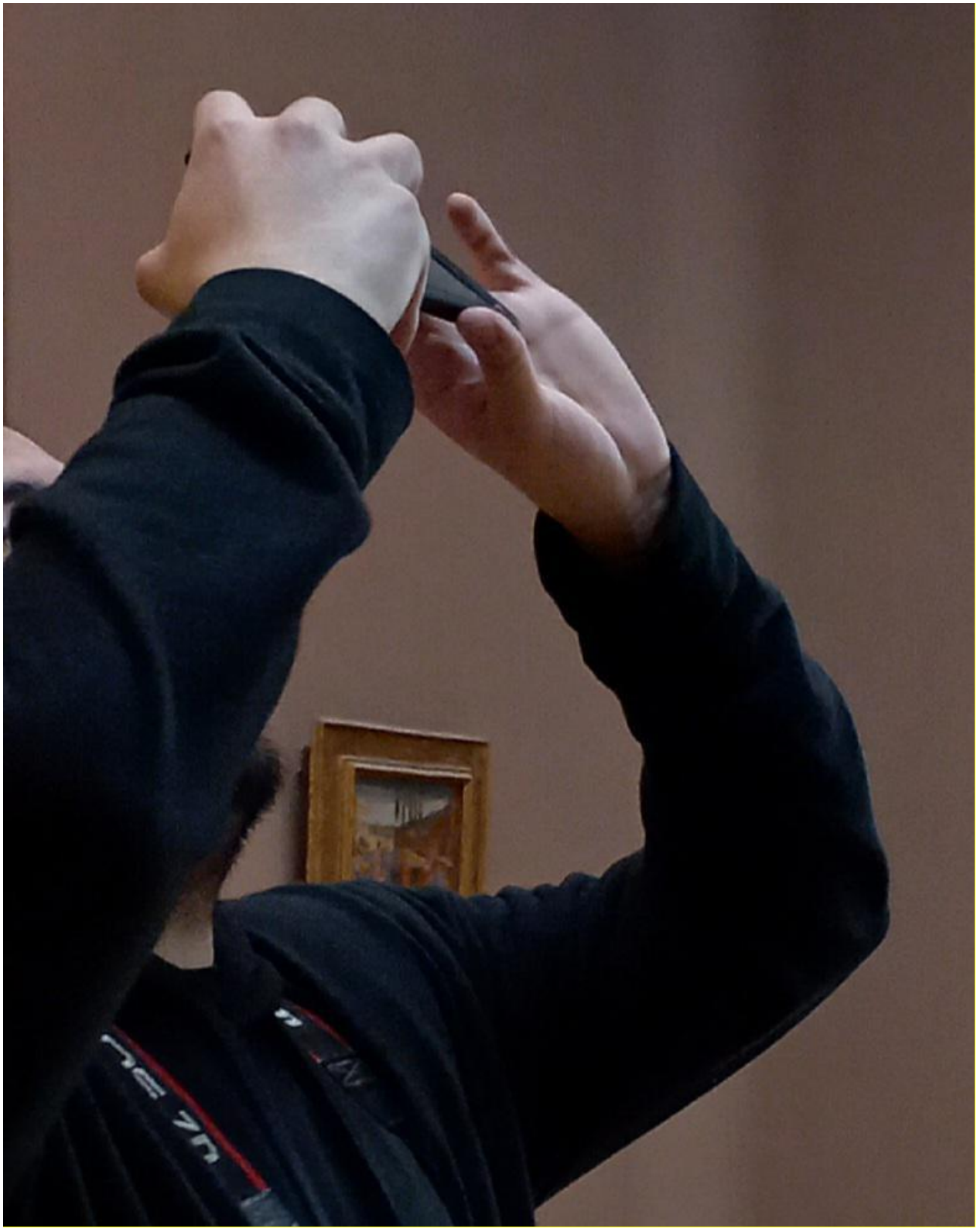


Figure 17: Photovoice practice in action, Louvre, Denon Wing.

6.2. Interactions - Note Taking

General description
Visiting a museum, whether we like it or not, is a social activity. The interactions and micro-interactions that take place between the different actors, human and non-human, are also part of the museum experience. This approach aims to raise awareness of the different types of interactions, whether verbal, conversational or gestural, that can take place in a museum visit as a situation. First, through close observation, we can identify situations of interaction, we can categorise them, then systematically count them, and finally compare the numbers and select the relevant interactions in the context of the SENSE.STEAM vision in general and the Louvre case study.

Sources of inspiration
- Dora Garcia22: Instant Narrative (2006-2008) is a performance involving an observer in an exhibition space typing on a laptop computer, writing everything she sees and hears, mostly the appearance and behaviour of the visitors to that exhibition.
- Frederick Wiseman[23]: *National Gallery* (2014) is It is a documentary film about the National Gallery in London, the result of a prolonged observation of the many activities that take place in a museum.

Data collection: Note Taking
- FeederWatch[24]: A November-April survey of birds that visit backyards, nature centres, community areas, and other locales in North America. You don't even need a feeder! Count your birds for as long as you like on days of your choosing, then enter your counts online. Your counts allow you to track what is happening to birds around your home and to contribute to a continental data-set of bird distribution and abundance.
- Zooniverse[25]: The Zooniverse enables everyone to take part in real cutting-edge research in many fields across the sciences, humanities, and more. The Zooniverse creates opportunities for anyone to contribute to a crowdsourcing effort to classify galaxies, to identify animals in photos from camera traps or transcribe old letters among many other options.

Ideas and guidance
- Pick 2 rooms and choose specific artworks as observation zones.
- Distribute the work and organise it in a very systematic manner.

[22] https://www.museoreinasofia.es/en/collection/artwork/instant-narrative
[23] https://www.youtube.com/watch?v=1pR0RR1F8vw
[24] https://feederwatch.org and https://www.allaboutbirds.org/cams/cornell-lab-feederwatch/#
[25] https://www.zooniverse.org

- Pay attention to: Distance between individuals (4 zones of proxemics: intimate, personal, social and public), between different groups or between visitors and artworks/museum devices and space, Group composition, Social interactions in relation to space and artworks, Verbal expressions, Conversational exchanges and modalities of silence, Gestural or non-verbal interactions.

Figure 18: Note-taking in action. Louvre, Cour Khorsabad.

Figure 19: Note-taking in action. Louvre, Cour Khorsabad.

6.3. Circulations - Mapping

General description
How do visitors move through the different areas of the museum? How do they move from one area to another? How is spatial orientation managed? How do we identify visitors who follow a predefined itinerary and those who do not? How do visitors perceive and experience disorientation? How do we recognise a visitor who is lost? This theme is concerned with the flow of people, with concentrations at specific points (whether connected to specific works of art), with the ways in which these concentrations of masses of visitors are formed and dissolved. It focuses on those spaces, galleries and exhibits that are less crowded or overlooked, allowing for a museum experience in relative solitude, and on transitional spaces within the museum (staircases, lifts, entry-exit points, corners, etc.).

Sources of Inspiration
- Fernand Deligny[26]: In 1968, Fernand Deligny created a network for autistic children in the Cévennes region of France. Social workers were asked to transcribe the children's movements and gestures, and for ten years, they traced maps of their own journeys and then, on tracing paper, the children's wander lines were marked, circulating within these territories and gravitating towards activities, presences, objects, or nodes of life.
- From 2004 to 2013, Antoni Abad[27] devoted his activity to undertaking the megafone.net online communication projects based on publications from smartphones done by various groups at risk of exclusion in Brazil, Canada, Colombia, Costa Rica, Mexico, Spain, Switzerland, United States, and the Algerian Sahara. It started with BARCELONA*accessible. 40 disabled people photograph with mobile phones every obstacle they find on the streets. They draw the cartography of inaccessible Barcelona and located 3,593 sites that they cannot access. In October 2014 he began developing the BlindWiki project in Rome, an online citizen network conceived for people with visual impairments.

Data collection: Mapping
- In 1854, John Snow[28] used the power of mapping to identify the source of a cholera outbreak in London. The map he created based on the locations of deaths due to cholera allowed him to see a clear pattern that no one had noticed yet and ultimately determine the source of the outbreak.
- Mercè[29]: a citizen science experiment that involves citizens in training an algorithm to help us design more livable cities. The experiment (carried out from

[26] Cartes et lignes d'erre/Maps and Wander Lines. Traces du réseau de Fernand Deligny 1969-1979 et Journal de Janmari, Paris, Éditions L'Arachnéen, 2013.
[27] https://megafone.net/INFO/index.php?/catala/2006-planol-de-barcelona and https://blind.wiki
[28] https://archive.org/details/b28985266/page/n57/mode/2up
[29] https://300000kms.net/case_study/merce/

May to November 2020) compiled evaluations for more than 3,000 streets, and more than 42,000 total interactions were collected. The final report compiles the results of the experiment and determines which streets in the city are most and least livable.

Ideas and guidance

- Pick 2 rooms and choose specific observation spots.
- Using the tourist maps of the museum and the self-produced drawings of a particular gallery space, trace the visitor's trajectory. Compare with the suggested trajectory (institutional trajectory).
- You may rethink the exercise in other spaces close to the galleries you have chosen: Lifts, Stairways, Restroom zone, Café / Restaurant, Hall, Transitional spaces.

