



SOCIETAL ENGAGEMENT  
WITH KEY ENABLING TECHNOLOGIES

## DELIVERABLE 1.4

# Reflexive Evaluation of En- gagement in KETs Innovation

## *Learning and Building on Quality Criteria*



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AUTHORS	Lisa Augustijn, Willemine Willems & Frank Kupper
REVIEWERS	Alix Thuillier (ECSITE), Nina Ritter Nielsen (DTI), Eskil Welan and Kathrine Collin Hagan (DBT)
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## 1. Executive summary

This deliverable presents the methodology for evaluation of the SocketETs labs, which are established to experiment with co-creation and societal engagement in the development of Key Enabling Technologies' applications to societal challenges. KETs are technologies such as advanced manufacturing systems, advanced materials, nanotechnologies, biotechnologies, the Internet of Things (IoT), blockchain technology, and artificial intelligence. In the SocketETs project, early engagement in innovation is stimulated by the SocketETs labs. For evaluation of the SocketETs labs, we propose a reflexive evaluation approach, which combines both regular evaluation methods with more responsive evaluation methods and consists of four major phases: 1) collectively determining the evaluation scope and its demarcations, 2) joint collection and analysis of data, 3) joint sense making and interpretation of findings and 4) formulating action perspectives, guidelines for societal engagement activities and best practices.

### 1.1. Evaluating engagement

For societal engagement approaches to flourish there is a need to develop assessment methods that can make the impacts and benefits of societal engagement visible. Several initiatives have tried to achieve this, both by top-down evaluation practices by formulation of a standardized list of quality criteria and by approaches with more attention towards context and flexibility. It is widely recognized that benchmarking or assessing impact of societal engagement practices is a balancing act: "any emerging quality criteria need to be concrete enough to provide real guidance but flexible enough to adapt to the specificities of varying contexts". This is especially relevant for the SocketETs project, as the challenges addressed in the labs can be categorized as complex problems. These are problems to which no 'right' or 'clear' solution can be formulated and often deal with much uncertainty. Processes as such are in need of more flexible and adaptable evaluation methods. In addition, a more flexible and adaptive evaluation method is needed as societal engagement currently is not widely taken-up in industry settings. This can be attributed to a misalignment of engagement methodologies and concepts on the one hand and industrial practices on the other.

### 1.2. Reflexive evaluation

To contribute the up-take of societal engagement in industry innovation practices we turn to reflexive evaluation. Reflexive evaluation is a combination of regular and responsive evaluation. While regular evaluation is used for purposes of legitimacy and accountability but it often does not sufficiently inform action or research practices, responsive evaluation facilitates mutual learning. Solely focusing on learning might reduce the societal impact and contribution to greater ambitions. Therefore, these two approaches are combined in the reflexive evaluation method and will be used in the SocketETs labs.

### 1.3. Reflexive evaluation for the SocketETs labs

#### 1.3.1. Different roles

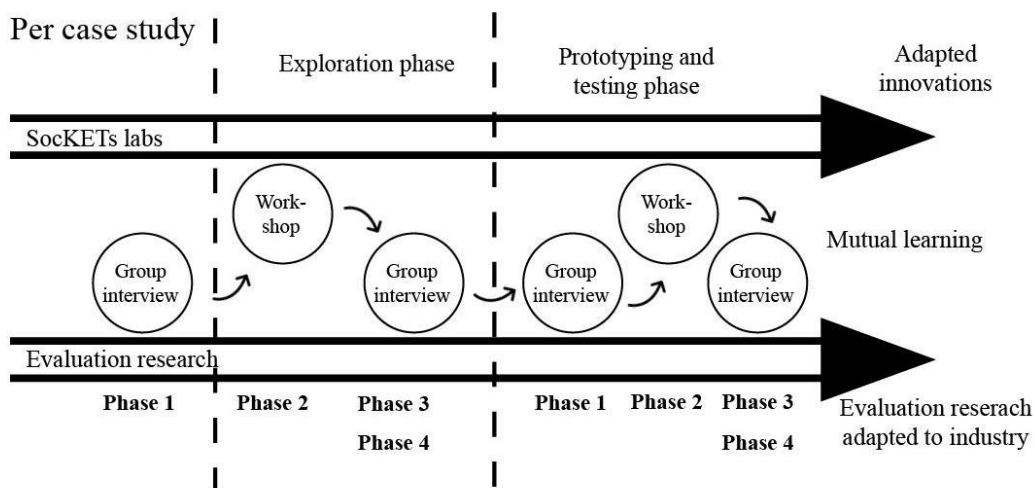
The reflexive evaluation process in the SocketETs labs will concern three different parties: 1) the reflector and evaluator (VU partner), 2) the case study owners (third linked parties and DTI, TECNALIA and AIRI) and 3) the participants (ecosystem stakeholders). In the SocketETs labs case study owners organize co-creation and

societal engagement activities together with the participants. These will be evaluated in several different that the reflector and evaluator organizes.

### 1.3.2. Reflexive evaluation phases

Reflexive evaluation consists of four major phases: 1) collectively determining the evaluation scope and its demarcations, 2) joint collection and analysis of data, 3) joint sense making and interpretation of findings and 4) formulating action perspectives, guidelines for societal engagement activities and best practices.

In the first phase the reflector and evaluator will determine the evaluation scope and its demarcations together with the case study owners. This meeting takes place before the first design workshop in WP2. In the second phase data will be collected by the case study owners with certain elements added for evaluation purposes in their design workshop. In phase three joint sense making and interpretation of the findings will take place. For the first evaluation round this meeting takes place during the Bilbao CM. And finally in the fourth phase, action perspectives and guidelines for societal engagement activities and best practices are constructed. This phase also takes place during the Bilbao CM. For an overview of the evaluation phases and alignment with WP2 activities see figure 1.



#### Reflexive evaluation phases

**Phase 1:** Collectively determine the evaluation scope and its demarcations

**Phase 2:** Joint collection and analysis of data

**Phase 3:** Joint sense making and interpretation of findings

**Phase 4:** Formulating action perspectives, 'learning questions' and guidelines for societal engagement activities and best practices.

Figure 2. SocKETs labs reflexive evaluation process

## 2. Introduction

The SockETs project aims to engage stakeholders and citizens in the innovation processes of Key Enabling Technologies (KETs). KETs are technologies such as advanced manufacturing systems, advanced materials, nanotechnologies, biotechnologies, the Internet of Things (IoT), blockchain technology, and artificial intelligence. These technologies potentially have a great impact on our daily lives. Therefore, it is important to engage citizens in early stages of the innovation process. In this way citizens' concerns, needs and values can shape the innovation process, thereby making it more inclusive, socially robust, acceptable and democratic.

