

# **SISCODE CO-DESIGN FOR SOCIETY IN INNOVATION AND SCIENCE**

## **DELIVERABLE 3.1: CO-CREATION JOURNEYS**

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## Executive Summary

The WP3 aims at planning, conducting, monitoring and disseminating high-impact experiments in real-life contexts. By engaging citizens, local actors, stakeholders such as policy makers and the wider scientific community, the WP has the objective to increase knowledge on co-creation through action research, as well as test the effectiveness of design methodologies to better combine co-construction (ideation) and co-production (implementation) of solutions and policies for the integration of society in science and innovation.

Experiments will take place in 10 co-creation labs across Europe, each of them is a member of one of three following networks: the Fab City Foundation (managed in part by Fab Lab Barcelona), European Network of Living Labs (ENoLL), and European network of science centres and museums (ECSITE):

- Fab Lab Barcelona (Spain), Polifactory (Italy), Underbroen (Danemark) are at the core of both Fab Lab and Fab City networks experimenting with many approaches and stakeholders, as well as pushing for the adoption of the culture of making on many societal contexts.
- KTP (Poland), PA4ALL (Serbia) & Thess-Ahall (Greece) are Living Labs operating as intermediaries among citizens, research organizations, companies, cities and regions for joint value co-creation, rapid prototyping or validation to scale up innovation and businesses.
- Ciência Viva (Portugal), Traces (France), Science Gallery Dublin (Ireland) or Continium/Cube (Netherlands) are Science Centres or Museums convinced that public engagement goes further than participating in activities and programs and includes the participation of different stakeholders in policy making, co creation and the design process based on the integration of Responsible Research and Innovation (RRI).

Experiments will be conducted through the implementation of co-creation journeys that will last around 18 months. In these experiments, each lab aims to tackle a specific societal challenge, (meaningful for the context in which the lab is located but at the same time transversal and relevant at a wider scale) and engage with it a set of stakeholders in a co-creation process from the stage of co-design where stakeholders will analyse the context, reframe the problem and envision alternatives, to that of co-production of prototypes within an iterative process. The figure below exemplifies the proceeding as it shows the network of

participating 10 co-creation labs surrounding the striven working process of firstly understand the respective local contexts to then start off the 18 months co-creation journey.

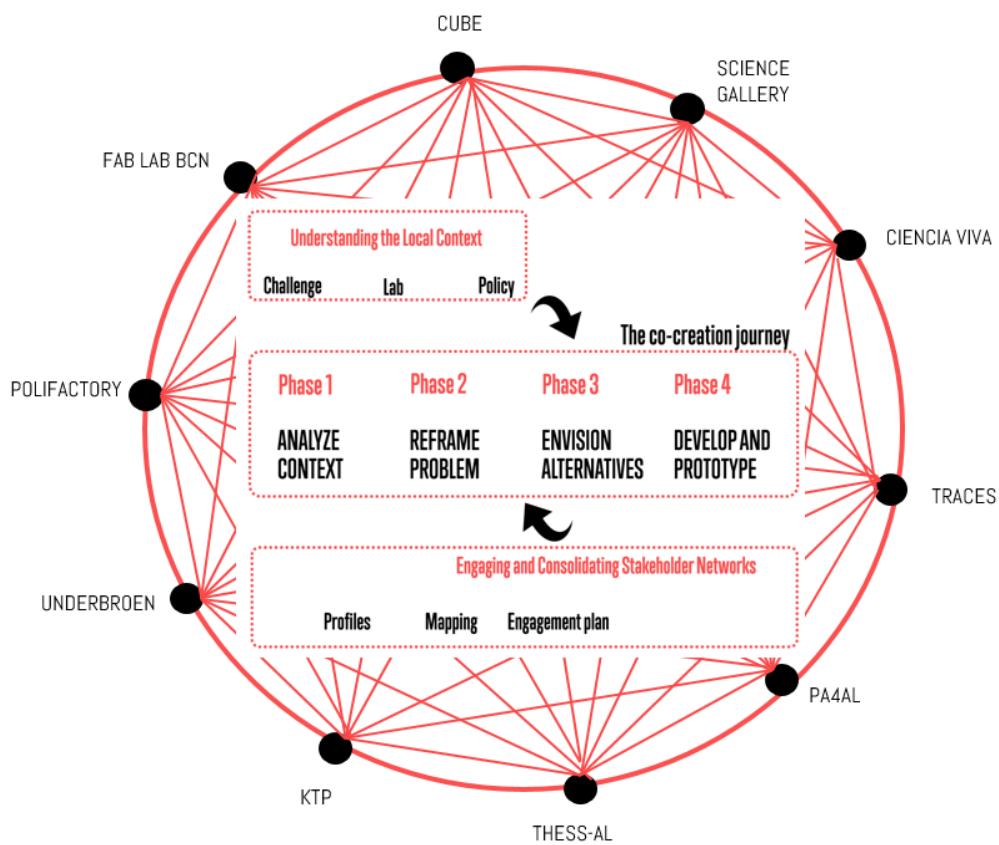


Figure 1 Overview of the SISCODE co-creation journey and its co-creation Labs

The first mission of the WP3 consisted in developing a toolbox specific for the SISCODE co-creation journey keeping in mind with the insights gathered in WP1 (RRI approaches and methodologies) and the expectations of the labs that needed a common framework to develop a sustainable journey according to the overall project objectives.

This deliverable presents the activities of the WP3 since the beginning of the SISCODE project and more specifically the task 3.1 entitled “Design of the co-creation journeys”, that aims to engage the 10 partner Labs in developing the journey using the SISCODE toolbox

The report is organised into four main sections dedicated to the presentation of (1) a comprehensive and detailed overview of the SISCODE toolkit; (2) the first steps to engage the Labs in designing their co-creation journeys; (3) the co-creation journey plan shaped by each Lab and (4) the first lessons learned and feedback arising from the shaping of the co-creation journey and concludes with some guidelines for the next step of the project.

Here the main highlights and results of this deliverable:

- The SISCODE Toolbox was created to provide support for the co-creation labs in making sense of existing data, tools and toolkits. It has the ambition to be aligned with the effective gaps of RRI approaches appealing to deal with societal challenge complexity, stakeholder engagement and a better tangibility of actions. The SISCODE Toolbox is presented as a meta-design and experiential-learning framework that aims to facilitate the design and implementation of co-creation journeys for the SISCODE laboratories, focusing on a better understanding and prioritization of the particularities of each context. It is now a 36 pages document explaining the global process and giving operational tools to the labs. It is mainly composed by a variety of design canvases that help them to 1) explore deeply the context of challenges, 2) identify and find strategies to engage stakeholders and 3) keep tracks on the activities realized all along their journey.
- 10 workshops have been realised to engage each Lab with the experimentation. This has permitted them to foster intents, be more familiar with the toolbox, share knowledge about co-creation and their context as well as effectively start to co-design the future journeys with more confidence. These workshops have been considered by the Labs as a first positive step of engagement and learning and end with the design of 10 co-creation journeys as well as first feedback on the use of the toolbox.
- The 10 plans display a great diversity of the Labs regarding their themes (from healthcare, agriculture, fab cities, data and rights, ocean, sport and leisure and territorial and policy contexts (from local to European policy level). There is also a rich variety of approaches, backgrounds, experiences related to co-creation that will feed directly the shaping of each journey.
- Now that the first plans have been shaped (T.3.1), the labs have started the first phases of their journey. The partners will be guided to think with and beyond the toolbox to better foster a mutual learning experience between Labs and define an agile way to support and monitor the interaction during the co-creation journeys. In that way, they will be able to gather insights and actively participate in the co-design of the future learning platform of the SISCODE project.

## 1. The SISCODE toolkit for designing the co-creation journey

### 1.1. Introduction

The SISCODE project aims to explore how co-creation can overcome some of the current limits and weaknesses of RRI and co-creation in policy making approaches. The project is looking for new ways to design, activate and implement effective solutions for complex problems and societal challenges that could be based on a more systemic approach and new fairer mode of governance between extended network of stakeholders that include citizens and policy makers).

A first preliminary work reached by the SISCODE partners in WP1 analyses the complexity and diversity of approaches of co-creation in the context of STI policy-making and RRI (see Rizzo et al. (2018))<sup>1</sup>). This study led to build a common knowledge basis, defining what co-creation is in the context of the project and define the theoretical background of a new toolbox for supporting co-creation in journeys.

The SISCODE partners has defined co-creation as a non-linear process that involves multiple actors and stakeholders in the ideation, implementation and assessment of products, services, policies and systems with the aim of improving their efficiency and effectiveness, and the satisfaction of those who take part in the process.

More specifically, SISCODE interprets co-creation as a process in an integrated perspective in which it occurs all along the phases that range from the identification of needs and opportunities, to their transformation into a working object (be that a product, a service, a programme, etc.), its assessment and adjustment. Co-creation is a dialectical process of bringing and aligning different perspectives (public, civil and business stakeholders) to bear on a problem. Performing such an alignment is only possible by enabling a learning process, within which actors can learn new competences and acquire relevant knowledge by interacting with particular groups of interest in order to face peculiar social challenges. Co-creation thus starts from the situated needs, competencies and experiences of each actor, and strives to set up new modes of interaction that will flow in new assembly and network configurations. It includes co-design, co-production, co-assessment along a continuum, associating them respectively to phases of problem identification, reframing and design (ideation/formulation), and phases of concrete realisation (implementation/actuation).

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<sup>1</sup> Rizzo, F. et al (2018). DELIVERABLE 1.2: CO-CREATION IN RRI PRACTICES AND STI POLICIES. SISCODE EU project.

To explore the potentials of co-creation in RRI, the 10 partner labs in the project will implement diverse “co-creation journeys”, facing specific challenges bound to the integration of society in science and innovation in diverse fields. This is the main activity of the WP3 which contains the specific objectives to:

- Generate direct knowledge on co-creation through action research, feeding triangulation (WP5) with knowledge coming from analytical research (WP1 and WP2);
- Support the consortium to test and validate design methodologies as an approach to better manage the process of co-creation integrating co-design and co-production;
- Improve labs and their internal organisation processes as well as their capacity to apply design methodologies to co-creation activities, managing organisational transformation and learning in their institutional and policy domains;
- Assess and disseminate the results of the innovation journeys to other actors in the co-creation labs ecosystems.

WP3 is aiming to create inspiring, tangible and locally designed solutions as well as related policies with a strong potential for replication taking into account the different cultural, institutional and regulatory backgrounds.

These journeys will support an experiential learning about co-creation for 3 types of labs – Fab Labs, Living Labs, Science Museums – and will allow the partners to add a higher level of reflexivity on the role that co-creation can play in addressing RRI and STI policy challenges. Important lenses were remaining in Rizzo et al. (2018)<sup>1</sup> stating that these journeys are also considered as “*political acts*” (p.83), because they introduce a set of practices and tools which directly challenge the established order in labs and aims to reinforce a general culture of social justice (i.e. a sense of balanced power-relations and flat hierarchies) between the different stakeholders.

The support of these journeys has been built around the development of a design toolbox that each lab can read, interpret, use and adapt to their own needs.

## 1.2. Concept, approach and methodology: the toolbox

### 1.2.1. RRI, customization and reflexivity as 3 goals for the toolbox

The SISCODE toolbox is developed to support labs in the adoption of co-creation in their journeys with three specific goals:

- (1) Aligning the toolbox with the effective gaps of RRI approaches appealing to deal with societal challenge complexity, stakeholder engagement and a better tangibility of actions;
- (2) Proposing a customizable design approach that both considers how context matters and acts for leveraging existing tools and toolkits, instead of designing new ones;
- (3) Ensuring the construction of a learning experience that allows spaces for reflexivity and comparison of the dynamics and the configurations through which design-led co-creation can realise implementable solutions and policies as well as engaging the public.

These goals are described one by one below and summarized in the Table 1.

#### 1.2.1.1. *Overcoming RRI gaps with context, stakeholders and prototype focus*

An effort was made to align the toolbox with the effective gaps encountered in RRI approaches appealing to deal with societal challenge complexity, stakeholder engagement and a better tangibility of actions.

#### #Challenge: *Complexity raised by societal challenges, in preach for systemic approaches*

The challenges presented in RRI approaches and in SISCODE pilots are based on wicked and undefined problems. Thus, the design process is supposed to use a more human-centred perspective while considering other factors. Co-creation teams have to go beyond a pure utilitarian and problem-solving attitude. They will adopt systemic approaches that rely on the main idea of interdependencies and that are used for understanding and highlighting the diversity of representations between stakeholders as well as for supporting various connections and shifts in term of thinking, patterns, cultures of organizations and societies.

#### #Stakeholders: Engagement of public and large networks of stakeholders

Compared to more classical processes, co-creation approaches are envisioned in an extended view of stakeholder's notion gathering both public, civil and industrial stakeholders. Citizens are part of the civil stakeholders and can play an active role in the co-creation processes, specifically in the context of RRI that is deeply related to public engagement. Engaging a

strong diversity of stakeholders has the potential to support creativity and offer the best way of reinforcing transparency and resolving any controversies. Rizzo et al. (2018)<sup>1</sup> particularly mentioned that '*the early engagement of the public is necessary in the perspective of overcoming potential misunderstandings, frustrations and failings.*' (p.13) Identifying the relevant stakeholders, engaging them, and sustaining their participation are tricky, hard and complex activities undertaken during co-creation processes but will influence the success or the failure of all the project.

### #Prototyping to impulse the tangibility of co-creation approaches

In the SISCODE project, partners have postulated that prototyping in a broader sense is able to reduce gaps between planning and action, between ideal and real outputs for RRI approaches and policy-making in general. Based on product and software design, raising agility and using prototyping in design processes supports the effective implementation of solutions, in a shorter duration, and with more qualitative functions. Moreover, Rizzo et al. (2018)<sup>1</sup> introduced that, "*the role of prototypes goes beyond the simple testing concepts; instead, it is a creative way of investigating what a potential future might be.*" [...] "*The use of prototypes and their experimentation in real contexts opens up a discourse on what a preferred state might be as an intentional outcome of the co-design process, which also allows different stakeholders to consider the ethical implications of their proposed solutions.*"(p.113)

#### 1.2.1.2. *A customizable design approach within Fab Labs, Living Labs and Science Museums*

The SISCODE Toolbox aims to leverage existing toolkits instead of designing (yet another) new one, with the need to customize the set in accordance to the diversity of the local challenges and contexts. Under the recommendations of EU, SISCODE partners have decided to avoid a "one-size-fits-all" approach and suggests to work at a meta-level, in which to support users in making sense of existing tools and toolkits, combining for each lab a customized set of co-design tools in order to integrate the practices already in use.

### #Context matters

Whether they are Fab Labs, Living Labs or Science Museums, each lab pilot has its own history, political context, own processes and culture in terms of design and co-creation that need to be understood. They are choosing a specific challenge that can involve them in adopting new postures and practices, being surrounded by diverse and new representations,

letting them navigate among more or less un-explored dimensions. Within the SISCODE philosophy, the journey of each lab will be adapted to the cultural context of the labs and will be able to evolve through time to better suit the ongoing need appearing during the process.

### #Tools appropriation

Although, the SISCODE toolbox is not creating tools, it aims to support the appropriation of co-creation tools by the labs. Consequently, as suggested by Rizzo et al. (2018)<sup>12</sup> “*it is important to facilitate access to the existing relevant amount of toolkits and tools with “an accessible way to find out what’s possible, navigate what’s available, match tools with the context and the available skills and capabilities, and get advice and support when inevitably issues arise”*”. (p.109)

#### 1.2.1.3. *Constructive learning through Reflexive spaces*

Each co-creation journey can be defined as an action-research for the Labs, oscillating with the development of the actions of their own project and a regular space for reflexivity that will help them better understand and manage their processes as well as sharing feedback in order to build a common knowledge basis on co-creation.

### #A common framework allowing comparison

As highlighted in Rizzo et al. (2018)<sup>1</sup>, “*it is necessary to find the right balance between the need to allow for comparison and the need to adopt context-based processes and tools. Therefore, SISCODE plans to manage the trade-offs between the two approaches with a mixed-up solution: on one hand a co-creation process characterized by common macro-phases that can be freely organized in sub-phases, and on the other hand the adoption of a limited set of common tools that synthesize the outcomes of each phase, combined with customized sets of tools bound to the different problems to be handled and the characteristics of the local contexts*”’. (p.15)

## #Spaces for sharing, communicating, disseminating and building knowledge

The toolbox needs to be completed by individual efforts of reflexivity and moments for interaction between labs. It could be through events, regular calls, mailings, and social media communication. This will allow a dialogue and the constant realignment necessary to ensure continuous learning and communication. These interactions need to be captured to better monitor and assess the different journeys and understand the dynamics and the configurations through which design-led co-creation can realize implementable solutions and policies and engage public.

Goals	Details	Specifications for the toolbox's design
RRI Gaps	Complexity of societal problems	Context-based approach using systemic tools
	Engagement of stakeholders	Use of stakeholder canvases all along the journey
	Tangibility of RRI projects	Use of prototypes as boundary objects
Customization	Context Matters	Adaptable selection of tools according to cases
	Tools appropriation	Support provided to enlarge the practical knowledge about tools. 101 methods design cards.
Reflexivity	Comparison necessities	Process characterized by common macro-phases that can be freely organized in sub-phases, and on the other hand the adoption of a limited set of common tools that synthesize the outcomes of each phase
	Common knowledge spaces	Organization of interactive moments with partners like lab exchange day, skype call and communication spaces (social media, website...)

Table 1: Set of goals with the related specifications for the SISCODE toolbox

### 1.2.2. From the SISCODE design-based learning framework to the toolbox

At a theoretical level, the toolbox's originality relies on the development of a meta-design approach based on a learning process framework that overlap the experiential learning model of Kolb (1983)<sup>2</sup> and classic design thinking processes (as described in Dorst, (2010)<sup>3</sup>) as to ensure effective learning and strong capacity of adaptability for users. Indeed, users (co-creation labs in the context of SISCODE) will be able to use the SISCODE framework combined with a rich diversity of design approaches and tools.<sup>4</sup>

<sup>2</sup> Kolb, D. A. (1983). Experiential Learning: Experience as the Source of Learning and Development (1 edition). Englewood Cliffs, N.J: Prentice Hall.

<sup>3</sup> Dorst, K. (2010). The nature of design thinking. In Design thinking research symposium. DAB Documents.

<sup>4</sup> See more information about the framework in Rizzo et al., (2018)

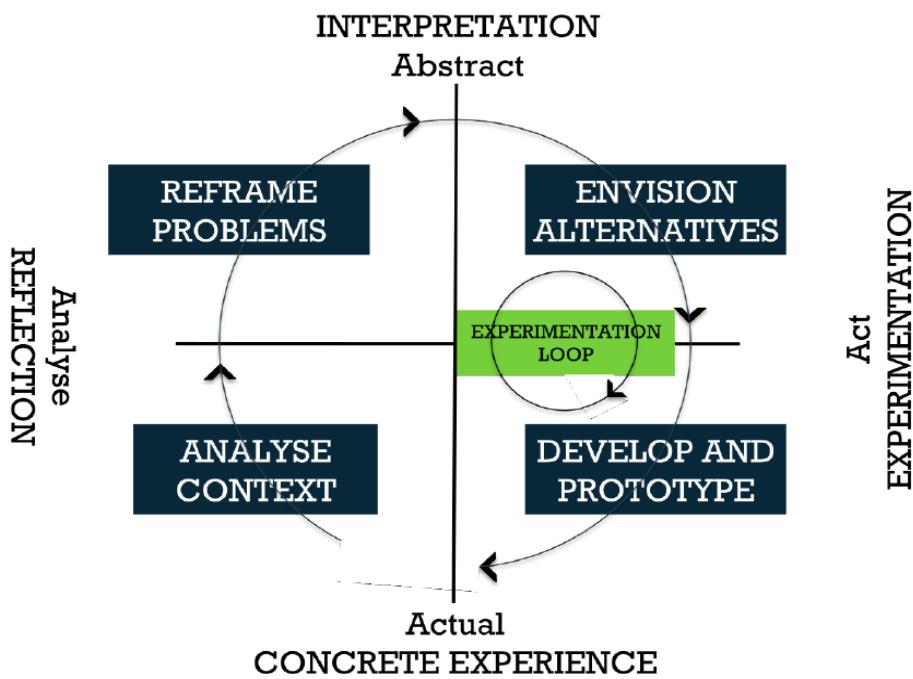


Figure 2: SISCODE design-based learning framework (Rizzo et al. (2018), p.114)

Several efforts have been made to make the theoretical framework operational for the SISCODE project environment:

- Moving from circular to linear perspective: the process can be visualized in both circular and linear ways to respectively highlight the notions of “iteration” and “temporality”;
- Adopting paper canvases (instead of a digital environment that would shorten the development time) so as to make the SISCODE Toolbox available to the co-creation Labs sooner, and achieve a higher degree of usability and accessibility;
- Materializing each phase of the framework by the definition of (1) a set of activities where different tools can be used and (2) specific outputs called “synthesis tools”;
- Adapting canvases and selecting tools from two existing and referent design toolkits (silearning<sup>5</sup> for the synthesis tools and 101methods<sup>6</sup> for feeding the set of activities)
- Adding two specific sections for supporting (1) the context description (challenge, lab, policy) and (2) the continuous evolution of stakeholder engagement;
- Designing a toolkit that consists in a concise and step-by-step guide, aiming to document the operational process of the SISCODE framework and make it accessible for users

<sup>5</sup> More information on <https://www.silearning.eu/>

<sup>6</sup> Kumar, V. (2013). 101 design methods: a structured approach for driving innovation in your organization. Hoboken, N.J: Wiley.

A first version of the toolbox structure was described in Rizzo et al. (2018). From the first uses and discussions among different stakeholders, some changes have been made to achieve the 3 goals described above and to have a more practical and pedagogical version. In the *annex 5.1*, you will find a description of the changes that occurred in the toolbox between the previous (D1.2) and present deliverable (D3.1).

The toolbox is composed of 36 pages:

- A cover page and an index (2p)
- An introduction to the SISCODE toolbox (2p)
- A two-page tutorial explaining how to use each canvas (2p)
- An introduction to the challenge part designed to understand the local context, followed by three canvases respectively aiming to explore the lab more deeply, as well as the challenge and the policy context. (5p)
- A description of the co-creation process that explains the 4 different phases (1-Analyse Context, 2- Reframe Problem, 3- Envision Alternatives and 4-Develop and Prototype) and presents two canvases to support the design of each phase. The Phases Canvas will help to understand each phase, making sense of the necessary inputs and outputs expected, how to best define the necessary activities for the accomplishment of each phase, and how to manage them. The Activity canvas will help to find the appropriate tools and discuss how to organize every activity. (6p)
- A description of the different tools aiming to support the identification and the engagement of stakeholders. It contains 3 canvases: the stakeholder profile, the stakeholder map, and the stakeholder engagement plan. (7p)
- A presentation of each phase output materialized as synthesis tools. (10p)
- An acknowledgement and reference section. (1p)

A summary of the toolbox is presented in the section 1.3. It will describe the co-creation journey and the different tools created to support it.

### 1.3. The co-creation journey and its tools

The co-creation journey is composed of 4 phases, supported by two activities that consist of understanding the local context and engaging stakeholder networks.

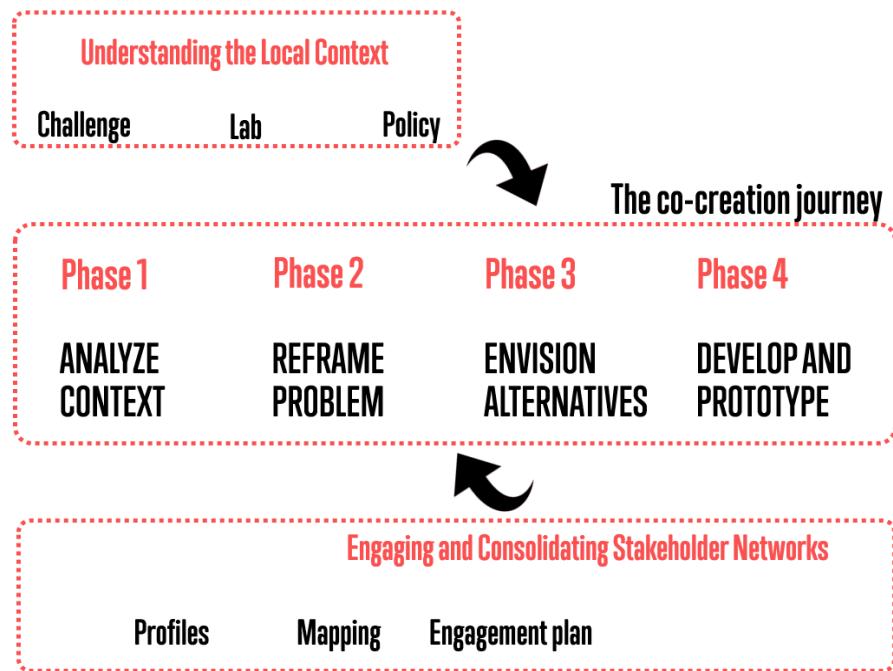


Figure 3: Overview of the co-creation process proposed in SISCODE

In the following section, an overview of the general procedure is generated, presenting the canvases, following the order of the toolbox:

- 1) The mode of understanding the local context, its challenges, the lab itself and the respective policy circumstances.
- 2) The co-creation journey with canvases for each phase, activity and outcomes.
- 3) The canvases for supporting the envisioning of the stakeholder's network is provided.

### 1.3.1. Understanding the local context:

A preliminary step is to define the societal challenge addressed by each lab. This effort was supported by inviting labs to have a better understanding their local context and explore their intents. The Canvases “Local Context”, “Lab Context” and “Policy Context” were created to better understand the infrastructures of the SISCODE co-creation Labs as well as to update the challenges, solutions, and policies from SISCODE.

#### 1.3.1.1. *Challenge Context*

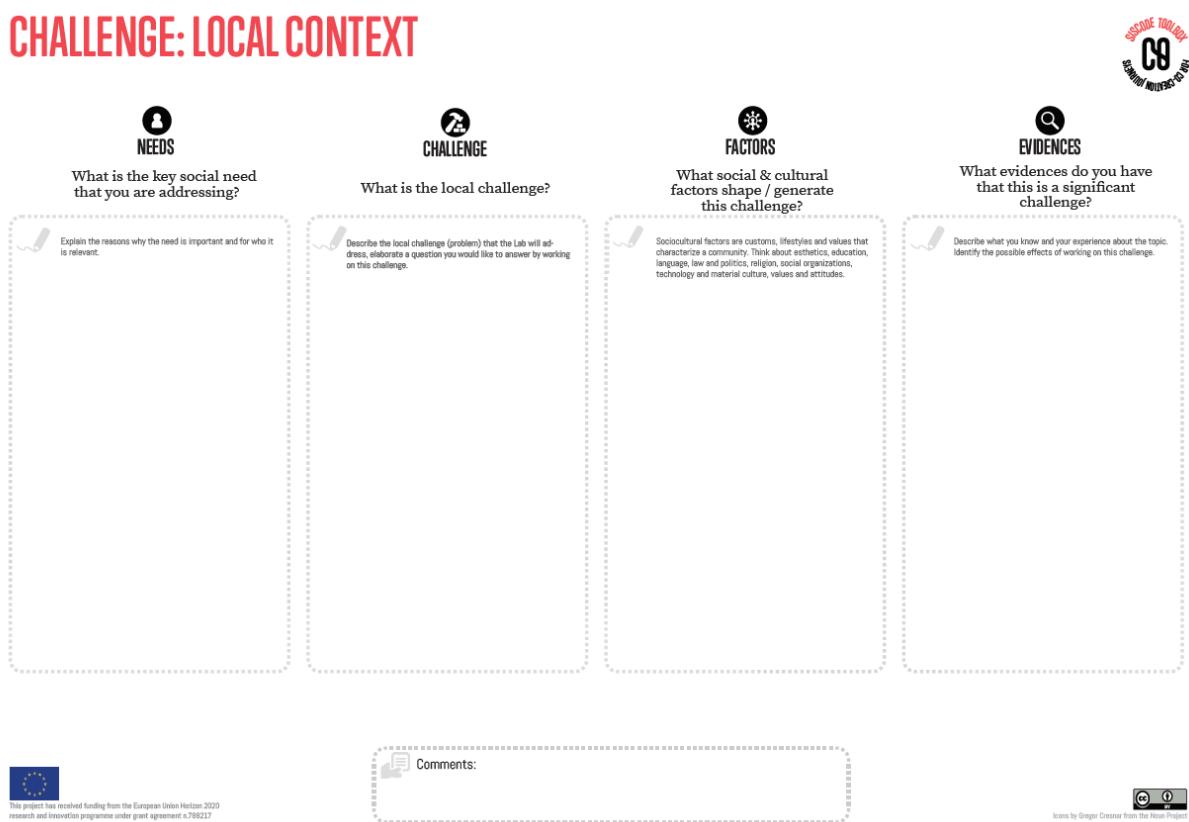


Figure 4: Challenge: Local Context Canvas

The local context canvas invites users to explore locally the key social needs they are addressing in order to clearly define the challenge they are choosing. Participants will be asked to provide evidence about the significance of the challenge for the territory and the lab involved and describe factors which could influence the success or failure of potential solutions in the actual ecosystem. They will find answers to the questions of what are the social and cultural factors that causes the challenge.

### 1.3.1.2. *Lab Context*

## CHALLENGE: LAB CONTEXT

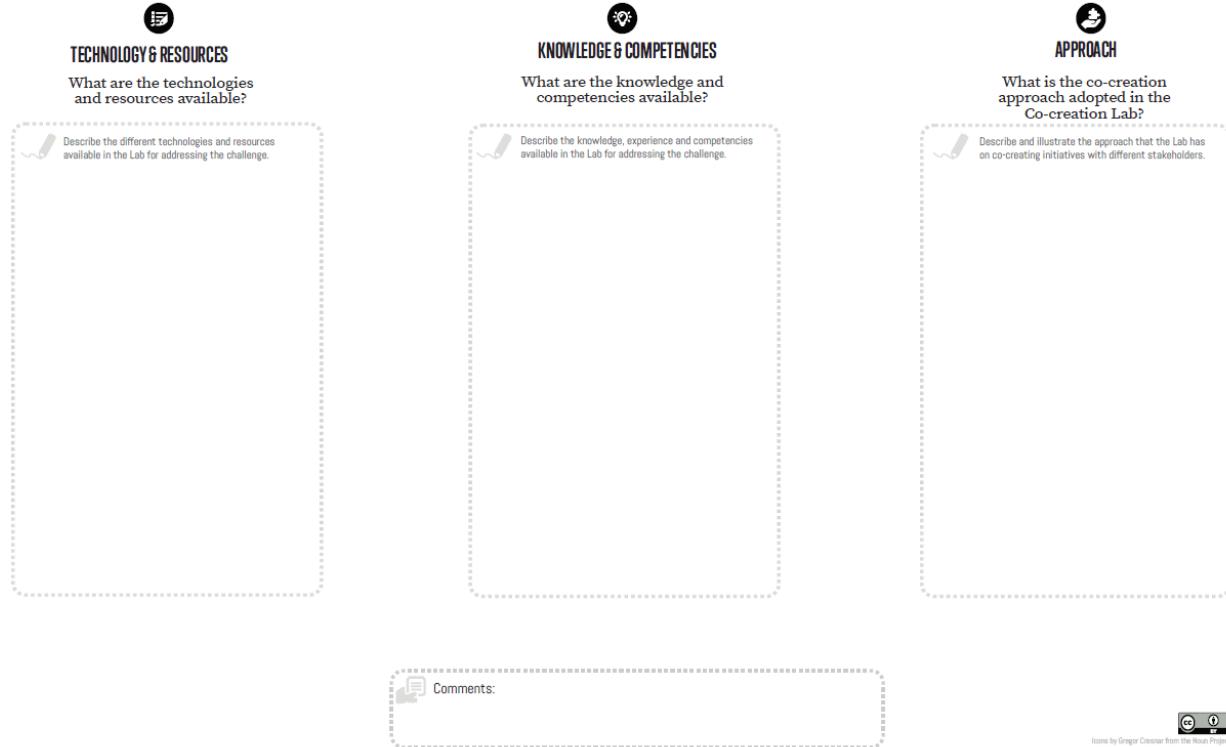


Figure 5: Challenge: Lab Context Canvas

The Lab Context Canvas provides a better vision of the capabilities of the labs and helps them start to identify the specific needs in terms of tools for their customized journey. It consists of defining technologies and resources present in the lab and necessary to address the challenge. Then, knowledge and competencies that are available and finally what is the co-creation approach adopted in the lab. It is also a way for the labs to formalize and raise awareness about implicit practices.

### 1.3.1.3. Policy Context

## CHALLENGE: POLICY CONTEXT

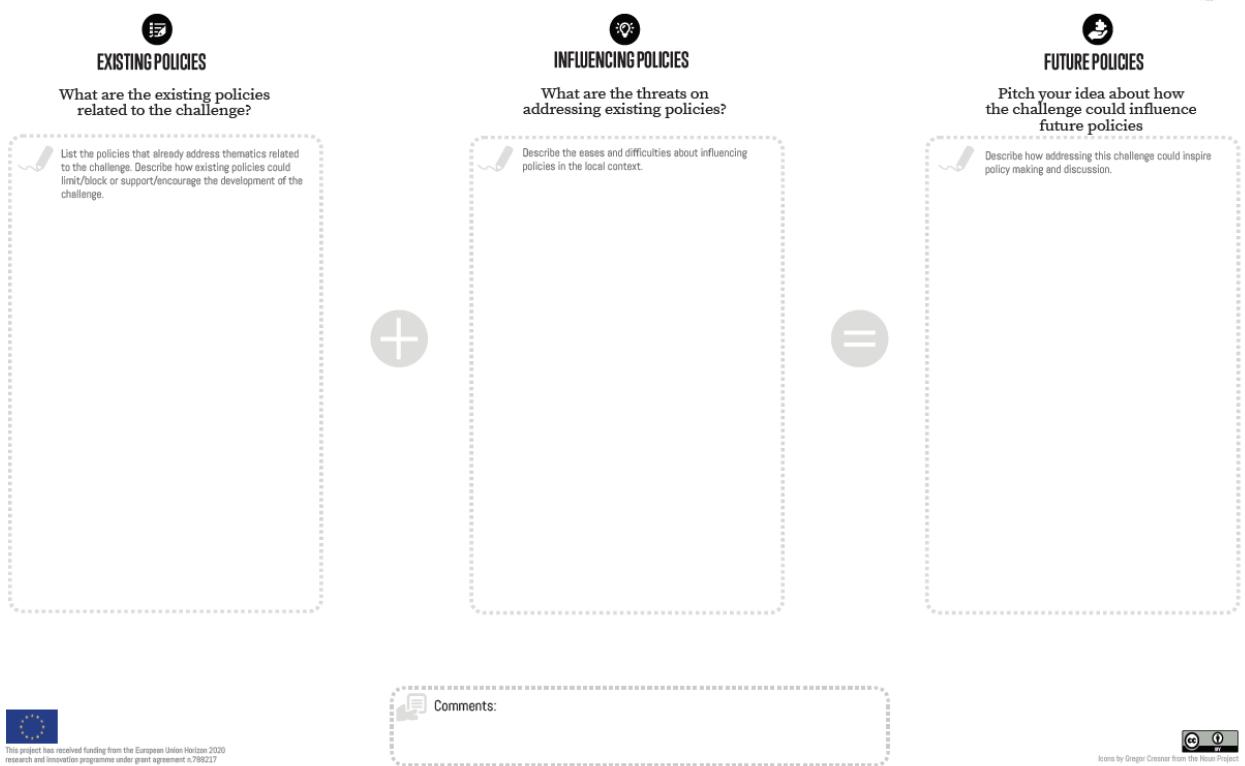


Figure 6: Challenge, policy context canvas

The Policy Context Canvas helps the labs to engage in discussions about how their challenge is related to policies in general, as it is quite a new area for most of the labs. It consists of letting them explore the existing policies addressed by the challenge, evaluating their capacity to influence policies and imagining how the challenge could effectively influence future policies.