Figure 20: Mapping in action. Louvre, The Marly courtyard.

Figure 21: Mapping in action. Louvre, The Marly courtyard.

Figure 22: Mapping in action. Louvre, The Marly courtyard.

6.4. Soundscapes - Low-cost sensing

General description
The aim of this theme is to draw attention to the sound dimension of the museum space, of its different spaces, in that it structures and determines the aesthetic experience beyond the optical aspect and the museum as a "visual machine". It will be a question of becoming sensitive to and identifying different soundscapes or sound atmospheres at various locations in the museum, to explore the agency of sound and the ways it affects the visitors' experience. To do so, we will measure the sound or noise in very different conditions.

Sources of Inspiration
- This research explores the atmospheres of the underground city focusing on the Louvre and Les Halles de Paris[30].
- Soundscapes[31]: A selection of artists who featured and composed new pieces of music or sound art in response to painting in the National Gallery collection.
- An exhibition gathering a selection of hundreds of sound works between 1980-2020[32].

Data collection: Low-cost sensing
- In the spring of 2016, different groups of citizens in Barcelona, Pristina and Amsterdam concerned about noise pollution, air quality and gamma radiation in their neighbourhoods begin to collect data with low-cost sensors[33].
- After the earthquake and tsunami on March 11, 2011, and the subsequent meltdown of the Fukushima Daiichi Nuclear Power Plant, accurate and trustworthy radiation information was publicly unavailable. Safecast was formed in response, and quickly began monitoring, collecting, and openly sharing information on environmental radiation[34].
- Public Lab[35] is a community and a non-profit, democratising science to address environmental issues that affect people. Public Lab was formed in the wake of the BP oil disaster.

Ideas and guidance
- Pick at least 2 observation rooms and identify specific contexts.
- Use a free App to measure noise levels.

[30] https://aau.archi.fr/cresson/cres-s-o-u-n-d/ambiances-sous-la-ville-audio/
[31] https://www.nationalgallery.org.uk/exhibitions/past/soundscapes/soundscapes-artists
[32] https://www.museoreinasofia.es/exposiciones/audiosfera
[33] https://filmfreeway.com/CITIZENSCIENCEREVOLUTION
[34] https://safecast.org
[35] https://publiclab.org

- Measuring sound in different spaces: Galleries (different ones according to popularity), Café, Lifts, Transition spaces, Hall, The entrance / exit
- Complement the noise level measurements with an accurate description of the location, the context, the environmental conditions, and the exact time.

Figure 23: Louvre location, French Painting section (Room 822).

Figure 24: Low-cost sensing in action in Louvre, French Painting section.

7. Louvre research locations

The different locations were chosen to diversify the observation spaces, depending on the type, nature and scale of the objects on display, the museography, the lighting atmospheres (for instance, from the natural light of the Marly courtyard to the dimly lit atmosphere of the French paintings portraits room), the size, design and architectural layout, the variations in the flow of visitors, the accessibility issues, etc. For logistical and pragmatic reasons, all the chosen observation areas were concentrated in the Richelieu wing, with the aim of avoiding excessive numbers of visitors in crowded areas such as the Denon wing.

Thus, the Napoleon III apartments offer a sumptuous setting for visitors to immerse themselves in the splendour of the Second Empire (1852-1870) and its dazzling decorations preserved almost intact for more than 150 years. On the ground floor, the rooms in the Oriental Antiquities section offer an overview of the ancient civilizations of the Near and Middle East. The Khorsabad Courtyard reconstructed in the museum part of the Assyrian Palace built by the King Sargon II between 721 and 705 BC. The sculpted walls and different decorative motifs also had a magical and protective function over the city and its palace, especially in places such as gates and passages, which are framed by monumental androcephalous winged bulls (Lamassus). Under a glass ceiling, the multi-layered space of The Marly courtyard displays a selection of French sculptures, most of them were made for outdoor spaces, such as the gardens of the the Château de Marly (residence of King Louis XIV, near Versailles). Finally, the small room 822 of the paintings department brings together a series of French portraits made during the 16th century representing royalty and nobility, which are displayed protected by a glass case.

This variety of spaces and atmospheres seeks to amplify the difference between the various thematic axes, observation protocols, and methodological approaches proposed to the working groups.

Figure 25: Room 229, Richelieu Wing, Level 0. Interactions - Antiquités orientales department - The Khorsabad Courtyard.

Figure 26: Room 102, Richelieu Wing, level 0. Circulations - The Marly Courtyard.

Figure 27: Room 822, Richelieu Wing, Level 2. Soundscapes - French Painting Room.

Figure 28: Room 544- Richelieu Wing- Level 1. Bodies - The Napoléon III Apartments.

8. A survey

Engagement in CS has typically been defined through behavioural patterns of quantity and quality of data contributions. However, engagement is a complex and multifaceted concept. It entails cognitive, affective, social, behavioural, and motivational dimensions (Phillips, Ballard, Lewenstein, and Bonney, 2019). Socio-psychological approaches are grounded on the assumption that individuals live in a perceived world and thus respond to the world as they perceive and interpret it.

Taking into consideration this perspective, the workshop wanted to start experimenting with evaluation tools which can be reused when engaging external stakeholders in SENSE.STEAM activities of the STEAM Labs. For this purpose, a survey was prepared. The survey is a simplification and adaptation of the survey UB performed to analyse the dynamics of the participation of librarians and users in a local CS project (Cigarini, Bonhoure, Vicens and Perelló, 2021). The approach is based on the Theory of Planned Behavior (Ajzen, 1991) and assumes that the intention to remain engaged in activities is best predicted by positive views (attitudes), favourable opinions held (subjective norms), and individual perceived ability to be engaged in the activities (perceived behavioural control) (Ajzen, 1991). The survey also included a question on whether workshop participants consider that CS and Art practices are related to each other.

To dynamically monitor the views and opinions of the workshop participants, three almost identical surveys were launched in three different moments of the workshop (see Fig. 2).

The three moments were (see Annex):

1. Survey 1. Launched before starting the workshop. Workshop participants were asked to answer the survey after the Welcoming session (Day 1) and before introducing CS and Art practices.
2. Survey 2. Launched during the workshop. Workshop participants were asked to answer the survey after the Session 3: Test and Action Plan).
3. Survey 3. Launched when the workshop ended (Day 2).

The workshop participants were asked to fill in an online questionnaire, and before starting the workshop, they signed an informed consent. To ensure anonymity, the participants were assigned an ID number to complete the three surveys.

We here highlight some of the results of the Survey. Firstly, before giving context and describing CS or art-related practices we asked the workshop participants about key traits about themselves. A vast majority of the participants have a scientific background. We were not asking about which specific discipline or whether they belong to social sciences or natural sciences. However, this value highly contrasts with the fact that only one in four participants have ever participated in a CS project.

Another important aspect to underling is that 69% of the participants had experience working with local communities.

As shown in Fig. 29, a second aspect to highlight is the progressive increment of the participants' self-perception on several aspects that were identified to be critical when designing the workshop. In Survey 2, participants already showed a strong confidence in the statement "I do know what CS is". From a 1 to 5 scale range (1 means that you absolutely disagree and 5 means that you absolutely agree), participants moved from 2.9 in Survey 1 to 3.8 in Survey 2. Between the two surveys, the participants were introduced to CS, learned about 4 CS and Art practises examples, and made the first steps in the development of their own research-in-the-field. In Survey 3, the score remained stable.

This score is, however, lower than those related to two very important statements: "I think that a Citizen Science project may have a positive impact in my hometown." and "Citizen Science may have a positive impact in terms of Social Inclusion.". Their scores went from 4.2 in Survey 1 to 4.7/4.8 by the end of the workshop. Therefore, workshop participants have a strong confidence that CS can have an impact and can have a strong social dimension in terms of social inclusion.

A linked aspect is the feasibility of implementing CS practices. The survey included the statement: "I feel I have enough tools and skills to carry out a Citizen Science project in my hometown." This was the statement with a lower score (2.5, on average) in the first Survey, but this score did quickly increase and finally got a 3.6 when the workshop finished. However, this score must be seen as an indication that further effort would be required if CS practices are aimed to be implemented broadly in SENSE.STEAM activities within the STEAM Labs.

Finally, we viewed the workshop as an initial step towards potential convergences between of CS and Art practices. These reflections are planned to be better developed in future deliverables from Work package 3. We however show in Fig. 30 that participants already started this reflection during the workshop. The statement "Citizen Science and Art Practices are related to each other." showed a gradual increment from 3.3 to 3.7. The score is showing some hints that it could be possible to unite efforts from both practices but still some additional effort might be required in future phases of the project.

A possible hint on which direction STEAM Labs might take are the results shown in Fig. 31 which describes a mild positive correlation among the statements "Citizen Science and Art Practices are related to each other." and "Citizen Science may have a positive impact in terms of Social Inclusion." Those participants giving a high grade in one answer tend to give a high grade to the other answer (1 means that you absolutely disagree and 5 means that you absolutely agree). However, few participants (one dot, one participant) strongly agreed with the statement "Citizen Science and Art Practices are related to each other." but not that strongly with the statement "Citizen Science may have a positive impact in terms of Social Inclusion."