In the SockETs project, early engagement in innovation will be stimulated by creating six so-called SockETs labs in six different countries, each with a focus on societal engagement in the development of KETs applications for one of three societal challenges: industrial innovation, circular economy or electronic health. The SockETs labs engage case-specific ecosystem stakeholders in co-creating innovation and engagement ideas, based on the idea that it is not only crucial to integrate the perspective of academia, industry and state/government, but also of society (the Quadruple Helix) (Carayannis & Campbell, 2009). The aim of the labs is to stimulate exploration, experimentation and co-creation between the invited stakeholders (D2.1).

In this deliverable we will present the methodology developed for evaluating the co-creation activities of the SockETs labs. The evaluation has three main objectives: to evaluate the engagement processes that unfold during the workshops of the SockETs labs, to facilitate mutual learning and to evaluate the co-creation methods used and created within the labs. As such, the evaluation will enable selecting the 'best' co-creation tools for the toolbox that will be created in work package 3 (DoA).

## 3. Evaluating engagement

### 3.1. Introduction

The SockETs labs are based on the social lab approach (Hassan, 2014), which aims at bringing different actors together to enable combining a diversity of knowledge and expertise in order to contribute to solving complex problems. The approach finds its origin in innovative education (Tabarés Gutiérrez & Bierwirth, 2019) and entails elements such as constructivist ideas about science, technology and innovation, critical pedagogy, and approaches to learning that focus on developing tacit knowledge and skills through doing (D2.1). The growing interest in social labs and the proliferation of similar initiatives such as "citizen labs", "urban labs", and "media labs" (D2.1), and the development of approaches such as Responsible Research and Innovation, midstream modulation, Quadruple Helix and mode 3 knowledge production reflects the growing emphasis in STI governance on the need for (early) public engagement in research and innovation.

There is a widely held agreement that in order for such approaches to flourish we need to develop assessment methods that can make the impacts and benefits of societal engagement visible (Wickson & Carew, 2014; Peter et al, 2018; Meijer & Klippe, 2021; Yaghmaei & Van de Poel, 2021). The MoRRI (Monitoring the Evolution and Benefits of Responsible Research and Innovation) project was the first large project initiated to develop a monitoring system for the assessment of RRI projects in Europe (Meijer & Klippe, 2021). On



the basis of a literature review covering the six key areas of RRI identified by the European Commission (gender, equality, science literacy and science education, public engagement, ethics, open access and governance) the project developed a system consisting of over 36 indicators. Five of these indicators pertain to societal engagement: public involvement in decision making, democratization of science, search for information about controversial technologies, inclusion of public engagement in assessment, and in activities of research funding organizations.

With its ambitious approach aimed to enable systematically assessing and comparing countries' efforts and accomplishments in regards to the six RRI areas, the MoRRI project is an exception in the field. Typically, literature about assessing public engagement projects is pervaded with strong reflective awareness of how challenging, if not problematic, such an endeavor is. The indicators, rubrics or criteria nevertheless developed are not seen as a standardized list suitable for any evaluation practice, but they are typically suggested as a "useful starting point" helpful for "prompting or facilitating ongoing discussion, development and debate" (Wickson and Carew, 2014, p. 257). Developing quality criteria and indicators is a balancing act: "any emerging quality criteria need to be concrete enough to provide real guidance but flexible enough to adapt to the specificities of varying contexts" (Wickson and Carew, 2014, p. 257).

The need for both guidance and flexibility is widely endorsed both in regards to the evaluation and to the conceptualizations of approaches to societal engagement (Klaassen et al, 2017). Recognition of the risk of an evaluation system becoming a bureaucratic ticking box exercise with little sensitivity for the actual context of its users played an important role in how the successor project of MoRRI, SUPER MoRRI, was set up (Meijer & Klippe, 2021). It is also reflected in EU-projects such as the SISCODE, Go Nano and PRISMA, in which criteria for assessment were adjusted to specific case contexts. In such projects, assessment is typically conducted with both qualitative and quantitative methods.

In Responsible Research and Innovation both the need for interpretative flexibility and for guidance and conceptual clarity are recurring topics in literature. Voices calling for more clarity about the concept (Ofstedal, 2014; Zwart et al. 2014, Owen et al, 2012; Wickson & Carew, 2014) can be answered by those that emphasize the advantages of conceptual flexibility. When a variety of interpretations is possible, the concept can be applied to many different areas and combined with the many other forms of interaction between STI development and society (Klaassen et al, 2017; De Jong et al., 2016). A solution that Klaassen et al offer to this quandary is what they call the "5p structure" (2017, p. 79): *purpose, product, process, pre-conditions, and people*. These five components each represent another vantage point for understanding RRI, and thus offer a clear guiding structure, while leaving space for flexibility.

## 3.2. Evaluating engagement in solving complex problems

The need for flexible, yet clear, assessment methods is particularly pressing for the SockETs project because its aim is to stimulate public engagement in innovation directed at solving problems that can typically be identified as complex. The electronic health, industrial automation and circular economy ecosystems are complex in terms of the variety of stakeholders involved and of societal problems and solutions addressed. Moreover, while introduced as a panacea to the grand societal challenges, KETs, like many new technologies, will most probably give rise to a new set of different and unanticipated problems. The innovation processes of KETs applications often include many uncertainties in regards to both scientific facts and societal

values, concerns and priorities. Choices will have to be made that impact the future and that have no clear 'right' or 'wrong' direction.

Top-down evaluations with a set of previously drafted quality criteria or norms, aimed at measuring accountability, prove insufficient in the context of engagement with innovation processes that might give rise to complex problems. Such problems inherently require an assessment method that is more flexible and adapted to the specific situation as they change and are molded during the process. In the literature, on the one hand a call for more straightforward impact measurement has been proposed in order to enable clear benchmarking of such practices; on the other hand, there is a mismatch between assessment strategies and their applicability in practice due to a poor adjustment to the context (Folkert et al., 2018).

### 3.3. Evaluating engagement in industry contexts

Another reason that the SockETs labs need an evaluation method that allows for flexibility *and* guidance is that the case studies address industrial innovation processes. Until recently, most public engagement projects were initiated and executed in research and policy settings, while impact on the industrial community has been limited (Frow et al., 2015; Saarijärvi et al., 2013; Dreyer et al, 2017; Lubberink et al., 2017; Van de Poel et al., 2017; Porcari et al, 2021).

In literature, the limited uptake has been attributed among other aspects to companies questioning the added value of societal engagement compared to already existing Corporate Social Responsibility practices (Porcari et al, 2012; Porcari, Borsella & Mantovani, 2015). Note however, that even though there are quite a number of deliberation initiatives in industrial innovation, not many are inclusive (Lubberink, 2017), that is, for most of these initiatives the invited participants have mostly the same world views, convictions and concerns as the innovators themselves.