### 1.3.2. The journey

#### 1.3.2.1. *Phase, activity, design methods*

For each phase, a set of activities will be defined with the use of various existing design methods and tools (see Figure 7).

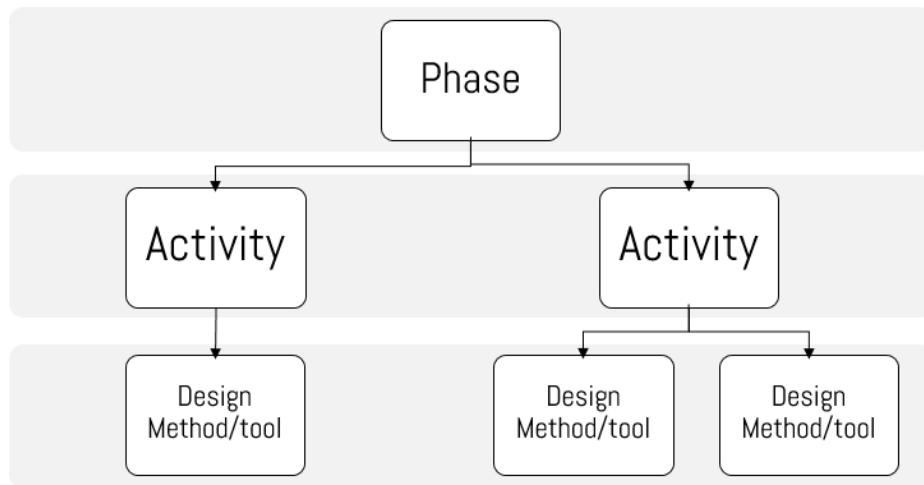


Figure 7: Interrelations between Phase, Activities and Design Method/Tool

Each activity and design methods will be adapted according to the context of each lab. Two common canvases (Phase and Activity, see below) will be used by all labs to feed into their processes. To support them in the customization of their journeys and the definition of the design methods they will use, a set of design methods (collected in the 101 Design Methods book written by Kumar (2013)<sup>6</sup>) has been provided to the Labs.

#### 1.3.2.1.1. *Phase Canvas*

The Phases Canvas will help users understand each phase, making sense of the necessary inputs and outputs expected, how to best define the necessary activities for the accomplishment of each phase, and how to manage them.

Phase by phase, this canvas gradually supports them to define the management of the co-creation journey. For each phase, they will be invited to discuss who is leading the phase, who are directly involved with or affected by the phase. At this stage, they can also take time to brainstorm about the different types of activities, inputs and outputs they will need for each phase.

**PHASE**

1. Analyse Context     3. Envision Alternatives  
 2. Reframe Problems     4. Develop and Prototype

**ACTIVITIES**  
What are the activities developed in this phase?

**STAKEHOLDERS**  
Who is involved in each activity?

**ROLES**  
What are the roles of the stakeholders during each activity?

**OUTCOMES**  
What are the desired outcomes of this phase?

Start Date: \_\_\_/\_\_\_/\_\_\_

End Date: \_\_\_/\_\_\_/\_\_\_

Comments:

Icons by Gregor Czerner from the Noun Project

Figure 8: Phase Canvas

**1.3.2.1.2. Activity Canvas**

**ACTIVITY**

1. Analyse Context     3. Envision Alternatives  
 2. Reframe Problems     4. Develop and Prototype

**OBJECTIVES**  
What are the objectives of this activity?

**TOOLS**  
What are the tools/methods used to achieve the objectives and how?

**OUTCOMES**  
What are the desired outcomes for each objective?

**DURATION**  
What is the time needed for reaching each objective/ using each tool?

Start Date: \_\_\_/\_\_\_/\_\_\_

End Date: \_\_\_/\_\_\_/\_\_\_

Comments:

Use 101 Design Methods for inspiration  
<http://101designmethods.com>

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°789327

Icons by Gregor Czerner from the Noun Project

Figure 9: Activity Canvas

For each phase of the co-design journey, different activities could be developed according to each context. All along the journey, users will need to plan which activities they want to apply in their context, define what the activity process will be and explore which design methods they want to use for each of them.

The Activity canvas will help them to find the appropriate design methods and tools and discuss how to organise every activity. First, they will have to choose an activity. Then, they will explore the 101Cards to be inspired for selecting the design methods. Once they have defined the design method, the template will lead them to define the participants that will work on it, which are the procedures and rules, and the different outputs they are expecting.

#### *1.3.2.1.3. Picking into the 101 design methods cards*

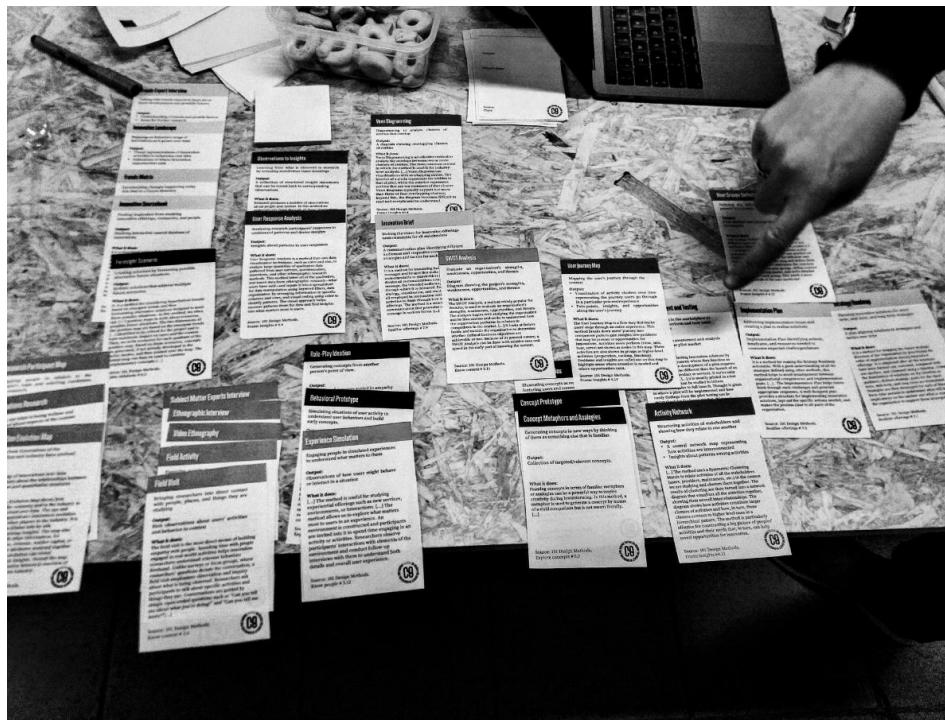


Figure 10: Photo of the 101 Design Methods Cards in use at Polifactory

One of the aims of the use of the toolbox is to collect the design tools and methods used by labs during their journeys. A first set of design methods of the 101 Design Methods book have been materialized in cards to inspire labs in the construction of their journey. “Blank Cards” were designed to let each participant complete the toolbox with their own tools and methods. This set of tools could be used all along the project, consulted by each participant to complement his/her practice and completed by new inputs and insights about how to use the tool.

### 1.3.2.2. *Synthesis tools for each phase*

#### 1.3.2.2.1. *Analyse Context*

The aim of this phase is to understand the context in which the challenge will be addressed, in terms of local characteristics, stakeholders, relevant policies. It consists in researching and identifying how the different characteristics of the environment are related to the challenge and the capabilities of the lab. At the end of the phase, labs will be able to complete the ‘problem definition canvas’.

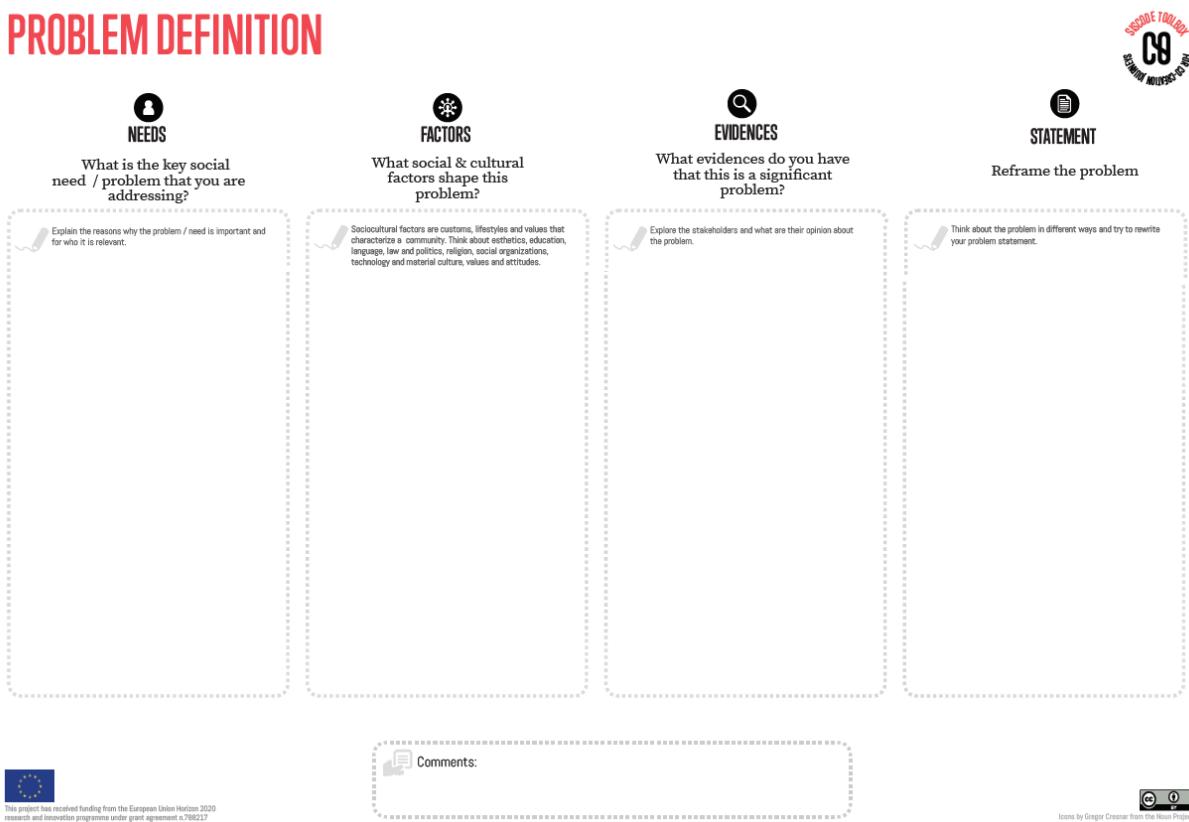


Figure 11: Problem Definition Canvas as a synthesis tool for analysing the context.

Defining a problem is an important step to creating an effective and efficient solution, as what may appear at first to be the problem may be the result of an underlying and perhaps even larger problem. This tool allows groups to understand what these underlying factors may be, to find evidence on their first assumptions. It aims to better contextualize the problem to re-frame it in a more specific and direct manner.

Completing the task with stakeholders is recommended as the objective of the exercise is to approach the problem from different perspectives in order to understand and define the problem better. The worksheet should be filled out from left to right.

### 1.3.2.2.2. Reframe Problem

The aim of this phase, on the basis of the common understanding of the local context, is to learn and gain multiple perspectives about the main problem, in order to identify new possible opportunities to undertake the challenge. At the end of the phase, labs will be able to update the ‘problem definition canvas’ and start completing the ‘Idea Card canvas’.

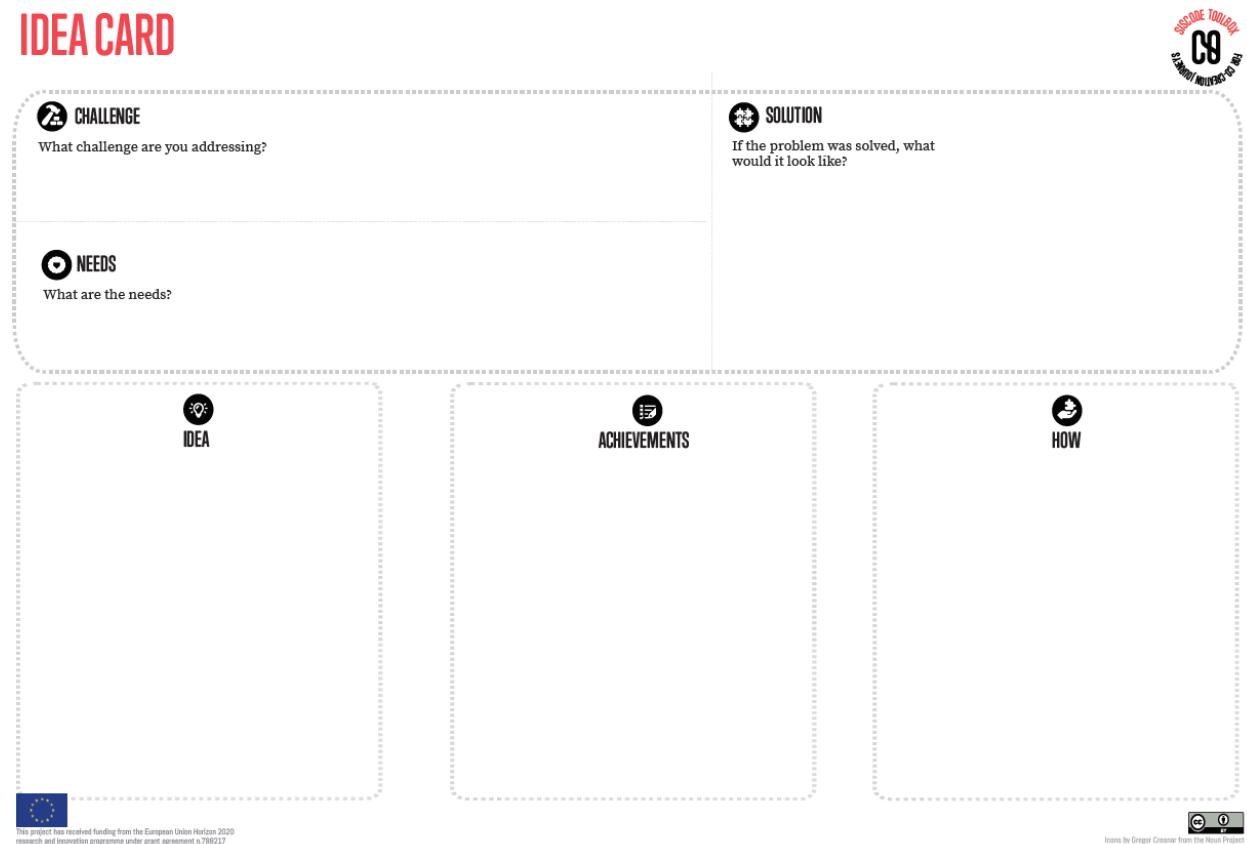


Figure 12: Idea Card Canvas as a synthesis tool for reframing the problem

The Idea Card canvas organizes in one page the idea that labs are developing: the challenge and needs they are addressing, the solution, what they might achieve and how they will accomplish this. It is an excellent tool to use when presenting the initial idea to stakeholders or future beneficiaries/customers to get a feel of what they are doing right and what they could improve.

The tool can be completed individually or in groups. Users start the activity by defining their challenge and the specific needs that they are addressing. Next, they think about what it would look like if the challenge was solved. Once their challenge is framed, each lab can clarify its own idea, what it could achieve and how it could be accomplished.

### 1.3.2.2.3. Envision Alternatives

The aim of this phase is to elaborate new ideas and viable solutions to address the challenge grounded on previous insights and reflections. Hence, multiple concepts will be generated and aligned in a coherent value proposition system related to the challenge. At the end of the phase, labs will complete the previous canvases and start completing the ‘Business Model canvas’.

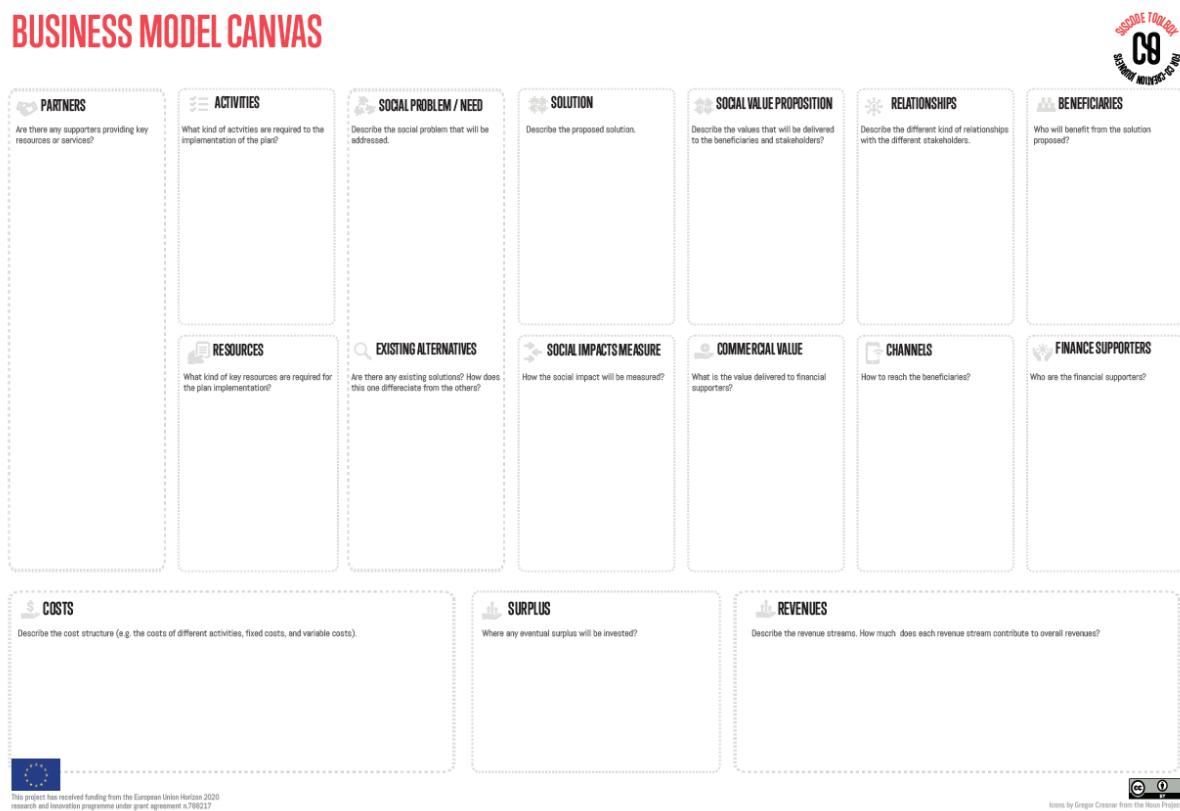


Figure 13: Business Model Canvas as a synthesis tool for Envisioning Alternatives

Fleshing out the business model of the lab’s idea in a canvas is a key aspect in furthering the design of the concept by providing the big picture on the processes that goes on to ensure that value is created, delivered and captured. The tool is a precursor for drawing up a complete business plan and it is useful for formulating in a more rapid and cost-efficient manner the business model behind the idea for the initial phases.

The social innovation business model canvas is made up of 15 blocks. Unlike other similar business model canvases, this one has been modified to better suit social innovations, including among others, the following changes: a specific social value proposition, a separation between beneficiaries and financing supporters and boxes dedicated to surplus identification and social impact measurement. The canvas can be completed in any order.

### 1.3.2.2.4. Develop and Prototype

The aim of this phase is to apply new concepts, ensuring that solutions are purposefully designed and implemented considering stakeholders' needs and expectations. This will be carried out by means of co-developing, testing and assessing practices in an iterative manner, to provide a real value for the extended ecosystem of concerned stakeholders. At the end of this phase, labs will provide a documentation of prototyping like photos, open source documentation and use the stakeholder journey canvas to make explicit the experience created.

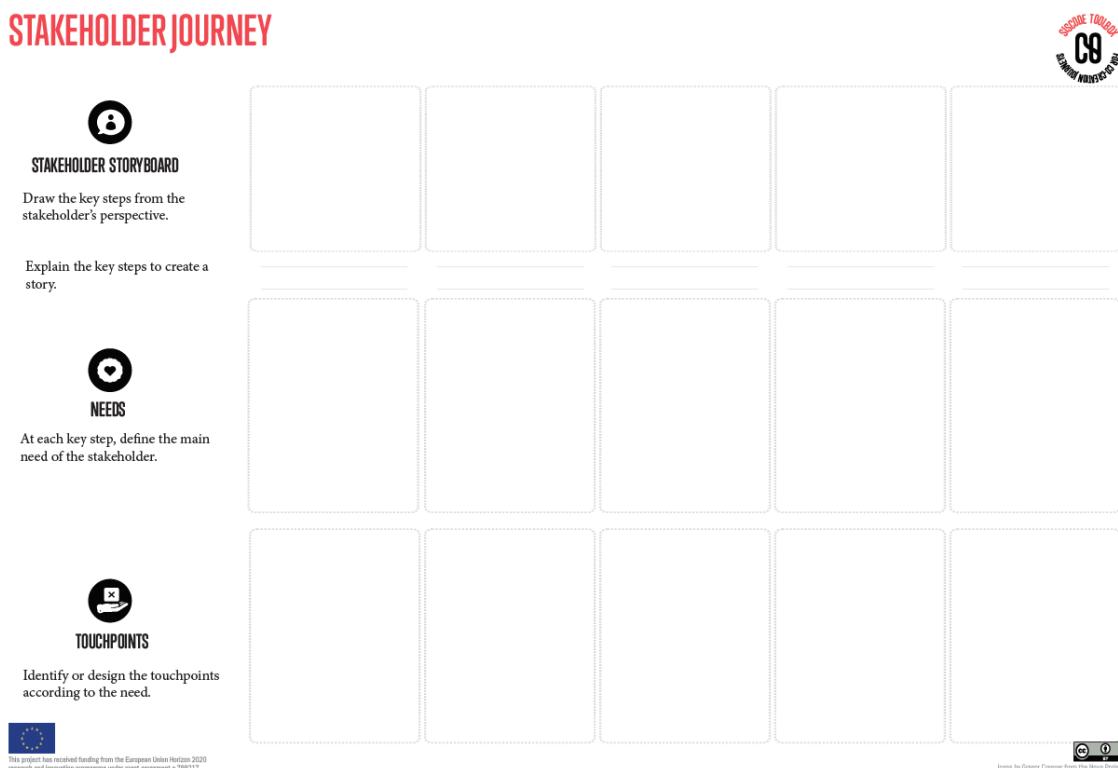


Figure 14: Stakeholder Journey as a synthesis tool for develop and prototype phase.

The Stakeholder Journey canvas is a visual interpretation of the stakeholder's relationship with the organization, service or product. It is a useful strategic tool that keeps the stakeholders at the centre of design decisions, highlighting pain points and opportunities for the organization to create a better stakeholder experience and an effective service. First, labs will individualize the stakeholder they will be designing for and map out the main phases of their journey throughout the service. Then, they will draw sketches of the phases in the boxes by taking pictures or use photos and converting them into sketches. Afterwards, they will provide explanations of the phases to create a story of the stakeholder's journey. At each step along the way, they will identify the need that the stakeholder has at that moment and the touchpoints through which he/she is interacting with the system. Touchpoints will pinpoint the intersection between stakeholders and the co-creation lab and thus how the stakeholder interacts with the lab itself.

### 1.3.3. Stakeholder tools

#### 1.3.3.1. Deepening the journey with personas

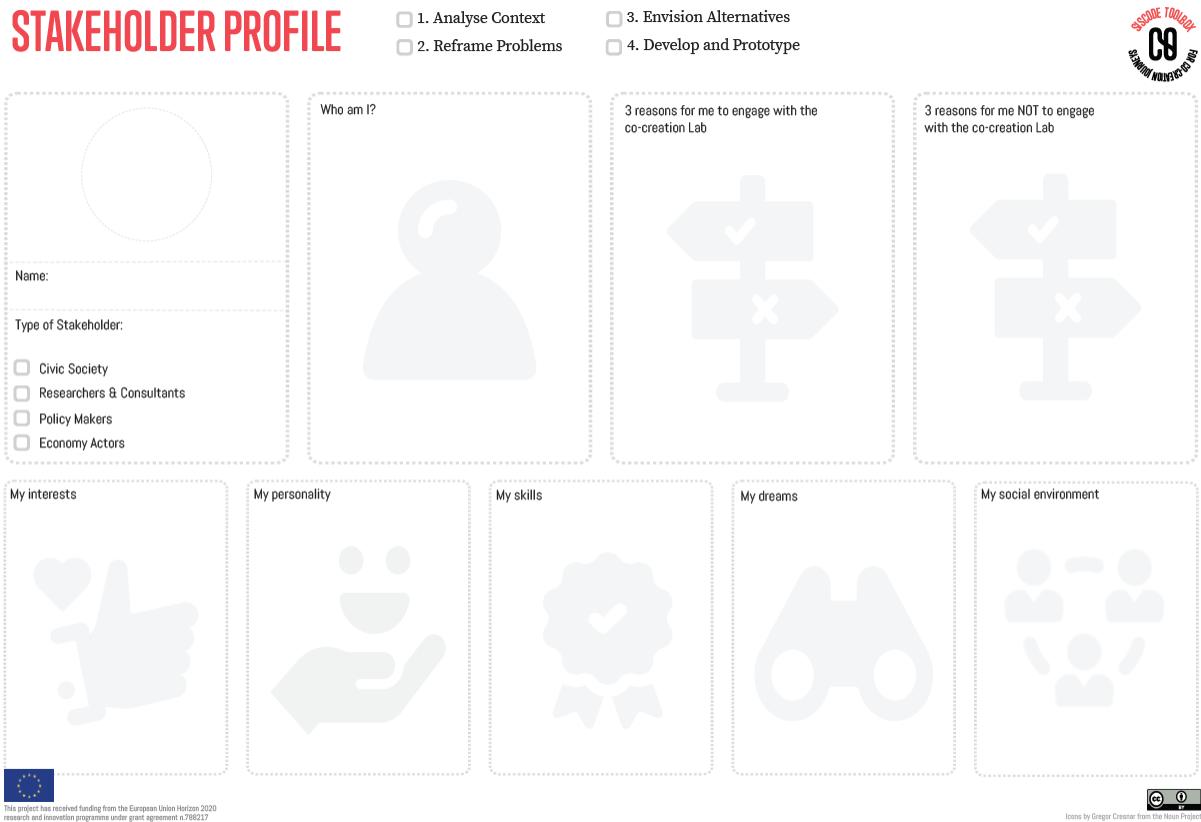


Figure 15: Stakeholder Profile Canvas

This tool uses personas to define diverse stakeholder profiles of the network that is going to be built. Personas are fictional characters who embody the archetype of all stakeholders (civil society, researchers and consultants, policy makers, economic actors). They are created through exhaustive observations of the stakeholder segment and the joint-drawing of their shared characteristics, behaviours, motivations, interests, etc. It is a useful tool to really focus on getting to know who the people we are designing for. The goal of the activity is to make the persona as accurate as possible and hence as detailed and nuanced as can be. Users start by giving their persona a name and identifying from which stakeholder's segment s/he comes from. Then they move on to describing who s/he is: age, personal background, education level, profession, etc. Finally, they make a sketch of the persona and move on to the other sections in any order they'd like and feel free to add more details.

### 1.3.3.2. *Building a Stakeholder Map*

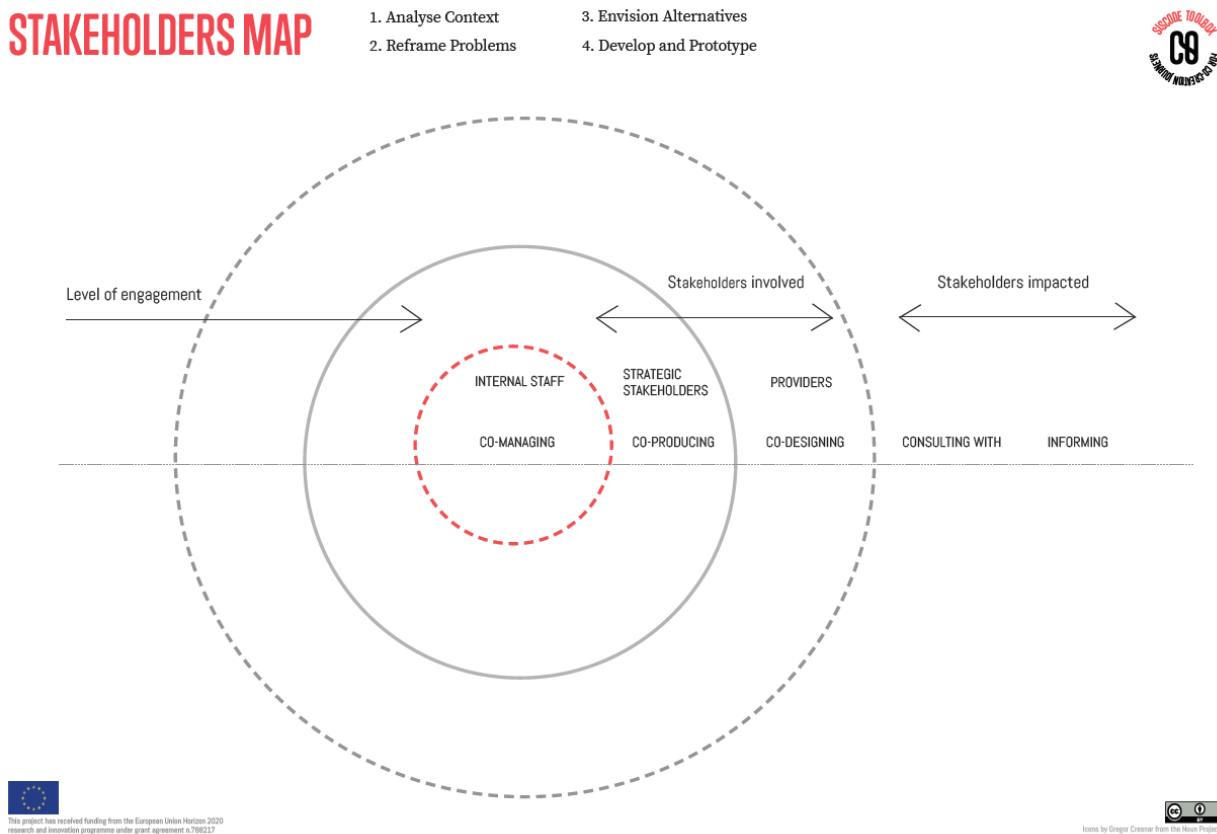


Figure 16: Stakeholder Map Canvas

The stakeholder map is a great tool for understanding who the partners of the labs are or might be and what role they play or could play in the ecosystem. It also allows users to visualize who they are targeting with their solution, what role they could play in the strategy and how the direct stakeholders work together to reach them and by what means.

Users start by jotting down who is involved in co-managing the solution: internal personnel, pro-active stakeholders and beneficiaries. Then, they move outwards and list their strategic stakeholders and technical providers who might co-design and co-produce the solution with them. They conclude by noting down the stakeholders who are impacted by the solution and dividing them into groups: those within the network may have consulted for advice and insight when designing the solution and those who are merely informed of the solution.

1.3.3.3. *Create an engagement and dissemination plan*

### STAKEHOLDERS ENGAGEMENT PLAN



PHASE AND ACTIVITY	STAKEHOLDERS	OBJECTIVES IN TERMS OF COMMUNICATION	BARRIERS	KEY MESSAGES	ACTION(S)	CHANNEL
						WEB
						FACEBOOK
						TWITTER
						INSTAGRAM
						OTHER

This project has received funding from the European Union Horizon 2020 research and innovation programme under grant agreement n°789217

Icons by Gregor Cremer from the Nouu Project

Figure 17: Stakeholder' Engagement Plan

This stakeholders' engagement and dissemination plan will help Labs to define their strategy to engage and communicate with their stakeholders. It is part of the T3.6 task described in Filipecki et al. (2019)<sup>7</sup>.

This canvas will support them to clearly define, for each phase, which stakeholders they will interact with and how. For each stakeholder, they will need to explain what the objective is in terms of communication, what are the key messages they have to communicate with him/her, what actions they will put in place and by which channel (web, Facebook, twitter, Instagram, other...)

<sup>7</sup> Filipecki, S. et al. (2019). D3.6 Local engagement et dissemination plans. SISCODE project.

## 2. Engaging the laboratories in designing the co-creation journey: the toolbox in action

### 2.1. Introduction of the chapter

As for any design process, one of the challenges for the SISCODE Toolbox is the appropriation of the solution by a group of first users. The 10 pilot Labs will be the pioneers to experiment with the toolbox, to transform the methodology into practice, and to support the continuous improvement of the tools present in the toolbox. Different efforts have been realized to engage with the 10 pilots with the objective to support them into the design of their future co-creation journeys. The following section will first propose a succinct presentation of each lab clustered according to its type i.e. Fab Labs, Living Labs, or Science Museums and then, describe the procedures and processes adopted to engage laboratories in the implementation of the toolbox.

### 2.2. Who are the co-creation Labs?

#### 2.2.1. Fab Labs

The Fab Lab Network is an open, creative community of fabricators, artists, scientists, engineers, educators, students, amateurs, professionals, of all ages located in more than 78 countries in approximately 1,000 Fab Labs. From community-based labs to advanced research centres, Fab Labs share the goal of democratizing access to the tools for technical invention. This community is simultaneously a manufacturing network, a distributed technical education campus, and a distributed research laboratory working to digitize fabrication, inventing the next generation of manufacturing and personal fabrication. With the launch of the Fab City initiative, some Fab Labs jointly with citizens and City officials collaborate locally to implement new urban models through interventions in governance and policy. Fab Lab Barcelona, Underbroen and Polifactory are at the core of both Fab Lab and Fab City networks experimenting with many approaches and stakeholder pushing for the adoption of the culture of making of many societal contexts.