In the opposite direction there are no participants.. This correlation is shown in Survey 1, before starting the workshop. During the workshop, we did not openly discuss this connection and that's why we have opted to show results from Survey 1. Surely, the connection will be an aspect to explore further in future steps of the project.

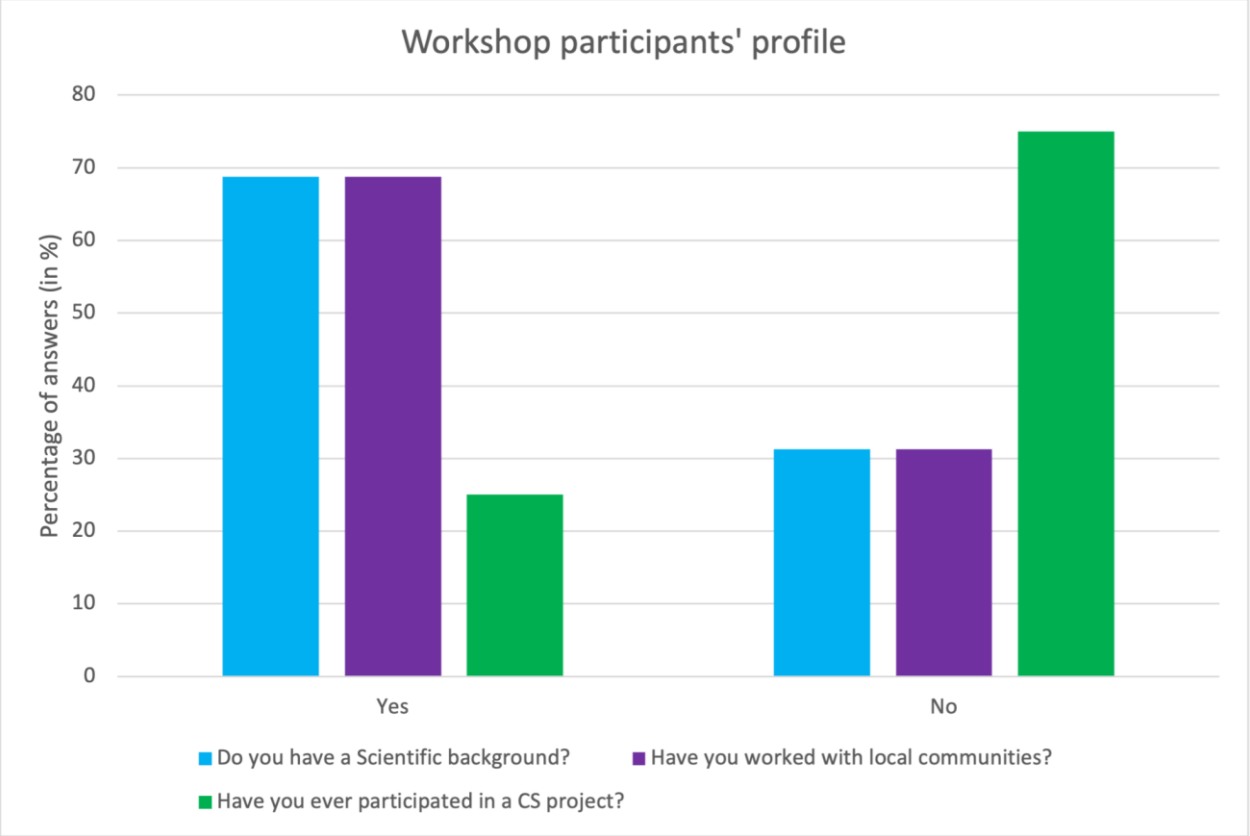


Figure 29: Participant's profile based on the answers of the first survey, before starting the workshop activities.

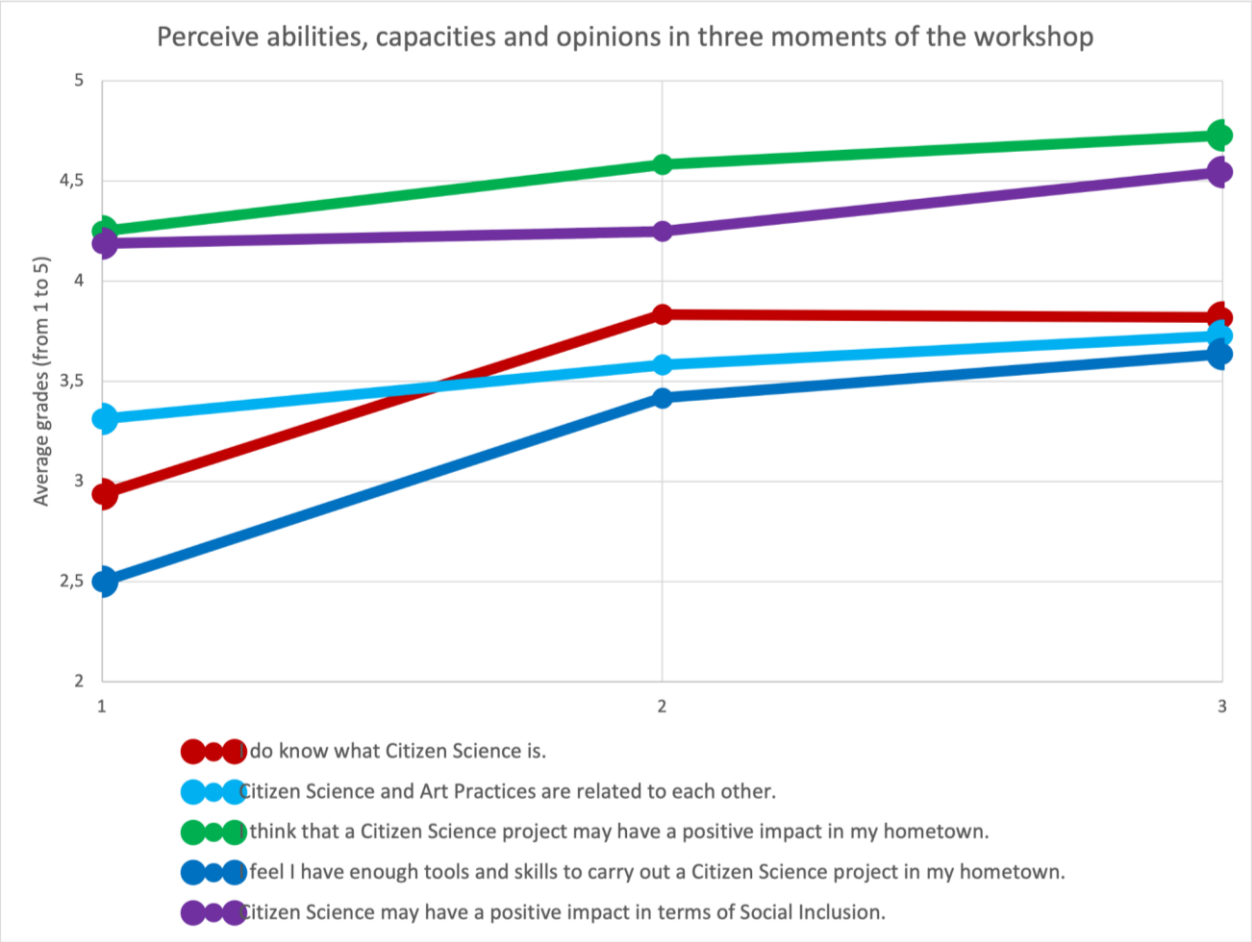


Figure 30: Averaged perceived abilities, capacities, and opinions during the workshop in the three different moments of the workshop. We provide the averaged grades of overall participants (1 means that you absolutely disagree and 5 means that you absolutely agree).