Another aspect that is seen to contribute to the limited uptake in industry is a misalignment between engagement methodologies and concepts on the one hand and industrial practices on the other (Dreyer et al, 2017). The concept of innovation in most engagement projects refers to scientific and technological development, yet, such projects have a blind spot for processes of commercialization that are essential to innovation in a business context (Lubberink et al., 2017). Another is the lack of recognition of the fact that values and interests of innovators in business most likely differ from those of innovators in academia. In some of the literature, the creation of key performance indicators that can help businesses create an RRI strategy is seen as crucial for overcoming such misalignment (Van de Poel, 2017).

The above difficulties were the reason for the PRISMA project to develop a model (*figure 1*) that provides practical guidance for companies in identifying the background variables for RRI implementation, developing fitting strategies and measuring the impacts (Porcari et al, 2021). Such a model can thus motivate and assist companies to endorse and work with RRI principles and help further develop evaluation methods for RRI in industry. Most importantly, it allows for aligning the RRI strategy with the existing company's strategies and practices.





Figure 1: PRISMA model (Adapted from Porcari et al., 2020)

Despite the efforts of aligning industry and societal engagement initiatives on a conceptual and methodological level the tensions still remain. With the evaluation method adopted for assessing the SocketTs labs, we attempt to bridge the gap between engagement practices and approaches on the one hand and the business context on the other. We do this not by aligning concepts and methods, but by adopting a more reflexive approach to the evaluation of the SocketTs labs.

## 4. Reflexive evaluation

### 4.1. Theoretical building blocks of reflexive evaluation

For the evaluation of the co-creation activities of the SockETs labs we turn to a reflexive approach. Reflexive evaluation combines both regular evaluation with responsive evaluation (Verwoerd et al., 2019; Folkert et al., 2018). Regular evaluation stems from a modernist epistemology that sees evaluation sciences as a tool that can produce evidence-based knowledge regarding the effectiveness and efficiency of the evaluated intervention. This approach is therefore primarily concerned with accountability and often makes use of pre-defined quality criteria by which the intervention or method is evaluated in hindsight. This is often done by technical analytical methods such as questionnaires or KPIs (Verwoerd et al., 2019). In contrast, responsive approaches stem from a constructivist epistemology and see knowledge as pluralistic. Therefore, in responsive approaches emphasis is on including the multiple forms of knowledge of stakeholders that are involved in the evaluation process. It places emphasis on mutual learning; ‘what works, what does not and why?’ leaving room for multiple types of knowledge to contribute and coexist simultaneously. This approach often uses deliberative analytical methods such as co-creation or reflexive monitoring (Folkert et al., 2018).

When looking at these two approaches we can differentiate between the schools of thought or epistemologies they stem from. Although this distinction is only instrumental for demonstrating the main differences between both approaches and often does not represent evaluation in the ‘real world’, where such a distinction is more difficult to make/observe (Verwoerd et al., 2021).

Table 1: An overview of regular and responsive evaluation

	<b>Regular evaluation</b>	<b>Responsive evaluation</b>
<b>Epistemology</b>	Modernist	Constructivist
<b>Goal of evaluation</b>	Accountability	Mutual learning
<b>Methodology and tools</b>	Technical-analytical (eg. questionnaires, KPI's)	Deliberative-analytical (eg. co-creation, reflexive monitoring)

## 4.2. Regular evaluation practices

In the context of the SockETs labs there are three reasons why regular evaluation is troublesome. The first reason concerns the assumption of a linear process, where input and output are linearly linked (Klaassen et al., 2020). This assumption is often made in regular evaluation methods in an attempt to determine the value and use of certain interventions. It builds on the idea that the system within which evaluation takes place is known and that the goals of engagement are clearly formulated. While in practice, especially in case of the complex problems addressed in the SockETs labs, this is often not the case. They often change and are moulded during the process. This generally makes it impossible to set clear goals beforehand (Folkert, Verwoerd & Verwest, 2018).

The second reason concerns that with the SockETs labs we want to adhere and connect to practices valuable for industry, and although regular evaluation methods offer legitimacy, it is often found that these evaluation findings are not well suited to inform action or feed back into the innovation practices (Klaassen et al., 2020). This is also apparent in the gap observed between societal engagement in research and policy settings versus its uptake in industry. Currently regular evaluation practices seem to do a poor job in informing action and thereby creating value for industry.

The third reason concerns the plurality of voices involved in the SockETs labs. Regular evaluation practices often depart from criteria or procedures determined beforehand that stem from a certain viewpoint or frame, thereby excluding other views present in the complex ecosystem. The SockETs lab context, where a wide range of stakeholders are taking part, which all hold their values, views, and solutions to problems, asks for a more inclusive and representative method of evaluation. This is especially important because different stakeholders only tend to recognize the evaluation outcomes when they sufficiently adhere to their viewpoints (Verwoerd et al, 2018).

All in all, regular evaluation practices start from a clearly defined goal, drafted from a specific frame, and focus on objectivity, accountability, and legitimacy (Nieminen & Hyytinen, 2015) at the cost of, for example, inclusivity, usefulness, or learning (Klaassen et al., 2020). To address these shortcomings, but still make use of the strengths of responsive evaluation; providing legitimacy and accountability, we turn to reflexive evaluation, which combines regular evaluation methods with more participatory methods.

## 4.3. Responsive evaluation methods

In the context of the SockETs labs there are three important reasons to use responsive evaluation methods. Firstly, responsive evaluation methods are primarily aiming at facilitating a mutual learning process (Klaassen et al., 2020). Due to the attention it pays to all different voices, views and needs, it aligns well with the SockETs labs context in which a wide variety of stakeholders (The Quadruple Helix) will be involved. It is also hypothesized that by applying this approach, industry voices can be understood more in-depth which can potentially contribute to decreasing the gap between societal engagement and industry practices.

Secondly, including these views and perspectives will create so-called robust knowledge (Nowotny et al., 2003; Verwoerd et al., 2019 p 13) and will make it possible for stakeholders to recognize their own interest and points of attention in the evaluation process and thus in the outcomes.

Thirdly, a responsive approach stimulates reflexivity by providing a process in which the underlying causal mechanisms contributing to certain problems can be revealed, which raises ecosystem stakeholders' awareness of their role within it. This can then 'optimize their capacity for adaptive change' (Verwoerd et al., 2019 p.13).

At the same time, besides these benefits of a responsive evaluation method, it is important to recognize that an evaluation method that mainly focuses on learning, misses out on improving specific procedures in institutional and societal contexts and might lose track of larger ambitions and societal impact. We therefore argue that an evaluation method that accommodates both approaches, the general and the responsive evaluation approach, provides both accountability and learning and is best suited for evaluation complex processes, as occurring in societal engagement projects (Klaassen et al., 2020).