##### 2.2.1.1. *IAAC – Fab Lab Barcelona*

Fab Lab Barcelona is part of the Institute for Advanced Architecture of Catalonia, where it supports different educational and research programs related with the multiple scales of the human habitat. It is also the headquarters of the global coordination of the Fab Academy program in collaboration with the Fab Foundation. It is currently developing projects in

different scales, from smart devices for data collection by individuals (Smart Citizen innovative project award in the Smart City Expo and World Congress in Barcelona), the development of the new generation of Fab Labs in the Green Fab Lab project, to the new production models for cities with the Fab City project being implemented in Barcelona. The mission of the Fab Lab is to provide access to the tools, the knowledge and the financial means to educate, innovate and invent using technology and digital fabrication to allow anyone to make (almost) anything, and thereby creating opportunities to improve lives and livelihoods around the world. Community organizations, educational institutions and non-profit concerns are our primary beneficiaries.

#### 2.2.1.2. *Polifactory*

Polifactory<sup>8</sup> is the makerspace/Fab Lab of Politecnico Milano. It is a multidisciplinary research lab developed by the departments of Design, Mechanical Engineering, and Electronics, Information and Bioengineering. Polifactory investigates the relationship between design and the digital transformation of manufacturing processes, promotes a new culture of making and explores the emerging scenarios of production: open and distributed production, small urban manufacturing, open design and open hardware, interactive product-service systems. Polifactory operates in different areas:

- **Research and Consultancy.** Polifactory proposes and participates to research and consulting with/for firms, organizations and institutions at a national, regional level and international level. It can operate both as a manager or a partner of technological-scientific projects dedicated to the competitive and pre-competitive development and as a services supplier for public and private subjects interested in using its spaces, its technologies and its competences for research purposes.
- **Pre-incubation of talents.** Polifactory “Talents in Residence” programme actively supports young talents’ professional growth and pre-incubation paths. Thanks to open public calls participation, Polifactory offers, to students and researchers from various disciplinary backgrounds, the possibility to operate inside the makerspace, stimulating them to acquire knowledge about the digital manufacturing processes and supporting them in the realization of prototypes and in the creation of connections with incubators and research centres.
- **Experimental and peer-to-peer didactics.** Polifactory collaborates, inside and outside of the Politecnico di Milano, with schools, consortiums and associations to carry out advanced and experimental education: from the organization of individual training modules such as workshops and jams, up to specialization and high

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<sup>8</sup> More information on <http://www.polifactory.polimi.it/>

formation courses and initiatives dedicated to postgraduate, like Master and research PhDs in Engineering, Architecture or Design.

- **Cultural dissemination.** Polifactory promotes and organizes, autonomously or in collaboration with bodies and institutions, initiatives of cultural dissemination such as cycles of seminars, conferences and small exhibitions, concerning themes which explore the relationship between design and new models of production encouraging the relationship between different disciplines.

The community of students, teachers, researchers and companies that operate and cooperate is the heart and the most vital part of Polifactory. It is managed by a scientific committee and a permanent staff that promotes, coordinates and manages the activities of the makerspace. It collaborates with a wider group of teachers, researchers, PhD and undergrad students who develop scientific, training and cultural projects in residence.

#### 2.2.1.3. *Underbroen - Maker*

Underbroen is a prototype and pre-fabrication facility where traditional craftsmanship is combined with modern digital fabrication technologies. It is located by the waterfront in the centre of Copenhagen and situated in an old bridge called Langebro. Underbroen opened in 2016 and is co-founded and co-managed by the association Maker and a private company called BetaLab. Underbroen helps makers to develop and scale their projects and businesses in a vibrant, creative and collective environment in the heart of Copenhagen, and facilitates meetings between makers, businesses and organizations, citizens and institutions.

Maker is a non-profit association in Copenhagen (Denmark), founded in 2015, with the core objective to promote and support maker communities and fab lab activities, methodologies and tools to the broader public and sectors. It works to build and secure cross-sectorial platforms and a strong network of makers, private companies, policy makers, and the public sphere in Denmark and the Northern countries through strategic and cross-sectorial collaboration and co-creation, and hands-on projects with various partners. Maker's mission is to mediate formal and informal relationships and collaborations between makers, civil society actors, private and public organizations, policy- and decision makers. Maker engages a Danish and European ecosystem of creatives in innovation and co-creation of sustainable, and digital solutions, knowledge building, design tools and methodologies, and digital fabrication technologies.

The makers-community (members-community) is the core in Underbroen and counts approximately 70 members (in Underbroen and BetaFactory), whereas one half is full-time members who run their businesses from the premise. The member's professional

background spreads from industrial designers, architects, entrepreneurs to interaction designers and social entrepreneurs, and many more. Underbroen is a creative platform where the creation of prototypes, products and innovation processes become the focal point for dialogue and development of solutions for local and urban production. It is a meeting place for people with different professional backgrounds and interests with an open source logic that explores and pushes the boundaries of urban local production in a global world – therefore we strive towards pushing and developing the Fab City agenda<sup>9</sup> in Copenhagen.

Among many projects, Maker organizes the annual, maker faire in Copenhagen, Copenhagen Maker Festival<sup>10</sup>, gathering makers, researchers, organizations, policy makers, companies, students and citizens in inspirational, educational and hands-on activities in tech, design and IT, initiate conversations around technology in our lives and society at large.

### **2.2.2. Living Labs**

Living Labs are open innovation environments characterized by systemic co-creation, multi-stakeholder participation and active user involvement in real-life settings through multi-method approaches. The European Network of Living Labs is composed of more than 400 historically recognized Living Labs, of which three Labs are acting as co-creation Labs within the framework of the SISCODE project: KTP, PA4ALL & Thess-Ahall. KTP aims to develop modern economy and innovative academy-based technology enterprises in the region of Krakow, Poland. PA4ALL focuses on Precision Agriculture, cross-fertilizing two most promising sectors in Serbia but also globally: ICT and agriculture. Thess-Ahall is very active in the field of active ageing, working closely together within the actual community settings in Greece.

#### **2.2.2.1. *PA4ALL***

As a result of multidisciplinary research scope (ICT, Agriculture, Environmental Engineering, Ecology etc.) and intensive cooperation with local innovative ecosystem (ICT SMEs, Start-ups, end-users (farmers and agricultural enterprises) and governmental institutions), BioSense Institute founded and hosts the first European Living Lab (LL) focused on Precision Agriculture – PA4ALL, an open innovation ecosystem that promotes the development of user-driven precision agriculture. Since August 2013, PA4ALL is an official

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<sup>9</sup> More information on <https://fab.city>

<sup>10</sup>More information on <http://www.copenhagenmaker.com/>

member of ENoLL, engaging in Knowledge Exchange activities with the International LL community.

The multi-stakeholder PA4ALL living lab network generates constant osmosis with pressing end-user needs as well as all the methodological tools (Open Innovation, Lean Start-up methodology, Business Model Canvas, B2B speed dating methodology etc.) to understand the context in terms of the existing business processes and business chains. It brings together main innovation actors including public institutions, researchers, technology and knowledge transfer institutions, and end-users.

#### 2.2.2.2. *Thess-Ahall*

The Thessaloniki Active and Healthy Ageing Living Lab (Thess-AHALL) is located and governed by the Laboratory of Medical Physics, part of the Medical School of the Aristotle University of Thessaloniki, Greece. The Lab's main strengths lie with the operation in actual community settings and residences following a paradigm of in-the-wild collection and processing of data, offering ecological validity schemes, a strategic geographical location and a wide, trans-national network with strong collaboration capacity with the Active and Healthy Ageing (AHA) ecosystem in Greece and the Balkan region. It is a hub of interconnected pilot sites that enable user-driven research and innovation in the Active & Healthy Ageing (AHA) domain. Furthermore, they participate in the Greek Inter-Municipal Network of Healthy Cities, on top of a series of common activities in the AHA Domain.

Some of the most important European and international networks of which the Medical Physics Lab is an active member and which are related to the activity of Thess-AHALL are: the European Innovation Partnership on Active and Healthy Ageing (EIP on AHA), the International Association of Gerontology and Geriatrics (IAGG), the European Platform for Rehabilitation (EPR), Alzheimer Europe, etc. Moreover, the Living Lab is an adherent member of the European Network of Living Labs (ENoLL), having received multiple distinctions and actively participating the boarding council of the Network. In August 2018, Thess-AHALL was selected by ENoLL to host the 2019 Open Living Lab Days conference, the most important annual gathering of the ENoLL members.

Apart from adopting well established co-creation approaches, Thess-AHALL contributes to the scientific background of Living Labs as well as mobilisations towards openness activities as an active member of the Open Knowledge Foundation (OKFN) Greek chapter. Getting to know it through the dissemination activities, many SMEs from the silver & health market

sectors have already contacted Thess-AHALL for evaluating their products or even bridging demand and supply coming from different countries.

#### 2.2.2.1. *Krakow Living Lab (hosted by Krakow Technology Park (KTP))*

Krakow Technology Park (KTP) is one of the key actors in creating and implementing the Regional Innovation Strategy and promoting smart specialisation and user-driven approaches in the region in the paradigm of quadruple helix approach bringing together administration, business, science and citizens. KTP is an ecosystem of 300 companies, responsible for managing the Technology Park and special economic zone. Its mission is to support innovative technology-oriented businesses at all stages of development from start-ups to SMEs and large enterprises offering them a variety of services. KTP is supplying ICT companies, start-ups with tailored advisory services and training in business management, product and service development, new technology trends, IPR etc. To better support companies KTP founded and hosts Living Lab (LL) to test and verify the products and services developed by them. Krakow Living Lab created jointly with City of Krakow is a platform for testing products and services in the conditions in which they are used in life (streets, parks, buses, schools, hospitals and other public buildings, depending on the company's requirements). End users are involved in the co-creation of the products and services, and verification of the products. The process of testing follows a structured iterative plan from concept via prototype to the product/service implementation.

The open ecosystem created by Krakow Living Lab involves hundreds of varied multi-stakeholders bringing and sharing experience and know-how on dimensions of innovation, innovation management, cooperation and co-creation between start-ups /SME and large enterprises, incubation and acceleration programmes, approaches to innovation (Living Lab, design thinking, hackathons), branch events, product development. It serves as a hub for main innovation actors including public institutions, researchers, technology and knowledge transfer institutions, and end-users.

### 2.2.3. Science Museums

Ecsite is the European network of science centres and museums, linking science communication professionals in more than 400 institutions in 50 countries. Founded 20 years ago, Ecsite<sup>11</sup> connects member institutions through projects and activities the organization facilitates the exchange of ideas and best practice on current issues. The members engage the public in science through accessible, interactive exhibits and programs. Ecsite's vision is to foster creativity and critical thinking in European society, emboldening citizens to engage with science. Its mission is to inspire and empower science centres, museums and all organisations that engage people with science, and to promote their actions.

The four science centres involved in the SISCODE project (Ciência Viva in Lisbon, Traces in Paris, Science Gallery Dublin or Continium/Cube in Limburg), denote a specific interest for a better integration of public and civil stakeholders in Responsible Research and Innovation projects.

#### 2.2.3.1. *Continium discovery centre and Cube design museum*

Continium and Cube are part of Stichting Museumplein Limburg, a foundation in Kerkrade (Netherlands) that also includes Columbus earth centre. Together these three venues tell the story of the earth, sustainability, science and technology, and design in the context of mankind, industry and education.

**Continium** is an interactive science museum (Discovery Centre), where stories of the interwovenness of industry, science, technology and society are told in an exciting, playful, and understandable way. Continium combines the methods of a science museum with the approach of a science centre. Visitors participate in science and technology via exhibitions, workshops, activities in the science labs, during science shows, etc. Continium discovery centre offers visitors and participants the opportunities to discover their talent, skills and possibilities.

Continium displays the role of science and technology in the daily life of the visitors or in our society. The impact of science and technology on the society in the past, present and future. The exhibitions range from historical collections like steam engines, tools from the mining industry or the glass industry to exhibits around themes such as nanotechnology, the human body or the role of science in our society. Continium offers the visitors to experience the evolution of science and technology but more importantly searches for dialogue and debate

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<sup>11</sup> <http://www.ecsite.eu/>

about the ongoing changes making the visitor aware about their own role and possibilities within these future developments. Programs of Continuum showcase developments in universities, science parks and industry in the region and give the visitors the opportunity to discover the future systems and products which will have a big impact on their own life.

**Cube** is a museum about design and development. It is aimed at an international public that is interested in the process of design and design for human needs and ambitions. At the same time, Cube serves as a permanent laboratory where students and designers co-create with the public. In this position it focuses on education, business, and the world of designers.

Through the **design labs**, Cube encourages and enables students to approach the process of design not in an isolated manner but based on an analysis of needs, possible materials or technologies, production possibilities, and market opportunities. In this way, Cube approaches the design process through a chain concept of market demand, innovation, and knowledge transfer. In the design labs, visitors are encouraged to participate in the co-creation process as end users.

#### 2.2.3.2. *TRACES*

TRACES is a not for profit association acting at the crossroad between participatory science engagement and social inclusion. TRACES runs the activities of Espace des Sciences Pierre-Gilles de Gennes, the science-culture venue of ESPCI Paris and PSL Research University, a leading French research university covering a wide academic field, well-connected to national research bodies and with a strong innovation-oriented research policy. As a platform between the academic, associative and private spheres and in collaboration with diverse partners, Traces aims to create living lab spaces in which to reflect, experiment and innovate in the fields of science in society, science education and public communication of science.

#### 2.2.3.3. *Ciência Viva*

Ciência Viva - the Portuguese agency for the public awareness of science and technology - is a non-profit association of public institutions and research laboratories; it is also a network of 20 science centres across Portugal, including Pavilhão do Conhecimento (Pavilion of Knowledge), in Lisboa, host of this co-lab. The agency has extensive experience in engaging the public, researchers, schools and policy makers in science and society initiatives. Ciência Viva has been involved in several European projects for science awareness, science education, sharing of resources and, more recently, responsible research innovation and

open science. Pavilion of Knowledge - Ciência Viva's co-creation lab assembles three seemingly unrelated strands of Ciência Viva's identity, interests and networks:

- The first strand is related to the field of “ocean literacy”. For several years, Ciência Viva has developed expertise and grown a robust local and national network focused on raising awareness about marine sustainability, ocean health, etc. This work has been mostly based on campaigns, science education and multi-stakeholder debates. It is now our aim to put this network forward combining it with the following strands and creating something concrete to foster the engagement of the public with ocean sustainability.
- The second strand is based on the maker space/Fab Lab “DOING – augmented factory”, an area of Pavilion of Knowledge. DOING works with the general public as well as schools from greater Lisbon, and has an annual calendar of workshops of various lengths on topics as diverse as programming, digital modelling and fabrication, robotics, soldering, sewing and shoemaking, etc. DOING also collaborates with small tech training companies.

Ciência Viva, through DOING or other teams, has strong ties with the City authorities (the municipality and its departments working with research, innovation, sustainability, etc.), having worked together in EU funded projects (e.g., PLACES) and on the organization of the Lisbon Maker Faire®.

Recently Ciência Viva also worked with the Portuguese government through its Ministry of Science, Technology and Higher Education in several projects that develop participatory and co-creation principles at the national level. These projects include the national participatory budget for science, and the organization of “public participation laboratories”.

#### 2.2.3.4. *Science Gallery Dublin*

In 2008, a forgotten corner of Trinity College Dublin was transformed into a living experiment called Science Gallery Dublin (SGD). Through a cutting-edge programme that ignites creativity and discovery where science and art collide, SGD encourages young people to learn through their interests.

Since its opening, more than three million visitors to the non-profit gallery have experienced 43 unique exhibitions, ranging from design and violence to light and love, and from contagion and biomimicry to the futures of the human species and play. SGD develops an ever-changing programme of exhibitions and events fuelled by the expertise of scientists, researchers, students, artists, designers, inventors, creative thinkers and entrepreneurs. The focus is on providing programmes and experiences that allow visitors to participate and facilitate social connections, always providing an element of surprise.

SGD always focuses on one scientific theme for each exhibition - always an abstract theme that will be used as a lens to focus on different aspects of the topic. For example, the exhibition LIFE AT THE EDGES investigated life in space, extreme environments (e.g. volcanoes), and organisms that can survive high-pressure temperatures. The SGD team design every exhibition, which each lasting around 3 months, meaning that efforts such as design, creativity, and working with experts in these fields are constantly on going.

Currently SGD has four main departments (Exhibitions, Events, Education and Research), with a multi-disciplinary approach, where each department feeds into the other. There are also supporting departments such as the marketing and technical teams.

### 2.3. Implementation of the toolbox and design of the co-creation journeys

- A preliminary engagement for the Labs

The 10 Labs engage in the SISCODE project with the ambition to experiment and better understand co-creation as well as to reinforce the networking between three different types of labs. A preliminary stage has consisted in having a better overview of what was imagined by the labs and understand their disparity in term of intents, ambitions and themes. First insights and data were collected from the different Labs thanks to a first short online survey and a first collective session in the second project meeting held in Barcelona on the 10<sup>th</sup> and 11<sup>th</sup> October. The predominant challenge themes identified were healthcare, agriculture, fab cities, data and rights, ocean literacy, sports and leisure (see Figure 18). At this stage, most of the Labs challenges were identified as undefined and still elusive with an effective need to be refined with a more specific framing. Labs were in demand for support and looking forward a collaborative organization so to better know what to do, how to start and work together.

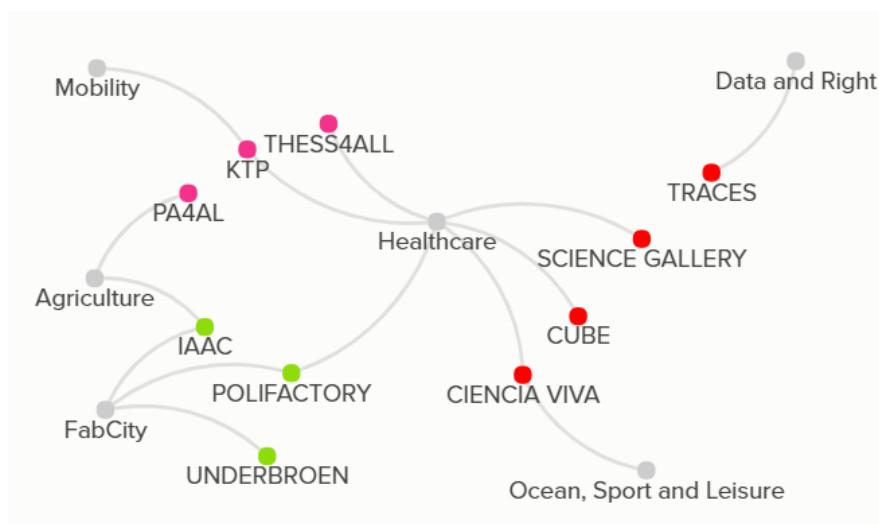


Figure 18: Labs grouped by preliminary themes and type of labs

- Kick-off Meeting and initiation of interaction between labs and WP partners

The kick-off meeting of WP3 has been held on the 7 of November 2018 (using the Blue Jean Visio conference online system) with all labs and organizations involved in the WP3. A reminder of the WP3 agenda (timing and deliverables) and a first version of the toolbox has been presented by the lead WP partner. Additionally, an organization of the communication between Labs and other WP3 partners was proposed to support the definition (and then

implementation) of each challenge and co-creation journey. It was based on three forms of interaction: biweekly remote calls, individual calls, visits and collective workshops.

Between November and January, 5 collective calls (2 in November, 1 in December and 2 in January), and 10 workshops (one in each lab) were realized.

- Internal dissemination of the toolbox: giving online access to the toolbox via Basecamp<sup>12</sup> platform.

During the different calls, all labs have been informed of the different versions of the toolbox. The last version of the toolbox was explicitly described with a moment of questions and answers (Q&A) and then, posted internally so to be accessible for each lab.

- 10 on-site workshops to foster intents, share knowledge and co-design each future journey.

A support group was created with a referent for each type of Lab to design and run the 10 different workshops. This group was composed by POLIMI, IAAC, and CUBE who were referents for the Fab Labs, Living Labs and Science Museums respectively. First, they have defined the agenda and the content of the workshop. Then (between December and January), each referent travelled to each separate lab to run the workshops (see Figure 19). Furthermore, they have regular exchanges via skype and email for gathering feedback on methods, practices and workshop insights.

The workshop was designed to last 1 or 1.5 days according to the needs and availability of the Labs and the Support group. The agenda has set up times for an immersion in each lab with a visit and a discussion of their actual practices of co-creation. The SISCODE co-creation journey was then presented via a common presentation about the project and a review of the SISCODE toolbox. Different moments with the toolbox canvases and 101 methods cards have been scheduled to (1) jointly explore and refine the challenge, (2) define a first version of the stakeholder map and (3) draft their journey. Finally, each Lab documented and draw conclusions about the mainstream planning and upcoming steps. (*See Annex 5.2*)

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<sup>12</sup>More information on <https://basecamp.com/>

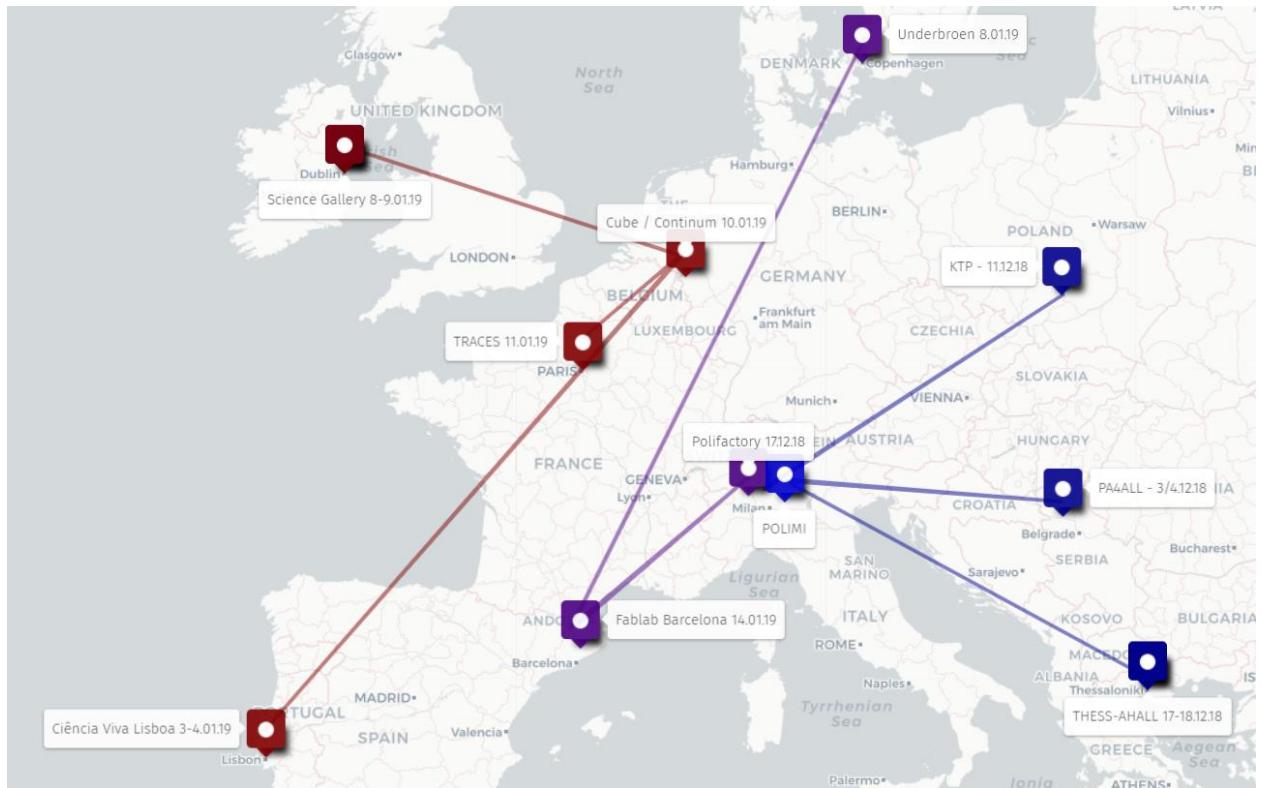


Figure 19: Geographical Map representing the travels for the first workshop

After the workshop, each lab refined the results and shaped a digital version of their co-creation journey. These journeys are presented one by one in the following paragraph.

### 3. The Shaping of co-creation journeys

In this session, we present each lab, with a special focus on co-creation journeys by synthesizing the challenges, canvases and presenting:

1. Lab context including technology and resources, knowledge and competencies and approach to co-creation;
2. Local context including the focused challenges and needs;
3. Policy context including existing, influencing and future policies;
4. A co-creation plan (in term of phases, activities, tools, outcomes);
5. An overview of the stakeholder network is displayed for each lab.

The following table presents an overview of the co-creation challenges defined by each labs:

FAB LABS	
FAB LAB BARCELONA	Fab Lab Barcelona's challenge aims at exploring what could be the <b>future skills</b> developed in Fab Labs for supporting the transition towards more <b>circular cities</b> . It will particularly focus on the field of <b>urban agriculture</b> by engaging students and local communities to contribute to the redesign of future generations <b>of vertical farming systems within a short-loop and eco-innovative approach</b> . The challenge will be situated within the <b>Poblenou and Valldaura territories</b> , engaging entrepreneurs, food cooperatives, local restaurants, the community of makers, students and other local enterprises.
POLIFACTORY	Polifactory's challenge aims at exploring the potential of co-design, <b>new production models and user innovation for the next health and wealth ecosystems</b> . Polifactory will address its challenge with a service design approach and aims to inspire policy making and discussion with a new platform, bottom-up approaches and the <b>engagement of patient associations</b> as key stakeholders to change policies.
UNDERBROEN	Underbroen's challenge aims at addressing how the <b>City of Copenhagen</b> can become more <b>circular regarding material flows and utilization, local design and production</b> , and do it in a collaborative way that empowers both makers, designers, companies and municipal initiatives in <b>creating ecosystems and supply chains for recycling materials</b> such as plastic, wood and textile?
LIVING LABS	
KTP	The KTP's challenge is to improve the <b>quality of the air</b> in Krakow and Malopolska by supporting decision makers in creating the <b>updated regional policies</b> and programs that are not only evidence-based, realistic, measurable and feasible, but are also co-created with the involvement of varied groups of stakeholders through a user-centred approach.
PA4ALL	<b>PA4LL's challenge aims at introducing precision agriculture tools in high-schools</b> for agriculture and uptake of innovation by presenting the benefits of using the <b>ICT</b> and engaging stakeholders such as farmers, agriculture high schools and education policy makers. This also relates to the notion that <b>the younger agricultural household</b> members are a demographic group that has demonstrated higher adoption rates of technology.

THESS-AHALL	Thess-AHALL's challenge aims at <b>facing the social exclusion walls</b> and <b>welcome institutionalized and chronic disease outpatients, as well as older adults</b> , back to the community, introducing the "Participate 4" campaigns.
<b>SCIENCE MUSEUMS</b>	
CIENCIA VIVA	What concrete measures could help engage the widest range of people in <b>recreational marine activities</b> ? What service, equipment or practice can help engaging the public in marine leisure activities, while <b>promoting ocean literacy and awareness</b> , and being accessible to a wide range of users? The challenge will be located in <b>Parque das Nações</b> , a new business and residential area of Lisbon surrounding Pavilion of Knowledge.
CUBE	How might we increase the quality of life of people living and growing up in an <b>ageing society</b> like Parkstad (South Limburg region) and more specifically <b>fight loneliness</b> ? The challenge is related to an increasing number of single-person households, a more individualist but also a more culturally diverse society (due to migration), questions of (regional) identity, and an increasing feeling (or fear) of loneliness.
SCIENCE GALLERY	SGD will address the problem of developing " <b>mental health and well-being management with young people in Ireland</b> ". What is the most important issue to young people today that needs to be heard?
TRACE	How can we enforce our " <b>right to be informed</b> " in automated decision processes using algorithms in everyday life? How can the presence of <b>AI-based supports</b> to professional or everyday life decisions become noticeable and readable for <b>end users / citizens</b> so they can make informed choices in crucial aspects of their lives? How can we make people more <b>conscious of automated decision processes</b> / services / applications and of criteria used by algorithms? How can we make ethical issues explicit and understandable for the generic users?

Table 2: Summary of the challenges defined by each of the 10 Labs pilots

Every journey presented in this section will follow the macro planning presented below:

	M9	M10	M11	M12	M13	M14	M15	M16 to M27
PHASE 1								
PHASE 2								
PHASE 3								
PHASE 4								

Table 3: Overview of the estimated duration of the co-creation journeys

### 3.1.Fab Labs



Figure 20 – Fab Labs in action during their workshops

### **3.1.1. Fab lab Barcelona journey**

#### *3.1.1.1. Lab context*

- *Technology and resources*

The Fab Lab Barcelona is situated in two different locations:

- The main lab is situated in Poblenou. It is composed by educational, research and design areas and digital fabrication spaces for wood, electronic, textile and metal transformation. Diverse digital fabrication tools and equipment are presented in this installation such as Multicam, 3 Milling Machines, Vynil Cutter, Laser Cutters, and 3D printers, Digital Embroidery Machine, Axis Robotic Arm, Metal and Welding Area, Vacuum Press).
- The second installation is the Valldaura Labs where the Green Fab Lab has been created as a self-sufficient habitat research centre. Located in the Collserola Natural Park, in the heart of the metropolitan area of Barcelona, it has laboratories for the production of energy, food and things, and develops projects and academic programs in association with leading research centres around the world such the EU project ROMI, dedicated to open-source high-technologies for rural farming.

The technological and educational resources of the Fab Lab are also based on the development of different platforms, like Fab Labs.io, smartcitizen.me, fabcity.io that enrich the international visibility and development of the Fab Lab community.

- *Knowledge & competencies*

The Fab Lab Barcelona has diverse abilities in terms of research, development and education that will directly serve the SISCODE pilot:

- The Fab Lab has an historical capacity to make products from digital fabrication and to develop connected devices, platforms and visualisation tools related to environmental and social issues. Within the project of the Fabricademy, the textile team has elaborated a new set of techniques to create bio-materials, by adopting a circular economy perspective. With the SmartCitizen project, new connected sensors and a platform has been developed to enable citizens to collect and visualize different data and thus empowering community to better understand their local environment.

- Several European projects have been promoted in the Fab Lab Barcelona, among them [DDMP<sup>13</sup>](#), [ISCAPE<sup>14</sup>](#), [Organicity<sup>15</sup>](#), [ROMI<sup>16</sup>](#), [Grow Observatory<sup>17</sup>](#) and [Making Sense<sup>18</sup>](#). Further, many pilots and open events have been realised in the IAAC, engaging different communities and audiences.
- In terms of education, the Fab Lab is also innovative and pro-active as it supports original educational programs (the Fab Academy, Fabricademy and Bio Academy) and runs different learning experiences like the Wine Maker Labs. The originality of the education approach relied on the concept of learning by doing and fostering global connections between different localities and reach a strong diversity of students.
- *Approach of co-creation*

The approach of the Fab Lab Barcelona cannot be reduced to a specific co-creation method as each context and involved actors are defining their own way to build community and develop projects. The main values behind the co-creation approaches of the lab relies with digital empowerment, social integration, information access, knowledge sharing, open source philosophy, peer2peer production and learning by doing. All the projects are guided by the use of material artefacts and the intent of appropriation of fabrication technologies. Prototyping is at the core of the community of makers and it is their main strength to success in engaging with a strong diversity of stakeholders. Strong efforts are usually made a posteriori to understand the process of creation and to disseminate, in a transparent way, what has happened in the project.

One example is the project “Making Sense” where a co-creation approach to run a citizen-sensing project were designed and disseminated from real experiences. The Making Sense approach is explicitly described in a dedicated book<sup>19</sup> entitled “Citizen Sensing: A toolkit”. The approach is based on 4 cross-cutting principles that are the empowerment, the change-making, the openness and the co-creation itself described as a practice of collaborative development that supports multiple individuals to work together in playing field, using a

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<sup>13</sup> More information on <http://distributeddesign.eu/>

<sup>14</sup> More information on <https://www.iscapeproject.eu/>

<sup>15</sup> More information on <http://organicity.eu/>

<sup>16</sup> More information on <https://romi-project.eu/>

<sup>17</sup> More information on <https://fablabbcn.org/0000/02/09/grow.html>

<sup>18</sup> More information on <http://making-sense.eu/>

<sup>19</sup> More information on <https://issuu.com/iaac/docs/citizen-sensing-a-toolkit>

wide range of resources and ideas, methods and tools to create new actions and objects. The design process to run a citizen sensing project consist in:

- (1) Scoping the project with geographical and common mapping and scheduling tools;
- (2) Building a community with empathy timeline tools + recruitment process;
- (3) Planning what will be measured and what is needed to be calibrated, when, where and by whom;
- (4) Sensing by delivering customized kits for sensors users, containing operational manuals, data journals and open hardware documentations;
- (5) Raising awareness by visualizing and feedback collection tools;
- (6) Taking action for policy changes or community concerns by having a digital presence, using the “future newspapers” ideation tools and run co-creation assembly;
- (7) Reflecting on the project by questionnaires and pilot appraisal;
- (8) Building a legacy of the project using “legacy storylines, developing new training for the next generation of users.

Case-studies of Making Sense in different countries were capitalized and shared within the website. Other co-creation approaches of the Fab Lab can be found in the different online platforms and websites of dedicated projects<sup>20</sup> or in the book “Fab Lab: Revolution Field Manual”<sup>21</sup>.

### 3.1.1.2. *Local context*

- *The challenge*

The challenge aims at exploring what could be the future skills developed in Fab Labs for supporting the transition towards more circular cities. It will particularly focus on the field of urban agriculture by engaging students and local communities to contribute to the redesign of future generations of vertical farming systems within a short-loop and eco-innovative approach.

The challenge will be developed within the Poblenou and Valldaura territories, engaging entrepreneurs, food cooperatives, local restaurants, the community of makers, students and other local enterprises. The challenge is systemic as it supposed to think at both material, product and ecosystem level. Indeed, the stakeholders will have to (1) reach a precise knowledge of the local resource flows, (2) explore new techniques for supporting material innovation from local bio-wastes and other Fab Lab wasted-materials and; (3)

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<sup>20</sup> More information on <https://fablabbcn.org/projects>

<sup>21</sup> More information on <https://www.slideshare.net/sonijug/pdf-book-fab-lab-revolution-field-manual-download-ebook>

propose new product components for existing complex systems by constantly raising awareness of the potential environmental and social impacts they are generating.

In that sense, the lab will propose the creation of several knowledge experiences and the realization of a maker challenge event. Open regular creative spaces for broader discussions will take place in order to support a better understanding about the possible futures of agriculture for cities and a critical analysis of the conviviality of innovative urban agriculture systems like aeroponic technology.

- *Needs*

In addressing the challenge will help the Fab Lab will aim at developing environmentally-friendly practices for the Fab Foundation community, to support the local ecosystem of the Poblenou District towards more eco-effective materials, industrial symbiosis and push the development of the vertical farming community developed by the Next Food and Grow Stack.