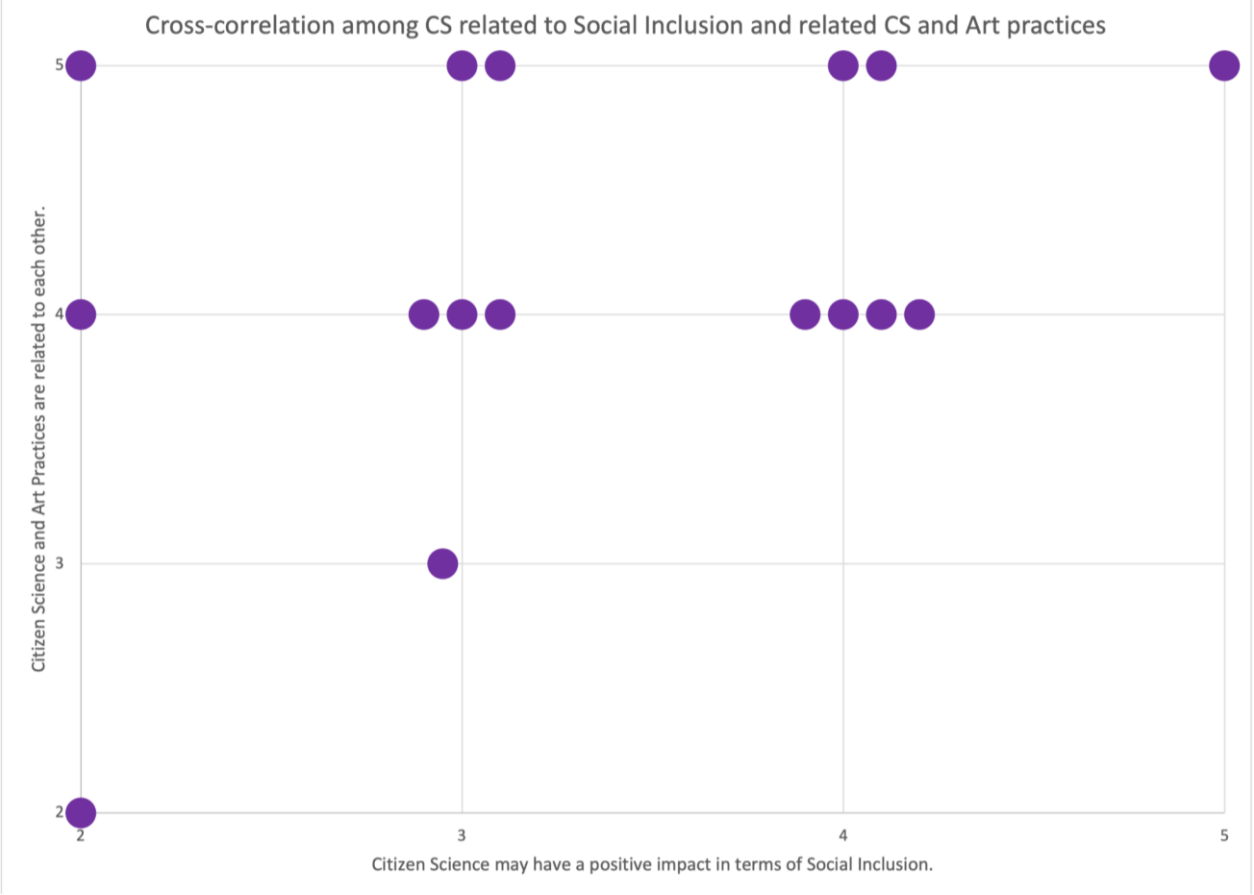


Figure 31: Scattered answers with grades from 1 to 5 in the statements that connect CS and Art practices and CS and Social Inclusion in Survey 1.

9. Summary and Conclusions

During the last part of the workshop, participants shared their initial analyses of the data collected by their respective working groups. The group also took the opportunity to engage in critical reflection on the overall workshop approach and on the experience proposed. The discussion opened to the question of the possible applications of the workshop experience in the framework of the different contexts in which the partners develop their professional activities based on their different profiles, missions, location and set of skills. In addition, this session operated as a platform for exchange on some important methodological, epistemological, and logistical issues that affect the development of a given project.

Thus, on the second day of the workshop, the section dedicated to the collective sharing of research results from the four defined thematic axes took place. The groups' research experiences took place in several locations mainly within the Richelieu Wing of the museum. Each of the four working groups shared the pre-results of their research. This pre-analysis of the data was articulated according to four questions: 1) What do you think (that) the results should be? (Hypothesis) 2) What is the data collected telling you? (Empirical Observation) 3) Is there something that specially draws your attention? (Critical Thinking) And 4) What can we do with the knowledge obtained? (Actionable Knowledge).

The first working group focused on the visitors' bodies and applied the photovoice methodological strategy. Their research question was articulated as "how do the visitors use their arms and what can we understand about that?". The observation area for this working group was to be the rooms of the Napoleon III apartments but, in the absence of sufficient visitors in the time zone in which the observation practice took place, the group decided to move to more crowded rooms in the Denon Wing of the museum. The first insight from the results was that most of the gestures observed and documented were quite conventional and standardised. The group was surprised by the fact that visitors seemed to be rather passive, just gazing, not stopping in front of the works on display and making little use of their other senses. Based on these results, this group developed a series of reflections and recommendations on how to make the visitor's experience in the museum more interactive, so the people will be more engaged with the exhibits, for example, how to make visitors more active using AR devices for them to create their own versions of the exhibit. It was also observed that the sculptures on display increase the dynamism of the visitors. This group also developed several reflections on the reductionist power of the museum to dictate behavioural constraints on visitors. The approach taken by this group to conduct their research task triggered reflections on the biases of any research.

The second working group was looking at circulation from the research question "how do visitors move around and experience space?". They intended to explore this question and the experiential and movement-related dimension to enhance the

sensory aspect of the museum visit, using mapping as methodology. In their research approach, this group formulated a more methodological reflection on the capacity of mapping to capture these two dimensions linked to the circulation of museum visitors. Their observation area was the Marly Courtyard, a semi-open, multi-layered space gathering a selection of French Modern sculpture including some trees and ornamental vegetation. Most of the statues in this space were formerly in gardens, and the atmosphere of the courtyard recreates this feeling of being outdoors. To conduct their research, they had to draw detailed maps including all the different entrance points, staircases, and the positioning of the statues. Using the methodological perspective of mapping, they tried to capture the individual path of the visitors, considering circulation as a flow of movement. The aim was to understand what external (i.e., space layout, light, the positioning of the statues) and internal (i.e. subjective decisions based on interactions with human and non-humans) factors affect and condition decision-making when moving and moving through this space. To answer these questions, this group followed up with members of their own group and then with some visitors. The observation of the moments of pauses in the visitors' trajectories was important points for this group, as well as the emotional aspect of the experience including how attention fluctuates and the level of exhaustion. While having some preconceptions and somehow expecting to get a more diverse variety of movement, the collected data showed how the type of space seemed to affect movement more than the specific artworks. While the first day of observation they focused on determining generalised circulation and movement patterns, on the second day they realised that by focusing on individual visitors' journeys they could obtain more relevant insight with respect to the premises of the research. The presentation of this group prompted some reflections on materiality, the place of touch and hapticality as part of the essence of experience, and how this dimension of knowledge is difficult to put into practice in a museum context.

The third group's research aim was interaction, using note-taking a methodological approach. Their research took place mainly in the Khorsabad Courtyard, in the Oriental antiquities department. Their research question focused on observing which statues attract the most touching or are more tempting to touch by the visitors. Before starting the observation, their hypothesis was that it would be the statues depicting animals and those whose relief was more prominent that would make visitors more likely to touch them. Regarding the profile of the visitors, they thought that it would be mainly children and teenagers who would touch the statues the most. The data collection was particularly affected by the time of observation. The absence of visitors in the morning in this room determined the scarcity of the data collection and the difficulty of interpretation of the results.

The last working group focused on capturing the soundscapes of the museum, using low-cost sensing as a methodology. Their zone of observation was a series of rooms within the French Painting area. They wanted to compare sounds of different spaces and people's effect on sound and atmosphere in qualitative and quantitative ways complemented by assumptions of how sound space changes within groups in different contexts of groups, circulation, rooms/ spaces. This group decided to work

on two research questions: how does the presence of benches for sitting affect the volume of areas within our space? and how do different rooms affect the volume of groups moving through the space? They set up two different approaches, one space-based and the other person-based. They made the hypothesis that the rooms displaying paintings would be natural places for people to congregate, to gather or to spend some more time, and aimed to test whether this affects the amount of sound or noise generated by visitors. By following some visitors around, they observed that, in general, visitors used the space very quietly and they either don't say anything at all amongst themselves or have very hushed quiet conversations. This group found that the moment when most conversations arise is when visitors have finished in one room and are moving on to the next. At such moments, the body language of the visitors becomes also more evident. The research of this group was also affected by the small number of visitors present in the rooms at the time of observation. Observing the time visitors spend in front of the artworks was an important aspect of this group's practice. The data collected did not allow them to determine whether the presence of furniture such as benches in the museum affect the sound level, nor whether the different lighting environments influence this (for instance, the 822 room is especially dark). The presentation of this group triggered a collective discussion on the physiology of the visitors' bodies connected with the museum fatigue – the specific type of fatigue provoked by the museum experience - within a more general reflection on the limits and constraints imposed by the museum and its "coercive" system. This was followed by a discussion on the preconceptions and value judgements on visitors' behaviour (for example, the practice of taking selfies) which is not a new phenomenon and is part of the history of the museum as an institution and across different countries. This pointed to the importance of avoiding judgement while doing research in museums and to keep in mind that for many people the museum is still a sacred space that is crossed or experienced as a kind of *déambulation,* a wandering practice with strong religious connotations.

The last part of the general discussion gave space to the participants to critically reflect on the workshop approach and on whether the research experience was applicable to the diversity of activity contexts of the different consortium partners. The discussion focused on the extent to which participants consider that the specificity of the research approach and the co-production of knowledge specific to Citizen Science –in this case taking place within an art museum context– is translatable to other contexts (countries, cities, or neighbourhoods). More theoretical questions related to the notion of space and the links between space and the modes of interaction it generates, including movement as an important aspect of the experience of any space, were also addressed. This was followed by some reflections on the notion that space is not a container, but a set of interactions, as well as some thoughts on the link between the complexity of space and the richness of the interactions it is capable of triggering. The discussion closed with some structural reflections on how to address more concretely the issues of diversity and social inclusion in the framework of the project.

This workshop follows on from the STEAM DNA workshop of November 2022 and adds the domains of art, citizen science and community work to the shared experiences and collected documentation.
The workshop significantly enriches the consortium's collective knowledge on a practical and theoretical level and makes an essential contribution to the collection of SENSE.STEAM prototypes that will be implemented and evaluated in work package 4.