In summary, regular evaluation offers legitimacy and accountability but often does not inform action or research practices sufficiently. Responsive evaluation can contribute to informing action and research practices by its focus on mutual learning, but solely focusing on learning might reduce the societal impact and contribution to greater ambitions. Therefore, these two approaches are combined in the reflexive evaluation method and will be used in the SockETs labs.

## 5. Reflexive evaluation of SockETs

### 5.1. Reflexive evaluation of the SockETs labs

This section describes the operationalization of the reflexive evaluation process for the SockETs labs. The SockETs labs are inspired by the concept of social labs which aspires to facilitate collaboration with a broad range of stakeholders addressing and developing solutions for our most pressing social challenges, comparable to how science labs facilitate addressing and solving scientific and technical challenges. Social labs have three core characteristics: they are social, they are experimental and they are systemic. In the SockETs project six Labs are established throughout Europe on the topics of circular economy, electronic health and industrial automation systems. These labs are a container to experiment with conditions, resources and tools to explore controversies, dilemma's and facilitate societal engagement activities surrounding KETs in the industry sector (D2.1, Mendibil, Tabarés, Arroyo, Jimenez, 2021).

## 5.2. Different roles in reflexive evaluation

The reflexive evaluation of the SocketETs lab involves several layers in which workshops, interviews, research and experiments are taking place. Some will take place in the SocketETs labs, while others will involve evaluation workshops and interviews organized by the VU with the case study owners. To avoid confusion and to be explicit about who is involved in which activity; this section describes the roles of the involved partners.

### 5.2.1. Evaluator and reflector - VU partner

The VU partner is responsible for the evaluation process of the SocketETs labs and will facilitate the reflexive evaluation process, while balancing between involvement and distance to the SocketETs labs (van Mierlo, Regeer, van Amstel, Arkesteijn, Beekman, Bunders & Leeuwis., 2010). The role of the evaluator and reflector is therefore not defined as a 'distant researcher' but as an active facilitator who focuses on collaboration between case study owners and accommodation of the different points of view. In this way it is possible to stimulate mutual learning and where necessary to adjust goals, perceptions and the way in which outcomes are interpreted. Thus, on the one hand the VU team needs to be involved in SocketETs labs as this is a prerequisite to successfully adjust and co-create the evaluation process and facilitate reflection, but on the other hand a certain distance is required to be reflexive about project dynamics and laying bare their own implicit assumptions (van Mierlo et al., 2010). To ensure the independence of the researcher for this type of research it is important to leave ownership of the evaluation as much as possible with the case study owners in the evaluation methodology. In this way both the quality, usability and therefore the impact of the produced knowledge will be enhanced in comparison to alternative evaluation methods (Folkert et al., 2018).

Attention points for the evaluator and reflector:

- Be aware of the apparent tension between learning and justifying. Learning requires openness and cooperation whereas justification often involves a certain closedness and strategic behavior (Folkert et al., 2018, p.4). Making the tension explicit and addressing it during the evaluation sessions can help restore a balance between learning and accountability (Brouwers et al., 2020 p 13).
- Balance between involvement and distance
- Leave ownership of the evaluation with the case study owners

### 5.2.2. Case study owners - (Third parties, TECNALIA, DTI and AIRI)

The case study owners carry out the activities with the participants (ecosystem stakeholders) in the SocketETs labs. They are responsible for recruitment of the participants, designing and facilitating lab activities and processes, and documenting the activities and the preparations. In the reflexive evaluation process that takes place simultaneously, the evaluator and reflector (VU partner) designs and facilitates (group) interviews and reflection sessions with the case study owners (Third parties, TECNALIA, DTI and AIRI).

Attention points for the case study owners:

- To know how potential participants (ecosystem stakeholders) see a certain problem. (van Mierlo et al., 2010)
- To ensure that the core of the problem will be addressed (van Mierlo et al., 2010)
- Ownership of the project (van Mierlo et al., 2010)
- Active role and willingness to learn (Brouwers et al., 2020, p8.)

### 5.2.3. Participants - Ecosystem stakeholders

The workshops conducted in the SockETs labs will be held by the case study owners who invite the participants. These participants are a selection of ecosystem stakeholders that were mapped in D1.1 of the SockETs project.

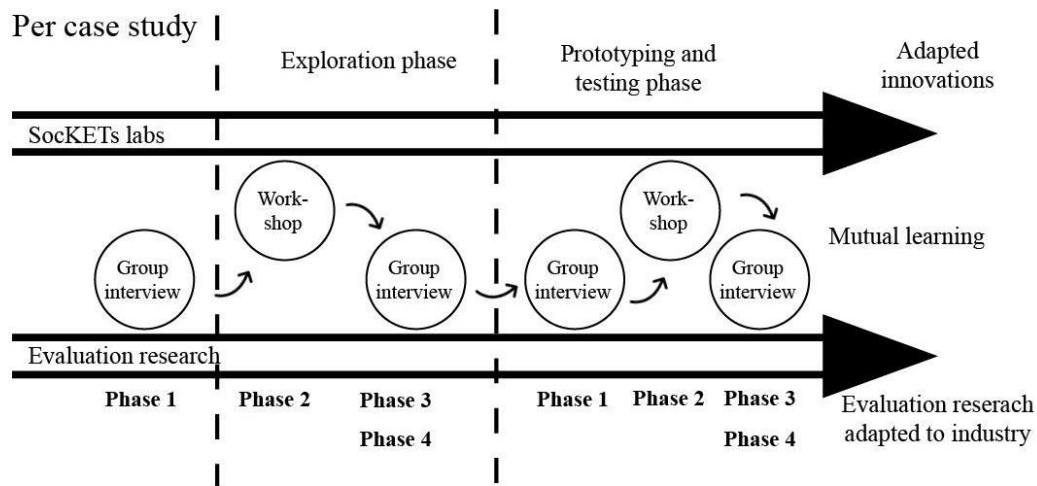
## 5.3. Process outline

All labs follow the same set-up regardless of the different topics explored in each Lab. The process consists of two phases: exploration, and prototyping and testing.<sup>1</sup> The evaluation phase takes place simultaneously with the other two phases and is the focus of this deliverable (see Figure 2).

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<sup>1</sup> For a more elaborate description of these processes, we refer to D2.1





#### Reflexive evaluation phases

**Phase 1:** Collectively determine the evaluation scope and its demarcations

**Phase 2:** Joint collection and analysis of data

**Phase 3:** Joint sense making and interpretation of findings

**Phase 4:** Formulating action perspectives, 'learning questions' and guidelines for societal engagement activities and best practices.