- *Factors & Evidences*

Building “eco-design skills” in Fab Labs:

The Fab Lab communities are newly engaged in several projects that involve the idea of rethink the sustainability and localisation of design and manufacturing products. Fab Labs are now perceived as key spaces for actively developing practical knowledge and create interactions with local (re)manufacturing businesses, public institutions, digital networks and more global institutions toward a more sustainable and redistributed manufacturing. Within the Fab City Global Initiative, that was partly created to look for enabling this shift, Fab Lab Barcelona is working to make Barcelona a more locally productive and a globally connected city. For now, the culture of eco-design and circular economy remains still at an embryonic stage in maker education and activities. Kothala (2015)<sup>22</sup> highlights the need to adapt these skills by exploring how the makespaces and their effective practices of social and digital fabrication could better consider, assess and improve their environmental impacts when designing, prototyping, making new systems.

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<sup>22</sup> Kohtala, C. (2015) ‘Addressing sustainability in research on distributed production: an integrated literature review’, Journal of Cleaner Production, 106, pp. 654–668.

Supporting the local ecosystem of Poblenou towards material and product symbiosis:

In Poblenou, considered as the Catalan Manchester, an important plan was established by various stakeholders from civil, public and industrial society to regenerate the area as an innovative and making district with the objective of attracting people to live, work and re-appropriate a space. The place is complex, benefitting from an old-cooperativism spirit mixed with a strong ecosystem of small companies, a new wave of habitants and tourism, and a strong involvement of public stakeholders. There is a need to reinforce the proximity and interaction between stakeholders and activities by better identifying and supporting resource symbiosis, so the district becomes more circular. Urban garden (Huert indignados), Leka restaurant and initiatives of shops for local reuse materials have been identified as strategic stakeholders to engage for providing materials, products and information.

Pushing up new initiatives for vertical farming:

Diverse ongoing initiatives from civil society are emerging for a better food sovereignty in territories by looking for more transparency, organic, fair productive and distributed systems. In this respect, citizens are experimenting with new forms of participation from the creation of urban gardens, food cooperatives and short-loop models contracting with local producers. Makers are now front-end innovators to create open-source solutions for actual and future urban agriculture. The emerging solutions (from aquaponics systems, beehives, indoor aeroponics systems, farming tools) are designed to potentially be used by citizens acting more and more as “prosumers”, in their garden, house, and district. More often, these solutions are still in a prototyping stage, needing to be re-designed, adopted by larger communities and scaled up. This is the case for vertical farming and more specifically for the aeroponic systems developed by Nextfood in Copenhagen and at Fab Lab Bcn.

### 3.1.1.3. *Policy context*

- *Existing policies*

In 2014, the mayor of Barcelona challenged cities to produce everything they consume by 2054. Since then, with the emerging Fab City foundation created in December, a set of values and engagements have been signed by each city involved.

Concerning circular and sustainable policies, Barcelona has engaging successive action plans for transforming the city toward more empowered and sustainable cities. The last

plan<sup>23</sup> (from 2018 - 2030) highlights 18 axes with 4 that are directly related to our challenge that is supporting virtuous cycles, responsible consumption, zero waste and food sovereignty. This document made official the wish of the city to both establish a new program of training for circular economy, impulse the consumption of products from waste revalorization and local food cooperatives and the development of local Fab Labs.

Besides, Barcelona is reputed to create significant actions to better involve citizens in the development of the city like the platform DECIDIM. They also propose specific supports for the different districts as well as dedicated action plans for education, entrepreneurship and social innovation through Barcelona Activa.

Policies in the Poblenou area has a strong history, involving different units like the @22, the Urban Poblenou District and the Maker district with a substantial ambition for innovation, smart and connected infrastructures.

- *Influencing policies*

From a citizen, maker and entrepreneur point of view, it exists important gaps between their needs and the effective implementation of the action plan described below. Here an overview of what has been identified from now during the workshop:

- The field of urban agriculture innovations is still a niche and not enough known and present in the public debate.
- There is no actual possibility for “local” procurement.
- The access to places is still limited for experimental project.
- The status of how to reuse/recycle ‘waste’ is blurred for entrepreneurs
- There are some barriers concerning the quality/ health for prototyping materials and complex procedures to reach label and acceptance on the market.
- There is an important risk of putting in danger the viability of a start-up when new rules/legislations are defined for ‘emerging’ systems’ or “niches”.
- There is a lack spaces for discussing openly and in a transparent way the paradoxes of actual funded projects in terms of societal impacts.

A more deepen analysis of the context need to be done for gathering all the problem that could face designers, makers and entrepreneurs when developing and promoting circular systems for urban agriculture.

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<sup>23</sup> More information on: [http://lameva.barcelona.cat/barcelona-pelclima/sites/default/files/documents/pla\\_clima\\_cat\\_maig\\_ok.pdf](http://lameva.barcelona.cat/barcelona-pelclima/sites/default/files/documents/pla_clima_cat_maig_ok.pdf)

- Future policies

The project can help to democratise the debate on urban agriculture, cross-cutting the communities of neighbours, makers, activists and urban farmers. It might help to identify the actual gaps on Barcelona policy system for implementing the circularity of local resources. This pilot is an action-research that could give tips to make effective a part of actual plan of the city in term for instance of Circular Economy training support. It will act as a first step to identify how Fab Labs could play an important part in new participative policy-making design approaches.

#### 3.1.1.4. *The co-creation journey plan*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Circular economy context analysis (policy–education–research)	Understanding the actual and future implications of CE for makers in city	Desk and field research Discussion with experts	A clear and visual synthesis of CE for the context
	1.2 Local Ecosystem Mapping of Poblenou district	Start to visualise the ecosystem in term of people and flows of materials/products	Interviews Field Activities Simplified Material Flow analysis	Resource- Stakeholder-Geographical Mapping
	1.3 Socio-technical analysis of Urban Agriculture (UA) systems	Understanding the complex aeroponic system of Next Food.	Interview with Rasmus System analysis/disassembly Course design	Educational kit for UA-Nextfood List of potential improvements
Phase 2. Reframe Problems	2.1 Recruitment	Engaging stakeholders for the: (1) board of the pilot; (2) maker challenges	Open call Personalised emails	List of contacts
	2.2 Raising and exchanging knowledge	Creating a common knowledge base for stakeholders and raising interests for the pilot	Running an event with thematic knowledge workshops and engagement tools Field Visits	Post-event synthesis with list of participants and contents and feedback
	2.3 Framing opportunities	Sharing a clear view of the challenge opportunities	System Hotspot analysis Assessment matrix creation	Descriptive Value Web – Opportunity map

<b>Phase 3. Envision Alternatives</b>	3.1 Maker challenge	Engaging creative communities in a X days event for imagining the future material recipes, new components and local synergies	Digital communication Series of experiences Hackathon in Barcelona Design week	List of solutions and first prototypes Idea Cards
	3.2 Refining and selecting concepts	Analysing the maker challenge results to “redefine and select” the project(s)	Systemic analysis for conviviality Peer 2 Peer Assembly?	Tree-Map and synthesis document
	3.3 Planning the next steps	Co-creation of the plan for phase 4	Establishing Road Map Plan	Roadmap plan
<b>Phase 4. Develop and Prototype</b>	4.1 Loops of Implementation	Implementing the first journey iteration	From CAO/BM models to a set of prototypes Work with students?	Storyline of the “making”
	4.2 Open Source Documentations	Making accessible the system created	See other fab products	Open Source Kit
	4.3 Assessment and testing (user, scale)	Analysing the gains and pains for users + society	User Journey – UX tools Simplified LC / Fab.city / Convivial matrix	Assessment report
	4.4 Dissemination	Opening the debates and communicate on the pilot process and results	Design Week Events DDMP? GrowStack? Policy Maker workshop?	Photos, visuals and posts

Table 4: Design of the co-creation journey of Fab Lab Barcelona

### 3.1.1.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
Fab Research Team	Internal staff with a diversity of skills	x					All P.A: management and knowledge sourcing, production	Y
Next Food and Grow Stack	Vertical farming community		x				1.3: Data sharing P2,3,4: support of communities	Y
Leka and other restaurants	Local engaged restaurants		x				1.2: Consultation 2.2: Good Practice Presentation 3.1: Participation, Waste collection? 4.1+4.3: User feedback	Y
Urban Gardens and Valldaura	Community of “outdoor” makers		x				Idem as LEKA 4.1: Peer 2 Peer supports	Y
Schools and local associations	Young and/or motivated people of the district		x				2.1 + 3.1: Participation to the Maker Challenge 4.3: User feedback	N
Students and Makers	Community of fab lab students from IAAC/Fab Foundation		x				1.1 Gathering feedback on fab lab practices 2.2+3.1+3.2+4 Participation in the community	Y
Poblenou ecosystems	Companies, Shops, Makers, Citizens	x			x		1.2 Feeding the mapping 1.3 2.2+3.1+3.2+4 Participation in the community	Y
Ateneu(s)	Public fab labs in the cities like “la Fabrica del Sol		x				1.1 Gathering feedback on fab lab practices 1.4 2, 3, 4 Sharing tools/spaces and involvement in the challenge	Y
Barcelona Activa	Public institution for innovation / education			x			1.1 + 1.2 Consulted 2+3 To be defined 1.2 4.4: Participation in policy workshop	Y
@22 / BIT / Poblenou Urban District	Poblenou public/private institutions			x	x		1.2. Feeding the mapping 2, 3, 4: support for dissemination 4.4: Participation in policy workshop	Y
Barcelona Ecologia / Decidim	Public institution for Climate Change / Sustainability			x			1.1 + 1.2 Consulted 2+3 To be defined 4.4: Participation in policy workshop	N
Foodcoop(s) And activist initiative	Cooperative of consumers and other engaged initiatives	x		x			1.3 Interview with Ricard Espelt 2.2+3.1+3.2+4 Potential participation in the community	N
Other researchers	(ICTA / Degrowth / RMIT, Elisava, abroad researchers)	x		x			1. Consultation 2.2 Participation in KE 3,4 Expert consultation/ P2P	Y

Table 5: Stakeholders on the co-creation journey of Fab Lab Barcelona

### 3.1.2. Polifactory journey

#### 3.1.2.1. *Lab context:*

- *Technology and resources*

Polifactory is a 280sq.m makerspace, which combines a Fab Lab and a co-working area. It is equipped with a large collective iconic table intended to accommodate the designers and research community, with a machine shop and workshop having a set of digital fabrication machines: laser cutter, CNC milling machines, 3D printers, and an electronics bench. There is also a reconfigurable space for presentations, workshops and events, a kitchen and a living room which encourage people to socialize. The spatial configuration of Polifactory is specifically conceived to enable collaborative design and prototyping processes, didactical and cultural activities hosting a multidisciplinary, heterogeneous and project-based community: designers with different backgrounds, economists, service and manufacturing companies, craftsmen, experts in life science and social science and humanities, associations of citizen, professionals, companies, and policy makers from local to foreign institutions. In a unique place it will be possible concentrate many design, execution and implementation activities of the pilot.

- *Knowledge & competencies*

Polifactory team has already carried out several research both in healthcare, manufacturing and policy-making areas in an RRI perspective. According to the different phases of the challenge, specific projects can be listed and testify the available competences of Polifactory:

- a. Co-design and launch of a social and open innovation challenge

**Fabcare** is an experimental initiative part of DDMP - Distributed Design Market Platform (Creative Europe Programme, [distributeddesign.eu](http://distributeddesign.eu)) created to stimulate designers, makers and indie innovators to co-design open source healthcare solutions that can be distributed through digital platforms and materialized within the Fab Labs community ([Fab Labs.io](http://FabLabs.io)).

- b. Experimental, responsible and critical making

**Next Design Innovation** ([nextdesigninnovation.it](http://nextdesigninnovation.it)) was a pilot-project developed in collaboration with Regione Lombardia, Regione Catalunya, and Escuela Elisava that engage regional policy makers and universities to co-design an innovation challenge that stimulated young design professionals to explore and demonstrate the potential of digital fabrication in the development of interactive product-service systems for traditional manufacturing sector.

### c. Policy co-design (and prototyping)

**Mi-Generation Lab** ([migeneration.it](http://migeneration.it)) was a pilot-project coordinated by the Municipality of Milan based on a set of free educational courses focused on the use new technologies, finalized on the development of new skills and on the production of entrepreneurial ideas in innovative areas. The project was dedicated to over 200 young and elderly students from 18 to 35 years old, precarious or unemployed, with residence or domicile in Milan.

**Maketocare** ([maketocare.it](http://maketocare.it)) is a research project that aims to identify, map and represent an emerging ecosystem of patient innovators, independent researchers, research institutions, med-tech entrepreneurs, makers, Fab Labs and workshops for digital production that work for the development of concrete design solutions capable of improving the everyday life and health of persons living in situations of disability.

- *Approach of co-creation*

Polifactory usually collaborates with companies, universities, citizen, companies and professional associations, public bodies and institutions in order to co-develop research activities or to co-design experimental and cultural initiatives, which often are based on public events or challenges. For example, in the FabCare initiative Polifactory has involved companies, hospitals, policymakers, and Fab Labs in the whole process that range from the co-design of a challenge (open call for ideas) the evaluation and selection of ideas and in the final development of the prototypes by a group of designers. As a result of Maketocare project, Polifactory has been developing a Patient Innovation Ecosystem and a Patient Innovation Ladder to support the development of people-powered healthcare and patient innovation in local and national health policies. Thanks to the work done for this project, Polifactory has been involved in workshops, meeting, conferences on RRI and social innovation topics in order to promote the idea of structure open and user innovation ecosystems in the healthcare sector.

#### 3.1.2.2. Local context

- *The challenge*

Within SISCODE, Polifactory's challenge is to **explore the potential of co-design, new production models and user innovation for the next health and wealth ecosystems**. Polifactory will address its challenge with a service design approach and aims to inspire policy making and discussion with a new platform, bottom-up approaches and the engagement of patient associations as key stakeholders to change policies. Coherently with

SISCODE objective and the co-creation journey, the basic structure of the pilot developed by Polifactory is based on the following three pillars:

- a. *Co-design and launch of a social and open innovation challenge* stimulating the co-creation of healthcare solutions embedding RRI and policy making issues.
- b. *Experimental, responsible and critical making*. Collaborative prototyping of healthcare solutions through experimental, responsible and critical (co)design and making activities developed by designers with patient innovators and associations, and actively involving policymakers. Prototypes will be used to demonstrate and stimulate new and shared forms of health literacy and agency for citizen, companies, researchers and policymakers.
- c. *Policy co-design (and prototyping)*. Citizen, companies, researchers and policymakers co-design guidelines for the development local/regional policy innovation initiative for the development of an open and user innovation ecosystems in the healthcare sector.

At the moment, great attention has been paid to the patients' association to involve in the pilot. Indeed, in order to achieve good results, the following aspects are crucial in the selection: (1) *representativeness*: type of pathology and the number of patients represented by the association. Some diseases, such as the rheumatic', which are degenerative and chronic pathologies, allow more easily and efficiently to involve patients and to develop co-created solutions with a large number of stakeholders. Other diseases such as oncological may have higher levels of difficulty and incompatibility with the timing of the pilot; (2) *operability*: local action capacity and distribution throughout the country; (3) *organization*: design and communication skills owned by the association, which would be suitable to participate in the pilot; (4) *experience*: participation in previous co-creation initiatives in collaboration with designers e policymakers; (5) *motivation*: commitment and effort in the active participation in the pilot activities.

- *Needs*

From one side, **innovators and entrepreneurs** have been paying more attention and increasing their investments in products and solutions, which connected AI, big data, co-design processes, wearable devices with the medical world. This trend was evident also in

the last edition of BioUpper<sup>24</sup> challenge where accelerators and incubators supported the applicant start-ups were in the development of the project.

From the other side, there is an increasing need (due to time issues of the public healthcare system and costs of the private) and willingness for **patients** to be involved in the cure and recovery processes. However, as we are going to explain in the following section, a major role of patients should not correspond to an absence of the medical staff from the whole process. Moreover, “Patient-centred care” (PCC) has emerged as a primary approach to health care. This approach emphasizes partnerships in health between patients and healthcare professionals, acknowledges patients’ preferences and values, promotes flexibility in the provision of health care and seeks to move beyond the traditional paternalistic approach to health care. Thus, in addition to the physical aspects of health care, the PCC approach acknowledges a patient’s beliefs and values towards wellbeing.” (Delaney, 2018)<sup>25</sup>.

**Nesta Health Lab** ([nesta.org.uk/project/health-lab/](https://nesta.org.uk/project/health-lab/)) represents a good example of the importance of patients in relation to the cure and recovery processes. Nesta Health Lab is a centre of expertise on people-powered and data-driven health, where test and scale up new sources of “people powered” health support. Some of the innovations have reached significant scale, able to deliver their services to any public service nationally that commissions them.

- *Factors & Evidences*

Notwithstanding the fact that Italy ranked as the world’s healthiest country, and fourth in the health system efficiency rank (Bloomberg, 2018)<sup>26</sup>, decreasing good perception and trust in the medical system has been manifested by the Italian population. However, it must be highlighted that the differences between North and South are still relevant. 4 Italians out of 10 (23.6 million people) are affected by a **chronic disease**; while 1 in 4 among the adult patients is affected at least by two chronic conditions. Another alarming data is about the increasing use of antidepressants (40 doses per 1000 inhabitants).

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<sup>24</sup> More information about BioUpper study, an Italian platform which promotes and support start-ups in life sciences sector on [https://www.repubblica.it/salute/medicina-e-ricerca/2019/01/18/news/bioupper\\_intelligenza\\_artificiale\\_e\\_smart\\_device\\_vincono\\_la\\_sfida\\_delle\\_startup\\_bio\\_mediche-216803182/](https://www.repubblica.it/salute/medicina-e-ricerca/2019/01/18/news/bioupper_intelligenza_artificiale_e_smart_device_vincono_la_sfida_delle_startup_bio_mediche-216803182/)

<sup>25</sup> More information on [www.collegianjournal.com/article/S1322-7696\(17\)30042-2/pdf](http://www.collegianjournal.com/article/S1322-7696(17)30042-2/pdf)

<sup>26</sup> More information on [www.bloomberg.com/news/articles/2018-09-19/u-s-near-bottom-of-health-index-hong-kong-and-singapore-at-top](http://www.bloomberg.com/news/articles/2018-09-19/u-s-near-bottom-of-health-index-hong-kong-and-singapore-at-top)

According to the latest Eurispes report (2017), about 13 million Italians would rely on alternative treatments and of these almost 10 million (76.1%) would choose homeopathic ones. This is not necessarily bad, but the most discussed topic of recent debate is that of vaccinations since from 2010 there has been a decline in vaccines against infectious diseases, especially in childhood<sup>27</sup>. This behaviour is part of a “do-it-yourself” medicine trend. Misinformation is spread through the internet, social networks and TV as well; more than 40% of people prefer **self-diagnosis**.

Interviews with doctors carried out for previous research (Maketocare) confirm this counter-productive behaviour of patients. Indeed, in many cases patients, when they do not make the diagnosis and the cure by themselves, tend to adjust and correct the treatment without consulting the doctor first.

As mentioned above, the habit of independently facing own small health problems is not necessarily bad; experts speak of a process of “autonomy”, which is well evaluated by operators in health policy because it reduces public spending and allows doctors to focus on most serious pathologies. However, self-managed medicine is neither easy nor risk-free. This is why Assosalute, already in 1997, created an Observatory on Responsible Self-medication<sup>28</sup>.

Within this panorama, **makerspaces** and creative communities in Milan are particularly active in projects that deal with healthcare. Italy is advanced in this area. Italian Fab Labs collaborate and operate on these issues together with patient associations, policy-makers and RRI experts in several European projects, such as *FabCare* and *MakeToCare* (Polifactory); *Made4You*, *Hackability Milano* (OpenDot); *OpenCare* (WeMake); *Ubora* (Fab Lab Pisa). *Smart-Map* research has repeatedly involved Italian Fab Labs (Polifactory, Fablab Milano, WeMake, OpenDot, FabLab Pisa) on issues related to healthcare, RRI and policy making.

These collaborations are very important especially for users, since, “*Research has shown that many users ‘drop out’ of the innovation process before having realized a prototype and may be doing so too early for what is socially optimal, leaving potentially valuable ideas undeveloped.*” (Svensson and Hartmann, 2018, p.278)<sup>29</sup>

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<sup>27</sup> More information on <https://edition.cnn.com/2018/08/07/health/italy-anti-vaccine-law-measles-intl/index.html>

<sup>28</sup> More information on [http://www.repubblica.it/www1/cultura\\_scienze/automed/automed/automed.html](http://www.repubblica.it/www1/cultura_scienze/automed/automed/automed.html)

<sup>29</sup> More information on [https://osuva.uwasa.fi/bitstream/handle/10024/7487/isbn\\_978-952-476-497-1.pdf?sequence=1](https://osuva.uwasa.fi/bitstream/handle/10024/7487/isbn_978-952-476-497-1.pdf?sequence=1)

### 3.1.2.3. *Policy context*

- *Existing policies*

In Italy, the healthcare policy system and service sector are mainly structured at a regional level. Lombardy is one the most populated European region and has one the most advanced healthcare system in Italy and Europe. In 2014, Lombardy Region published the White Paper on the development of the social and health system in Lombardy, followed by the issue of the law of reorganization “Evolution of the Lombardy socio-economic system” (August 2015). At the local level, however, at least two themes were recently debated. One refers to the increasingly widespread practice of co-designing, and, in particular, the transition from co-planning to the co-management of services/interventions in the social area and these practices are transforming the relationship between public and private.

**Co-design** was implemented as a way to improve the governance of local social policies in order to give more responsibility to the different subjects involved and to strengthen the sense of belonging to public policy projects and programs. It is, therefore, a way to improve the efficiency and effectiveness of community welfare actions. The other level concerns experiences of **community welfare** spread in Lombardy thanks to the program financed by Fondazione Cariplo with the tender called *Welfare in Azione* (transl. Welfare in Action). A call for proposals that has set the ambitious objective of changing welfare systems through innovation processes, enhancement of community resources and participatory governance.

**Fondazione Cariplo** (a philanthropic organization based in Lombardy) is particularly active in this field. Indeed, it manages the program *District of Rehabilitation*, started in 2014, which includes several activities and projects, such as the *CREW - Codesign for REhabilitation and Wellbeing*. This project wanted to create innovative technological solutions in the motor and cognitive rehabilitation field and was aimed to facilitate social inclusion for people with permanent, temporary or age-related disabilities. *CREW* was based on the European model of Responsible Research and Innovation (RRI), using co-design as a methodology to express and identify the needs and find possible solutions.

- *Influencing policies*

The Municipality of Milan is focusing on five main lines of action, which are influent for the focus of this pilot<sup>30</sup>:

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<sup>30</sup> More information on [http://urbact.eu/sites/default/files/milan\\_iap\\_2018.pdf](http://urbact.eu/sites/default/files/milan_iap_2018.pdf)

- a. *Hybrid Enterprises & Urban Regeneration*: these enterprises mix profit and non-profit, different sectors, and several stakeholders take part in them. They generally participate in processes of urban regeneration.
- b. *Sharing & Collaborative Economy*: in the Milano Sharing City guidelines, a Sharing City is defined as “an ecosystem where the different actors are solution holders in a virtuous process of **co-design**, **co-development**, and **co-management** of practices, spaces, goods, and services”.
- c. *Start-up & knowledge-intensive economy*: Milan wants to stimulate the **synergy** between universities, research centres, and the entrepreneurial world.
- d. *New Craft & Urban Manufacturing*: are platforms for **experimentation** and **collaboration**, thanks to which it might be possible to create new jobs, regenerate suburbs and promote social cohesion.
- e. *Smart city & Smart citizens*: this line is focused on technological and economic development, social cohesion, and participation in the city.

These lines follow and focus on 3 cross-sectorial actions:

- a. *Participatory Planning*: e.g. How to design policies?
- b. *Impact Measurement*: e.g. How to evaluate policies?
- c. *Impact Finance*: e.g. How to finance policies?

In addition to that, at regional level, Lombardy Region founded the Life Sciences Lombard Cluster, which collects all the public and private actors committed with diagnostics, advanced therapies, pharmaceuticals, medical devices and technologies applied to health, to better facilitate the progress of life sciences in Lombardy and the creation of new business opportunities among the members. In line with the cluster, Lombardy Region organizes the *Research and Innovation Hub*<sup>31</sup> competition. The aim of the call is to strengthen the innovative capacity of the territory and the infrastructures of research and innovation, to make ease the process which goes from ideas and their implementation.

- **Future policies**

Svensson and Hartmann (2018) identified three main issues about user innovation to target in order to favour the social welfare improvement: the 1) non-development, 2) under-development and 3) under-diffusion of user innovation ideas. The kind of policies needed would be able to “enable or encourage more innovation effort investment by users at either the extensive (i.e. having **more users engage in innovation** or innovation diffusion) or intensive (i.e. enabling users that already innovate or **diffuse innovations** to invest greater efforts in doing so)” (*ibidem*, p. 279). Therefore, Polifactory thanks to the pilot wants to

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<sup>31</sup> More information on <http://www.openinnovation.regione.lombardia.it/landing/default/hub>

favour the acquisition of a participatory approach in the process of policy development; in the specific cases focused on healthcare and user innovation. These policies should regard also the facilitation of networking and collaboration among different stakeholders, would improve inclusivity at various levels, would identify specific roles of design and its specializations, and would support the creation of innovative start-ups.

### 3.1.2.4. *The co-creation journey plan*

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Desk Research	Gather knowledge about topics of co-design in healthcare (innovation, policies)	Desk research	Overview of bottom-up policies for healthcare; models of co-creation labs and their initiatives; relevant stakeholders
	1.2 Stakeholder identification	Gathering on the main challenges Evaluate stakeholder interest in the participation in the pilot	Informal interviews and conversations with researcher who work in these fields and with the identified stakeholders	Confirmed list of relevant stakeholders to involve in the pilot
	1.3 Synthesize & analyse data	Collect data and analyse	Data Analysis Evaluation	Report on the data collection with recommendations
Phase 2. Reframe Problems	2.1 Reasoning with analysis of the context	Deeper understanding of the local challenge	Analytical thinking Analogous models	Outline of the clear vision of the local challenge
	2.2 Innovation challenge design	Co-design an innovation challenge to co-create solutions to stimulate a new healthcare ecosystem	Co-design workshop	Launch of the challenge for the pilot
Phase 3. Envision Alternatives	3.1 Innovation challenge conduction/Ideas generation	Proposal of innovative healthcare solutions	Co-design workshop	Summary of innovative healthcare solutions
	3.2 Innovation challenge conduction/Ideas selection	Ideas evaluation and selection	Co-design workshop	Selection of innovative healthcare solutions

<b>Phase 4. Develop and Prototype</b>	4.1 Innovation challenge conduction/ Ideas development	Collaborative development of healthcare solutions	Co-design workshop	Development of innovative healthcare solutions
	4.2 Innovation challenge conduction/ Ideas prototyping	Collaborative prototyping of healthcare solutions	Co-design workshop	Prototypes of innovative healthcare solutions Prototypes evaluation by user (patient association) policymakers and other stakeholders
	4.3 Policy co-design for citizen, companies, researchers and policymakers	Co-design experimental initiatives to stimulate new forms of health literacy and agency	Co-design workshop	Policy co-creation guidelines and recommendation (report)

Table 6: Design of the co-creation journey of Polifactory

During the workshop, several tools from the 101 Design Method Book has been selected from the activities 2.2 to 4.3: Role Play ideation, Behavioural Prototyping, Experience simulation, Innovation brief, Venn Diagramming, Swot analysis, Concept Metaphor, Concept prototype, Concept Scenario, User map journey, Activity network, Pilot Development and testing, User group definition. However, the team cannot say at this stage what will be their final selection.

### 3.1.2.5. *Stakeholders involved in the co-creation journey plan:*

The team has identified the typologies of stakeholders to involve in the co-creation journey which they are going to inform and consult in the following days:

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
Civil Society/NGOs	Involvement of at least one Patients and caregivers association <sup>32</sup>		X				<i>2.2 + 3.1 + 3.2 + 4.1 + 4.2 + 4.3 Innovation challenge conduction/Ideas generation, selection, development, prototyping, policy co-design</i>	Y
Policy makers	Involvement of local policymakers: Regione Lombardia, Municipality of Milan, Milan Chamber of Commerce)		X				<i>2.2 + 3.1 + 3.2 + 4.1 + 4.2+ 4.3 Innovation challenge conduction/Ideas generation, selection, development, prototyping, policy co-design</i>	Y
Companies	Involvement of companies among these categories: Digital fabrication (e.g. WASP), Med-tech, Pharma-Healthcare companies (e.g. Sanofi Genzyme), Innovation hubs, and Social Enterprises			X	X		<i>2.2 + 3.1 + 3.2 + 4.1 + 4.2+ 4.3 Innovation challenge conduction/Ideas generation, selection, development, prototyping, policy co-design</i>	Y
Scientific & Research communities	Involvement of Technical Universities (School of Design and School of Engineering – Politecnico di Milano) and eventually other Universities and/or Hospitals (e.g. Humanitas, San Raffaele Hospital, if compatible with the pilot)	X	X				<i>2.2 + 3.1 + 3.2 + 4.1 + 4.2+ 4.3 Innovation challenge conduction/Ideas generation, selection, development, prototyping, policy co-design</i>	Y
Designers and makers	Involvement of junior and senior designers, local Fab Labs (e.g. OpenDot)	X	X				<i>3.1 + 3.2 + 4.2 + 4.3 Innovation challenge conduction/Ideas generation, development, prototyping, policy co-design</i>	Y

Table 7: Stakeholders on the co-creation journey of Polifactory

<sup>32</sup> Polifactory is considering selecting an association among following categories: rare diseases (e.g. Huntington's diseases), degenerative diseases (e.g. amyotrophic lateral sclerosis), chronical diseases (e.g. atopis dermatitis) and rheumatisches diseases (e.g. rheumatoid arthritis).

### **3.1.3. Underbroen Journey**

#### **3.1.3.1. Lab context**

- *Technology and resources*

Underbroen holds more than 300m<sup>2</sup> of workspace for working with local and distributed production and co-creation processes that engage citizens, policy makers, organizations and companies in sustainable solutions to local as well as global challenges. Underbroen is therefore a place for experimentation and development of engaging design practices, innovation and prototypes.

Tools and Technology available in the Lab:

- Laser Cutters: 100W, 1200x900mm and 80W, 500x600mm;
- 3D Printers: 2x Prusa I3 MK3, 3D scanner for iPad Pro, ROSTOCK MAXTM V2
- CNC mills: 180x124cm, metal CNC, metal engraver, and one full sheet CNC (available in BetaFactory);
- Wood Workshop: Wood lathe, Band saw, Plunge saw with guide rails, Crosscut/Mitre saw, Drill press, Screwdrivers, Belt sanders, Eccentric grinder, Compressor, Nail gun and various hand tools;
- Metal Workshop: TIG and electrode welding systems, Grinder, Bench Grinders, Mini-lathe (available in BetaFactory);
- Graphic and Printing Workshop: HP DesignJet Z3100ps large format photo printer, Cast iron presses, Silhouette Studio vinyl cutter, Black/white and colour A4 printers, A4 Scanner;
- Electronic Workshop: Soldering station (with extraction), Heat gun, Mini drill press, Oscilloscope, multimetres and we also have a huge rack with lots of electronic goodies
- Open Innovation Materials and Tools: all materials for ideation, design thinking and rapid-prototyping;
- Plastic shredder (Precious Plastics Machines).

Maker can also get cheap access to BetaFactory, which is a newly opened flexible factory in Copenhagen. BetaFactory has around 2000 m<sup>3</sup> with a big traditional and digital wood workshop, full metal workshop, 3D printers etc. We pool resources and competencies from the members that work at Underbroen and BetaFactory. Currently counting 70 active members with expertise in various fields (i.e. industrial design, software engineering, interaction design, etc.). We involve and consult our members in projects for valuable knowledge and technical consultancy, as well as in co-producing and sub-contracting specific technical tasks.

- *Knowledge & competencies*

Maker has knowledge about materials, design and production (makers and designers) and about building and working with prototypes (products and services). Maker fosters the emergence of a full supply chain (ecosystem) for working with recycled plastics – from factories (waste contributors), MatKon and other specialists who can clean and sort it, makers/designers who can design and develop products from recycled plastics, shops who are willing to sell the products and customers who are willing to deliver the products back instead of throwing it out. They own and disseminate a small catalogue of products made from recycled plastics (ChipChop, Slik Design Studio, and Von Plast) and are part of an innovative and creative environment within various sectors focusing on sustainable urban development, design and architecture. Maker's employees at Underbroen have been working with the maker movement and fab labs as a field, as well as on experimenting with its related design methods in cross-sectorial collaborations at since 2014. They have experience in organizing and facilitating innovation and development sprints, and hackathons with companies, citizens and members at Underbroen. Maker is also part of the Fab City Network that works to promote and implement the fab city agenda globally. Maker's employees are also experienced in various topics (Fab City Agenda, Urban development, Micro entrepreneurs, Open innovation etc.) and have a vast knowledge in different public engagement formats, including workshops, network and knowledge events and facilitated processes.

- *Approach of co-creation*

For the Maker team, co-creation is a process that can happen facilitated (formal) and/or spontaneous (informal), and most of the time (when done properly) in iterations. The strength in both cases is the ability to involve, engage and learn from various stakeholders (also within a common group - e.g. makers), and collectively define and develop various outcomes.

Co-creation in Underbroen often happens from a tactile (hands on) starting point, where tools such as hackathons, prototyping and prototyping is part of the initial phases, and is often used as a tool as part of the ideation phase (and ongoing), to complement traditional brainstorming and post-it exercises. This is called “a maker mind-set” and presents it to a broad network of stakeholders from various sectors that we engage and collaborate with, as well as in company innovation workshops/processes facilitated by Underbroen.

In the case of Underbroen, co-creation mostly happens on two levels: *informal and formal*. Informal co-creation happens as spontaneous and un-facilitated processes (informal co-creation), where sharing of knowledge, ideas, competencies and labour is a means to the best possible outcome – the team and their members has co-create the space, all the projects and products as well as the knowledge and competencies present in Underbroen. On a more formal scale, co-creation in Underbroen often means the mediation between our maker community (specialists in informal co-creation), SME's, the Municipality and organizations, with a joint focus on co-developing (ideating, designing, developing, implementing) ideas, solutions and products.

By including and implementing knowledge from all relevant stakeholders in the lab, the distance between ideation and implementation is often delimited, as cross-sectorial and trans-disciplinary knowledge and experience is taken into account from the initial stage. The implementation and experimentation of “a maker mindset” (design thinking, prototyping and iterative design methods), mostly affect all stakeholders positively, as it provides a tactile common ground and a co-creational design tool for working with concrete challenges.

### **Co-creation example: Rattrap Case**

The rattrap case was a project running for one year (2017) on improving, re-developing and testing hardware improvements to rattrap solutions for the pest's unit in Copenhagen.