10. Main results

The implementation of the workshop allowed the following actions to be addressed, which are key points in the development of the SENSE.STEAM methodological approach:

- Reflect about how Citizen Science can be related to a variety of educational contexts to change the way we approach STEM, and the way we understand and run a scientific research project.
- Reflect on the implementation of Citizen Science and Art Practices in local contexts.
- Build spaces of interaction among the workshop participants, allowing the participants to collect and experiment Citizen Science strategies that might be valuable to the SENSE. project partners and their communities.
- Set the conditions to the consortium and associated partners to further reflect on Citizen Science and Art Practices in a proactive manner.
- Explore and contribute to the essence of the theoretical and practical foundations of SENSE.STEAM

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12. Annex 1

12.1. Workshop Schedule

12.1.1. Day 1 (30/03/23)

9h00 - 9h30	Welcoming
9.30h - 10h40	Start & Workshop Presentation
10h40 - 11h00	Context 1
11h00 - 11h15	Coffee Break
11h15 - 12h30	Context 2
12h30 - 14h00	Lunch
14h00 - 15h30	Citizen Science & Art Practices at the Louvre Museum into action.
15h30 - 16h30	Test Action Plan
16h30 - 17h00	Debrief

12.1.2. Day 2 (31/03/23)

9h00 - 9h30	Welcoming
9.30h - 10h45	Data collection at Louvre
10h45 - 11h00	Coffee Break
11h00 - 12h00	Data Discussion and Sharing Results
12h00 - 12h30	Discussion Round Table

13. Annex 2

13.1. Workshop agenda

This Annex presents the agenda with basic descriptions of the objectives, the materials needed with logistics related, and the people involved as facilitators in each of the sessions. For each session, the timing and a brief description of the activity being developed is also provided.

13.1.1. Welcoming - Day 1

Objectives	Materials needed	People involved (facilitators)

• Welcome all participants to the workshop
• Get them to know each other in an informal manner
• Give participants all the materials and aspects they will need
	• Louvre Badges
	• Louvre Maps
	• Document with important and relevant information:
	  ○ Wifi
	  ○ Restrooms
	  ○ Circulation inside the museum
	  ○ In and out access
		• Anne
		• Josep
		• Inés
		• Marc

Time	Facilitators	Description	Observations
9h15 - 9h30 (15 min)	Organisers	All participants have instructions on where to meet the first day (exact place to be set). Once everyone is there, we move to the room where all the first day activities are happening. While getting into the room, people find relevant information related to the workshop and the museum, as well as some welcoming coffee and snacks. Welcome and accommodate everyone in the venue and give the proper material needed. There will be 3 Q&A throughout the	Some coffee or something to eat can be offered to participants while they arrive. One group ordinary entrance (those punctual) For those that are late Anne will wait for them at the entrance. Meeting at 8.45h a l'Oratoire.

		WS. The first one is meant to be answered at the Welcoming	
Venues	Meeting point: Entrée l'Oratoire, in front of 164, Rue de Rivoli + *Room 80*		

13.1.2. Workshop Presentation - Day 1

Objectives	Materials needed	People involved (facilitators)
• Present the workshop in the context of the SENSE project • Present the agenda of the workshop • Get to know all the participants	Projector Badges for the presentation technique (they are to be printed in a stick paper and have to be cut it before going to Paris)	• Anne • Lydia • Inés • Marc

Time	Facilitators	Description	Observations
9h30 - 9h40 (10 min)	Lydia	Event presentation in the context of the SENSE project. Welcome everyone to the workshop and give context in terms of the SENSE project.	Status of SENSE Why Citizen Science and Artistic practices workshop Ambition of the meeting
9h40 - 09h50 (10 min)	Anne	Event presentation as the host and logistics. • Presentation at the museum and as the host of the event • How to move around the museum (maps) • Louvre regulations • Restrooms • Rules (taking pictures...) • Wifi • In case of incidence / emergency	Room needed to be prepared (seats in a circle).
9h50 - 9h51 (1 min)	Josep	Connection and introduction of the workshop's leaders: Inés+Marc	The general agenda can be projected on the wall with the video projector.
9h55 - 10h00	Inés & Marc	Present a General Agenda and context.	Research in the wild Lab in the field

(5 min)		The agenda is shown, and we give participants a general idea about all the things that will be done during these 2 days. Survey is introduced. Make sure that there is an external link for those that can use the QR (add that in the Survey slide)	Survey and Informed Consent
10h00 - 10h35 (35 min)	Inés & Marc	Presentation Technique. (5 min) Explain the technique. (5 min) Each person creates their own badge in where they must add 3 words/short phrases given in different stickers. (10 min) Once everyone has his/her own badge, it places it in his/her chest and walks around the room. Control the time with a timer. (5 min) First round. When walking around the room, your goal is to find somebody that has something like you and discuss with that person for 1 minute about the similarities that you may share and see all the points in common. In this round, each participant should encounter 3 - 4 people. (5 min) Round Two When walking around the room, your goal is to find somebody that has something very different compared to you and discuss with that person for 1 minute about the difference and both participants will contrast their points of view. Participants are asked not to	We need to have badges ready. Diversity is an asset. Starting point in a co-creation dynamic for citizen Science projects.

		choose people from the previous round. (15 min) Debrief. Participants are asked to present themselves and share the experience and some anecdotes that have happened in their encounters. At the end of the debrief, a connection with CS practices is made and that was the link to the next session of the workshop.	
Venue	*Room of 80* (Inside the Auditorium)		

13.1.3. Workshop Session 1: Context (Day 1)

Objectives	Materials needed	People involved (facilitators)
• Set a context related to CS and Art Practices • Get to know 4 different projects in CS and Art Practices • Have a starting point for the groups to think about a CS project in the context of the Louvre Museum	The materials that each spot/corner might need (laptops, tablets, posters, books, printed ephemera...)	• Josep • Carolina (CREDA) • Laura (UEDin) • Sasha (HVL) • Isabelle (UB) • Inés • Marc

Time	Facilitators	Description	Observations
10h35 - 10h55 (20 min)	Josep	CS and Art Practices Presentation A 20 min talk is addressed to the audience, related to Citizen Science and Art Practices. The different points covered: What is Citizen Science and its context Relation of Citizen Science and Art Practices Examples of some practices Citizen Science Actors	Artistic practices in where the audience is engaged What art can bring to participants.

		Citizen Science Values	
10h55 - 11h15 (20 min)		Coffee Break	In the place in front of the room. There are chairs and coffee in there.
11h15 - 12h05 (50 min)	Carolina (CREDA) Laura (UEdin) Isabelle Sasha (HVL) Josep	Corners 4 different CS projects are presented by 5 different people. Some of them (at least 2 are related to Art Practices). (35 min) Participants team up (at random) in groups of 4-5 participants, and they go around the corners. Every team starts in one corner and will be there for 6 minutes. Once the time has finished, each team moves to the next corner, and they will have 6 minutes again. This is repeated 4 more times, until everyone has visited all the projects. There is a person responsible for each corner, and they are the ones in charge. The task is: • to explain the project related to the corner • Show the different materials brought • Talk about the opportunities The different projects and people in charge are: Daniela/Carolina: The Florence Experiment (1) Isabelle: CoAct for Mental Health (2) Laura: Bridges (3) Sasha: Traveller Community Mapping Coolock StoryMap: Storied places of belonging and unbelonging (4) Josep: Free corner. A poster paper in where participants share their own experience (5). (15 min) Debrief	Set a specific order for the short presentations The facilitators (I&M) are going to tell the groups when it is time to switch (working as timekeepers). According to the room dimensions and potentialities, readjust needs in terms of material, disposition, and display.
12h05 - 12h20	Inés & Marc	The Citizen Science and Artistic Practices experience	A text describing each case is needed.