Figure 2: SockETs labs reflexive evaluation process

Exploration, and prototyping and testing are the general phases in which a number of workshops and experiments, which can vary per case study, will be conducted in each SockETs lab. The number of workshops needed might differ per case study as the topics, contexts and cultural conditions of all case studies differ. For example, in the eHealth case in Denmark, where a cultural tradition of deliberation is in place, it might be more straightforward to find and map the challenges and how these can be addressed by means of societal engagement in contrast to the case study of circular economy in Italy, where culturally there is less experience with engagement and in which much B2B activity is taking place. In the case of Italy, it is likely that more workshops dedicated to networking and establishment of trust and cooperation networks will be needed before the options for societal engagement can be crystallized. Therefore, the number of activities in each phase might differ per case study.

The reflexive evaluation process consists of four major phases: 1) collectively determining the evaluation scope and its demarcations, 2) joint collection and analysis of data, 3) joint sense making and interpretation of findings and 4) formulating action perspectives, guidelines for societal engagement activities and best practices (Verwoerd et al., 2019). The following sections give an overview of what each phase entails and how phases relate to the exploration and prototyping and testing phases of WP2. For the linked third parties we will develop an adapted evaluation process that is less demanding in terms of time and that takes into account that they host a SockETs lab and an exhibition.

### 5.3.1. Phase 1: Collectively determine the evaluation scope and its demarcations

In the first step in the reflexive evaluation the VU partner together with the case study owner collectively determine per case study the evaluation scope and its demarcations. A start has been made with a

literature review and the expert seminar, yet as more details and concrete plans for the WP2 workshops are currently formulated, these will be extended by (group) interviews with each case study owner. These will take place prior to the first workshop held with industry partners in the exploration phase of WP2. Therefore, this evaluation phase overlaps with the preparations of workshop 1 and will involve setting evaluation criteria guided by the 5 P's (*purpose, product, process, preconditions, and people*) and by the PRISMA model presented in the second section of this deliverable (figure 3), jointly adjusting and co-creating the methods and materials for the second evaluation phase (see next section, e.g., reflection diary, assignment and evaluation form). During this phase we will also discuss what engagement methods (best practices) would be suitable to use for their SockETs labs workshops.

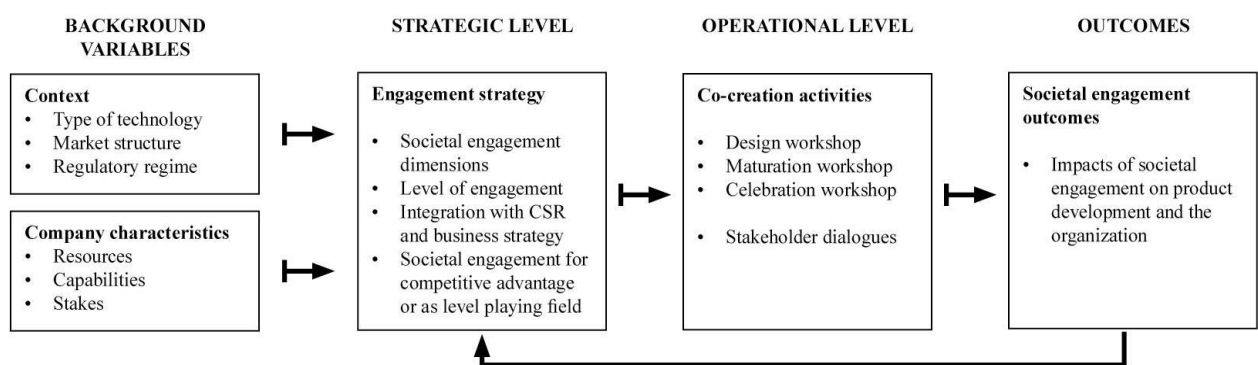


Figure 3: Adapted PRISMA scheme (Porcari et al., 2020)

### 5.3.2. Phase 2: Joint collection and analysis of data

This phase of reflexive evaluation overlaps with the exploration phase of WP2 that consists of exploring and mapping the current challenges and barriers within each SockETs lab. These challenges will give a better overview of the needs of industry and how these can be addressed by societal engagement. During this phase at least one workshop: the design workshop, will be conducted. All case study owners collect data during the design workshop and are asked in addition to determining the current challenges and barriers within each lab, to keep a reflection diary and add a specific assignment/question to the agenda of the workshop. In the below the assignments are explained. Note that these are just starting points; the final versions of the materials will be case study specific and they will be developed in phase one: collectively determining the evaluation scope and its demarcations.

Reflection diary (annex 1):

Before the workshop (during the preparation), and after the execution of the workshops we ask you to fill in a reflection diary (see annex 1). This diary is intended to encourage you to reflect on the co-creation activities. Furthermore, it is a tool to keep track of your experiences with facilitating openness and reflexivity of public dialogues on innovation. The diary consists of two entries, each consisting of six different questions. One entry can be filled out prior to the design workshop and one after. Please take your time to

answer the questions with attention. This may take some effort, as critically reflecting on your own actions and assumptions is not always easy and may even be confronting.

Specific assignment for design workshop 1:

In workshop one it is important to touch upon the question with your participants: What opportunities do you see in the SockETs labs? We ask you to add this question, or a variation on this question in the design of your workshop, so this can be used as input for the reflexive evaluation.

Evaluation form (annex 2):

In annex 2 you find an evaluation form that can be given to the participants after each workshop. This evaluation form contains four reflection questions: 1) What I realized today... 2) I hope societal engagement in technological innovation... 3) What needs to happen for that... 4) What I would like to contribute to that ...

### **5.3.3. Phase 3: Joint sense making and interpretation of findings**

After each activity of the exploration phase an evaluation interview will be conducted by VU with each case study owner. This is done to facilitate joint sense making and interpretation of the findings of the design workshop. For the first design workshop this joint sensemaking and interpretation of findings is facilitated during the CM in Bilbao by the VU partner. In these sessions time is allocated to reflection and scoping the outcomes of the design workshops. For the partner and linked third parties that will not have facilitated the design workshop before the CM in Bilbao yet, we will come up with a different solution

### **5.3.4. Phase 4: Formulating action perspectives, 'learning questions' and guidelines for societal engagement activities and best practices.**

From the joint sense making and interpretation of the findings, action perspectives and learning questions can be formulated. This will be facilitated as a separate session during the CM in Bilbao. In this evaluation phase the focus will be on together formulating the 'learning questions' that came up in the design workshops. Thereby identifying the most prominent needs and barriers of the industry actors in each case study. After this meeting VU will draft these learning questions and present them back in the next evaluation meeting, which is the kick-off of a new cycle of the four reflexive evaluation phases.