- Solutions to be integrated in existing solutions MO and purchased products
- Existing solutions were varying in quality and “hit rate” due to experiences flaws
- Hardware adaptations and new Wi-Fi and GPS solution was integrated, and pilot tested

The rattrap case involved employees from the local pest's unit, decision makers from Copenhagen Solutions Lab, as well as managers and expert members from Underbroen. First step was a thorough mapping and evaluation of existing solutions. Thereafter, the second step was ideation and conceptualisation of new solutions that incorporated a GPS/GSM solution for data collection and monitoring. Three functional prototypes were built and tested during summer 2018.

### 3.1.3.2. Local context:

- *The challenge*

The EU produces 25 million tonnes of plastic waste per year – and less than 1/3 is recycled<sup>33</sup>. From the perspective of a makerspace/fab lab, small design company or other design and hardware facility it can be difficult to get access to and to reuse/recycle materials in a way that enables high quality material standards and the possibility of scaling production. At the same time we experience an increasing interest and willingness to collaborate between sectors to actually address pressing environmental issues regarding waste management and recycling.

The challenges that Underbroen (Maker) will address in Copenhagen is to explore how prototyping and localized production as part of co-creation processes can be used as a tool for creating a better, more sustainable and more empowering Copenhagen. **How can the City of Copenhagen become more circular regarding material flows and utilization, local design and production, and do it in a collaborative way that empowers both makers, designers, companies and municipal initiatives in creating ecosystems and supply chains for recycling materials such as plastic, wood and textile?**

The challenge that Underbroen (Maker) addresses is connected to the Fab City agenda, with a core objective of developing and promoting local production and recycling in the city.

#### *What materials and waste products will we address?*

The growing group of on-boarded stakeholder already points to plastic being one of the materials that we will work with. Apart from plastic, wood and textile are large and problematic waste fractions that we will work on as well. Especially since we as a Fab Lab create a large amount of wood waste ourselves.

#### **Desired Outcomes**

- 5 to 10 concepts for recycling materials (products/services).
- Max 3 prototypes of locally designed and produced products made from recycled materials (plastic, wood, and textile). The requirements will be connected to the fab city initiative and therefore also be focusing on local production and global distribution (open source, distributional and made for replication).
- The development of a collaborative blueprint and the prototyping on an ecosystem (supply chain) for recycling the three fractions (plastics, wood and textile).

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<sup>33</sup> More information on <https://plasticchange.org/media/40915/praesentationsbrochur-uk.pdf>

- The aim is to develop a prototype that solves infrastructural and organizational tasks such as *logistics, sales channels and collection, product development and design, and finally production*.

- *Needs*

The challenge comes from the emergence of several needs:

- Need for establishing and experimenting with circular production models - especially with a focus on micro entrepreneurs (makers, small design companies etc.) and SMEs.
- Need for flexible and agile test zones for activities supporting the fab city agenda and circular models for production and co-creation.
- Agile business models and legislation supporting micro entrepreneurs and SMEs keen on establishing circular models and local production.
- Need for establishing better systems for direct recycling and to transform plastic waste into valuable materials (high standards and commercial quality and quantity).

On a broader scale, the challenge is based on the necessity to solve different environmental problems present in actual global value-chains (especially regarding energy waste and transportation costs) by relocating more recycling activities in cities.

Create new sustainable and local recycling systems can also contribute to the reduction of cities' "ecological footprint" in a context of urbanization where more and more people live in cities, which means more construction activity to meet housing demands, which again means more waste.

- *Factors & Evidences*

Underbroen collaborates with a vast and diverse group of stakeholders. Besides Danish and international makerspaces and Fab Labs, the lab has collaborated with the Danish Technological Institute (a government run R&D institute for business, industry and private citizens specialized in fields like material innovation, production, business and science) and non-profit organizations with large networks in the fields of urban development, design, tech (e.g. Bloxhub, Danish Architecture Centre, and Danish Design Centre). In regards with Policy Makers, Underbroen has the potential to reach officers and decision-makers in the varied municipal departments including the Dep. of Culture and Leisure and Dep. of Technology and Environment.

Since working with circular economies in Copenhagen, Underbroen's journey can benefit from a well-functioning waste sorting system, both as system per say and as a culture, since Copenhagen citizens have demonstrated good practices in waste management. This means potential for well sorted and high-quality resources from waste materials, and therefore better source material and systems for prototyping. At the same time, Denmark has a proud history of cooperatives, which is a social and cultural mentality that potentially can support and develop a circular productive agenda/model.

Copenhagen, and Denmark in general already has a well working waste management infrastructure and system (but not when it comes to recycling locally). Further, Denmark, and especially Copenhagen, is a recycling city and the citizens are very engaged in and aware of the benefits of sorting and recycling. This means well-sorted and high-quality resources from waste materials.

Denmark has a proud history of cooperatives, which is a social and cultural mentality that potentially can support and develop a circular productive agenda/model.

There is already a great and broad agreement among citizens, policy makers and industry players, on the importance of sustainable design and a general attention and support around the agenda. For example, the concept of “design-for-disassembly”, material transparency and flexible design is pushing forward by the city and designers.

However, the challenge will face different difficulties at a technological and systemic level. At a technological level, the infrastructure, tools and machines for recycling e.g. plastic remains expensive to buy, and difficult to process in a manner that the final material standards are of a quality that makes sense on a commercial scale but still produced in a fab lab/makerspace setting. In a systemic point of view, it exists some barriers to overcome at a policy level (lack of agile legislation and service systems for circular production and business models) and governance level (lack of successful and established cross-sector collaboration working on recycling and local production).

### 3.1.3.3. *Policy context*

- *Existing policies*

Danish legislation makes it difficult to directly reuse and source materials from resource centres, since it is illegal to source material from these places. However, many resource centres have set up shops. The downside here is that normally it's not materials etc., but more often old furniture and toys. Procurement policies do not embed recycled materials or

sustainable materials. Denmark has well-functioning waste management plans, but still struggle with utilizing waste from private households in a good way.

- *Influencing policies*

With the new Sydhavn Genbrugscenter (Sydhavn Resource Centre) the City of Copenhagen has begun a thorough and ambitious initiative regarding circular initiatives. Therefore, the political landscape is already open to activities and projects working with this scope. However, building regulation and material transparency is still issues when working with recycled materials and products.

- *Future policies*

Extended responsibility of producers, but also on procurement within municipalities and companies. One can imagine a new certification system for local and circular products. New opportunities for experimenting with better quality and better access to materials/fractions from recycling stations and centres. Enabling better collaboration between municipal stakeholders, companies and innovation environments such as makerspaces/Fab Labs and production facilities. Piloting new collaborations to ensure better models for recycling, designing and producing high quality and small to medium scale productions (products and services).

#### 3.1.3.4. *The co-creation journey plan:*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse the context	1.1 Mapping of circular economy, technologies and relevant systems (context analysis)	Engage practitioners and researchers in Phase 1 as to gain knowledge, inspirations, and understanding of needs	Desk research (internet, books, articles etc.) Conversations and meetings with makers and other practitioners Situation analysis Discussion with experts	Intent Statement #1 Infographics Holistic diagnostics Knowledge generation
	1.2 Mapping of best practices (context analysis)	Learn from successful initiatives that addresses the same challenge (SMILE plastics, fab city pilot in Barcelona etc.)	Desk research (internet, books, articles etc.) Conversations and meetings with makers and other practitioners Interviews Field Activities	Intent Statement #1 Various infographics Holistic diagnostics DDMP → SISCODE Knowledge generation <b>Overall objective:</b> Generate knowledge, inspiration and early involvement of stakeholders

<b>Phase 1. Analyse the context</b>	1.3 Mapping of existing ecosystems and models, especially circular economy (context analysis)	Identifying relevant existing systems, initiatives and technologies	Desk research (internet, books, articles etc.) Conversations and meetings with all relevant stakeholders and inspirers Interviews Field Activities Simplified Material Flow analysis	Full understanding of the ecosystem and available infrastructures Knowledge generation Circular economy context understanding and synthesis
	1.4 Diagnosing policies & legislation	To engage and learn from municipal actors and policy makers from phase Identifying the existing policy landscape for recycling, waste/resource management.	Desk research (internet, legislations and policies, municipal action plans etc.) Informing and consulting with our close municipal network (that we already talk to on a monthly basis)	Full knowledge creation within the field (in a local context)
	1.5 Begin to create/establish stakeholder relationships & engagement	Including existing and potentially relevant stakeholders from the beginning (Von Plast, Makers/designers, BetaLab, MatKon)	Meetings Workshops for engagement and co-designing the journey Visit and new meeting with MatKon and VonPlast	Invested core of stakeholders New knowledge List of relevant and potential stakeholders
<b>Phase 2. Reframe Problems</b>	2.1 Transferring knowledge (Feedback Sessions)	Re-engage stakeholders for a 2-way information exchange (their participation in meetings and workshops)	Invest in direct contact with stakeholders, reinforcing the relevance of their involvement and how their participation can benefit their own work Feedback sessions and workshops with close stakeholders and lab community	Revaluation of knowledge
	2.2 Informing (Newsletters and Maker Meet ups)	Disseminate the co-creation journey, and engage with more members of the community	Newsletter distribution and personal meetings during events, use of online channels	List of people informed
	2.3 Recruiting and engaging stakeholders (workshops)	Engaging and learning from stakeholders	Invest on existing contacts and collaborators Direct contacts Authoring and distribution of communication Possible one-on-one meetings if necessary Online actions Open call Personalised emails	First feedback, interests and KE transfers
	2.4 Visit “Sydhavn Resource Centre”	Identifying the potential opportunity for collaboration Engage with said stakeholders to gain insights from their expertise and access to facilities & equipment	Field observations Stakeholder meeting Field Visit	List of opportunities with the different stakeholders Completion of the prescriptive value web tool

<b>Phase 2. Reframe Problems</b>	2.5 Establishing an advisory board (AB) for the project	Invest in existing connections, reinforcing the relevance of their involvement and how their participation can benefit their own work	Direct emails Personal information to meetings	A chart of engagement from a set of stakeholders sharing the vision and defining their engagement and mode of management
	3.1 Ideation	Engage key individuals as to assure their participation in the AB Engaging our maker community recycling and product/idea development	Workshops Informative events Hackathons Events at Roskilde Festival with Vallekilde Højskole	List of solutions Idea Maps
	3.2 Refine concepts	Engage stakeholders as for the active and intense Developing products/solutions and testing	Ideation and prototype workshops and hackathons Product development Ecosystem development and testing	Relevant and feasible product prototypes from recycled materials Final group of designers and makers
	3.3 Selection of ideas	Stakeholder participation and sharing Iterations on solutions	Participation in the co-creation journey Hackathons Matchmaking sessions Prototyping	Redeveloping ideas, solutions and products Final team is set
	3.4 Planning and Finding compromises	Final selection of solutions	Workshops Core stakeholder meetings and internal meetings	Strategic road map
<b>Phase 3. Envision Alternatives</b>	4.1 Implement 1st iteration of co-creation journey	Design and production Quality testing of the products	Workshops Coordination	Max 10 concepts and 3-5 prototypes Ecosystem for testing is established
	4.2 Disseminate & Communicate	Understanding key learnings Communicating results and key learnings	Maker Meet ups Newsletters Direct communication Online platforms (WikiFactory)	Spreading knowledge, experiences and initial results Gaining interests from policy makers
	4.3 Pilot testing of ecosystem and products	Proof of concept Analysing the benefits from each stakeholder	Hands on work Qualitative interviews	Getting valuable knowledge form pilots
	4.4 Disseminate, communicate and getting feedback stakeholder experiences)	Understanding key learnings Communicating results and key learnings Feedback sessions (internal and external)	Events (e.g. Roskilde Festival and CPH Maker Festival) Stakeholder experiences analysis Meetings	Spreading knowledge, experiences and initial results Gaining interests from policy makers Understanding insights and next steps

Table 8: Design of the co-creation journey of Underbroen

### 3.1.3.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
Von Plast	Company specialised in reusing and recycling plastic waste. Inspired by the Precious Plastics-initiative	X	X				Involved in all 4 phases as a strategic partner	Y
MatKon	MatKon is a Danish company refurbishing routers and can provide app. 19 tons of cleaned and recycled ABS plastic into the journey. MatKon will be part of establishing, coordinating and maintaining an ecosystem (supply chain) for collaborative utilization of recycled plastic. MatKon has modern production facilities and is located approximately 30 min drive from Copenhagen.		X	X			Involved in all 4 phases as a strategic partner	Y
ChipChop	Design, product design and architecture company specialised in digital fabrication tools. Already working with recycled plastics as part of their product design portfolio, but as an established design company they experience difficulties with getting recycled plastic materials in the right quality for e.g. furniture making (locally produced and recycled plastic sheets).	X	X				Will be involved as internal and strategic stakeholders, mainly in phase 3 and 4, with a special focus on design and fabrication.	Y
Vallekilde Højskole	Vallekilde Højskole (Vallekilde Folk High School) is a school founded in 1865, specialized in journalism, game development, design, event management, youth leadership, entrepreneurship, literature, and crafts.	X	X				Will be involved as internal and strategic stakeholders, mainly in phase 3 and 4, with a special focus on design and fabrication. And for workshops and events.	Y
Bloxhub	Bloxhub is a newly opened (May 2018) Nordic innovation hub for sustainable urbanization in the centrum of Copenhagen. Bloxhub is founded on the belief, that the challenges of global urbanization and climate change require new ways of collaboration.	X		X	X		To be defined	Y
DI	Dansk Industri (The Confederation of Danish Industry, DI) is a private organisation, funded, owned and managed entirely by approximately 11,000 companies within the manufacturing, trade and service industries.			X	X		To be defined	N
Silk Design Studio	Design and product design company working with commercial materials from recycled plastic (especially working with SMILE plastics).	X	X				Will be involved as internal and strategic stakeholders, mainly in phase 3 and 4, with a special focus on design and fabrication.	Y
Specialisterne	Specialisterne (The Specialists) is a social enterprise where the majority of	X	X				To be defined	Y

	employees have a diagnosis on the autism spectrum. Employees work as business consultants on tasks such as software testing, programming and data entry for the public and private sectors. MatKon and Specialisterne already work closely, and Specialisterne play an important role in the ecosystem of recycling plastic.										
Sydhavn Genbrugscenter	Sydhavn Genbrugscenter (Resource Centre is the new recycling centre in Copenhagen with a special focus on direct recycling and reuse of materials and waste. They can provide access to recycled materials, knowledge and data about waste and waste management. The new resource centre is designed by BIG group.		X		X				To be defined		N
Plastic Change	Plastic Change is a Danish organization working internationally. They raise awareness about the consequences of the increasing plastic pollution of the oceans and the environment in general.	X		X				Potentially take shape as advisory board, knowledge and research.			N
BetaLab / BetaFactory	BetaLab is Maker's co-founding partner in Underbroen, but also runs BetaFactory, which is a production-oriented space for both traditional and digital fabrication and holds more than 2000m <sup>2</sup> of workshop space. The team behind is specialised in digital design and fabrication, and can provide space for scaling as part of Underbroen's co-creation journey.	X	X	X				Will be involved as internal and strategic stakeholders, mainly in phase 2, 3 and 4, with a special focus on design and fabrication, and facility providers.			Y
KEA	Copenhagen School of Design and Technology (KEA) offers practice-oriented, higher education developed in close cooperation with the business community and educational institutions in Denmark and abroad ( <a href="https://kea.dk/en/">https://kea.dk/en/</a> ). KEA has already done a lot of work with recycling plastics, among other materials, in the 'Material Lab'.				X	X		To be defined			?

Table 9: Stakeholders on the co-creation journey in Underbroen

### 3.2. Living Labs

# L I V I N G L A B S



Figure 21– Living Labs in action during their workshops

### 3.2.1. KTP

#### 3.2.1.1. *Lab context*

- *Technology and resources*

Thanks to KTP's shareholders structure (main shareholders are Ministry of Entrepreneurship and Technology, Marshall office of Malopolska Region, Municipality of Krakow, Krakow University of Science and Technology, University of Technology, Jagiellonian University) and over 20 years of experience KTP has a wide ecosystem of partner organizations (NGO's, companies, among others) and direct access to relevant experts (in such fields as air pollution, transportation, mobility etc.).

Main fields of expertise and activities for KTP are: IT/ICT, engineering, industry 4.0, IoT, gaming, multimedia sector, space sector. The park offers support services for ca. 100 ICT companies on different levels of development. An important part of the Park are the laboratories dedicated for carrying out both R&D and more commercial projects:

- Data Centre with advanced cloud features - a dedicated space for IT hardware offered for companies looking for high quality standards, safety of data storage,
- Multimedia Lab – a unique space with high efficiency equipment for production and postproduction, VFX, video, motion –capture, 3D scanning),
- Lab Gallery – a state-of-the-art venue for presenting tech solutions of the companies, a showroom including exhibition space, game zone and others,
- Library – a knowledge repository that provides access to a database of solutions and IT/ICT market analyses.
- *Knowledge & competencies:*

KTP offers its clients a variety of services that are provided by experienced staff with support of external experts.

Kraków Living Lab is a service provided by KTP to its clients, offering a platform for testing products and services in the conditions in which they are used in life. Tests are conducted in the final/target context of use and operations not only to verify the product concept but also to point out the potential challenges and unforeseen aspects of use. The process of testing follows a structured iterative plan from concept via prototype to the proper implementation. It includes product testing, support in designing change and testing in a real environment. This includes the identification of spaces for conducting testing.

In addition to the LL services, KTP offers to its clients a variety of services such as:

- “Brain Hours” which consists of practical workshops where KTP selects carefully the instructors according to the objectives and topics that can go from sales, marketing,

and communication; online app security to public speaking for business; European funds etc.

- Consulting services in topics such as legal issue, marketing, EU funds, UX/UI, business development;
- Mentoring programme, which is a unique opportunity to meet more experienced colleagues and talk about the challenges that the company is facing;
- Networking in KTP (networking breakfasts, lunch talks, seasonal events, and dozens of sectoral events that attract each year over 6000 people).

- *Approach of co-creation*

The Krakow Living Lab works closely with ICT organisations from a wide internal and external ecosystem that has a rich diversity of structures from R&D to more businesses-oriented ones such as ICT big companies, SMEs & start-ups. Moreover, as a public based entity with the mission to support economic sustainable development, Krakow Technology Park supports local and regional authorities in the areas that are important for citizens and address the key challenges of the region or local community.

The methodology and scope of cooperation with companies and local/regional authorities varies depending on the project and maturity of the products that are being co-created, developed, prototyped, tested or implemented based on the TRL.

KTP perspective in co-creation processes is mainly driven by business approach. The co-creation process usually starts from the ideation phase of the new product or service development validation and testing of the service or products by involving a community of possible end-users outside the company.

Depending on the character of the product and its maturity KTP involves a wide range of stakeholders such as customers, suppliers, citizens, science and administration, which contribute to the development of ideas and concepts from tester's perspective. Through a series of steps, stakeholders are invited to contribute, evaluate, and refine ideas and concepts. Co-creation, as well as demonstration and prototyping, are crucial for creating and delivering processes, services or products that meet market requirements and customers' expectations. This will produce ideas and solutions the company may not have thought of. For example, In Smogathon project, bottom up initiatives were aiming at fighting smog with innovations and technology. In this project, the co-creation process was initiated by defining the challenge, building teams and creating as much as possible IT based solutions during a 24 hours hackathon. The best air-pollution solutions were awarded and demonstrated in

front of local administration. The winning solution was being developed and tested during an acceleration program.

### 3.2.1.2. Local context

- *Challenge*

The KPT's challenge is to improve the quality of the air in Krakow and Malopolska by supporting decision makers in creating the updated regional policies and programs that are not only evidence-based, realistic, measurable and feasible, but are also co-created with the involvement of varied groups of stakeholders through a user-centred approach. The involvement and consulting about the new policies and programs with various groups of stakeholders from the very beginning of the process will be reflected in the real understanding of the problem; in the engagement and motivation for citizens to change their ecological attitudes, transport and heating habits; and for the industry to modify their business operations. It all will lead to the creation of a common space for citizens, policy makers and other stakeholders for self-development, realization and for doing more responsible business. The defined challenge is in line with the local and regional strategies referring to the Air Protection Program for the Malopolska Region and Integrated Quality of Air Management System in Krakow, both aiming to achieve permissible levels of air pollutants in the whole Malopolska Region by 2023 with lower levels of: PM10, PM2.5, benzo (a) pyrene, nitrogen dioxide and sulfur dioxide.

This challenge is inspired by the SMART KOM strategy, a specific roadmap for smart solutions in Kraków and the Kraków Metropolitan Area (KMA) that was developed by KTP together with urban and regional authorities and foreign project partners between 2013 and 2015.

- *Needs*

Although during the last year there have been many actions and initiatives undertaken by authorities in order to limit the air pollutions, the results are still not satisfactory. The quality of air is unacceptable. Therefore, there is a need to adjust the existing policies and programmes aimed at limiting air pollution to the actual environmental and social circumstances. It is crucial for the sustainable development of city's ecosystem to understand better citizen's habits, behaviour and needs to create more appropriate policies. In order to consider citizen's perspectives (and even creativity) to address air pollution, Krakow has to establish good platform of cooperation between all relevant stakeholders involved in solving

the issue of air pollution (authorities, business, experts, NGOs, citizens). Their participation of a variety of stakeholders in co-creating solutions could also be a tool for raising awareness and get their commitment on later implementation.

- *Factors*

A problem in Krakow is air quality. The city has been rated amongst the most polluted in the world in a World Health Organization (WHO) study. In the report, Krakow was ranked 8th among 575 cities for levels of PM 2.5 and 145th among 1100 cities for levels of PM 10. Indeed, there is a high concentration of dust in the air and smog sensed by inhabitants (according to responses in the survey), that is leading to exponential numbers of fatal chronic illnesses situated in lower respiratory tracts. Air pollutants are emitted from a range of both man-made and natural sources. The most negative effects on the quality of air come from emission of greenhouse gases due to burning of fossil fuels in households, transport, industry, bad spatial planning and urbanisation as well as the natural sources. According to the data of Krakow Smog Alert every year, due to air pollution, about 400 inhabitants of Krakow die prematurely.

People are very concerned about the quality of the air in their region, as it can be dangerous for their health. There are numerous social initiatives aimed at fighting with the problems of air pollution. They are very active in terms of social campaigns, lobbying on the authorities, raising the awareness of people. It is worth to mention that during last few years thanks to involvement of regional and local decision makers, politicians and bottom up activities the awareness on air quality and its impact on health and environment has improved significantly (for example network of Eco-consultants in Malopolska municipalities, who will support the implementation of the Air Protection Program has been established), but it still requires a lot of commitments and people engagement.

Regional authorities prepared and implement the Air Protection Program for City and Region; however, it was elaborated in 2012 and currently needs to be revised, updated and introduced. It is right moment to get involved different stakeholders, who will be work on the content of new program.

### 3.2.1.3. *Policy context*

- *Existing policies*

According to the article 74 par. 2 of the Constitution of the Republic of Poland, Environment protection is the responsibility of public authorities. Furthermore, public authorities have the obligation to prevent negative effects on the health of inhabitants coming from environmental pollution. Issues regarding air quality in Poland are regulated primarily by the Environmental protection law (POS) dated 27th April 2001. The quality of air in a specific location is assessed according to the content of substances in the natural composition or occurring in an amount exceeding specific levels. Detailed issues regarding air quality are regulated by separate ordinances of the Minister of the Environment. It was also necessary to implement EU regulations, including the CAFE Directive and the IED Directive. The Act of 27 April 2001 was amended. Also, relevant provisions appeared in the Act of October 3, 2008 on sharing information about the environment and its protection, public participation in environmental protection and environmental impact assessments.

The Malopolska Regional Assembly adopted a resolution dated April 24, 2017 on the introduction of bans concerning the scope of the operation of installations in which fuel burning takes place in the area of the Krakow municipality in the period from 1 July 2017 to 31 August 2019. As a result, from July 1, 2017, it will not be possible to heat houses and flats using low-quality coal in Krakow. The regulations will apply for about two years. On September 1, 2019, a total ban on coal burning in the area of the municipality of Krakow comes into force.

The scale of impact and the scope of air pollution, as well as the ineffectiveness of activities aimed at limiting the concentrations of selected pollutants, have caused that issues related to air quality, thus becoming a critical challenge for government and administrations both at the regional and local level.

- *Influencing policies*

Public authorities adopted the Development Strategy of the Malopolska Voivodship<sup>34</sup> for the years 2011-2020. A part of it is dedicated to the environment protection. The program presents activities planned for implementation in 2014-2020, including those that do not result from the direct competence of the Malopolska Region Self-government. It is therefore

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<sup>34</sup> Voivodship is the highest-level administrative subdivision of Poland, corresponding to a "province" or region in many other countries.

a document comprehensively treating the task of environmental protection through specific priorities and the most important directions of activities. The strategy is the basic and the most important document of the Voivodship self-government, defining the areas, objectives and directions of development policy interventions, conducted in the regional space. Bearing in mind the obligations under the Local Government Act, the basic responsibility of the Voivodship self-government in creating and implementing Voivodship development strategy focuses on shaping broadly understood civic and cultural awareness, modern economic development as well as sustainable environmental and spatial management.

This document needs to be permanently updated and adopted to dynamic circumstances. It is necessary to involve all actors and stakeholders in the processes of validation and revision of the Strategy in order to cover all dimensions. To support the preparation of the updated document, the Marshall Office of Malopolska Region has appointed a programme council, consisting of experts in air pollution issues.

The regional authority of Malopolska is currently running a project called “Implementation of Air Pollution Programme in Malopolska Region – Malopolska in healthy atmosphere”. The main aims of the project are to raise awareness of pollution issues, to support the inhabitants of the region by offering them support and consultancy services in the area of air pollution actions and energy efficiency and to build a network of eco-consultants, responsible for the implementation of the Air Protection Programme.

Apart from the activities undertaken by the public and regional authorities, the companies that are developing products/services in the field of air pollution are also willing to present their solutions. Each year Krakow is hosting the “smogathon” competition. Smogathon is an initiative aiming to fight the smog with innovations and technology. The smogathon projects created by the companies and presented during the competition have a real impact in the battle against smog. Solutions are implemented all over the world to bring relief to people in the most polluted cities.

- *Future policies*

The Local and Regional authorities are working on the relevant policies to address the challenge and set clear vision for further implementation of Air Protection Program for City and Region including new trends and ICT technologies. KTP as an important actor on the regional landscape will actively support of the regional authorities in preparation of the updated Air Protection Programme. For this purpose, KPT is collaborating with the

Environmental Department of Marshall Office of Malopolska Region and the Department for Air Quality of the Municipality of Krakow. KPT will perform the co-creation process with participation of city inhabitants, NGO's, representatives of business, academia, researchers and administration. As a result of the co-creation process performed within the SISCODE project the decision makers will be able to include in the different perspectives and ideas raised by all stakeholders in the new air pollution policy that will be updated until December 2019.

#### 3.2.1.4. The co-creation journey plan:

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases as displayed in the following table.

	<b>Activity</b>	<b>Objectives</b>	<b>Tools</b>	<b>Expected Outcomes</b>
Phase 1. Analyse Context	1.1 Desk Research	Gather insight of the local challenge Preliminary Research Get knowledge to prepare the research Map stakeholders Define the scope/structure of the research	Desk research Key facts Interviews Research participant map	Outline of the local challenge Varied stakeholders list
	1.2. Interviews with relevant stakeholders	Participants on board Data/information collected, available for further analysis	Interest Groups Discussion Research Planning Survey Activity Network	Participants on board Data collection, Outline of the perspectives of key stakeholders regarding the challenge
	1.3 Synthesize & analyse data	Collect data and analyse	Initial opportunity map Trends matrix Convergence map Buzz reports	Situational analysis Map stakeholders Identification of trends and initiatives Repository of ideas and solutions Initial Report of this phase

<b>Phase 2. Reframe Problems</b>	2.1 Understand the data collected	Deeper understanding of the local challenge	Mind mapping Insight clustering matrix Persona definition	Outline of the clear vision of the local challenge Data summary and visualisation
	2.2 Aligning the lab concept with knowledge gathered	Redefine/ rethink the challenge (make it more feasible) Framing the challenge together with opportunities	Comparative analysis Concept sorting Concept scenarios	Realistic / feasible defined problem/ challenge Report on the chosen local challenge
	2.3 Frame opportunities	Defining opportunities & possible solutions	Brainstorming exercise Best practice identification	List of possible opportunities
<b>Phase 3. Envision Alternatives</b>	3.1 Ideas generation	To collect ideas	Brainstorming exercise Convergence map Soft „hackathon” / Design challenge	Summary of tenable ideas
	3.2 Idea selection	Prioritize ideas according to evaluation criteria Select ideas Refine ideas	SWOT analysis Concept sorting Solution evaluation Concept grouping matrix	Summary of the selection of the appropriate idea
	3.3. Generate a concept	To visualize and specify the idea To prepare detailed concept	Concept scenarios Persona definition Solution roadmap	Report of solutions and policies (D3.2)
<b>Phase 4. Develop and Prototype</b>	4.1 Concept development	To develop the concept and implementation plan	Solution storyboard Description of prototype Competences plan Strategy roadmap	Fully elaborated and detailed concept with outlined operational plan
	4.2 Prototyping	Implement a prototype Collect user feedback	Solution prototype Solution Enactment Pilot development and testing Implementation plan	Report on the tested prototype

Table 10: Design of the co-creation journey of KTP

### 3.2.1.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
Marshall Office of Malopolska Region, Environment Development	Specialists and experts from Environment Development		X		X	X	1,2, 3.1, 4	Y
City of Krakow	City specialists <sup>35</sup> and Plenipotentiary for Air Quality Management			X	X		1.1 + 1.2 + 2.1 + 2.2 + 3.1. + 4.1+ 4.2	Y
The Metropolitan Association of Krakow: representing 15 communities	The Association performs the role of the executing body for Integrated Territorial Investments. It is a responsible body for prioritization of the investments and its implementation.		X		X	X	2.1 + 2.2. + 2.3. + 2.4. + 3.1. + 3.2 + 4.2	Y
University of Science and Technology	Relevant Departments as Environmental Protection, Transport, Air Quality etc.  Students science associations		X		X		3.1. + 3.2 + 4.1.	Y
Cracow University of Technology	Relevant Departments as Environmental Protection, Transport, Air Quality etc.  Students science associations		X		X		<i>1.1. + 1.2 Interviewees for the purpose of getting data &amp; preparing the operational regulations</i>  <i>3.1. + 4.1. Cooperation on the final concept development and prototype -supervision</i>	Y

Table 11: Stakeholders on the co-creation journey of KTP

<sup>35</sup> The Main tasks of the city specialist are to: 1. evaluate activities related to inventoried areas affecting the quality of air in Kraków; 2. create a concept and monitor implementation of the "Integrated Quality of Air Management System in Krakow"; 3. initiate activities to improve air quality; 4. cooperate with national/regional/local bodies, and socio-economic environments in the above area

### **3.2.2. PA4ALL journey**

#### *3.2.2.1. Lab context*

- *Technology and resources*

The unique characteristics of PA4ALL arise from a combination between its technological focus and its location. Indeed, the region of Vojvodina demonstrates a particularly strong agricultural sector. Therefore, the region is an ideal test field for applying the Living Lab (LL) approach, since a dynamic value-chain of stakeholders that can be involved in the participatory innovation approach already exists in the region. Inspired by the speed-dating methodology, PA4ALL introduced an innovative approach in collaboration and co-creation framework – the speed dating sessions facilitated numerous B2B meetings where people from ICT and agrifood industry and government representatives presented their problems, ideas, and discussed about same topics from different perspectives. PA4ALL is proud of its stakeholders, which collaboratively bring the research and innovation in a close interaction with farmers and the agrifood sector, government bodies, entrepreneurs and business community, researchers, such as Agriculture Faculty at the University of Novi Sad, and citizens. Also, by utilising the Digital platform AgroSense, developed by BioSense Institute, that provides support to farmers and agricultural companies in monitoring the growth of crops and planning of the agricultural activities is an important partner in the digitisation of agriculture, bringing to an increase in efficiency and competitiveness of Serbian producers.

- *Knowledge & competencies*

The PA4ALL brings together main innovation actors including public institutions, researchers, technology and knowledge transfer institutions, and end-users. During the challenge implementation various knowledge will be enabled, as well as experience exchange and peer-to-peer learning, co-creation of various frameworks, tools, and policy instruments.

Within FRACTALS project, 20 sub-projects (out of 43) performed real-life testing and validation through PA4ALL Living Lab which was enhanced geographically, as recommended by external reviewers, with a pool of users outside Serbia, and with users that are not so tech adept so not to skew the results. PA4ALL also engaged in facilitating matchmaking events that are stimulating cross border and cross sector teambuilding, business training portfolio for beneficiaries supporting them in coming from a business idea to a business model, understanding who their customers are and in acquiring all relevant knowledge for building a market ready product.

- *Approach of co-creation*

The PA4ALL lab works together with farmers, citizens, government by developing research in the use of ICT in the field of agriculture, as well as successful Digital Farm which created an open air show-room where innovative AgTech solutions are being presented and implemented on a real-life production farm, to allow farmers to see, test and assess them in real-world settings.

One of the co-creation cases is the Digital Farm, which acts as an innovative and unique facility, aims to support the digital transformation of agriculture in Serbia, the region and in Europe. The digital farm allows farmers from Serbia to learn more first-hand about the opportunities provided by digital and emerging technologies in every segment of crop production: from soil preparation, management zones, sowing, irrigation, fertilization and protection of plants, to the crop harvest and preparatory activities for the next season. The digital farm is located in the fields of the commercial producer Krivaja D.O.O. that implements modern digital technologies in agriculture production: sensors, drones, robots, satellites, modern agricultural machinery, etc.

### 3.2.2.2. Local context

- *The challenge*

Introducing precision agriculture tools in high-schools for agriculture and uptake of innovation by presenting the benefits of using the ICT and engaging stakeholders such as farmers, agriculture high schools and education policy makers. This also relates to the notion that the younger agricultural household members are a demographic group that has demonstrated higher adoption rates of technology. Therefore, they are a solid test-case for further co-creation and knowledge-transfer activities. Since they will lead the agricultural industry in 5-10 years it is very important to introduce future professionals with principles related to community-driven development and citizen science as early as possible.

- *Needs*

During previous projects, the lab has identified an insufficient usage of ICT for educational purposes in agricultural high schools, which generates a scarce acceptance of new technology. According to the data from 2012, there are over 3.4 million hectares of land processed in Serbia ([www.europa.rs](http://www.europa.rs)) and 631.552 farms. The average land size per farm is quite small, with most of the farms in the range from 2 to 5 ha.

The vast majority of the holdings are the family holdings. Being small participants on the market, family holdings are forced to purchase materials (seed, fertilizers, etc.) in smaller quantities, which results in higher prices. Selling of their products is also an issue, as it is either individual, or to the retailers. In 2011, there were around 1500 agricultural cooperatives in Serbia that might have helped to improve small holdings to sell their products in a distributed way. Unfortunately, these cooperatives were non-functional. So, the profit of the small farms is still at a very low and non-sustainable level. By delivering innovative ICT solutions that are accessible to all farmers, regardless of the size of their holdings, it is important to providing small farmers of the region with affordable enabling technologies that will allow them to become sustainable in the global competitive environment. The introduction of ICT subjects in agriculture courses, together with the inclusion of younger generations, could increase the awareness of the relationship between technology and agriculture in order to increase the productivity of the fields and at the same time, make more attractive the agriculture for younger generations.