(25 min)		(8 min) Presenting the experience that each group was asked to conduct at the Museum. And talk about the 4 themes. Also giving some guidance about the objectives to be accomplished in the afternoon. (2 min) Setting the teams for the experience. These groups are to be the same until the end of the workshop. Give to each group the document related to the thematic. (15 min) People meet their groups, and they have 15 minutes to read the paper related to their thematic, discuss it and assign roles to each participant of the team.	Preparing slides for the theme part. List of groups.
Venue	*Room 80* (Inside the Auditorium)		

13.1.4. Workshop Session 2: Research Question & Research plan (Day 1)

Objectives	Materials needed	People involved (facilitators)
• To establish specific observation protocols of visitors and context according to 4 thematic lines: Bodies Circulations Interactions Soundscapes • From a pre-set methodological toolbox as a working basis, to define several methodological approaches.	Presentation of the thematic lines Envelopes to decide what are the themes per group	• Josep • Anne • Isabelle • Inés • Marc

Objectives	Materials needed	People involved (facilitators)

• Two-fold structure:
  ○ Setting a time in the galleries to prepare the observation session (1st day)
  ○ Implementing the observation experience by applying the remarks, protocol adjustments, etc to the observed situation (2nd day)		

Time	Facilitators	Description	Observations
14h00 - 14h55 (55 min)	Inés & Marc	The Research Question The goal of this part is to set the research question for the experience at the Galleries. All teams will have the description of their thematic (Body, spatial, interactions and sound) and will have read it before lunch. A CS co-creation technique is presented to get to the objective. (15 min) Presenting the technique & the 4 different methodologies. All groups received a co-designing kit (co-design toolkit document) so that it helped them brainstorm about the RQ. (Presented by Josep) (10 min) RQ individual brainstorm. According to the theme of the team, each participant thinks of one RQ and adds it to the co-design kit table. For every RQ a column was to be filled in. (15 min) Once everyone has set his/her own RQ it will be time to share it with the team. Everyone will give a short description. Right after that, all	Talk about the 4 rooms. (add them on the slides)

		participants will locate research questions in the thermometers for each of the RQs with a sticker. The process is to create a hierarchy of “relevant” questions. Thermometers: • Motivation • Feasible • Impact / Relevant (15 min) Then all RQ will be discussed, debated, and refined according to the results of the Thermometers. One or two RQs will be consensual. This final RQs will be the one guiding the team at the Galleries.	
14h55 - 15h30 (35 min)	Inés & Marc	Planning the research (5 min) Explain the goal of this second part of the session. Now that every group has their own RQs it’s time for setting the research method. (30 min) In the description paper given before lunch to every group, they will have some ideas and a proposed research method that they will have to integrate, the different methodologies are as follows: • Interaction - Notetaking • Body - Photovoice • Circulation - Map drawing • Soundscape - Recording Some examples for every method are going to be provided. The team will discuss how they are going to measure it (where, who, the way data is going to be collected...). They will have to end up with a plan that is going to be tested right after this working session has finished. Anne is to validate the proposal that every team presents.	

Venue	*Room 80* (Inside the Auditorium)

13.1.5. Workshop Session 3: Test the Action Plan (Day 1)

Objectives	Materials needed	People involved (facilitators)
• Test the action plan at the galleries • Collect data at the galleries according to the defined data protocol	Notebooks Tablets Paper Pens Photos Drawings Sketches	• Team coordinators • Inés • Marc

Time	Facilitators	Description	Observations
15h30 - 16h30 (60 min)	Organisers	Testing the Action Plan A gallery is assigned to every team. The distribution is as follows: • Circulations: Courtyards • Soundscapes: Napoleon III • Bodies: Classical Room • Interactions: Oriental Antiquities Guidance on where the Galleries are is going to be provided to participants. The goal of this session is to test the Action Plan and see all possible inconveniences, to redefine it if necessary.	
16h30 - 17h00 (30 min)	Inés & Marc	Debrief. Plenary discussion. Every group share (in 5 min) their work during the afternoon. They share the research question with others, the action plan, and the difficulties or limitations found when collecting data at the Galleries. IMPORTANT: Recall Day 2's plan and tell participants to go straight to the galleries with their teams on Day 2.	

Venues	*Room 80* (Inside the Auditorium) + Louvre (Galleries)

13.1.6. Workshop Session 4: Data collection at Louvre (Day 2)

Objectives	Materials needed	People involved (facilitators)
• Gather data at the Louvre Galleries according to the theme.	Notebooks Phones Cameras (image & audio recording devices) Pens (Basic ethnographic toolkit)	• Team coordinators • Anne • Inés • Marc

Time	Facilitators	Description	Observations
9h30-10h45 (75 min)	Inés & Marc	Data collection at the galleries Teams collect data in two different galleries. The first gallery is the same one they have visited the day before, so: • Circulation: Courtyards • Soundscape: Napoleon III • Body: Classical Room • Interaction: Oriental Antiquities The second one, they can choose one out of the 3 left and collect data in that second one.	
10h45 - 11h00 (15 min)		Coffee Break	
Venues	Louvre (Galleries)		

13.1.7. Workshop Session 5: Data Interpretation and final discussion (Day 2)

Objectives	Materials needed	People involved (facilitators)
• Analyse the results of the data collected at the gallery • Share and present the results to the other groups	Data interpretation guide	• Team coordinators • Anne • Inés • Marc

Time	Facilitators	Description	Observations
11h00-12h00 (60 min)	Inés Anne Josep Marc	Data interpretation The different teams work on the data collected at the galleries. They are asked to gather as a group and talk about the results obtained. They have to answer the following questions: 1) What do you think that the result of your analysis should be? (10 min) 2) What is the data collected telling you? Can you reach any conclusion? (20 min) 3) What do you think about the results obtained? Is there something that draws your attention? (10 min) 4) What can we do with the knowledge obtained? Any recommendations you would do to Louvre visitors? (10 min) They were asked to discuss the 4 questions in 4 different rounds. At the end of the discussion, it is important that every group came to an agreement and reflected on it. All team members are to be aware of the answers because they are all going to share it in the following activity.	

12h00 - 12h30 (30 min)	Inés Anne Josep Marc	Debriefing all together about the potentialities of CS and exploring different ways to integrate its methodologies in SENSE. This session was recorded and transcribed. Inés & Marc took notes of the session. Anne and Josep led the discussion	
Venue	Studio Room		

14. Annex 3

14.1. Survey

Survey 1

Participants are asked to...

Introduce your ID number:

Yes or no questions.

Do you have a Scientific background?
Have you worked with local communities?
Have you ever participated in a Citizen Science project?

Graded statements (1 -5).
1 (I absolutely disagree) / 2 / 3 / 4 / 5 (I absolutely agree)

I do know what Citizen Science is.
Citizen Science and Art Practices are related to each other.
I believe that local communities in my hometown would participate in a Citizen Science project.
I think that a Citizen Science project may have a positive impact in my hometown.
I feel I have enough tools and skills to carry out a Citizen Science project in my hometown.
Citizen Science may have a positive impact in terms of Social Inclusion.

Survey 2

Participants are asked to...

Introduce your ID number:

Graded statements (1 -5)
1 (I absolutely disagree) / 2 / 3 / 4 / 5 (I absolutely agree)

I do know what Citizen Science is.
Citizen Science and Art Practices are related to each other.
I believe that local communities in my hometown would participate in a Citizen Science project.
I think that a Citizen Science project may have a positive impact in my hometown.
I feel I have enough tools and skills to carry out a Citizen Science project in my hometown.
Citizen Science may have a positive impact in terms of Social Inclusion.

Survey 3

Participants are asked to...

Introduce your ID number:

Graded statements (1 -5)
1 (I absolutely disagree) / 2 / 3 / 4 / 5 (I absolutely agree)

I do know what Citizen Science is.
Citizen Science and Art Practices are related to each other.
I believe that local communities in my hometown would participate in a Citizen Science project.
I think that a Citizen Science project may have a positive impact in my hometown.
I feel I have enough tools and skills to carry out a Citizen Science project in my hometown.
Citizen Science may have a positive impact in terms of Social Inclusion.

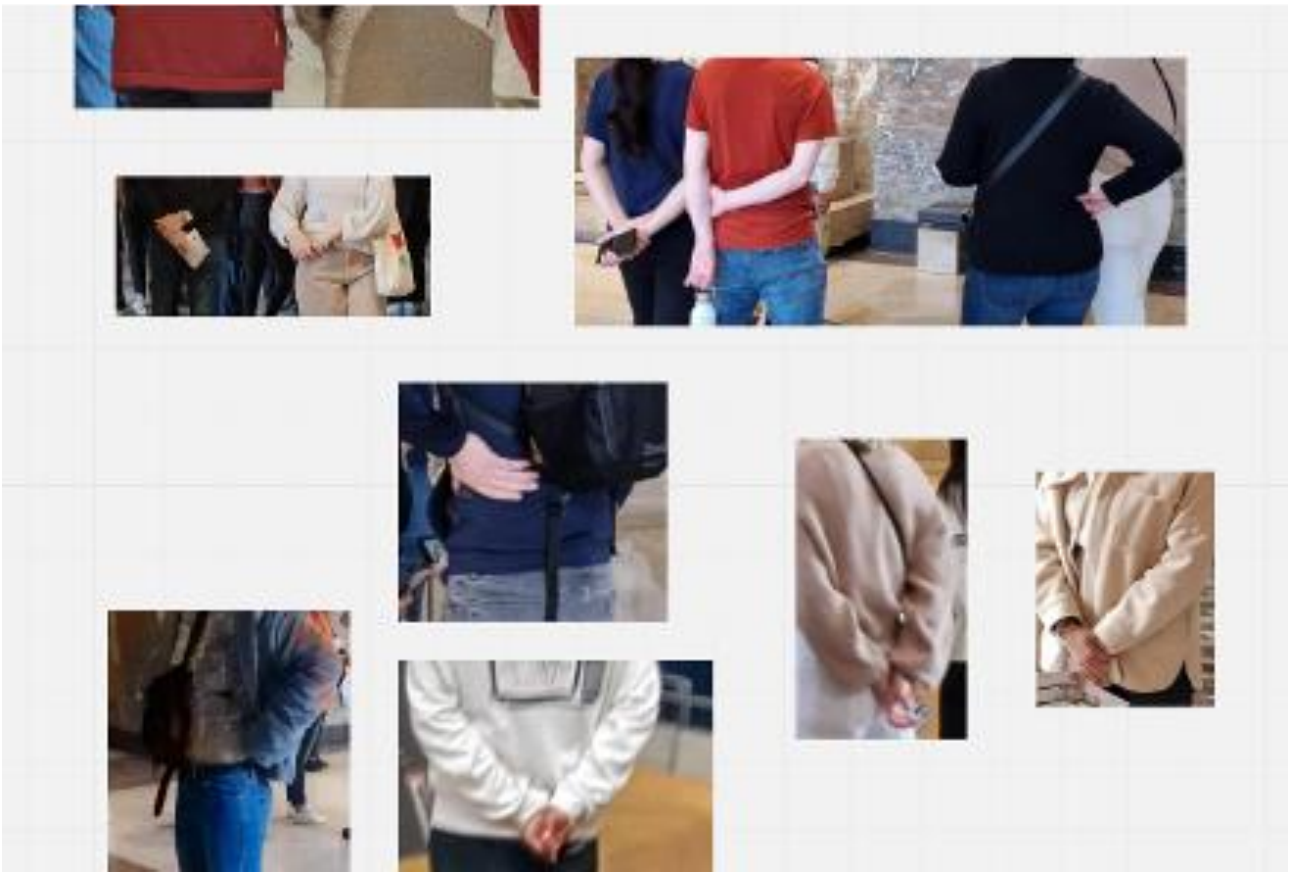
Add additional comments if you wish to do so:

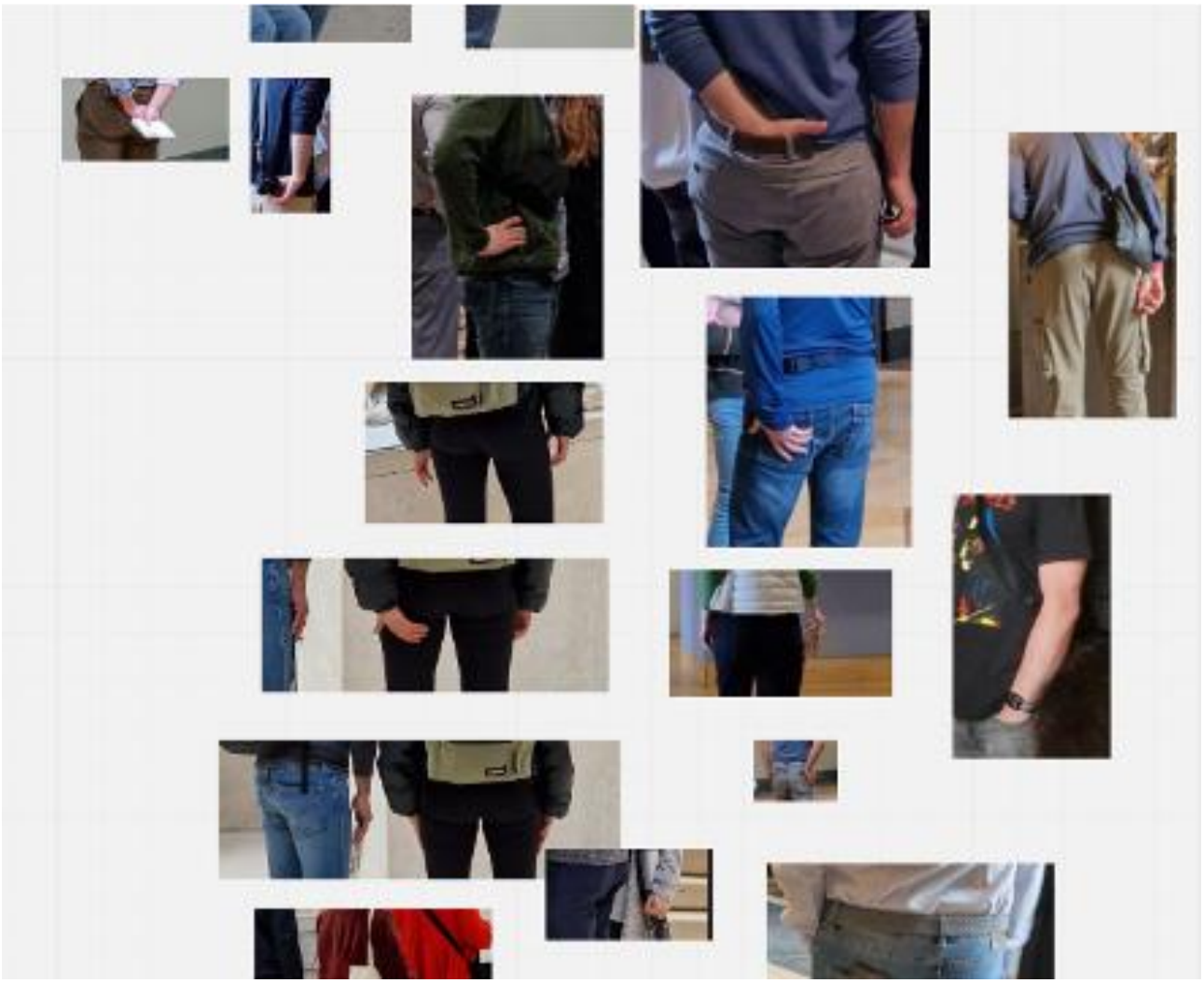
15. Annex 4

15.1. Research materials and Data analysis

15.1.1. Bodies - Photovoice

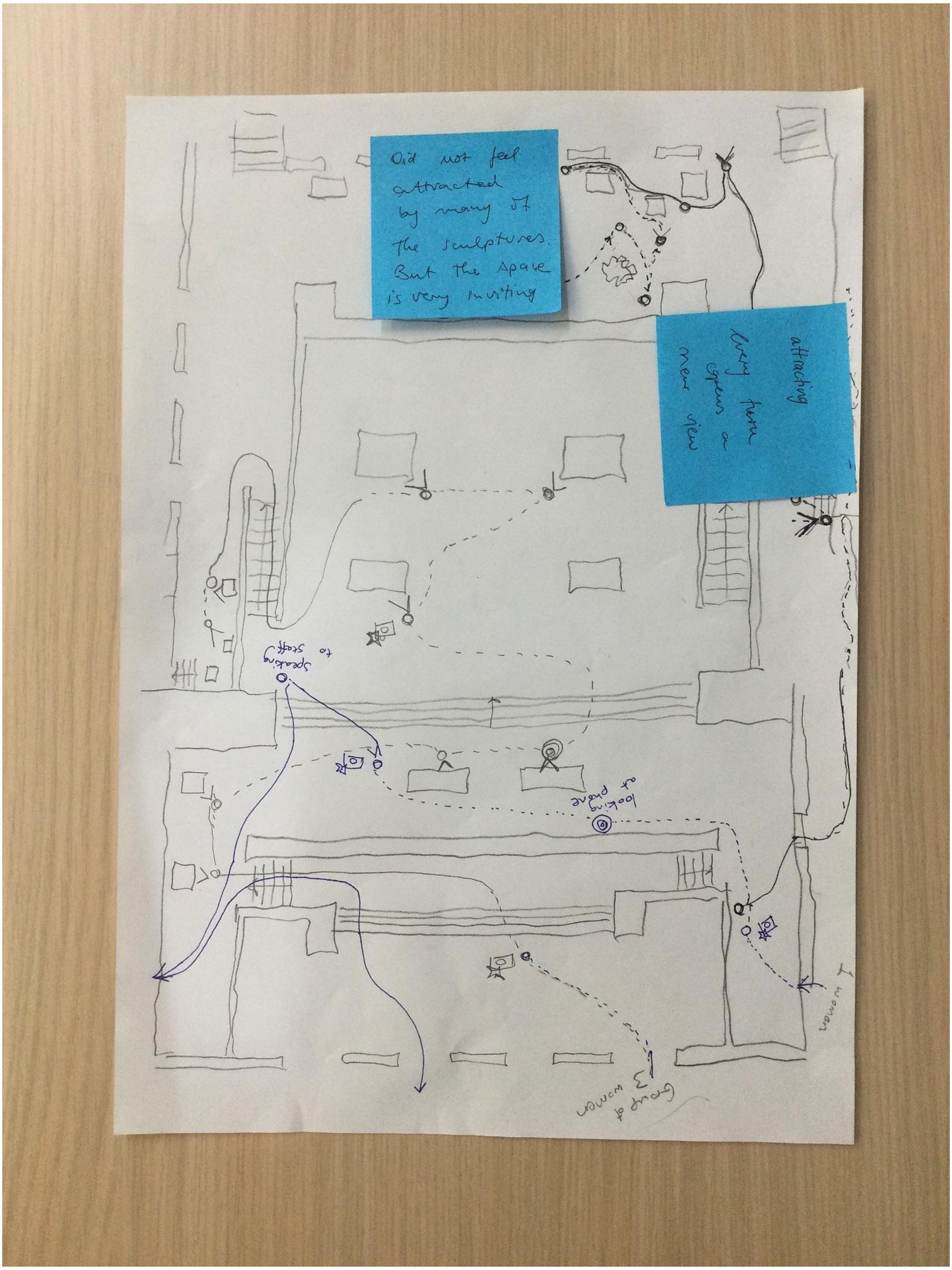
Examples of collection and classification of gestures using Miro Board app.





15.1.2. Circulation – Mapping

Examples of maps produced by the working group in the following pages.