## **5.4. Iteration**

The previously described phases of reflexive evaluation will be iterated and adjusted during all phases of WP2. For now, a detailed description of the reflexive evaluation during the prototyping and testing phase is

too premature as the output of going through the phases of reflexive evaluation will provide input for the next round. After phase 4 of the first reflexive evaluation cycle its input will be used for the second round that kicks off with phase 1 to again discuss and potentially adjust the evaluation scope and its demarcations. Depending on how many workshops each case study needs in the exploration phase, this workshop will fall either into the exploration or prototyping and testing phase. The four different phases are the basic building blocks of the reflexive evaluation but the frequency with which we will go through the phases can be adjusted during the process as keeping an open and adaptable stance towards the evaluation is of high importance to ensure flexibility and adjustment to context.

## 6. Concluding remarks

In this report we presented the reflexive evaluation method that we adopted for the evaluation of the SockETs lab. We identified a need for a reflexive approach because as is evident in literature about responsible innovation and science and society interaction, there is limited uptake of such initiative in industrial context. Moreover, the complexity of KETs and the societal challenges addressed in the SockET labs require an approach that allows for changing criteria along the way, and tailoring the method to needs of stakeholders and case study owners.

The reflexive methodology focuses both on accountability and learning. It is an iterative process in which the case owners of the SockETs lab are involved as much as possible. By adopting a reflexive approach, we hope to be able to find a common ground for both industrial needs and strategies of responsible innovation and societal needs and engagement.

In the course of WP2, we aim to build the evaluation method, learn and evaluate collectively. The outcomes of the process will help select the content of the toolbox that will be developed in WP3.



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## 8. Annex 1



SOCIETAL ENGAGEMENT  
WITH KEY ENABLING TECHNOLOGIES

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# Reflection diary

## Personal information

Name:

Country:

Case study:



Athena Institute

Connecting science and society  
for a better tomorrow

## Instructions

Please use this reflection diary during the weeks prior and the days after the design workshop. You can either print it out or fill it out digitally.

This diary is intended to encourage you to reflect on your co-creation activities and enable you to make in-action adjustments to those activities in the future. Furthermore, it is a tool to keep track of your experiences with facilitating openness and reflexivity of public dialogues on innovation. *Your entries in this diary will be processed and analysed for the purposes of the reflexive evaluation of the SockETs labs.* For this, we need your written consent.

We kindly ask you to fill out this diary at moments when you are planning a co-creation activity, afterward when you reflect on how you experienced it. We have created two entries, each consisting of six different questions. One entry you can fill out prior to the design workshop and one you can fill out after the design workshop.

Please take your time to answer the questions with attention. This may take some effort, as critically reflecting on your own actions and assumptions is not always easy and may even be confronting. However, please know that **there are no wrong answers!** The main questions in **bold** should be answered in detail; the questions in *italic* are intended to guide your reflection.

If you have any questions or experience difficulties, please don't hesitate to reach out to us.

Thank you for your time and effort.

On behalf of the VU team,

Willemine Willems and Lisa Augustijn

**1. Describe how you envision the co-creation event**

*What will happen? What co-creation activity do you envision and why? What will be the topic? What medium will you use? Who is the envisioned audience? What is the envisioned outcome of the situation? What opportunities do you see? What concerns do you have? In what case would you consider the activity beneficial, in what case not? You may add any screenshot, picture, drawing that might help you to better describe the envisioned situation.*

A large, empty rectangular box with a thin black border, intended for the user to describe their envisioned co-creation event. The box is currently blank.

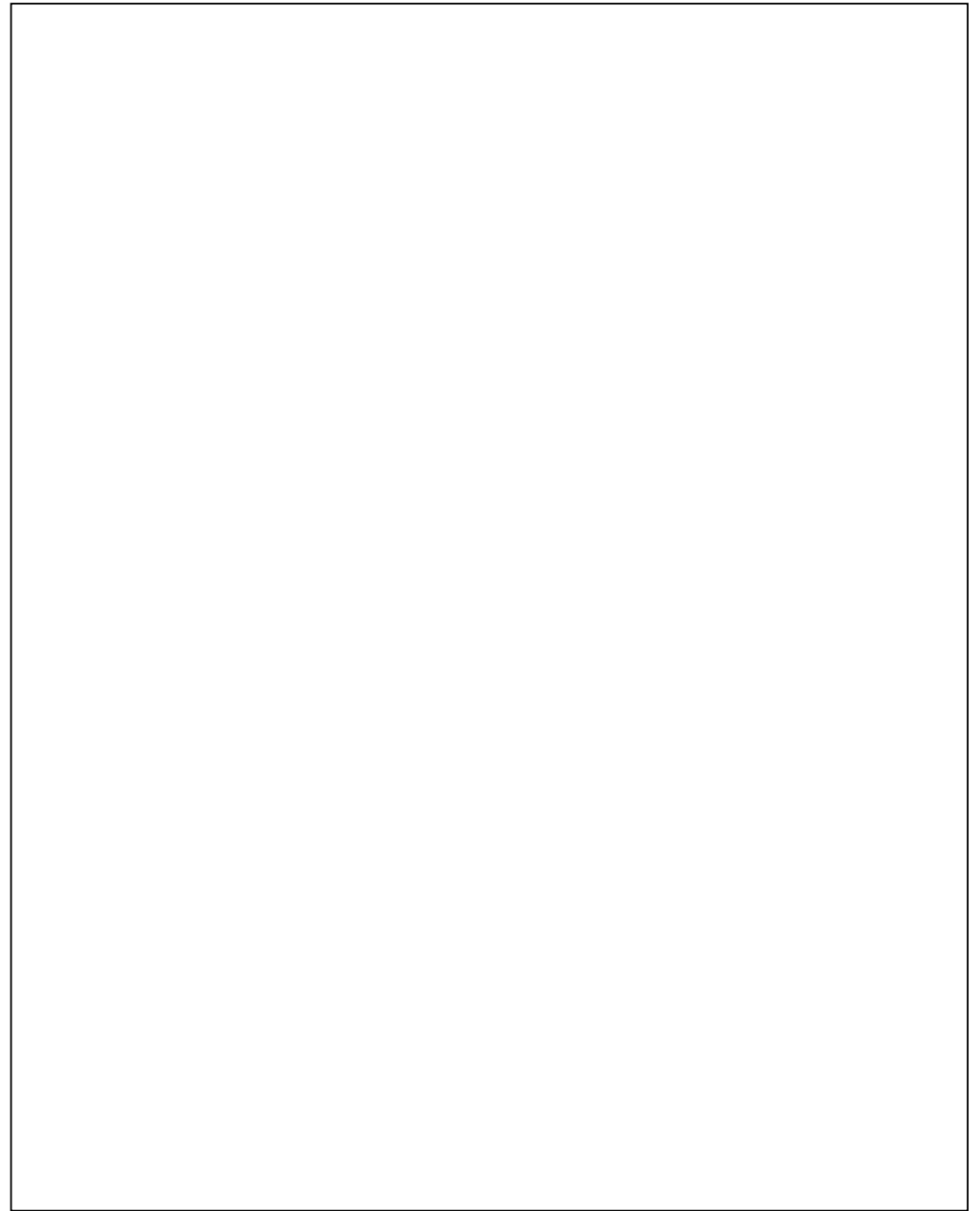
**2. What were your feelings and thoughts during the preparation?**