- *Factors and evidence*

Younger household members are a demographic group that has demonstrated higher adoption rates of technology. Therefore, they are a solid test-case for further co-creation and knowledge-transfer activities. Since they will lead the agricultural industry in 5-10 years it is very important to introduce future professionals with principles related to community-driven development and citizen science as early as possible. For this reason, early engagement of students in the ICT field could be used as an extrinsic motivator for students to continue with their education and commitment to stay in the agricultural sector in the long run, while continuously improving on their ICT skills. During the last years, and based on the recent reports, the enrolment in the agricultural high schools in Serbia, is not in the highest sought out school, and only reaches around 6% of the yearly enrolment, comparing to 26% of gymnasium enrolment, 19% of IT school enrolment and 17% enrolment to Economic/Law high schools. The statistics ought to be improved since agri-food sector is the best prospect industry sector in the Serbian economy and is an engine for development of rural areas, especially in Vojvodina. Traditionally, it has always been a significant part of the local economy and a generator of positive results, due to the abundance of fertile agricultural land which makes up 84% of Vojvodina's territory. The share of agribusiness in the total industrial production is 40% that is 30% in the total exports of Vojvodina. This is potentially due to the lack of funding of innovative teaching techniques, lack of adequate teaching staff trained in IT, as well as teacher's mindset which is more oriented towards the traditional

agriculture methods leading to the weak inclusion of ICT in schools. Also, the implementation of ICT in agriculture has always been associated with additional costs and the small farm owners do not have enough resources. This can be a complementary and key explication to the hesitant incorporation of ICT in agriculture.

### 3.2.2.3. *Policy context*

- *Existing policies*

The use of ICT is being supported on a country level by the Digital agenda of Serbia, Strategy of development of information society in Serbia 2020 and Strategy of development of e-communication in Serbia 2010-2010. These strategies are looking forward to integrating ICT in all the aspects of educational process, for the efficient and sustainable society. Strategies are particularly prescribing development of the ICT skills that will in the long run lead to more competitive economy and improve job prospects, especially in the agricultural sector for the upcoming generations.

The policies are directed to setting up a modern educational system, adjusted to the needs of ICT society, as well as development of new digital educational contents, training and mentoring teachers for the ICT adoption and operation. At the same time, policies state that it is necessary to raise the technological base in schools, including information technology equipment and communication networking of schools, and to take measures to apply the technological basis for the fulfilment of the above stated goals.

- *Influencing policies*

Potential drawbacks are foreseen in dealing with agricultural high schools, especially when talking about the way of introducing the change in the curriculum. Also, finding and engaging adequate teachers and educators, which would be involved in the challenge activities, can be recognised as a potential hindrance. However, due to the existing government strategies which are addressing the existing policies oriented to incentivize ICT in education, the different stakeholders could leverage the experimentation of solutions for this challenge and bring the change of mindset which is sorely needed.

- *Future policies*

Addressing the challenge could inspire policy discussion on including ICT and precision agriculture in the training curriculum of agricultural high schools and promote creation of

specific policies for inclusion of ICT high schools, as well as animate setting new funding options for ICT equipment purchase.

### 3.2.2.4. *The co-creation journey plan*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases as displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Desk Research	Gather insight of the local challenge	Desk research Interviews Focus groups	Outline of the local challenge
	1.2. Interviews with relevant stakeholders	Gathering on the specific queries – local challenge	Interviews	Outline of the perspectives of key stakeholders regarding the challenge
	1.3 Synthesize & analyse data	Collect data and analyse	Data Analysis Evaluation	Report on the data collection with recommendations
Phase 2. Reframe Problems	2.1 Reasoning with analysis of the context	Deeper understanding of the local challenge	Analytical thinking Analogous models	Outline of the clear vision of the local challenge
	2.2 Aligning the lab concept with knowledge gathered	Choose the appropriate local challenge	Comparative analysis	Report on the chosen local challenge
Phase 3. Envision Alternatives	3.1 Ideas generation	To garnish plausible ideas	Cross fertilizing knowledge, ideas, findings	Summary of tenable ideas
	3.2 Idea selection	To select the appropriate idea	Analysis ideas generated Idea card Concept sorting Concept evaluation	Summary of the selection of the appropriate idea
Phase 4. Develop and Prototype	4.1 Concept development	To develop the concept	Solution storyboard Solution Enactment Description of prototype Business canvas Personas	Fully elaborated and detailed concept with outlined operational plan
	4.2 Prototyping	Implement a prototype Collect user feedback	User response analysis Touchpoints/interfaces	Report on the tested prototype To understand the degree of successful operations

Table 12: Design of the co-creation journey of PA4ALL

### 3.2.2.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
Business Development Department (BDD)	2 experts in business development and communications, 3 experts and educators in ICT equipment within the Laboratory of BioSense Institute in Novi Sad	x					1.1 Develop the context analysis report 1.2 Conduct the interviews 1.3 Compose the data and presentation 2.1 Consider different aspects of the context analysis 2.2 Decide on the local challenge 4.1 Develop the concept 4.2 Engage and test the prototype	Y
Students	Students of agricultural high schools, along with students of Agricultural Faculty at the University of Novi Sad			x			3.1 Generate alternative ideas 3.2 Selection of applicable and appropriate idea	Y
School directors/ (local officials)	Agricultural Schools			x			1.2. Interviewees 4.2 Engagement in testing the prototype	N
Ministry of Education	Government officials from the Sectors for high school education, Sector for digitalisation in education and science		x		x		1.1 Co-creating the wider picture regarding the challenge 1.2 Interviewees for the purpose of getting data 3.1 Generate alternative ideas 3.2 Selection of applicable and appropriate idea	Y
Parents Advisory Board	Parents engagement for deeper understanding of students' needs			x			1.1 Co-creating the wider picture regarding the challenge Interviewees for the purpose of getting data	N
Media/wider public	Involvement for the purpose raising awareness of the context and the challenge				x		1.2 Communication of the overall conclusions and data gathered 4.1 Communicating the impact of innovative teaching techniques 1.3 4.2 Communication of the P4 results	Y

Table 13: Stakeholders on the co-creation journey of PA4ALL

### 3.2.3. Thess-Ahall

#### 3.2.3.1. *Lab context*

- *Technology and resources*

Regarding the technology infrastructure, the Thess-AHALL owns:

- Technology equipment for cognitive & physical training, such as mobile wrist units/sensors, touchscreens and a web-platform developed by the Lab the webFitForAll<sup>36</sup>, an already scientifically proven technology tool, a collaborative serious gaming platform that combines the contemporary exercises for improving the mental and physical condition of older adults and other vulnerable groups, through an entertaining environment.
- Two technology show case rooms (e-homes), 5 older adults' homes, equipped with infrastructure similar to the technology of the show case rooms (smartphones, smart TVs, tablets, laptops, etc.).
- The LLMCare Health Care System<sup>37</sup> which is developed within the Lab and is provided as a service for cognitive and physical training by the infrastructures of the Research Committee of Aristotle University of Thessaloniki at low prices in local stakeholders, public and private elderly care homes, health care professionals, individuals, as well as elderly citizens in need.
- A big, heterogeneous volume of data (behavioural recordings such as movement, activity levels, emotion and physiological signals, neuropsychological recordings such as EEGs, neuropsychological assessment tests, interventional data: computerized cognitive and exercise games), stemming from the large-scale pilots with seniors strengthens the competencies of the Living Lab, consisting one of its most valuable assets.

As far as it concerns the human resources of Thess-AHALL, the Living Lab has built a wide co-creation network, that ranges from primary end-users (e.g. older adults, chronic patients, patients' associations and people from other vulnerable groups -e.g. people with Down Syndrome), experts, healthcare service providers, caregivers, who constitute the Collaboration & Research Community for the Independent Living of the Lab and become the closest partners of researchers in every stage of their research activities (co-designers and co-producers) to hospitals (e.g. AHEPA, University Hospital of Alexandroupoli, "Attiko"), nursing homes (e.g. Chariseio, "Frontizo" nursing homes), day care centres and

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<sup>36</sup> More information on <https://www.fitforall.gr/dev>

<sup>37</sup>More information on <http://llmcare.gr/el/map>

rehabilitation centres (e.g. the Rehabilitation Centre for Social and Creative Employment for People with Disabilities “The Savior”, the “IASIS AMKE” care centre), as well as policy makers (e.g. the local community, the corresponding municipality structures), SMEs, private initiatives and other living labs.

Furthermore, the Laboratory of Medical Physics, part of which Thess-AHALL is, is comprised of 9 research groups, leaders in their respective specialties (Assistive Technologies And Silver Science, Biomedical Electronics Robotics & Devices, Medical Education Informatics, Neuroscience of Cognition and Affection, Medical Imaging, etc.), which pursue innovative research projects, while the wide network of Lab’s partnerships allows the involvement of external research partners, from other specialties and experts, when there is need for.

- *Knowledge & competencies*

Thess-AHALL has a rich experience and major research and development focus in the field of Ambient Assisted Living and Biomedical Engineering or what is now called Active and Healthy Aging (AHA), as well as technologies for Assisted Living for special target groups (older adults, chronic patients or other vulnerable groups). It counts more than 8 years of experience in user-driven innovation and evidence-based research in the AHA domain, which means more than 7,500 hours of piloting with more than 2,500 end-users.

It preserves a wide network of end-users and partnerships with local and national institutions, thanks to the high-trust communication and close collaboration between the research team and the stakeholder’s community, which enhances its competencies towards other similar research initiatives at the local and the European level. Moreover, the strategic geographical location of the Lab and its wide, trans-national network have established Thess-AHALL the only active Well-Being and Health Living Lab in Northern Greece and the Balkan region.

The research staff of the Lab and the Living Lab is well-educated and very experienced in co-creation and co-design methods, trained and certified to work with older adults, patients and other vulnerable groups, comprised of researchers with a wide diversity of scientific backgrounds (doctors, psychologists, engineers, social scientists, data analysts, etc.).

- *Approach of co-creation*

Thess-AHALL involves its co-creation network in every stage of the design (ideation), implementation (develop a prototype) and evaluation (and iteration, if needed) of its

activities, listening and understanding the needs of end-users, the primary beneficiaries of each research attempt. Moreover, the Living Lab has already run a number of successful pilots in cooperation with end-users, professionals, researchers and other involved parties, which have tried and validated user-centred methodologies and tools, designed and developed for its research projects.

In the same framework, Thess-AHALL also invests in face to face design thinking sessions, workshops, focus groups, meet-ups and personal interviews with both end-users and experts, so as to do research, based on the user-requirements principles.

Moreover, embracing co-creation approaches, Thess-AHALL has fostered collaboration with its co-creation network for all of its projects, including the establishment of communication and research channels for the development of social campaigns, based on the principles of gamification.

For example, the “Play4” campaigns, the “parent”-idea for SISCODE’s challenge, constitute a successful example of social campaigns, held by Thess-AHALL. The “Play 4” campaigns invited the public to visit nursing homes and patient associations to play and exercise through digital technology, the webFitForALL platform, while gathering points that would be turned into special gifts or other kind of benefits. The initiative enhanced interaction between community dwelling people and institutionalized seniors, providing the incentive of both social and material contribution in an entertaining way for people to attend. The campaign strengthened the institutions’ extroversion and introduced the future nursing homes as structures open to the local community.

### 3.2.3.2. *Local context*

- *The challenge*

Thess-AHALL aims to fight the risk of loneliness and social isolation in the ageing population and chronic patients, using open science and social research as its means. More specifically, older adults, and other vulnerable social groups, like chronic patients and institutionalized people, who receive residential care, experience the cultural stigma of losing their mental and physical abilities. To this end, older adults and chronic patients usually tend to spend their day mainly with other patients or people at their age, feeling socially isolated and inactive citizens. Meanwhile, the general public lacks awareness of those people’s needs and problems, contributing even unintentionally to their marginalization.

Thess-AHALL's big challenge is to break the social exclusion walls and welcome institutionalized and chronic disease outpatients, as well as older adults, back to the community, introducing the "Participate 4" campaigns.

At the other end, the scientific society is a community usually inaccessible to the general public, older adults and chronic patients included. Thess-AHALL's vision is to use Open Science, Social Research and Social Innovation as a means to bridge the gap between older people at risk of social isolation and Academia. More specifically, in its challenge, Thess-AHALL aspires to take the advantage of its many years' experience and knowledge in co-working with older adults and outpatients, as well as its knowledge of how Academia and the research community operate, to bring these two parties together.

The "Participate 4" campaigns will be the tool for the implementation of the challenge, encouraging the active participation and involvement of older adults and chronic patients in the research activities of the Living Lab, which will eliminate the "us"-“them” (researchers-older adults) relation of the two sides. Using the phrase "From Science in Society to Society in Science" as a starting point, Thess-AHALL aims to give older adults and chronic patients the floor to express their needs and problems, to get informed about the research and feel active citizens again, offering their valuable help to the Academia, not as subjects, but as equal partners in the whole procedure.

"Participate 4" campaigns will include open lectures, workshops, educational parallel events (like visits in museums or in the university), informative campaigns, and seminars (like training in new technologies) and will adopt gamification methods. This approach is also part of our research question, if the social campaigns and gamification practices can adequately be used as motivation and engagement triggering for older adults. The gamification method envisaged for our challenge is to credit to attendants through a "loyalty" point-system. The participants will collect points with their participation which will be turned into gifts or special benefits, provided by sponsors or policymakers for a predetermined good purpose.

- *Needs*

Studies have shown that people of older age and institutionalized patients are particularly at risk of becoming socially isolated, the growing presence of physical and cognitive limitations as people age. Furthermore, the fact that older adults also tend to spend the biggest part of their day at home can possibly contribute to further limiting one's ability and willingness to interact with others. The increased social frailty that can develop with time as a result of the

above can put older adults at particular risk of becoming socially isolated – especially when outliving their spouses or partners, family members, or friends. It is well-known that social isolation can have a significant effect on a person's overall health and well-being, and therefore finding ways to minimize this should remain a priority for modern societies<sup>38, 39</sup>. Retired people and chronic patients need to become integral parts of society and once again feel like active citizens. Senior activism and responsible research with the active participation of older adults or chronic patients could be used as means to tackle the risk of social exclusion and the possible cultural stigma.

On the other hand, Academia can benefit from getting closer to the society, in order to make research more accessible to citizens, by communicating its value to the general public. Special social groups, like older adults, often feel that they do not speak the same language with scientists and they are not so familiar with the new terms, co-creation approaches and technology.

- *Factors*

The long experience of the Lab in a wide variety of research projects has shown that although Academia calls the society for participation in its activities, research is communicated in a very scientifically-orientated way, which is not easily understood by the average citizen, and especially by older adults, who feel unable to follow the rapid development of technology and science. On the other hand, older adults may feel unwilling to participate, having the impression that they cannot contribute to research.

Concerning older adults, the EU has already published studies on Europe's ageing population, an international phenomenon, which brings the need for social and cultural change, as well as for the enhancement of the competences of older adults in the forefront. People over 60-65 years old should remain active citizens, living independently and tackling the social isolation and exclusion phenomena.

Also, studies in Greece have shown that older adults in Greece are not only unfamiliar with new technologies and research, but they are also “low-educated” and uninterested in scientific issues, mainly due to cultural conditions. There are some attempts of improving

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<sup>38</sup> More information on <http://nationalseniorsstrategy.ca/the-four-pillars/pillar-1/addressing-ageism-elder-abuse-and-social-isolation/>

<sup>39</sup> More information on [https://www.researchgate.net/publication/325291452\\_Pathways\\_from\\_Ageism\\_to\\_Loneliness](https://www.researchgate.net/publication/325291452_Pathways_from_Ageism_to_Loneliness)

older adults' competences and skills in using technology, like seminars of using a personal computer or surfing on the Internet, but more things should be done, especially in Greece.

### 3.2.3.3. *Policy context*

- *Existing policies*

Thess-AHALL has already taken the advantage of some existing policies on older adults, chronic patients and social research in previous activities, while it also examines the possibility of some others to support its challenge. A list of existing policies follows:

- Public policies for older adults: Day care and activity centres for the older adults (offering activity programmes, like sports, entertainment or educational seminars). They are public-municipal administrated. National Healthcare System (medication prescription). The “Help at Home” (Municipal Programme). The Greek Inter-Municipal Network of Healthy Cities (promotes good practices). Benefits/incentives for the elderly (free pass for the public transportation/ museums/ theatres). Resilient Thessaloniki municipal initiative (public transportation, mobility of people with disabilities);
- Policies for chronic patients: Greek federation of patients (a patient associations' joint force), regional or national Patients' Associations (Alzheimer's Association, Parkinson's Association etc.);
- Policies derived from the Private sector: insurance companies' programmes for older adults or chronic patients, private rehabilitation centres, Onassis & Niarchos Foundations' funds for research and the society. Corporate Social Responsibility initiatives: e.g. SKAI TV computer training programmes for the elderly, “Lidl Hellas” Healthcare/volunteering programmes (cooperation with sponsors);
- Awareness campaigns: online campaigns or campaigns published in the media, concerning the “safe” internet, new technologies, assistive technologies for older adults (communication and share of the research results);
- AUTH Tech. Transf. Office: mentoring, consulting role (prototype-commercial product)
- Ethics in research & bioethical regulations in the University, Open Access Data, Patients data (digital) (OKFN Greece), GDPR regulation (protection of stakeholders and search for existing data available);
- International policies: World Health Organization, European Commission funds and initiatives (Erasmus+, H2020/ AAL/ EIP on AHA/ NSRF (ESPA) (funding research activities)
- Policies derived from the research community: previous research projects, CERTH/ ITE research centres, Universities (cooperation with experts).

- *Influencing policies*

The high-level public policymakers in Greece, including the government and the national healthcare system authorities, lack awareness of older adults and chronic patients' needs. Moreover, they are not well-informed about developments in research and the value of

communicating research outcomes to the general public. Specifically, policymakers demand tangible evidence, and usually translate the benefit into financial gain or votes, before they fund the research or support the implementation of its results in society. Furthermore, policymakers in Greece, both public and private, are often inaccessible, due to the heavy bureaucracy and they ask for evidence to prove that something works: metrics (researchers have to describe/ find the value for the government and private companies). Also, bureaucracy is a deterrent to access older adults and chronic patients in Greece, since researchers should apply and wait for a long time for receiving special permission to visit day care centres, hospitals, associations etc., and work with the stakeholders.

The access to public data is limited. It remains still difficult for researchers to find the evidence requested for convincing the policymakers and conduct research. They are wasting a lot of time finding the information they need.

Furthermore, researchers are still not enough feeding back the information and do not engage participants in a systematic way. As a result, end-users participating in research activities often feel of being “used” and they cannot understand what the value is they get from involvement with research activities. Consequently, they become unwilling to continue their collaboration with scientists.

On the contrary, there are several examples of successful policymaking, concerning older adults and chronic patients, like the activities provided by the municipal day care centres and the good practices met in nursing homes and rehabilitation centres, of which researchers can take the advantage and improve their knowledge and experience in working with these stakeholders’ groups.

- *Future policies*

Thess-AHALL’s vision is to change the landscape of policymaking for older adults and other social groups, like institutionalized outpatients, through the successful running of the “Participate 4” campaigns, aiming to re-introduce them to the society while at the same time contributing to the extroversion of the Academia and research.

Thess-AHALL aims, in the future:

- The government/municipality to give their permission to the universities to participate in the activities of the healthcare sector (limitation of the bureaucracy);
- The municipalities to understand the importance of the universities & research as a means to improve the competences of the society and older adults;

- The Ministry of Health (and the National Healthcare System, Hospitals) to realize the value of alternative methods, like the ones used for the “Participate 4” campaigns to support the AHA;
- The cities to understand how important is to have “active people” (accessible cities, policies that welcome older adults);
- Thess-AHALL’s assistive approaches to independent living to be part of the insurance policies;
- The government to fund the patient associations;
- The government to support the networking against the social isolation;
- The private sector to take initiatives to support older adults, chronic patients and research in AHA;
- The Academia to generate trust in the society (get the real needs of the community / develop research projects within the university);
- The challenge to result in applied research (To get budget for turning the challenge into an in-depth research).

### 3.2.3.4. *The co-creation journey plan*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Prepare the research	Define a methodological framework Define the problem within the team Define the timeline Assign roles & tasks Contact external stakeholders to conduct the research	Keyword bibliometric – key facts – popular media scan Trends matrix – innovation landscape – initial opportunity map Strategy roadmap – implementation plan Team formation plan Research participant map – contextual research plan – research planning survey	Define the activities for collecting the data General guidelines to setup the challenge and the research Techniques for the research/ data collection Define the research questions Research timeline & milestones Create a team with defined roles Define some KPIs' (e.g. range of no. of stakeholders engaged) Contact list for possible research participants
	1.2 Research (data collection)	Addressing the research questions by collecting data. Executing the plan Literature review (desk research) Field research (interviews etc.) => Understand the needs of stakeholders	Remote research Five Human Factors Interest Group Discussions Innovation Brief Keyword Bibliometric Innovation Sourcebook Subject Matter Experts Interview User Pictures Interview Popular Media Research Analogy Models User Observations Database Field Activity/ Visit	A database of qualitative and quantitative data The state-of-the-art (benchmarking) both at the local and the European levels General database => each stakeholder group (a database) Existing policies
	1.3 Synthesize & analyse data	Conclude stakeholder group Select which policies address our challenge and divide into group (e.g. financial, cultural) Define the “value” we provide for policy makers, stakeholders	Persona definition User groups definition Competitors – Complementor Map Industry diagnostics SWOT Analysis Solution Database User Response Analysis Offering Activity Culture map	Competitors – Complementors defined SWOT Activities we offer and their domains Define/Understand our value

<b>Phase 2. Reframe Problems</b>	2.1 Visualize & interpret the data (+share)	Create a clear booklet of data Include all the different perspectives of the (interpreted) data	Infographics Asymmetric Clustering Matrix Compelling Experience Map Describe Value Web Venn/Tree Diagram Observations to insight User Journey Map	Create / Reference point for the current context Common understanding of the problem/context among all stakeholders
	2.2 Communication & Sharing of the research results	COMMUNICATION: to prepare a well-organized and coherent presentation of the data collected (+ a publication)	A concrete dissemination plan Use of communication channels (traditional & new ones) Observations to insight User Journey Map Activity Network	Common understanding of the problem/context among all stakeholders
	2.3 Communicate and reframe the problem with specific stakeholders	Bring all stakeholders together Find different aspects of the existing challenge Find alternative solutions	Activity Network Descriptive Value Web Insights Sorting Observation to Insights Insights Clustering Matrix Trends Matrix Solution Database	Extend the stakeholders network (community) Cover aspects and fields that we have not found during research phase Database with alternative solutions
	2.4 Search for frame opportunities to reach the same goal (solution, open the market) => new routes	Extend the stakeholders network (community) Cover aspects and fields that we have not found during research phase Database with alternative solutions	Analogous models Opportunity Mind Map Foresight Scenario Persona / Market Definition User Journey Map	To obtain a new vision for the future of the challenge Mapping alternative solutions (+ create a database)
<b>Phase 3. Envision Alternatives</b>	3.1 Generate Ideas	Generate ideas	Ideation Game Role-play Ideation Ideation Session Concept Scenarios Puppet Scenarios Principles to Opportunities Worst Idea Ever Value Hypothesis	Database of new ideas Database of new possible partners/ institutions

Phase 3. Envision Alternatives	3.2 Refine & Select ideas	Define the criteria of selection The new ideas based on some evaluation criteria Define the testing criteria for the final selection Select/ Refine the final ideas	Value Hypothesis Morphological synthesis Concept-Linking Map Solution Storyboard Concept Sorting Solution Evaluation	To reach refined ideas
	3.3 Generate a concept	Have a final concept Details of the concept	Concept evaluation Innovation Brief Concept Grouping Matrix Concept Design Brief	To have a clear and detailed view of the whole challenge (having collected all the data) <b>COMPLETE OVERVIEW OF THE CONCEPT</b>
Phase 4. Develop and Prototype	4.1 Create a plan for the final concept (+KPIs for the evaluation)	Give the details for the final concept (so as to move to the implementation) Define the KPIs	Solution Diagramming Solution Roadmap Implementation Plan	To create a structure/guidelines/ a plan to follow for the implantation To define (specific) the metrics system
	4.2 Develop the prototype (Run the challenge)	To materialize the concept To deliver the prototype To get feedback from stakeholders	Concept Prototype (using KPIs) Solution Prototype (using KPIs) Pilot Development & Testing Behavioural Prototype	The Prototype Feedback from users
	4.3 Evaluate the challenge (prototype)	To evaluate the concept Improve the challenge (concept)	User Observation Database Interest Groups Discussion Matrix (scoring)	Assessment of the prototype Lessons learnt (both positive & negative) Feedback & Reflections
	4.4 Iteration	Decide if we need iteration	User Observation Database Interest Groups Discussion Matrix (scoring)	Feedback & Reflections

Table 14: Design of the co-creation journey of Thess-AHALL

### 3.2.3.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
Scientific & research community	<i>The Lab (research staff): psychologists, data analysts etc., research Centres, behaviour Scientists, the Academia (AUTH)</i>	X	X		X	X	All. <i>Coordination, research and design activities</i>	Y
Citizens	Older adults, chronic patients, the general public		X	X		X	$1.2 + 2.3 + 2.4 + 3.1 + 3.2 + 4.2 + 4.4$ <i>Interview and active participation in the challenge</i>	Y
Experts	<i>Healthcare service providers, caregivers doctors/ Psychologists, social workers</i>		X	X	X		$1.1 + 1.2 + 2.3 + 2.4 + 3 + 4.2 - 4.3$ <i>Generation of knowledge and active insights in each phase</i>	Y
Civil Society/ NGOs/ Orgs	<i>Patient associations (directors &amp; members), nursing Homes, hospitals (university clinics), open Day Centres for Older Adults, Greek OKFN</i>		X	X	X		$1.1 + 2.3 + 2.4 + 3.1 + 3.2 + 4.2 + 4.4$ <i>Interview, co-design and active participation in the challenge</i>	Y
Policy Makers (municipality, region authority and EU-global initiatives)	<i>Centres for the Open Care of Older Adults, "Help at Home", Ministry of Health, Primary Health Care system, Greek Inter-Municipal Network of Healthy Cities, European, EIPonAHA, WHO, the Academia</i>		X	X	X	X	$1.1 + 2.3 + 2.4 + 3.1 + 4.2 I 4.4$ <i>Insights, co-design, providing support, consultants</i>	Y
Industry (Private Sector)	<i>Companies (sponsors or medical equipment providers), private initiatives (funding or CSR initiatives), insurance companies, private day care centres, neurofeedback Centre of Thessaloniki</i>		X	X		X	$4.2$ Develop the prototype (provide support, consultants) $1.4$ 4.4 Iteration (provide support, consultants)	Y / N
The media	<i>The popular media, Science communicators</i>					X	$2.2$ Communicate & Share the Research Results	Y

Table 15: Stakeholders on the co-creation journey of Thess-AHALL

### 3.3. Science Museums



Figure 22– Science Museums in action during their workshops

### 3.3.1. Ciência Viva journey

#### 3.3.1.1. *Lab context*

- *Technology and resources*

Pavilion of Knowledge – Ciência Viva (CV) has an ample space and is fully equipped for meetings and workshops, as well as hands-on activities. It is frequently used to host public events. The team has access to design & multimedia professional tools for content creation and to the Pavilions' DOING augmented factory. DOING combines a maker space, a prototyping studio and an interactive exhibition section, in more than 500 m<sup>2</sup>. It is fully equipped with 3D printers, CNC milling machines, cutter plotters, soldering stations, Arduino and Makey kits, computers, video projector, etc. Up to 15 people can work simultaneously in the more technical areas of the lab, which regularly hosts workshops for young people.

- *Knowledge & competencies*

Among its staff and through its networks, CV has considerable expertise in natural and social sciences relevant to the field of their challenge. CV team of communication has expertise in social media (Facebook, Instagram) and good connections with mainstream media. Its design team is experienced in content creation (graphic, text, multimedia), product design and digital fabrication (including 3D modelling, prototyping, etc., for exhibits).

More specifically related to their challenge, over the years, CV has amassed a core knowledge and resources about ocean literacy and related aspects: climate change, marine litter, sea food, sustainable uses of the ocean including sports and leisure; and has developed an extensive network that covers most areas related with ocean research and governance, uses of the ocean, ocean advocacy, and ocean education. In the last few years, the team of CV has been involved in design, organization and facilitation of participatory (although not fully-fledged co-creation) processes, involving students and school communities, researchers, policymakers, civil society, NGOs, entrepreneurs and artists.

- *Approach in term of co-creation*

Until now, for CV, co-creation is a tool for science education and communication, a more interactive approach to science communication, to engage the public with complex issues involving science, technology and society, raising awareness of the issues at hand and of the importance of participation. In practice the actual approach would gain in extending the

perimeter of application and in ensuring the usefulness and impact of the outcomes of such processes.

CV's co-creation initiatives mostly consist in debates and consultation, for instance, using different models of focus groups, and resourcing to a limited set of co-creation activities and tools e.g., diversity of participatory mapping, "what if"/future scenarios, role playing. No complete co-creation journey (as defined in SISCODE) was tried, although CV has organized or has been involved its different phases as isolated parts. The team tends to collaborate with participants from existing CV networks: frequently, school/university communities (students, teachers), researchers; occasionally, local and national policy makers, and NGO; more rarely, business partners.

For instance, in Sea for Society ([seaforsociety.eu/np4/home.html](http://seaforsociety.eu/np4/home.html)), a project that feeds directly into their challenge, CV worked with different stakeholders to identify barriers to sustainable uses of the sea in tourism/leisure, and transports; and devise solutions to overcome these barriers. Stakeholders were recruited following a long and thorough stakeholder mapping exercise, and included school students, researchers, teachers, policymakers, CEOs, NGOs, environmental activists, sailors, surfers, etc. This work culminated in several 1-1, 5-day dialogue based workshops (with one facilitator + 2 assistants each), to 1) Generate and prioritize issues; 2) map the issues: establish what causes what; 3) ideation and prioritization of solutions.

### 3.3.1.2. *Local context*

- *The challenge*

Portugal is a coastal country with yearlong mild and pleasant weather; it is an international beach tourist destination; the sea plays a central role in its history and its national mythologies and culture. Despite all these factors, marine leisure activities are relatively uncommon in Portugal – and in the city of Lisbon – compared to other activities and other countries and cities with similar geographies. The challenge CV wants to address, then, is something along the following: **how to get more people into the sea? What concrete measures could help engage the widest range of people in recreational marine activities? What service, equipment or practice can help engaging the public in marine leisure activities, while promoting ocean literacy and awareness, and being accessible to a wide range of users?** The challenge will be located in Parque das Nações, a new business and residential area of Lisbon surrounding Pavilion of Knowledge. Parque das Nações was

projected and built with the proximity of the estuary in mind, but here too the distance between people and the water environment is blatant.

- *Needs*

Marine leisure activities – sea sports but also other sustainable, zero-carbon, human powered activities pursued for fun, instruction, tourism, etc., falling under the umbrella term “blue gym recreation”<sup>40</sup> that put people in direct contact with water are obvious ways to increase engagement of different publics with the ocean and the potential for greater appreciation of these areas. They are thus crucial to enhance ocean literacy, i.e. the awareness of the mutual influence of the ocean and human health and well-being. But to have any meaningful impact, in terms of ocean awareness and protection of ocean’s health, marine leisure activities must be widely practiced.

Of course, physical activity, including moderate, “informal” physical activity is also crucial for human health and wellbeing across all ages. Lack of physical activity is notorious in Portugal<sup>41</sup>, with all its health implications (obesity, diabetes, heart disease, dementia, depression, etc.)

Public demand for access to coastal or water-based activities is not uncommon in Portugal – in Lisbon, for instance, this translates into proposals for open swimming pools in the river (submitted to municipal participatory budgets). Recent work in urban planning also has called for the development of recreational water-based activities as a key factor for urban regeneration, in particular in the area surrounding Pavilion of Knowledge. A similar call has been made over the years by researchers, policy makers and companies working in tourism development.

- *Factors*

Apparent symptoms of the challenge sit right at the door of Pavilion of Knowledge: one large and expensive marina built 20 years ago that is usually on the national news because it is mostly unused and empty; and an old dock turned into a reasonably large lake that is only sporadically used for official triathlon competitions and a few private kayak lessons. Similar underused spaces to which normal people don't have access exist elsewhere in the country

<sup>40</sup> More information on  
<http://environmentalscience.oxfordre.com/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-12?rskey=5lkN4s&result=4>.

<sup>41</sup> More information on [https://ec.europa.eu/sport/news/2018/new-eurobarometer-sport-and-physical-activity\\_en](https://ec.europa.eu/sport/news/2018/new-eurobarometer-sport-and-physical-activity_en)

and in the city. In Lisbon, these no-go maritime areas are easily documented by touring around the estuary; and they are regularly featured on the news, on political campaigns (e.g., “Giving back the river to people of Lisbon!”)

There are statistical evidences as well: numbers of people engaged in sports and/or informal physical activity for fun and leisure in Portugal are usually amongst the lowest in Europe (see above). Numbers of people engaged in maritime sports or recreational activities are relatively low as well, even compared to land-based sports and outdoors' activities, plus these numbers are not growing. (One notable exception to this is the number of surfers, which have soared in the last few years. But the same doesn't happen with simpler, less spectacular activities, like sailing, canoeing, etc.)

There is limited evidence on possible factors/causes of the challenge based on multi-stakeholder consultations and debates organized by Ciência Viva, and on different studies developed over the last few years (by the government, by researchers, and by businesses) These perceived causes tend to cluster into four groups:

- 1) Cultural habits, lack of “maritime culture”, maritime sports and activities absent from formal education;
- 2) Ineffective policies and conflicts between the several national and local authorities regulating water activities;
- 3) Lack of widespread and accessible infrastructures for maritime sports and recreational activities, and nautical services (marinas, docks, oceanic pools, etc.);
- 4) Costs of equipment (boats, suits, access to infrastructures, etc.): most marine activities are considered elitist, while land-based sports or outdoor/nature activities are considered more accessible.

### 3.3.1.3. *Policy context*

- *Existing policies*

The practice of water activities is actively promoted by national and local government initiatives. For instance, the government (Ministry of Education) has programs supporting the practice of water sports as part of high school curricula (especially surf, kayak, sailing) in high schools, granting free access to infrastructures and free equipment (suits, etc.). However, these supports are focused on the promotion of sports, not any other activities (awareness, education...).

At the local level, the City of Lisbon formed partnerships with nautical clubs to offer a limited number of sailing and rowing classes to high school students. This seems to be quite

successful (and is perhaps an indicator of the interest of the CV challenge): the program started in 2015 with 120 volunteer students; in 2016 there were 387, and in 2018 these numbers jumped to 769.