Did not feel attracted by many of the sculptures. But the space is very inviting
Speaking to staff
looking at phone


FELT EMOTIONAL
"THOUGHT OF ALL PEOPLE WHO WORKED HARD TO MAKE THIS PLACE BEAUTIFUL"
PHOTO + CONTEMPLATE + OBSERVING OTHERS
SHE FELT SMALL BUT IN AWE OF THE STATUE
READ LEGEND
CHECKED PHONE
CURIOUS
FAST - CHECKING
"SHE FELT THAT SHE LOST STH"
PHOTO
EET THE SPATIOUSNESS OF THE COURTYARD
SCARED OF THE STATUE (HUNTER)

15.1.3. Soundscapes - Low cost sensing

Working process

1 session: Planning 15:00 – 16:00, 30 March 2023

1. *Using the Collaborative research toolkit – The Research Questions template we individually prepared questions on how we could investigate the topic of soundscapes within our dedicated space in the musee du Louvre.*
2. *We shared our questions with the group*
3. *We categorised our questions to bring out common themes*
4. *We visited the space and undertook a shared walkabout*
5. *We refined the questions arriving at two:*

How does the presence of benches for sitting affect the volume of areas within our space?
How does different rooms affect the volume of groups moving through the space?

2 session – Field work 9:30-10:30, 31 March 2023

1. *Briefing outside the space to standardise method, calibrate phones for measurement*
2. *Complete measurements for the first question*
3. *Regroup and compare results*
4. *Measurements for second question*

Third session – analysis and discussion

1. *Convert data from app into csv*
2. *Gather data from all five team members and compare sound levels across spaces; Data preparation and visualisation in table*
3. *Draw conclusions*

Quality
We collaboratively decided to use fixed rooms, durations, visitor percentage in the museum (due to almost equal times of measurement), and document the room circumstances (complemented by pictures), as well as the observer's position (measurement spot) in the room. All datasets were saved and collected unmodified. To clear out as many disturbances as possible, we respected the following:

- *The time and measurements on the cellular phones used to collect data were compared, also, we all used the same app. The phone numbers did not seem to affect the measurements. The accuracy regarding differences between our phones shows a deviation of about 5-10 decibels.*
- *We agreed on not talking or walking when measuring, and to document if something that distorts our measurement happens (for example somebody talking directly to us, coughing, phone falls down...).*

The groups observed within the second question had to be documented regarding group size, estimated age and presumed relationship. Their route was about to be documented, too.

Field Observations

Space-based approach

Overview of spaces

Overview of spaces Room number	Type	Bench	Characteristics
823	Gallery	Large bench	Linear space, paintings on all walls, one way in, one way out, people pass through in a straight line
822	Gallery	no	A dark central room, with a well known painting
835	Entrance	no	Very close to the escalators which often squeak. Only one painting so not many people stop there.
820	Gallery	Small bench	Square space, paintings on all walls, one way in, one way people pass diagonally through
Corridor	Corridor		

Person-based approach

Overview table

Group nr	Description of group	Route taken	Duration of recording	Notes (e.g. level conversation, moving or not etc)
Silvia_1	Young couple (girl and boy)	First few rooms and stop at bench in an empty room	1m48s	Little conversation. Conversation of two staff in one of the rooms.
Silvia_2	2 women (young-ish)	Straight and downstairs. Going somewhere directly.	2m	Didn't stop at many rooms. Conversation. Conversation of two staff in one of the rooms.
Joseph_1	4 teenagers	From dark room into room 823	3m	Two of the group had a quiet conversation in French, spent most of the time in one room
Joseph_2	2 young women	From 823 to exit the space	1m 41s	First looked at a painting and then moved to the exit Conversation as they were walking
Carolina_1	2 women, likely mother and daughter	From 824 to 826	1m	They walked at a consistent pace, not focusing on one painting in particular.

Analysis

Measurements

Room (investigator)	Time	AVG	MAX
823 (David) Big bench	Slot 1: 9:51 – 9:52 Slot 2: 9:54 – 9:55 Slot 3: 10:09 – 10:10	1m0s 36.0 dB 1m0s 31.9 dB 1m0s 37.0 dB	54.4 dB (1 person next room) 42.1 dB (0 persons) 51.1 dB (1 p all the time, 1 p passing)
822 (Carolina) Dark room	Slot 1: 9:31 – 09:32 Slot 2: X:XX – X:XY Slot 3: X:XX – X:XY	29.6dB 51.5dB 19dB	54.6dB 84.9dB (woman dropped an object) 26.5dB
Sculptures courtyard (Carolina)	Slot 1 Slot 2 Slot 3	57.8dB 52.5dB 56.4dB	60.5dB 55dB 64.7dB
835 (Silvia) Entrance	Slot 1: 9:48 – 09:49 Slot 2: X:XX – X:XY Slot 3: X:XX – X:XY	1m 56.5dB 1m 54.5dB 1m 54.5 dB	72.7dB 62.1 dB (2 girls passing by + 1 woman passing by) 66.5dB
820 (Joseph) Small bench	Slot 1: 10:04 – 10:05 Slot 2: 10:06-10:07 Slot 3: 10:08-10:09	36.8db 35.1db 36.2dB	48.2dB 41dB 42dB
Corridor - 332 (Josep)	Slot 1: 9:49 – 09:50 Slot 2: 9:51 – 9:52 Slot 3: 9:53 – 9:54	1m1s 44.4 dB 1m1s 49.5dB 1m10s 47.6dB	52.2 dB 59.7dB (2 persons passing by) 57.9 dB
228 (Artefact Hall)	Slot 1: 10:26-10:27 Slot 2: 10:28-10:29 Slot 3: 10:30-10:31	50,3 dB 54,1 dB 52,1 dB	62,5 dB 65,3 dB 69,2 dB

A room Michel Colombe 104 (Josep)	Slot 1: 10:25 – 10:26 Slot 2: 10:26 – 10:27 Slot 3: 10:28 – 10:29	1m1s 61.4 dB 1m1s 63.9dB 1m1s 61.8dB	67.7 dB (two people reading the legends) 73.22B (two people reading the legends and others

Descriptive Statistics: Averages & Comparison

Room	Investigator	Avg1 [dB]	Avg2 [dB]	Avg3 [dB]	Avg M [dB]	Max1 [dB]	Max2 [dB]	Max3 [dB]	Avg Max [dB]
823	David	36	31,9	37	35,0	54,4	42,1	51,1	49,2
822	Carolina	29,6	51,5	19	33,4	54,6	84,9	26,5	55,3
835	Sylvia	56,5	54,5	54,5	55,2	72,7	62,1	66,5	67,1
820	Joseph	36,8	35,1	36,2	36,0	48,2	41	42	43,7
332	Josep	44,4	49,5	47,6	47,2	52,2	59,7	57,9	56,6
104	Josep	61,4	63,9	61,8	62,4	67,7	73,2	66,9	69,3
Courtyard	Carolina	57,8	52,5	56,4	55,6	60,5	55	64,7	60,1
228	David	50,3	54,1	52,1	52,2	62,5	65,3	69,2	65,7

- All rooms within our space were very quiet. When compared with rooms 332, 228, and 104 as well as the courtyard, a marked difference is observed.
- People within the space either observed in silence, or spoke with one another in hushed tones.
- The loudest sounds observed were those of people walking.

Qualitative observations – following groups
For the research on group behaviour and the effects of certain spaces on (various) groups, follow a group of at least three persons for 1 minute (minimum, to give veritable answers) to 5 minutes (maximum, to not influence their behaviour too much).
INQUIRY: Describe openly and as precise as possible, what you experience in relation to soundscapes, sound atmosphere, loudness... within the group depending on space.
Further notes to please take:

- *Group Description: Describe the group you followed by mentioning number of people, assumed age-group, assumed gender, assumed relationship (couple, family, colleagues, friends...)*
- *Space Description: Track the way they walked, preferably use room numbers if possible.*
- *Time: Track the time you observed by using hh:mm:ss for start & end.*

Discussion and conclusions

1. What do you think the results should be?

Hypothesis: After a preliminary observation, we expected not to have much noise in the rooms. We thought that the benches might be an encouraging factor to chat. The dark room could be louder as it was a special space where to stay put, in front of a famous artwork and in a confined/isolated place. Although the lighting of the dark room could influence the mood and make people quieter.

2. What is the data telling you?

a. All rooms within our space were very quiet. When compared with rooms 332 and 104 as well as the courtyard, a marked difference is observed.

b. People within the space either observed in silence, or spoke with one another in hushed tones.

c. The loudest sounds observed were those of people walking.

d. There was no major difference between rooms with and without benches.

e. Most visitors seemed to be visiting with a particular goal to view specific artworks – or they breezed through very quickly and superficially.

3. Is there something that especially draws your attention?

a. The spaces were very quiet and there were few people. Those who were there, were mostly alone or in pairs.

b. It looks like not many people come to this wing in the morning so perhaps the rooms were quieter than they could be at another time of the day

4. What could we do with the data obtained? a. Recommendations on the placement of benches, etc. with regard to noise. Education activities at the museum: This would tell us which spaces are quieter and more appropriate for these activities. In the quieter rooms there could be questions that encourage visitors to discuss (children would be a great target group).