*What did you feel before, during and after shaping the workshop? What do you think other people involved in the situation were feeling?*

**3. Why do you think you experienced these feelings and thoughts?**

*What was positive and/or negative about these feelings and thoughts? Why did you experience these as positive or negative? What assumptions and expectations did you have?*





**4. How could your feelings, thoughts and assumptions influence the preparation?**

*Were there thoughts, feelings or assumptions that affected your actions? How did your expectations influence the situation and your actions? Were there thoughts or assumptions you came to find were not (totally) accurate?*

**Additional comments**


*Any additional thoughts or revelations can be written down here.*





**1. Describe the co-creation event.**

*What happened? What co-creation activity took place and why? What was the topic? What medium did you use? Who were the audience? What were the outcomes? What went right? What went wrong? You may add any screenshot, picture, drawing etc. that helps you better describe the situation.*



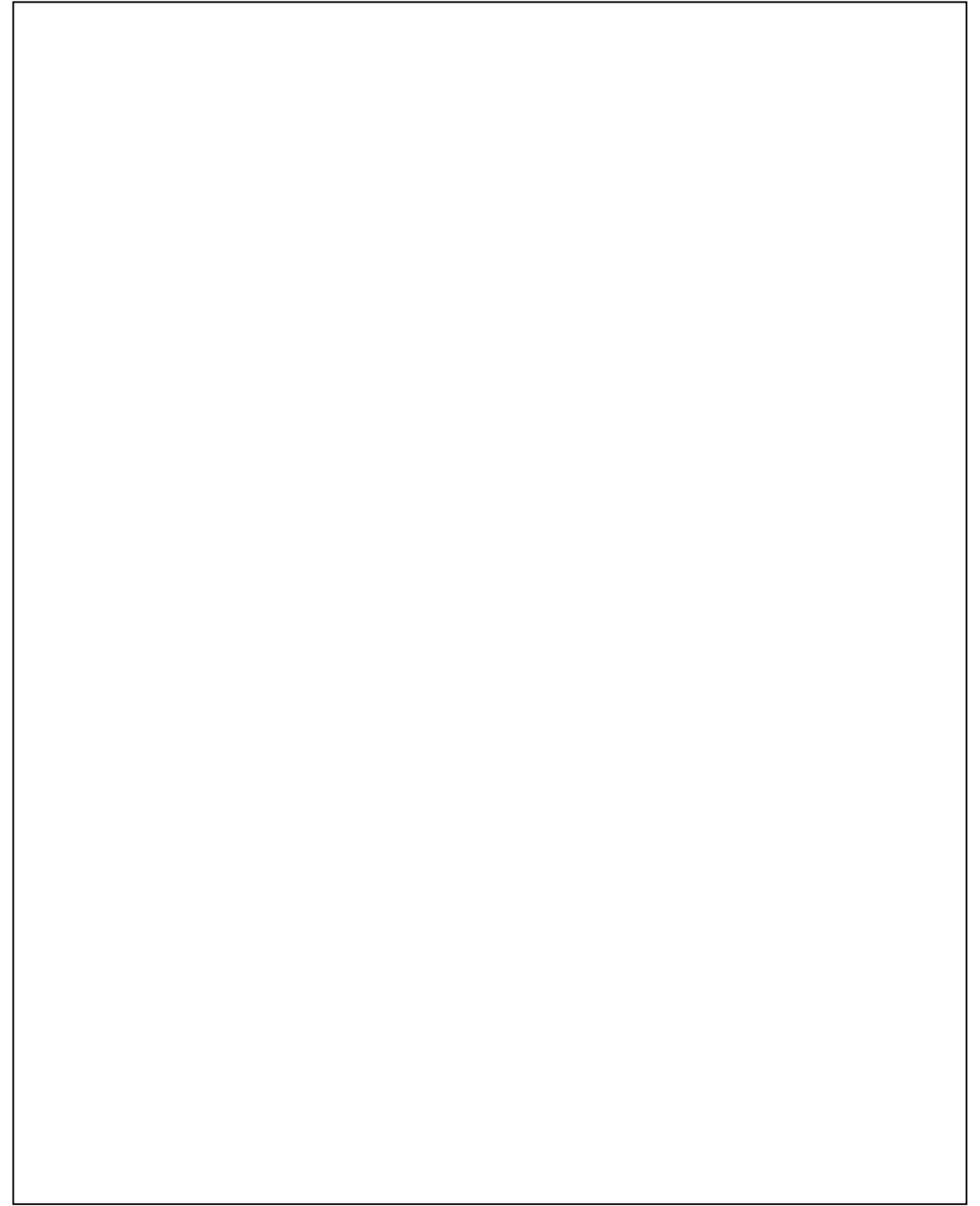
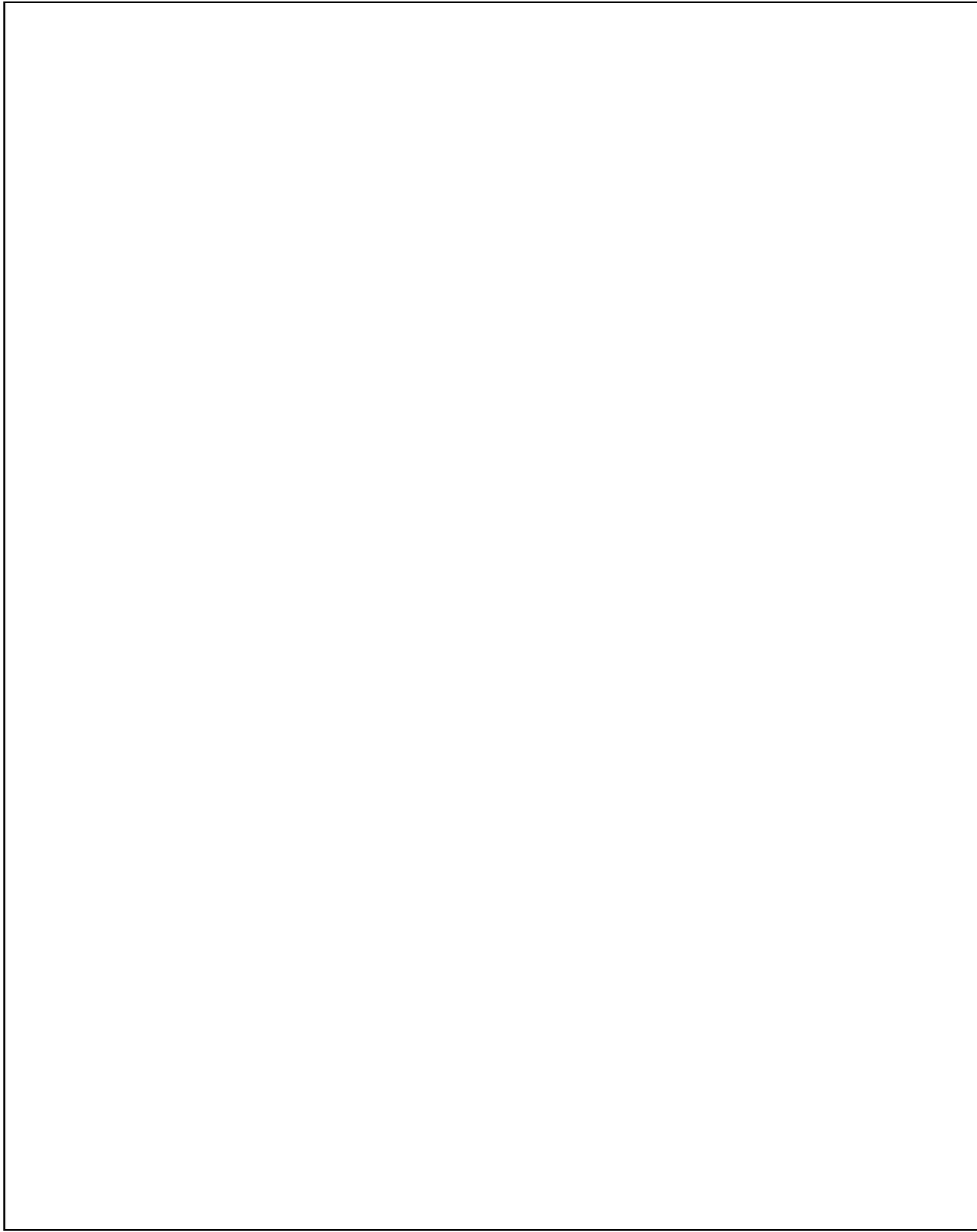
**2. What were your feelings and thoughts during the workshop?**