Several coastal municipalities have invested in campaigns promoting the practice of water sports, most notably surf, and "selling" their regions as special locations for these sports. Campaigns range from explicit marketing campaigns to the delimitation of a "world surfing reserve" to hiring champions to spread the news about a particular quality for the practice of surf (e.g., "the biggest wave in the world").

Yet another related measure, developed by partnerships between local and national policymakers, is the creation of "high performance centres" for rowing training in inland more or less remote locations. These centres include indoor and outdoor training facilities, accommodation, social areas, parking, etc., and are available for athletes from everywhere – again, this is directed at (professional) sports, not open to the general public or for recreational activities.

- *Influencing policies*

A possible major difficulty is the following: maritime resources (stretches of river banks, coast or open ocean, docks, piers, wharfs, dam reservoirs, etc.) in Portugal "belong" to different entities (e.g., port authorities, the boards of natural parks, the army, energy companies, different business, etc.), so access to these resources is not easy for normal people. Reaching to all these authorities can therefore be complicated for a local audience.

- *Future policies*

At the present, aspects of the challenge are being addressed in a very top-down approach: (1) realizing educational programs and marketing campaigns to start cultural change; (2) pushing for considerable investment in infrastructure to attract those that have big interests in water sports.

Pavilion of Knowledge co-lab will explore more bottom-up approaches, assuming that any initiative to foster marine leisure activities & ocean awareness should engage from its initial stages people that will benefit most from it; and these initiatives should be based in creative processes in which the needs and the circumstances of the users are put first to develop appropriate, adaptable, affordable, and accessible services and products.

Solutions devised in this lab could influence future policy measures for instance improving access and opportunities for more participatory projects. One important dimension of the challenge at stake is the vast expanses of land, buildings, services, along the waterfront now ruled by different local/national bodies and inaccessible to the public. Authorities could then grant free access to these resources to individuals and/or communities, associations, etc., and open them up to proposals for their use. These could then be developed through participatory budgets (a popular tool for citizen participation in several municipalities and at national level), in which citizens would be invited to submit ideas for projects to develop, use and provide context for the open source watercrafts mentioned above.

#### 3.3.1.4. *The co-creation journey plan*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Prepare research	Identify uses & users of sea/river environments	1) observation of real situations, media scanning, focus groups	1) Quanti-qualitative data
	1.2 Do research	Identify participants in the journey Know trends in uses of sea/river environments relevant for different users	2) popular media scans, interviews 3) publications research; interviews with subject-matter experts	2) Set of ideas for future scenarios 3) Identification of journey's team
	1.3 Analyse data	Design a socio-political map of the local context Insights on factors	4) publication research; interviews; focus groups 5) all the above	4) Contacts, and recruitment list
Phase 2 Reframe Problem	2.1 Visualise/interpret data	Get meaningful and useful information for different participants	User response analysis; user journey map; insights sorting	More precise problem; identification of methodology to follow
	2.2 Reframe problem	Summarise and translate information	Summary framework + design principles generation Problem definition canvas	Devising workable problem. Every stakeholder on the same boat, co-ownership of the journey. sustained active collaboration between team members, with specific roles in the journey
	2.3 Frame opportunities	Identify opportunities	SWOT analysis, opportunity mind map	Identification of possible new stakeholders/partners, and paths to follow

<b>Phase 3. Envision Alternatives</b>	3.2 Generate ideas	Create and explore (many) solutions	Creative ideation tools to be defined. Series of events for ideation (Pavilion of Knowledge + “blue school”)	Pool of solutions
	3.2 Refine and select	Evaluate and prioritize solutions	Tools to be defined	More focused and feasible (in terms of technical expertise, policy considerations, “market” values) solutions
	3.3 Generate concept	Devise, visualise one possible solution	Idea Cards SBM Canvas Strategy road map	Rough concept-solution
<b>Phase 4. Develop and Prototype</b>	4.1 Prototyping	Make the concept tangible	Using the prototyping tools in Doing- Could be a small exhibition, a campaign or some sort of contest	Tangible propositions as a prototype for an open source watercraft or a Plan for Unused Waterfront
	4.2 Assessing and shaping the experience	Define a set of experiments with local ecosystem	Tools to be defined	First insights from users
	4.3 Disseminating	Raising interests from key stakeholders (policy-making workshop)	Tools to be defined Any design/cultural events	Ecosystem attention / policy makers

Table 16: Design of the co-creation journey of Ciência Viva

### 3.3.1.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
CV + invited researchers	Experience & expertise in water/ocean matters; socio-cultural research); and participatory processes	x					All phases/activities: Coordination Research: desk and field research; ethnography; interviews; focus groups, quantitative and qualitative data analysis Compiling and “translating” results Identify possible collaboration between stakeholders	y
Local residents, “random” people	Potential/actual users of water leisure services, products; from CV staff, team’s personal networks + snowballing		x	x	x		1.2; 2.2; 2.3; 3.1; 3.2: 4.2; 4.3: Interviewees Debating/reframing problems	n
Local advocacy associations/ movements	Already working in urban regeneration of the neighbourhood, leisure activities, mobility and environment		x		x	x	1.2; 2.2; 2.3; 3.1; 3.2: 4.2; 4.3 Interviewees Debating/reframing problems	n
Local school community	One school involved in Ciência Viva initiative for ocean literacy in schools; two teachers from local schools responsible for water sports for high school programmes	x	x	x	x		1.2; 2.2; 2.3; 3.1; 3.2: 4.2; 4.3: Co-researchers (i.e., invited to document their experience) Debating/reframing problems Pilot development and testing Assessing the experience	y
Parish council (Parque das Nações)	Business and residential area of Lisbon surrounding Pavilion of Knowledge	x		x	x		1.2; 2.2; 2.3; 4.2; 4.3: Interviewees Debating problems	n
Environment department of the parish council (Olivais)	Neighbour parish; environment department has worked with CV; several initiatives for engaging people with the river	x	x	x	x		1.2; 2.2; 2.3; 4.2; 4.3: Interviewees 1.5 Debating problems	n
Lisbon Municipality : director of Sea Working Group	From a department in the City for the strategic management of sea activities	x	x	x	x		1.2; 2.2; 2.3; 4.2; 4.3: Interviewees Debating problems	n
Lisbon Municipality : department of education	Supervisors of school sports, including programme for water sports	x	x	x	x		1.2; 2.2; 2.3; 4.2; 4.3: Interviewees Debating problems	y

Researchers	Working in a) water leisure activities and urban/water front regeneration; b) environment, water quality, maritime citizen science; c) water sports	X	X	X		1.2; 2.2; 2.3; 4.2; 4.3: Interviewees Debating problems	N
Local businesses related with water activities	Water sports schools; maritime tour operators; private marina		X	X		1.2; 2.2; 2.3; 4.2; 4.3: Interviewees Debating/reframing problems	N
NGOs working in this field	Association to foster engagement of women of all ages in water sports, based near Parque das Nações	X	X	X	X	1.2; 2.2; 2.3; 4.2; 4.3: Interviewees Debating problems	N
Local media	Neighbourhood newspaper; featured several articles on challenge's subject; director is involved in water leisure activities		X	X		1.2; 4.3: Interviewee	N

Table 17: Stakeholders on the co-creation journey of Ciência Viva

### 3.3.2. Cube – Continium journey

#### 3.3.2.1. *Lab context:*

- *Technology and resources*

The Cube design labs offer spaces and materials for brainstorms, creative sessions, presentations, and interactive discussions with different stakeholders and museum visitors. Rapid prototyping facilities include 3D printers, a large format printer, a plotter, laser cutters and basic tools and materials. Continium has a workshop with equipment for woodworking and metalworking.

- *Knowledge & competencies:*

The Cube design labs work together with a team of experienced coaches in the fields of design thinking, design research, graphic design and product design. It has also built (and keeps on building) a network of professionals, researchers, and local/regional policy makers to continuously strengthen its knowledge base and regional anchoring.

The Cube design labs have more than three years of experience in developing and coordinating design challenges that address human needs and ambitions and in which museum visitors and other stakeholders play a key role in the co-creation process. This has resulted in 30 projects, involving over 100 national and international design students and alumni (primarily bachelor, but also vocational and master studies) from different disciplines.

Continium and Cube have an extensive experience in the management of complex projects, in particular developing and designing new venues/museums, and creating exhibitions around topics such as science, design, innovation and sustainability. This includes developing activities and events in which visitor participation is the central aim. The organisation behind both venues – Stichting Museumplein Limburg – is a network-organisation. For every project, activity and event it is crucial to build a network of stakeholders and partners with whom we can work together and cooperate in the research, design and realisation of all projects.

- *Approach of co-creation*

At Cube a co-creating initiative usually starts with a Cube Call – a design challenge that is either related to one of Cube's exhibitions, based on a (societal) question posed by an external party/organization/company or derives from a student's interest.

For every Cube Call, Cube builds a multidisciplinary team of maximum 5 students (and occasionally alumni) who work on this design challenge as part of an internship or graduation project. This takes usually 5 months. The design process, inspired by Stompff, (2018)<sup>42</sup> is based on design thinking and co-creation and composed by the following phases: ASK, IMAGINE, CREATE and EVALUATE in an iterative manner. Co-creation with museum visitors is facilitated and encouraged within every phase and on a daily basis.

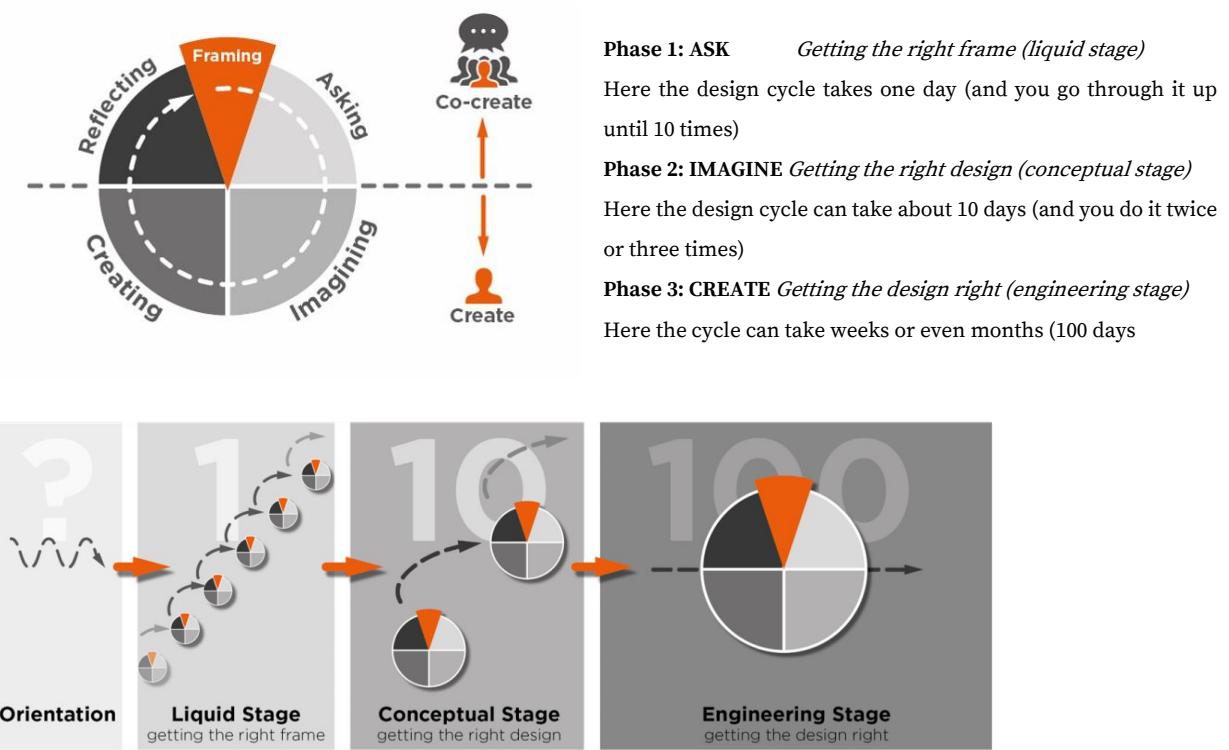


Figure 23: Co-creation method used by CUBE/CONTINUM

**Example:** The Cube Call *Fine Feathers Make Fine Birds* was initiated and funded by a passionate individual, confronted with a challenge in both her professional work as a medical doctor and university professor, as well as in her private live. Cube formulated the following Call in 2018:

<sup>42</sup> Stompff, G. (2018). *Design Thinking. Radicaal veranderen in kleine stappen*. Amsterdam: Boom uitgevers.

*“When someone needs long term or permanent care and has to stay in a nursing home, his or her life and personality will be strongly influenced. To be dependent on others for help with everyday routines often requires letting go of personal habits and individuality. [...] The aim of this project is to develop a clothing concept that allows people own clothing to be adapted so that it becomes suitable when they become dependent on care/nursing and thus allowing them to keep their own identity.”*

In this case, two bachelor students formed the core team; one studying Industrial Design at the Technical University of Eindhoven and one studying Spatial Design at the University of the Arts Utrecht. They regularly worked together with other students from industrial design, communication and multimedia design, and product design. They were coached within the Cube design labs on the process of design thinking and on how to visualise for and interact with museum visitors. The student team regularly presented to and consulted with the project client/initiator. They were also coached by and co-creating with a local fashion designer. Furthermore, in order to understand the context of the problem and the end users, the student team visited different nursing homes, did interviews with people who are physically limited and/or disabled, and did a couple of contextual inquiries to gain insights on the process of dressing and undressing. In addition, they experimented with dressing practices themselves, and prototyped and tested several technologies to be implemented in the clothing. The final concept was presented to the client and at a networking event for start-ups related to Brightlands Innovation Factory.

### 3.3.2.2. Local context

- *The challenge*

Due to increasing welfare and a continuously rising life expectancy European population is ageing. This demographic change brings about great socio-economic challenges on different policy levels. In the Netherlands, population ageing is an issue in particular in those (often peripheral) regions where the population is not only ageing but also shrinking. Parkstad – a network of municipalities in the South Limburg region – is among the fastest shrinking areas of the Province of Limburg. While there are European policies to address health and care challenges to promote ‘active ageing’, in the context of Parkstad/South Limburg there seem to be a variety of social challenges that require a different approach to how we envision future societies. These challenges include and are related to an increasing number of single-person households, a more individualist but also a more culturally diverse society (due to

migration), questions of (regional) identity, and an increasing feeling (or fear) of loneliness. Partly based on exploratory discussions with Cube visitors (most of them citizens from the region), the Cube team intends to address the social challenges related to the ageing society of the Parkstad region:

**How might we increase the quality of life of people living and growing up in an ageing society like Parkstad (South Limburg region) and more specifically fight loneliness?**

- *Needs*

The need for (meaningful) social contacts is of all ages. But with age come limitations in terms of mobility, income, and healthcare to name a few. A growing number and share of elderly persons need, want and have to live more independently under the demands/developments in our society; thus there is a need for so-called 'lifetime proof' environments. Furthermore, society has become more individualist. Living alone means that people who are less mobile or have less social capabilities will have a bigger chance to feel loneliness. We strongly believe in an approach that brings people together from different age, (cultural) background, socioeconomic status, walk of life, etc.

- *Factors & Evidences*

Demographic statistics (CBS, Neimed, and Eurostat) show evidence of an ageing population. More than a third of the Dutch population will be over the age of 65 by 2040. Life expectancy is on the rise as well. At present, 1 in 25 Dutch residents is 80 years or older, whereas 50 years ago this was 1 in 74. This demographic shift has increased pressure on health care, housing, city planning, mobility, and public facilities.

This demographic shift seems to be even more pronounced in South Limburg, which is a border region (next to Germany and Belgium) and considered the periphery of the Netherlands. It is a green area where housing is relatively cheap. At the same time economic opportunities are considered limited and young people tend to move towards other parts of the Netherlands, contributing even more to the ageing of this region's population. Furthermore, there seems to be a relatively high presence of mental health care facilities in this region.

Preliminary talks with museum visitors (both elderly and families with children) highlight loneliness to be a major social problem, now and in the future. Already existing local policies and initiatives underline the urgency of this challenge. Recently the city of Heerlen (and 15

other Dutch municipalities) has received funding from the national government to help fighting loneliness.

Another indication that there is a need for different ways of living and social contacts is the rise of new types of co-living and examples of ‘buddy’-initiatives.

### 3.3.2.3. *Policy context*

- *Existing policies*

The region in which the co-creation lab will operate is a context with an above average growing number and share of elderly persons. Many young people leave the area for education and jobs in other parts of the country. The need for health and social care is high. There are a couple of programs initiated by local, regional or national governments that are aimed at fighting loneliness and enhancing the life quality of elderly citizens (see list below):

- **Eén tegen Eenzaamheid** (national programme that provides funding to municipalities (Heerlen) to fight loneliness, particularly among people aged 75+)
- **Centrumplan Kerkrade** (cooperation/initiative between municipality of Kerkrade and a social housing corporation to make the city (centre) more attractive and liveable)
- **IBA Parkstad**
- a variety of local **‘buddy’-initiatives**
- **Seniorenpas** (discounts for elderly)
- **National financial (care) support**

At the same time we experienced that the success of these programs is strongly depending on the involved organisations, civil servants or politicians. There are only a few bottom-up initiatives initiated by citizens or private organisations, which often seem to have a relatively small scale impact. The ‘Gebrookerbos’ is an example of a development strategy of the municipality of Heerlen, where a specific area that used to be occupied by the coal mining industry is destined to get new functions and uses, by stimulating bottom-up initiatives of local citizens. This shows that local governments are actually open for and stimulating bottom-up approaches.

- *Influencing policies*

(Local) governments increasingly stimulate bottom-up approaches. Partly due to financial limitations and partly due to realisation that bottom-up approaches might be more effective, there is room for external/private initiatives in this region. At the same time, there are several reasons why it might be difficult to actually make a change, such as:

- (Lack of) awareness of need of change;
- Competencies of policy makers;
- Fragmentation of (local) initiatives;
- Potentially conflicting interests;
- Fragmentation of municipal administrations (many small municipalities).

- *Future policies*

One idea that came up during the workshop is to provide a showcase of a variety of (successful) local initiatives. This would increase the visibility of the existing problems, and then could increase awareness for the need of change among policy makers. This could then lead to a movement towards more encompassing and integrated solutions (compared to the current fragmented and ad-hoc approach).

#### 3.3.2.4. *The co-creation journey plan:*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

- **Note on the selected tools:** probably not all the tools listed in this table will actually be used. These tools seem to be the most promising, valuable and feasible for the Cube lab context.
- **Note on visualisation + co-creation:** the team believes that visualisation is an essential part of co-creation. Therefore, visualising and prototyping of research results, insights, ideas, problems, concepts and so forth for different stakeholders will be part of all phases, to support participation, communication and stakeholder engagement.
- **Note on the phases:** since the design process adopts an iterative approach, several phases or activities may overlap and, in practice, they will be conducted more than once.
-

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Prepare the Research	Identify and contact relevant stakeholders Plan research activities	Contextual Research Plan Research Participant Map Research Planning Survey User Research Plan	Elaborate research plan Stakeholder engagement
	1.2 Research (data collection)	Understand the: - size/scope/impact of the problem of loneliness -causes the problem -existing solutions + gaps and why they (don't) work -needs of target group and stakeholders	Subject Matter Experts Interview Field Visit/Activity Ethnographic Interview User Pictures Interview Image Sorting Key Facts Secondary sources and existing statistics	Demographic data (visualised) personal stories A map of existing solutions/initiatives (including successes and flaws)
	1.3 Data synthesis and analysis	Structure and document data Make sense of gathered data Identify preliminary design opportunities	User Observations Database ERAf Systems Diagram Activity Network Persona Definition	Data documentation + situational analysis, including: More elaborate problem definitions Personas, Preliminary design opportunities (10 frameboards - partly overlap with phase 2)
Phase 2. Reframe Problems	2.1 Visualize & interpret data	Find 'golden nuggets' (i.e. surprising insights) Present and communicate problem/challenge to different stakeholders	Observations to Insights Insights Sorting Insights Clustering Matrix User Journey Map	Visualisations of insights
	2.2 Reframe the problem	Change perspectives / explore different frames	Summary Framework [Cube's own tool: Frameboards]	10 Frameboards including HMW-questions (problem + opportunities co-evolve)
	2.3 Frame opportunities	Change perspectives / explore different frames	Design Principles Generation Principles to Opportunities Opportunity Mind Map  [Cube's own tool: Frameboards]	10 Frameboards including HMW-questions (problem + opportunities co-evolve)
Phase 3. Envision Alternatives	3.1 Generate (many) Ideas	Translate opportunities into design ideas (partly overlap with phase 2)	Ideation Session Concept Metaphors Ideation Game Foresight Scenario	Large collection of ideas
	3.2 Refine and select ideas	Visualise/ rapid prototype ideas for evaluation with users	Behavioural Prototype Concept Prototype Concept Sketch Concept Scenarios	10 Frameboards (partly overlap with phase 2) Feedback from users
	3.3 Generate 2 or 3 concepts	Based on feedback, translate ideas into 2 or 3 more elaborated concepts	Concept Sorting Concept Catalogue Concept Evaluation	Visualisations of 2-3 concepts to evaluate with stakeholders

<b>Phase 4. Develop and Prototype</b>	4.1 Develop the concept(s)	Based on evaluation of phase 3, develop the final (combination of) concept(s)	Morphological Synthesis Concept-Linking Map, Synthesis Workshop, Solution Storyboard Prescriptive Value Web Innovation Brief	A visualisation of the concept and an elaborate presentation for different stakeholders
	4.2 Create (a) prototype(s)	Materialise/ implement the solution	Solution Prototype Solution Roadmap	Testable prototype(s)
	4.3 Test and evaluate prototype(s)	Test and evaluate the prototype/concept and adjust it accordingly	Solution Prototype Solution Evaluation	Test reports and evaluations

Table 18: Design of the co-creation journey of CUBE

### 3.3.2.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing Network
		Internal	Strategic	Providers	Consulted	Informed		
Local or regional policy makers	Politicians and civil servants from the city or regional government	X	X			X	<i>Policy maker, initiator, responsible for implementation, Phase 2 - 4</i>	Y
Social care organisations such as GGZ, ZonMW	Organisations involved in the identification of needs, delivering mental or physical care or working on prevention programs.		X	X	X		<i>Stakeholder/partner in the projects, knowledge of citizens, regions and care. Phase 1 - 4</i>	Y/N
Citizens	City or region	X	X	X	X	X	<i>Stakeholder – participants – closely involved to create solutions together Phase 1 - 4</i>	N
Scientists (behavioural and social sciences) Maastricht University and research institutes like Neimed and Silverbrain	Researchers in social science, psychology, neuroscience, etc.		X	X		X	<i>Scientific research and validation Phase 1 - 2</i>	Y/N
Housing Organisations such as Wonen Limburg, Wonen Zuid, Heemwonen	Organisations that build, manage or rent out housing estates and are developing new strategies for their tenants.		X	X	X	X	<i>The citizens live in their houses and the organisations are aware of the needs and developments within these housing estates, neighbourhoods, etc. The housing organisations are in the middle of change and are aware of their responsibilities broader than only renting out living space. All phases</i>	Y
Health care organisations such as Zuyderland and Adelante	Organisations responsible for (mental-)health care		X	X	X	X	<i>Scientific and social input for the definition of the challenge and cooperation during the design process. All phases</i>	Y/N

Table 19: Stakeholders on the co-creation journey of CUBE

### **3.3.3. Science Gallery Dublin Journey**

#### *3.3.3.1. Lab context*

- *Technology and resources*

Science Gallery offers space and materials for brainstorms, creative sessions, presentations, and interactive discussions with different stakeholders and museum visitors. It houses state-of-the art audio visual systems, including point-to-point video conferencing, a multimedia theatre, studios, galleries, Wi-Fi and catering facilities and service. Rapid prototyping facilities include the studio spaces with in situ basic tools and materials.

Science Gallery Dublin (SGD) was pioneered in, and works in partnership with, Trinity College Dublin - the top ranked university in Ireland. Therefore, SGD has access to a wide network of researchers and professionals who are working in area of our chosen challenge. The challenge “to develop mental health and well-being management with young people” has strong ties with previous and upcoming exhibitions, so we can build on existing relationships as well as foster new ones.

SGD is also located in the centre of Ireland’s capital city Dublin, which is growing to be a technology hub of Europe. SGD is located just over 500 meters from ‘Silicon Docks’, the area of Grand Canal Dock where there is a very high concentration of European headquarters of high-tech companies such as Google, Facebook, Twitter, LinkedIn and other start-ups in the area. The number of tech professionals working in technology firms in the area is about 7,000. Therefore, a dynamic value-chain of stakeholders that can be involved in the participatory innovation approach already exists in the immediate area.

- *Knowledge & competencies*

SGD has a strong multidisciplinary team, all of our exhibitions bring together ideas from artists, engineers, designers and scientists. The challenge chosen (mental health and well-being in young people) ties in with past and previous exhibitions, so the SGD team has established relationships to build on as well as the opportunity to foster new ones. For example, our current exhibition INTIMACY, has a number of partners including First Fortnight as part of First Fortnight – European Mental Health Arts & Culture Festival 2019. This included Mental Health Uploaded, a day of tech-related events exploring the relationship between technologies and mental health. SGD also work with 3D designers and build teams for the development of each exhibition, so therefore the team will be able to recruit and draw on their expertise. This may be crucial during the prototyping phase if the

solution requires significant design and build. SGD also has a Technical Manager on site who will be able to be involved if needed.

SGD has a strong multidisciplinary team, with all of our exhibitions bringing together ideas from artists, engineers, designers and scientists. The challenge chosen (mental health and well-being with young people) ties in with past and previous exhibitions, so the SGD team has established relationships to build on as well as the opportunity to foster new ones. For example, our current exhibition INTIMACY has a number of partners, including a mental health group called *First Fortnight*, who collaborated with us as part of the *European Mental Health Arts & Culture Festival 2019*. This collaboration included *Mental Health Uploaded*, a day of tech-related events exploring the relationship between technologies and mental health. SGD also work with 3D designers and build teams for the development of each exhibition, so therefore the team will be able to recruit and draw on their expertise. This may be crucial during the prototyping phase if the solution requires significant design and build. SGD also has a Technical Manager on site, who will be able to be involved if needed.

The gallery also has a dedicated Marketing and Events team, who has been briefed on the SISCODE project. They understand its aims and will help deliver the communication and events that will be essential in addressing the challenge.

The unique placement of SGD within a university setting offers an access to the young people, for whom the challenge is aimed for. Therefore, the team will be able to make use of societies and other links within the college to invite them to participate in the co-creation journey. SGD has links with a few TDs (Teachta Dála – members of Irish government) that needs exploring so as to establish a stronger connection with them.

- *Approach of co-creation*

Co-creation is something that SGD values as important. However, the team possibly does not take the time to step back and analyse whether the co-creation journey being undertaken is the “best practice” for co-creation. SGD are looking forward to learning throughout the duration of the project and documenting the co-creation journey practice to replicate it in other practices within the gallery.

One of the most successful co-creation projects was an H2020 project called “Hack the Brain”. This consisted of a Hackathon weekend event, where researchers, designers, artists and citizens spent the weekend coming up with solutions using Brain and Neural Computer Interfaces (BCNI) devices to “hack the brain”. There was a judging panel at the end, which decided whose prototype was the best presented and most successful.

From the viewpoint of the gallery, the public were really engaged in this project, and the weekend itself went well. However, it lacked iteration (Phase 4), which will be carried out in SISCODE, in order to develop a prototype to fruition. It also did not necessarily involve all stakeholders from the very beginning of the co-creation journey - something the team is excited to carry out in SISCODE.

### 3.3.3.2. *Local context*

- *The challenge*

SGD will address the problem of developing “**mental health and well-being management with young people in Ireland**”. The SGD team would like to answer the question of what is the most important issue to young people today that needs to be heard. SGD feels that this topic is an important issue to tackle as our challenge, due to Ireland needing to improve in many areas when it comes to mental health and well-being management in young people. For example, Ireland still sends children to adult mental hospitals, a practice long since thought of as repugnant to civilised standards. As of 2018, there were nearly 2,700 young people waiting for mental health appointments, with anxiety being the most common mental health issue for young people. SGD is in a unique position where we are part of a college, and therefore have access to many young people on campus that will be struggling with mental health issues. This will be of great benefit in tackling this challenge as part of SISCODE. The aim would be that at the end of the project we would have a tangible prototype that young people feel addresses an important challenge for mental health and well-being management.

- *Needs*

In today’s society of young people, they are facing many more challenges than any generation that has gone before them - the digital age of social media, rising uncertainty about world leadership, and climate change are all factors that affect their mental health in a negative way. 1 in 10 young people in the UK experience a mental health disorder<sup>43</sup>, with there being an increase in prevalence of mental health problems at 16-19 years old<sup>44</sup>. It’s also of interest that over half of all mental ill health starts by age 14 and 75% develops by age 18<sup>45</sup>. SGD will focus particularly on 15-25 year old young people and their mental health issues, as this already is the target audience for SGD.

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<sup>43</sup> More information on <https://files.digital.nhs.uk/publicationimport/pub06xxx/pub06116/ment-heal-chil-youn-peop-gb-2004-rep1.pdf>

<sup>44</sup> Singleton N, Bumpstead R, O’Brien M, Lee A and Meltzer H (2001) Psychiatric Morbidity among Adults Living in Private Households.

<sup>45</sup> Murphy and Fonagy (2012) Mental health problems in children and young people.

- *Factors & Evidences*

A 2017 research project<sup>46</sup> was carried out based on young people's experience of first engagement with mental health services, and their transition through the system to inpatient care. It was designed to "provide psychologists with an insight into how young people believe services can be improved". This report found that the current process of helping children and young people with mental health difficulties is "a severely inadequate system". It recorded a lack of access (in a timely manner for suicidal youths) to emergency mental health services (particularly in rural areas) as a major issue.

It also documented issues such as GPs medicating young people who have severe mental health issues, either because of a lack of understanding, or because waiting times to see a psychologist are too long. It also has been reported that doctors are talking over the heads of children and young people who are experiencing severe mental health issues, addressing parents instead, and using language that the patient cannot understand.

Mental health is a priority for Irish people. A report by Mental Health Reform found that a large majority of the population are in support of increasing funds for mental health services<sup>47</sup>. The 2019 Budget allocation gave €55 million additional funding for mental health to a total of €105m, but there is currently no breakdown of adult and young people mental health spending. <sup>(3)</sup> This outlines a strong interest in mental health in young people, by both the government and the general population, to co-create solutions for problems in this area.

### 3.3.3.3. *Policy context*

- *Existing policies*

In terms of mental health policy in Ireland, in 2006, the Irish government published *A Vision for Change: Report of the Expert Group on Mental Health Policy*, an ambitious comprehensive mental health policy document which sought to consolidate and deepen moves towards community-based mental health care in Ireland. This came to the end of its 10-year term in 2016 and has been reviewed and updated. These policies will act as a strong support to the development of the co-creation challenge.

However this policy does not hold up to international practice according to an international study '*Mapping and Understanding Exclusion in Europe* report', which has criticised Ireland

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<sup>46</sup> Office, Ombudsman for Children's. 'Take My Hand' - Young People's Experience of Mental Health Services. Dublin: Ombudsman for Children's Office, 2018.

<sup>47</sup> Mental Health Reform. Mental Health Reform Pre-Budget Submission 2019. Dublin: Mental Health Reform, 2018. Department of Children and Youth Affairs. National Strategy on Children and Young People's Participation in Decision-making, 2015 – 2020. Department of Children and Youth Affairs. Dublin: Government Publications, 2015.

for its lack of reform in the mental health sector stating that in Ireland, “*Austerity measures and lack of clear policy guidance has resulted in very little progress and staff shortages and lack of funding imposes boundaries even for existing services*”.

Another contextual note is that the number of involuntary admissions to psychiatric care in Ireland has risen in recent years from 46.5 per 100,000 inhabitants in 2013 to 52.6 per 100,000 inhabitants in 2016. Additionally, the Mental Health Commission set out a strategic plan for 2016-2018 which aimed to promote the continuous improvement and reform of mental health services and standards. This policy should support the co-creation challenge.

Mental health was a priority in the 2019 Budget, which allocated €55 million additional funding for mental health to a total of €105m.<sup>48</sup>

- *Influencing policies*

In terms of co-creation, Irish policy is in favour of including young people in policy making. In 2015, the Irish government published a report on ‘*National Strategy on Children and Young People’s Participation in Decision-Making 2015-2020*’. A major objective set out in this strategy was that children and young people should have a voice in decisions that affect their health and well-being, including on the health and social services delivered to them. This strategy sets a strong precedent for co-creation for the SGD challenge “to develop mental health and well-being management with young people”. However, SGD is aware that influencing policy is very difficult, and this is not something in which the team has been involved with before. Thus, the team are hoping to have support and training from the project as much as possible in this area.

- Future policies

Addressing the challenge could inspire policy discussions on how to include young people from the beginning of a project, instead of as a tokenistic<sup>49</sup> practice. SGD imagines that it may be possible to affect policy change within the college they are based, specifically the mental health policies, as they have not been updated since 2008.

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<sup>48</sup> Department of Finance. *Budget 2019*. Department of Finance and the Department of Public Expenditure and Reform. Dublin: Department of Finance, 2018.