*What did you feel before, during and after the workshop? What do you think other people involved in the situation were feeling? What did you think during and after the situation?*

**3. Why do you think you experienced these feelings and thoughts?**

*What was positive and/or negative about these feelings and thoughts? Why did you experience these as positive or negative? What assumptions and expectations did you have?*





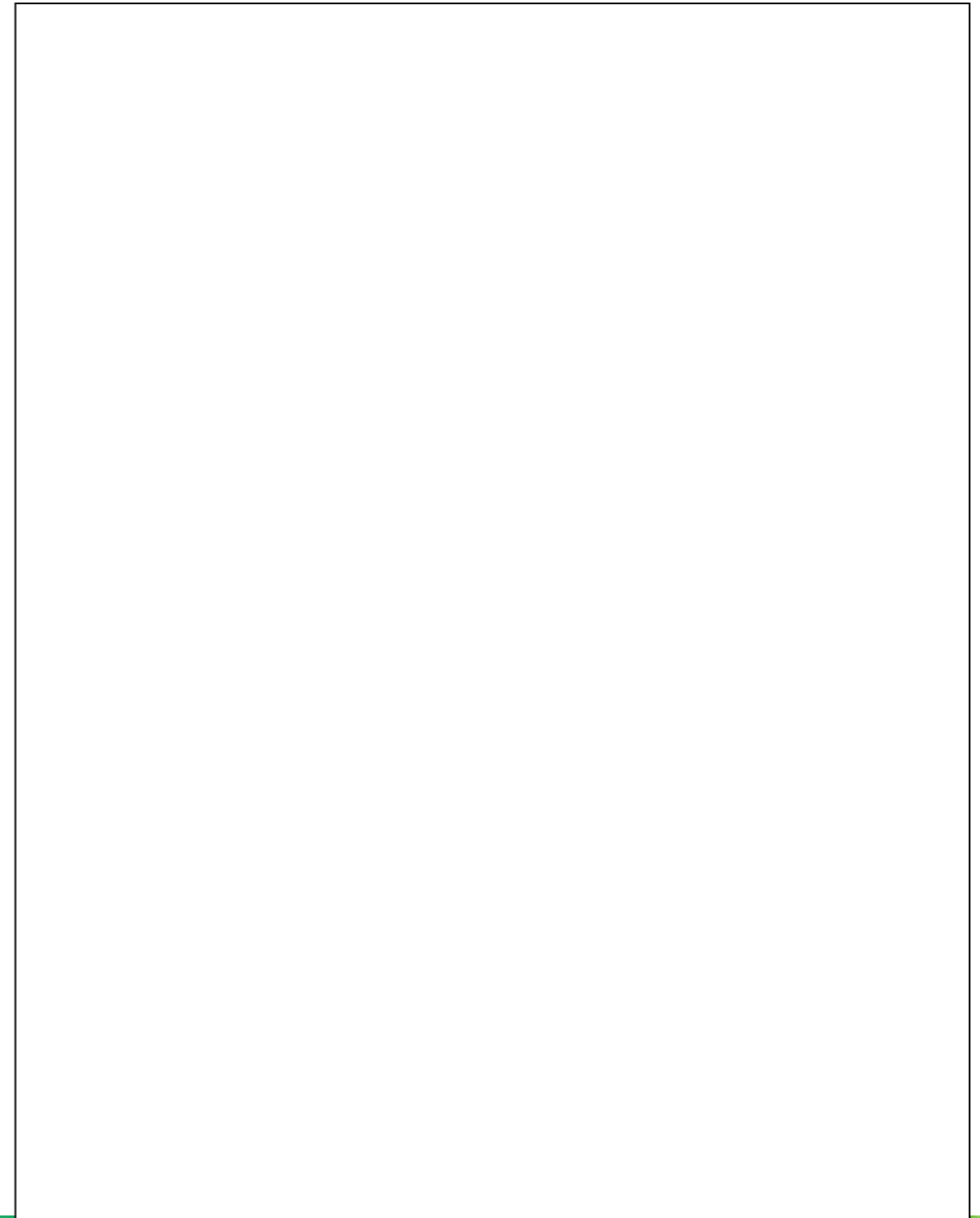
**4. How could your feelings, thoughts and assumptions have influenced the preparation?**

*Were there thoughts, feelings or assumptions that affected your actions? How did your expectations influence the situation and your actions? Were there thoughts or assumptions you came to find were not (totally) accurate?*



**5. What could you have done differently?**

*What helped you? What didn't?*



9. Annex 2

1. What I realised today ...

2. I hope societal engagement in technological innovation ...

4. What I would like to contribute to that ...

3. What needs to happen for that ...



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