<sup>49</sup> A tokenistic practice is a practice of making only a perfunctory or symbolic effort to be inclusive to members of minority groups

### 3.3.3.4. *The co-creation journey plan:*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Research	Involving stakeholders to define the problem and analysing the local context	2.3, 2.13, 2.12, 2.11, 3.1, 3.2, 3.5, 3.6, 3.8, 3.14, 3.15, 3.12, 3.10	Bibliography Generated usable data - qualitative and quantitative.
	1.2 Preparation of engagement	Create a positive environment for relationship building between different stakeholders.	1.1, 1.2, 1.5, 1.14	Relationships created between us and between the stakeholders
Phase 2. Reframe Problems	2.1 - Visualise and Interpret data	Transform all of the collected data (both qualitative and quantitative) into visually attractive graphs/sound bites/videos/images	4.17, 4.9, 4.8, 4.7, 4.18, 4.5, 4.12, 4.16, 4.2, 4.4	Clear visual representation of data, that highlights key areas of interest
	2.2 Reframe the problem	Showing results from data to extended group of stakeholders and narrowing down the options	4.11, 4.19, 4.13	Clear visual representation of data, that highlights key areas of interest
Phase 3. Envision Alternatives	2.3 Frame opportunities	Identify some hotspots, elements to focus on before starting the ideation phase	5.1, 5.2, 5.3, 5.4	Identify the important elements and listing what fit with the stakeholders' needs and motivations Have a better idea of the type of solution we will look for and better build the idea generation activity
	3.1 Generate ideas	To generate lots of different ideas  Build enthusiasm and ownership of stakeholders for their ideas.	5.9, 5.5, 5.8, 5.10	Multiple ideas  Ownership of ideas

Phase 3. Envision Alternatives	3.2 Refine and select ideas	Evaluate good and bad ideas Begin to graduate from an idea to a concept	6.4, 6.8, 5.3, 5.11, 6.6, 6.10, 6.3, 6.7, 6.5, 5.1.	Filter for best ideas Move ideas forward
	3.3 Generate a concept	Lead with backing ideas with research data  Explore concept (sort, evaluate, score)	5.13, 5.17, 5.7, 5.15, 6.2, 5.4, 5.12, 5.16, 6.11, 5.6, 5.14, 6.1, 6.9, 6.13	Strong concept that has evidence.
Phase 4. Develop and Prototype	4.1 Prototyping	Produce basic and first iterations of a prototype	6.8, 6.9, 6.10, 7.1, 7.4, 7.7	Prototypes will be produced
	4.2 Assessing	Assess the prototype, most importantly with the end users to encourage iterations	5.11, 5.12, 6.11, 6.13,	Prototype will be refined
	4.3 Disseminating	Working with SGD communications team to create a report	7.8, 7.9	A visually attractive report of the prototype

Table 20: Design of the co-creation journey of Science Gallery Dublin

### 3.3.3.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing Network
		Internal	Strategic	Provider	Informed	Consulte		
SGD staff	Members of the SGD Education, Events and Marketing teams	X					Involved in all stages	Y
Young people	in secondary school		X	X	X	X	Involved in all stages	Y
Young people	out of school		X	X	X	X	Involved in all stages	Y
Teachers /Educators	from Secondary Education		X		X	X	Involved in Phase 1, Phase 3, Phase 4 , on first-hand experience of dealing with young people's mental health	Y

Mental Health Groups	Groups eg. Pieta House, Jigsaw, First Fortnight who work with young people with mental health challenges			X	Consulting in Phase 1 and depending on prototype could be involved as strategic stakeholders or providers	N
Medical staff/clinicians	People who work directly in the mental health service and see young people with mental health problems and how the health system could be improved			X	Consulting in Phase 1 and depending on prototype could be involved as strategic stakeholders, to influence policy in the healthcare system	Y
Researchers from Trinity working in mental health research	Researchers in the area of neuroscience, or technology that could be used to treat mental health challenges		X	X	Consulting in Phase 1 and depending on prototype could be involved as strategic stakeholders	Y
Policy Makers	Policy makers at variant levels, locally and nationally,	X	X	X	Consulting in Phase 1, and kept informed at all stages, invited at Phase 3 and 4	N
High-tech companies	Google, Facebook, etc		X	X	Consulting in Phase 1, and kept informed at all stages, invited at Phase 3 and 4, potentially be involved in implementation of output.	N
Trinity College Dublin	Counselling service department, general faculty and admin staff working in this field		X	X	Consulting in Phase 1 and kept informed at all stages.	Y
'Technical/designer' professionals	Experts in tech and design, who can help implement a solution, (depending on the type of output that is planned)	X	X	X	Consulting in Phase 1, and kept informed at all stages, invited at Phase 3 and 4, potentially be involved in implementation of output.	Y

Table 21: Stakeholders on the co-creation journey of SGD

### 3.3.4. Traces journey

#### 3.3.4.1. *Lab context*

- *Technology and resources*

The Espace Pierre-Gilles de Gennes (ESPGG) has large space for brainstorming and creative activities, computers, conference facilities, co-creation spaces, 3D printer, a small space suited for prototyping (equipped with several makey-makey, arduinos, Raspberry Pi and computers currently used in educational activities). A dedicated zone to run living lab workshops and creativity workshop is under configuration. More complex lab spaces are located within the same campus and accessible on demand. Langevinium is a hacklab run by university students. Neighbouring fablabs are run by students in art and design (ENSAD). Lutecium has a youtube producing studio.

- *Knowledge & competencies*

Traces' core competences rely in innovative methods for science engagement and social inclusion, facilitation of discussion games on socially relevant science and technology issues, collaborative training in RRI and science in society.

In the last 3 years we have initiated several projects in frugal science using living lab approaches, bringing together the science community and other actors from the arts, international cooperation, education, etc.

- *Approach of co-creation*

Our approach is based on the concept of developing public activities within the “grey zone”, where the frontier between knowledge production and knowledge dissemination is not well defined. That is, activities that satisfy at the same time the needs of the general public and the needs of the research and innovation community. The living lab approach is particularly suited for this idea. Our aim is to combine dialogue approaches of science engagement and living lab methodology and open innovation approach to provide meaningful explorations of science based, socially relevant issues. Traces is adapting the usual criteria of living labs (involving end users in the design/ testing) in the classical process of co-creation, exploration, experimentation and evaluation, to events in which the general audience with a cultural interest / involvement in the issue can participate.

An example is the participatory and evolutive exhibition (or “exploration”, as we prefer to call it) “Frugal science”. The exhibition itself was entirely built during workshops involving very diverse partners (innovators, international cooperation activists, teachers, engineers, students, just to mention the main relevant), all exploring how to hack everyday technological objects to transform them into low cost scientific instruments. As an example, using spare parts of a broken CD ROM player to build a high definition, Arduino controlled microscope. Thanks to the innovative approach, the co-constructed exhibition was awarded the ECSITE Mariano Gago award for the best science communication initiatives of 2017 in the “Smart and simple” category. In this case co-construction was developed not at the initial stage but later on. For SISCODE our aim is to go deeper in co-creation process in the initial stage of framing the issue.

### 3.3.4.2. *Local context*

- *The challenge*

How can we enforce our “right to be informed” in automated decision processes using algorithms in everyday life? How can the presence of AI-based supports to professional or everyday life decisions become noticeable and readable for end users / citizens so they can make informed choices in crucial aspects of their lives?

How can we make people more conscious of automated decision processes / services / applications and of criteria used by algorithms? How can we make ethical issues explicit and understandable for the generic users?

- *Needs*

The need related to the right to be informed is important because there are more and more pressure of the public for knowing what is done with their data, and how our decisions are influenced and the Law enforced on European level obliges companies and administrations to be accountable for that.

More specifically, there is a real need of including discussions on the topic in contexts and situation easily accessible by general audiences, such as in educational or cultural activities.

- *Factors & Evidences*

There is a direct RRI issue because of the ethics issues linked to algorithms use as it is more and more used in our everyday life processes without being noticed: the Commission Nationale de l’Informatique et des Libertés (National Commission on Informatics and Liberty

– CNIL), which is in charge for the French government to protect citizen rights to the protection of their private data, has edited a report 6 months after the implementation of the RGPD EU law showing that there is more and more complaints (more than 10 000 for the year 2018!).

### 3.3.4.3. *Policy context*

- *Existing policies*

The mission of the CNIL in France is to inform French citizens about their rights and make sure the EU RGPD law and French law is well implemented and respected. Last year, Deputy Cedric Villani, a well know mathematician, and deputy, has presented a report on AI providing useful guidelines on how to address culturally and legally these emerging innovations.

- *Influencing policies*

In the local context, it can be difficult in this time frame to have direct impact, as the issues are rather of global nature. The team of Traces is planning to involve the region and city officers dealing with digital innovation, to ensure our activities are relevant for their policy needs at local level.

- *Future policies*

The labs products will inform and support policy makers in understanding public visions on the issue while providing tips for the actors of the educational and cultural community so to engage with the issue and have solid instruments to address it.

Traces envisages to concentrate on some specific areas, and professional engagement with algorithms in decision making, such as the education sectors, the medical sector, etc. It is possible that direct influence will be easier in more specific contexts. This will be part of the analysis that will be realised in the first part of the co-creation journeys, and will depend on the type of partnership the internal team will be able to develop.

### 3.3.4.4. *The co-creation journey plan*

Following the structure of the SISCODE co-creation journey, the plan is divided in four phases displayed in the following table.

	Activity	Objectives	Tools	Expected Outcomes
Phase 1. Analyse Context	1.1 Prepare the research	Define strategy for research Identify sources Design stakeholder analysis	Stakeholder map (mutualised with other activities!) Problem definition Retro planning	Identification of keywords Identification of key information holders Timeline
	1.2 Research and data gathering	Collect data Engage stakeholder by giving them expert role Provide knowledge base	Literature review Participation to events Organisation of local events to engage stakeholder and collect relevant information	Greater awareness of the topic within the team Some engaged stakeholders Understanding of the agenda and communication codes of relevant stakeholders
	1.3 Synthesize	Translate the outcomes of 1.2 into usable information	Tools for prioritizing and synthetizing	A readable, easy to use document
Phase 2. Reframe Problems	2.1 Visualize and interpret data	Identify bifurcations and decisions to be made	Stakeholder map reviewed	A clear and readable framing of the problem (visualisation, key statement, keywords)
	2.2 Reframe the problem	Validate the roadmap and the framing of the issue Prioritize and decide on which specific issue to focus on	Discussions and exchanges with stakeholder Organisation of semi-public events to reframe the issue Decision making	Roadmap shared with the strategic stakeholders
	2.3 Frame opportunities	Focalise on policy making uptake of the lab	Meeting with Ile-de-France Region and/or town of Paris to prepare their participation in co-construction labs	An engagement from the Region and/or the Town.

<b>Phase 3. Envision Alternatives</b>	3.1 Generate ideas	Translate the general issue in potential innovations	Phase 1 : soft activities within existing multi-stakeholder meetings Phase 2 : 1/2 day workshop with key stakeholders (mind map + discussion game)	A set of 2-3 general ideas, their impact, the potential interest for key stakeholders.
	3.2 Refine and select ideas	Extract from the potential social innovations the ones that can actually be treated in co-creation lab	Internal work on the outcome of 3.1	Idea card
	3.3 generate a concept	Isolate a workable idea of interest for the key stakeholders	Idea cards Other living lab inspired approaches based on the type of ideas emerged.	A “killer question”
<b>Phase 4. Develop and Prototype</b>	4.1 Develop the concept	Translate the issue/idea into an innovation concept	Expected tools highly depends on previous steps and nature of the concept (would it involve technological innovation? Would it be more a process? This will be clarified in previous step, and entirely influence the choice of the tool.	Technical documentations
	4.2 Create a prototype	Translate the concept into a prototype Ensure that the prototype is understandable and testable by different audiences of the science centre	IDEM	A working prototype (weather an object or a process) that can be tested, evaluated, hacked... in public events.
	4.2 Evaluate	Experience the prototype in a real context	Proposition of the concept in public events including stakeholders.	User feedback and recommendations for further development

Table 22: Design of the co-creation journey of TRACES

### 3.3.4.5. Stakeholders involved in the co-creation journey plan

Stakeholders	Description	Type (X)					Involvement and role in phases/activities	Existing network
		Internal	Strategic	Providers	Consulted	Informed		
ENSAD (Université PSL)	Roxane Jubert, Teacher and researcher				X	X	<i>Help in framing the issue from the point of view do design and visual communication</i>	Y
ERMES, Université PSL	Sarah Lasri, marketing and strategies research laboratory				X	X	<i>Help in framing the issue from the economic point of view</i>	Y
CEA-Saclay/LARSIM, Poléthis	Alexei Grinbaum, researcher in physics and ethical issues of science and technology			X			Complexity the ethical issues. Provide relevant examples to be used for benchmarking. Introduce us to other stakeholders.	Y
ESPCI / PSL	François Vialatte  Karim Benchenane - ESPCI: research lab in Brain plasticity / brain-machine interfaces				X		Fundamental research on induced memories. Possibility of influencing decision making from the point o view of neurosciences.	Y
Université Paris-Saclay,	Baptiste Caramiaux, researcher in CNRS, and computer sciences laboratory (LRI)			X			Projet Digiscope (Fab Lab and data visualisation).	N
Université Paris-Saclay, Ethics in research and scientific integrity Council +(POLETHIS)	Emmanuel Hirsch, professor in medical ethics, University Paris-Sud-Paris-Saclay, president of POLETHIS		X				Same as above + important entry point to the Regional political agenda (he is director of the Regional ethical advisory committee) applied to health issues	N
City of Paris	Jean-Louis Missika, Vice major in charge of innovation + maybe Pauline Veron in charge of "local democracy"		X				Involvement of city policy makers, embedding the idea in the city policy agenda	Y
City of Paris	<i>Marie Christine Lemardeley Vice major in charge of innovation (someone from her team) / Mme Guhl, in charge of "social innovation"</i>		X				Involvement of city policy makers, embedding the idea in the city policy agenda	Y
Conseil national du Numérique	<i>CNIL is a state body dedicated to defend people's digital rights</i>						Translate and elucidate digital transformations	
La 27e Région	a public policy lab, part of the network of European		X				<i>Organisation of an event/workshop/debate on the topic</i>	N

	Public Policy Labs, whose goal is to promote and experiment with new policy approaches.				<i>in the “Superpublic” venue, a place dedicated to bring together innovative approaches in public innovation, based on:</i> - design thinking oriented experimentation - dynamic between policy and practice <i>focus on local creativity, sense-making and ownership</i>	
Le Mouton Numérique	<i>Le Mouton Numérique</i> informs society which innovates through creation of open conversation between thinkers and makers of digital spaces		X		<i>Conference-debate</i>	
Pièces et mains d'oeuvre / chimpanzés du futur	<i>Controversy spaces between anti and pro technology developments (transhumanist)</i>		X		Public debate: “Frugal and human versus dehumanised megalopolis tomorrow? Can big data help us develop projects with positive social impact?	N
La FING	<i>An organisation which develops innovative projects around open science and good practices in algorithm use</i>	X			<i>Fing has run a very similar co-construction project focused on public administration.</i> <a href="http://fing.org/?Nos-Systemes-les-pistes-d"><u>http://fing.org/?Nos-Systemes-les-pistes-d</u></a> <i>Has developed a network of grassroots and industry based actor - “InfoLab” hubs dedicated to share data and practices in Self Data uses</i>	N
Eyeves	<i>A start-up which develops Data visualisation tools</i>				<i>Help in prototyping data-visualisation analysis</i>	
Maathics	<i>Anna Choury, mathematician and CEO of this start-up which delivers an “faire data use of IA” label to companies and organisations</i>		X		<i>A “fair data use” label for “ethical” algorithms, how do we determine and measure “inequality” and “discrimination” criteria uses in data treatment? What risks and solutions? Debate about social responsibility of research and its developments (as mathematicians for example involved in AI processes)</i> <a href="https://www.youtube.com/watch?v=S_n6TfIqwQ7b8"><u>https://www.youtube.com/watch?v=S_n6TfIqwQ7b8</u></a>	N
Fondation la Main à la Pâte			X		<i>Expertise in pedagogical methods and critical thinking</i>	Y
Le CRI	<i>Educative programmes for students and schools</i>		X			Y
Electrolab	<i>1st hackerspace European in Nanterre</i>			X	<i>A place to involve the hacker community in this issue of making visible where and when we are “being calculated”</i>	Y

Jaromil Rojo	<i>Hacker, researchers in hardware hacking</i>				X	<i>Another side of the story from counter-culture actors and deep systems specialists, ideas of DIY toolkit for understanding issues</i>	N
Fondation Orange – programme LORA (Laurent Chivot)	<i>Experimental lab on deployment of internet of things and connected objects, including reflexions on innovation impact</i>				X	<i>Major player in one potential application of automated decision making.</i>	N

Table 23: Stakeholders on the co-creation journey in TRACES

## 4. Lessons learned and feedback arising from the shaping of the co-creation journeys

This section presents the lessons learned by this first step of WP3 and gives some perspective for the next tasks and activities.

### 4.1. The workshop as a first positive step of engagement and learning

All Labs described the workshops as a key moment in the course of their involvement with the SISCODE project. Here an overview of the written positive feedback collected after the workshop by most of them.

Labs	feedback post-workshop
KTP	<i>"The workshop provided clear and in-depth understanding of the co-creation journey itself and the outcomes of the defined process."</i>
PA4ALL	<i>"The workshop provided clear and in-depth understanding of the co-creation journey itself and the outcomes of the defined process. The PA4ALL team was greatly appreciative with the engagement and enthusiasm of the POLIMI team, as well as with the conducted workshop which resulted with a clear vision of the challenge and activities that lay ahead."</i>
THESS-AHALL	<i>"The two-day workshop in Thessaloniki, led by POLIMI partners, was very helpful for the Thess-AHALL team, so as to determine its challenge more specifically and set its main goals and objectives for each phase of its journey. Many aspects of the co-creation labs' journey made clear and Thess-AHALL recognized and pivoted some "dull" parts of the challenge, clarifying them and making more sense of the "Participate 4" campaigns. Moreover, the fully exploitation of the toolbox proved very important for the continuation of the co-creation journey, while the workshop offered the opportunity to the Living Lab team members to generate some new ideas and aspects of the challenge, which they hadn't considered before."</i>
CUBE	<i>"The workshop has given us good insight on the co-creation process, the different phases and activities. It reminded us that there are a lot of similarities with our own design approach, but at the same time strengthened our focus on the roles of stakeholders, different types of stakeholders and how to engage them (this part was so far less pronounced in our design practice)."</i>
CIÊNCIA VIVA	<i>"The first workshop was extremely useful not least to help us understand what needs our team must address, in terms of skills, agenda and planning, human resources. The team now feels really challenged, in a good way. For some of us, the workshop provided a first glimpse on the steps in co-creation, and it was especially good to understand the iterative nature of these processes. Of course, the workshop was essential to have a more formal initial sketch from which to proceed. It was also important to start creating a workable map of the lab's stakeholders, even to identify specific individuals. Figuring out the complete journey from the beginning to prototyping is still somewhat difficult, somewhat abstract, as is fitting the tools available to the needs of the co-creation process (accounting for resources and duration of the project). The greatest fear of the team has to do with the time available for the first two phases, in particular for the work of research and stakeholder identification and recruitment. Now that we have a more clear idea of the journey ahead, we are a bit apprehensive about how to</i>

	<i>engage the stakeholders along this (relatively long) process – but hopefully this will change once we start real engagement.”</i>
SGD	<i>“The main gain from the first workshop was the Toolkit, and highlighting the use of “101 Design Methods” and the tools provided by the book. These will be very useful to our organisation, not just for SISCODE, but also for other ongoing projects.”</i>
FAB LAB BCN	<i>“The workshop was interesting to present the project and launch the pilot with the internal team who was not involved until now. The 101 cards “game” was useful to better know in few minutes the preferences and habit of each participant in term of design. Key discussions about the challenge and the political context has been raised so to define a first draft of the journey.”</i>
POLIFACTORY	<i>“Both the co-creation toolbox and workshop supported Polifactory to discuss and reflect about the initial structure of the pilot and the nature and topic of the challenge. Moreover, the workshop has stimulated Polifactory to pragmatically understand how the key elements of the vision and principles of SISCODE must be incorporated into the activities of the pilot and in the involvement of stakeholders.”</i>
UNDERBROEN	<i>“During the first workshop we experienced that we have already reached out to many stakeholders, but still need to establish the core team of stakeholders. We re-worked the work that has already been done, which was a good way to iterate the process so far. In this process we have limited us selves to only work with a maximum of 3 material fractions, potentially only working with two of the three.”</i>

Table 24: Post-workshop feedback - What has been learnt from the first workshop?

## 4.2. First feedback on the use of the toolbox

The workshops allowed partners to perform a preliminary testing of the beta version of the toolbox during one day or one day and a half workshop. As the toolbox is designed to be used on a longer working basis, the participants could have experienced just some steps restricted to the involvement of the internal team (see *the step 1, 2, 3, 6 and 7 presents on the page 5 of the toolbox*). The objectives remaining to get familiar with the global approach and most of the canvases, so to define a first plan and be ready to engage stakeholders. A posteriori, it has been noticed that the notion of synthesis tools has not been presented (except some cases), so labs might need to be updated on this particular aspect, when they will define the outcomes of each phase.

- *Diverse practices*

Although the facilitators of the workshops agreed on a common agenda, a great diversity of practices has been identified among the co-creation labs that is clearly visible by looking at the different outcomes of the sessions. As presented in the journey section (see Figure 20, 21, 22), the disposition of the canvases on the room, the way to fill them, whether or not to use post-it appears different in each context.

For the purpose of the workshop, the support group has decided to simplify some aspects of the toolbox to reinforce their appropriation by the users. A description of the possible activities done during each phase has been presented as a first step for realising the planning activities. These activities directly inspired by the IDEO<sup>50</sup> and the Design Council<sup>51</sup>. This was presented as a set of possible activities to follow on and discussions supported by a pre-selection of tools from 101 design methods. In a way, this has allowed to reduce the confusion of a too vast perimeter of possibilities for each phase, making non-experienced people feel quite unstable when facing the canvases. On the other hand, this has tended to standardize the journey of each lab. Indeed, when looking at the journey plans, the activities for most of the lab seem now similar. The “customisation” of the journey is now detected on a higher level of granularity which are the diversity of tools and outcomes defined by each lab.

The level of preparation before the workshops from each lab has also influenced the way the workshops were done. In the case of Underbroen, which was one of the last workshops, the team has already made the effort to understand the toolbox, and to complete most of the canvases. The workshop thus consisted of discussing the existing content and a more formalised vision of the challenge and journey. More efforts were made in the early stage, thus it was easier to refine the challenges and go further with decisions about the planning of journeys.

A posteriori, it has been noticed that the notion of synthesis tools has not been presented (except some cases), so labs might need to be updated on this particular aspect, when they will define the outcomes for each phase.

Least but not last, the toolbox was missing connexions with an effective timeframe to situate the phases and better know how to realise the project. The facilitators have shared a common WP3 planning and invited labs to develop a proper Gantt adapted to their journey.

- *Changes in canvases*

Several changes have been proposed for the different canvases due to difficulties, which arose during the workshops.

Concerning the Stakeholder Map canvas, some difficulties have been perceived not in identifying them but rather in sorting them by the category proposed within the tools.

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<sup>50</sup> More information on <https://designthinkingforeducators.com/about-toolkit/>

<sup>51</sup> More information on <https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond>

It appears that there is an important confusion about the diverse terms used in the canvas ‘Activity’ and ‘Phase’ and the order in which it is easier to complete them. feedback from both the users highlight that “*it could be more logical first to think about objectives of the phase and according to those objectives, we will define the activities and tools that will help us achieve those objectives and reach desired outcomes.*” Users could have been sceptical when they were asked to define the outcomes of each activities. The outcomes identified in the different journeys presented here could vary in term of pragmatic approach. In some cases, it remains difficult to distinguish the objectives from the outputs. These sessions around the definition of the journeys was perceived as repetitive and exhaustive to use one canvas for each activity defined in each phase as it means to fill in a few hours more than 12 canvases. One feedback comment highlights this in a clear way: “*We do understand the distinction between phases, activities and tools, but it can make you feel exhausted, because you have to fill in the same kind of canvases over and over if you aim to draw the whole co-creation journey*”. To make this task easier and accessible within the timeframe, most of the labs have focused on phases and identified tools and outcomes in a broader way, at least during the workshop. The canvases will need to be revised with a more comprehensive and deeper definition of each term. For a preliminary workshop like this one, it is needed to find an easier way to complete and brainstorm about the global journey. It might be by using only a redesign version of the Phase canvas or “looking for other ‘methods’ to structure this process”.

A discussion could also be had to see how to make a meaningful use of a more ergonomic version of these two canvases during the journeys so they can both support the stakeholders and reach the objective of monitoring activity.

#### **4.3.Beyond the toolbox: what next? Interaction, support, monitoring**

The toolbox is an artefact that was built to bring labs in a common approach of co-creation based on RRI, customisation and reflexivity. The realisation of the first workshop with a first use of the toolbox has permitted to better understand the practices and experience of each lab and to make the co-creation labs more familiar with the approach of co-creation constructed with the SISCODE project.

Now that the first task have been realised (T.3.1), the labs are starting the first phases of their journey. In addition to a certain impatience and strong motivation to start and be part of the SISCODE co-creation experience (as one partner well-illustrated stating that [they] “*are feeling very excited about the next steps*”), some first reservations from the labs have already

been identified. It is now necessary to take time to look at the journey with reflexivity and start planning the next steps and better define the means for supporting them in each step of co-creation and connect the different insights with the overall project frame.

- First fears and pains elicited by labs

The first concern of the labs deals with the lack of time available for realising the three first phases. Following the workshops, a revised planning of WP3 tasks was proposed that now ensure Labs more time to reach the phase 3 and define a list of solutions and policies.

Some feedback highlights an important disparity felt by the labs in term of design attitudes and co-creation capacities. While some labs feel pretty confident and are used to innovative design processes, other labs have been intimidated/felt overwhelmed by the strong expectations of the project, with a lack of trust in themselves, doubting their capacities to succeed in engaging people, running design workshops and overcoming the classic barriers that occur in RRI projects. By eliciting the effective co-creation practices during the workshops, every lab has demonstrated interesting skills to share. There is in fact a rich heterogeneity of experiences and approaches that let possible high potentialities for knowledge exchanges. Labs will learn from themselves and enrich themselves by the global co-creation approach of SISCODE.

The last reservation identified concerns the importance of iteration and more generally the phase 4 “Develop and Prototype”. The projections after the ideation stage remain hard as most of the time the type of prototype has not been identified. Numerous questions emerge about the overall sustainability of the co-creation processes, in particular on the possibility to implement prototype activities that may exceed the budget that SISCODE allocated to each lab. In this respect, labs could develop new synergies and collaborations, with the aim to reinforce their financial and material means to support more extensive and expensive co-creation activities, than those strictly required by the challenge negotiated within the project.

- New reflexions for better interaction, support and monitoring

While each lab is entering in the implementation of their first plans with research and engagement activities, the effervescence of co-creation will start to create interaction in both horizontal and vertical ways. These experimentations do not only aim to develop a concrete project locally on each territory to move toward more co-creation in RRI approaches but also to shape a co-creation journey itself in between the partners of the SISCODE project that are

participating in co-designing a future learning platform. This means that there is a necessity not only to follow and support the individual practices of co-creation but also to capture and foster the interaction between labs, between the support team and the labs, between the various artefacts generated by these simultaneous experimentations. Moreover, analysing the activities of the co-creation labs all along their projects will permit to specify the needs, gather contents and sketch first architectures and user interaction of the future learning platform of the SISCODE project.

Several axes of reflexion have been identified to pursue the future definition of management of the WP3 (Task 2-5) related to the support and monitoring of the co-creation journeys.

- *How to define the support and ensure organisational learning (3.4)?*

The support team aims to help the labs in the evolution of their journey. It consists (1) of identifying and anticipating the needs of labs at each step, (2) feeding the knowledge repository of SISCODE (with tools, case-studies, policy playbooks, communication tips) while making it accessible through events and internal communication, and (3) opening spaces to fostering the interaction between labs.

The support team has to encourage the labs while giving them enough space for autonomy and emergence (avoiding the frustrations and consequences of mollycoddle). The co-creation labs are engaged in their journey as “path-finder”, “maker” of future learning about co-creation. Every partner will learn from these experimentations that will feed the knowledge repository and inspire the development of the learning platform. Discussions are to be engaged to find a way to be agile on local requests while being reflexive for further steps of the project.

- *How to define the monitoring activity (T3.5)?*

Different dimensions will have to be part of the future monitoring plan (T3.5): the activity of co-creation itself in each lab, the provided supports and artefacts, the interaction between labs, the outcomes with RRI visions.

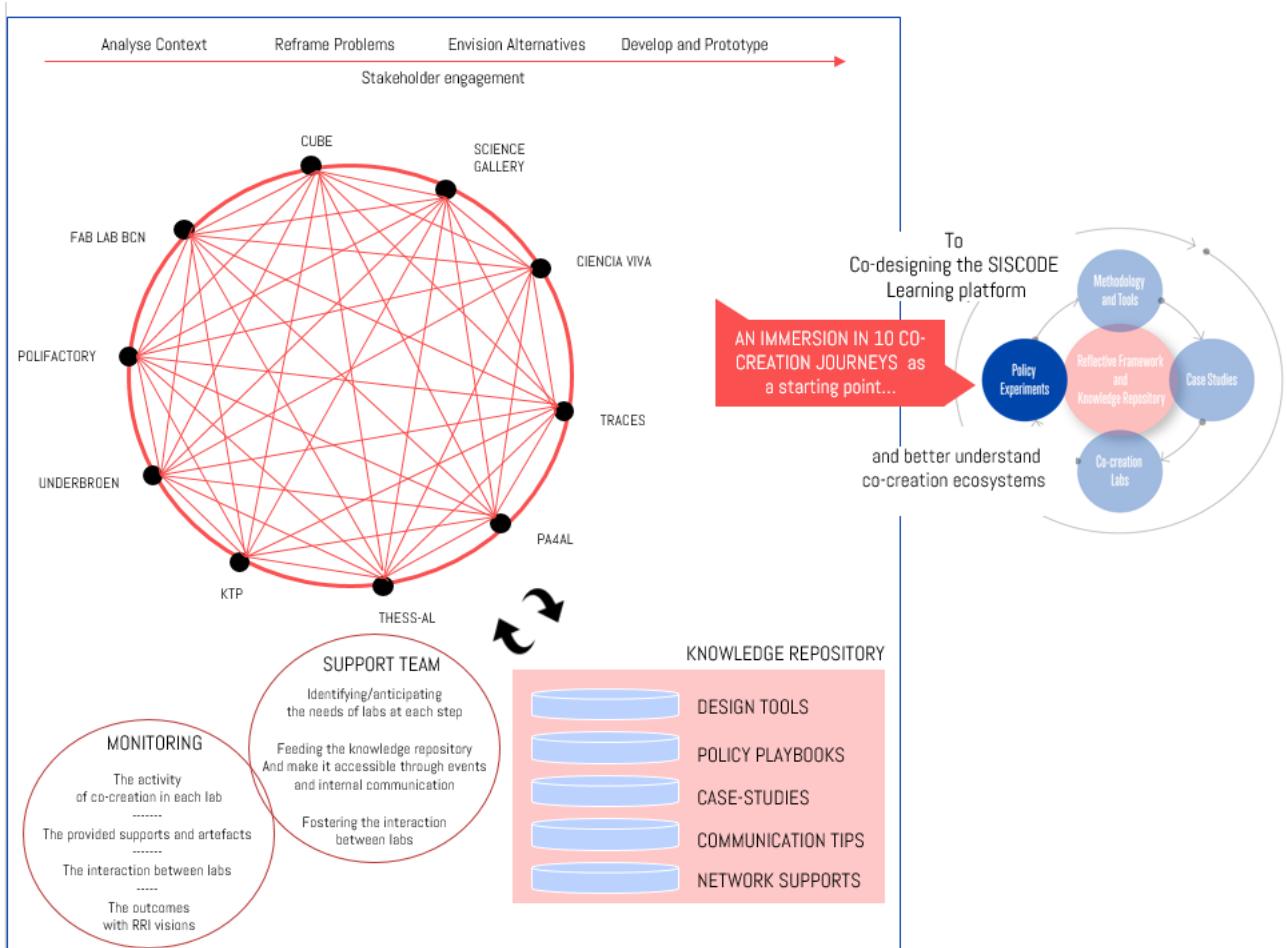


Figure 24: Sketch for situating the WP3- Co-creation journeys in a more systemic view

The next milestone for the project will be the first exchange co-creation labs event held in Milan on the next 12<sup>th</sup> and 13<sup>th</sup> of February. The event will focus on finding new means to foster the interaction between labs and reinforce their appropriation of the toolbox and related design methods.

## 5. Annexes

### 5.1. Toolbox Versioning: What has been changed?

Version	Changes	Partners involved
V0	1. Creation of the initial template based on D1.2 2. Use of synthesis tool with Silearning.eu and adaptation to the SISCODE graphical identity	Priscilla, Massimo (IAAC) POLIMI
V1	1. Refining the questions inside the canvases 2. Introduction + process slide design	IAAC (Priscilla / Massimo)
V2	1. Defining adding canvases for policy making and communication 2. Idiomatic / syntaxes errors	IAAC, DDC, ECSITE, POLIMI
V3	1. Alignment of CC logo /titles / EU flags 2. Adding page numbers to synthesis all the tools 3. Adapting persona profile with “Stakeholder” 4. Adding of cover pages 5. Design of the 3 Canvas for Challenge (Local Context, Local lab and Local Policies)	IAAC (Priscilla / Massimo) POLIMI
V4	1. Creation of the 101 cards presentation and redirection inside the toolbox Activity Canvas 2. Idiomatic / syntaxes errors	IAAC (Marion/ Massimo) UCL, POLIMI
V5	1. Layout of the plan with (introduction, Challenge, Phase/Activity, Stakeholders, Synthesis Tools) 2. Adding a description page to each canvas to highlight importance of context / stakeholder. 3. Adding an Acknowledgement and reference page	IAAC (Marion/ Massimo)
V6	1. Change of Challenge Canvas (cause/symptoms by facts and evidences) 2. Local stakeholder Engagement and dissemination plan canvases are merged.	POLIMI (Pamela) IAAC (Marion)

### 5.2. Documentations of Workshops

This annex presents the procedure of documentation for the workshop and propose a synthesis of where to find the relevant information in the internal communication tools: Base Camp.

All supports used during the workshop can be found in BASECAMP (WP3 Experimentation in co-creation labs> Co-design Journey > Template. It contains:

- The presentation done by the support group: SISCODE presentation\_Labs workshopV2.pptx
- The template for each Lab presentation: Co-creation lab presentation Template.pptx

- A template for realizing a Gantt: SISCODE Gantt (1).xlsx
- A template for filling the canvas directly on the Powerpoint software: Canvases\_PPT\_NameLab.pptx

Each Labs have a dedicated subfolder in which it has documented their own workshop with photos, pictures of canvases, co-creation lab presentation, and other relevant supports.

[SISCODE](#) > [Docs & Files](#) > [WP3 EXPERIMENTATION IN CO-CREATION LABS](#)

The screenshot shows a digital workspace for 'Co-design Journeys'. It features a navigation bar at the top with a 'New...' button and an 'Unsorted' button. Below the bar are four main colored sections: 'Museums' (green), 'Living LABS' (blue), 'FABLabs' (yellow), and 'Templates' (pink). Each section contains several sub-folders representing different labs or projects. For example, the 'Museums' section includes 'Science Gallery' and 'CUBE'. The 'Living LABS' section includes 'PA4AL - NOVI SAD' and 'KTP - KRAKOW'. The 'FABLabs' section includes 'Polifactory' and 'UNDERBRO EN'. The 'Templates' section includes 'comics data collection.docx' and 'Canvases\_PPT.pptx'. At the bottom of the workspace is a red banner with the text 'Workshop Agenda'.

Figure 25 Workshop Documentation Folder

<b>1. Understanding the lab and how the piloting will work (10.00- 11.30)</b>
a. Knowing the co-creation lab (presentation of the lab, the approach to co-creation, the previous projects and current activities) [Presentation template]
b. How the piloting activities will work in SISCODE (presented by the workshop facilitator)
<b>2. Going back to the challenge (11.30 - 12.30)</b>
a. Challenge context [Challenge canvases]
<b>3. Designing the co-creation journey (14.30 – 18.00)</b>
a. Drafting the co-creation process (phases, stakeholders and outcomes) [Phase canvas]
b. Drafting the description of activities and the toolkit 15.00 – 16.30 [Activity canvas, Tool cards]
c. Drafting the plan of activities [Gantt chart]
d. Drafting the engagement process (who will be involved and when) [Stakeholder map]

## Workshop Agenda



Figure 26: Description of the workshop agenda

