

# increase

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22	Solar Energy Association of Ukraine	Ukraine	ASEU
23	Euskal Trenbide Sarea	Spain	ETS
24	Podgorica	Montenegro	POD





## EXECUTIVE SUMMARY

The Increase project aims to foster green energy transition and the New European Bauhaus values by advancing the uptake of integrated photovoltaic (IPV) systems that integrate solar cells into construction components to produce sustainable and aesthetical energy solutions. However, ensuring the market acceptance of novel energy solutions is a complex design challenge, which requires a careful consideration of stakeholders' needs and expectations in the innovation process. To stand up to the challenge, Increase applies a co-creative approach to integrate the expertise and perspectives of diverse stakeholders into all phases of innovation.

This report puts forward a conceptual model, along with practical tools and recommendations, to guide co-creation processes with stakeholders in the Increase project. The model will support local co-creation processes in the nine demonstrations in six European countries where IPV solutions are tested on real buildings and infrastructure objects. It also helps structure the aesthetical assessment of IPV modules and stakeholder engagement across the IPV value chain to jointly develop strategies for increasing market acceptance. In addition to that, the model provides guidance for exploring the opportunities for participatory and inclusive energy transition in Ukraine.

Synthesizing methods, tools, examples and good practices from the fields of co-creation, social innovation, open innovation and design thinking, the model outlines stakeholder engagement approaches across three main phases of co-creation – co-design, co-implementation, and co-assessment. The Increase co-creation approach focuses on co-design and co-assessment, while some demonstrations also have the potential to involve stakeholders in the co-implementation of the pilot solutions. The model outlines methods, tools and tips to assist the planning, implementation and assessment of co-creation processes, starting from context and stakeholder mapping, and ending with feedback and assessment of results. The main body and annexes also contain a number of useful templates and resources, which partners are encouraged to use.

Due to the variety of co-creation activities in the Increase project and the differences in the scope and local settings of the demonstrations, the co-creation model does not prescribe a strict process to be followed uniformly across the project. Instead, it provides a set of key principles and a general framework, which partners can adapt to their particular objectives and needs.



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## GLOSSARY

**IPV** (integrated photovoltaics) – refers to the integration of photovoltaic elements, typically solar cells, into various structures or systems to generate electricity while simultaneously serving other functions, such as providing shade or acting as building material. This integration enhances the efficiency and aesthetic appeal of solar energy systems by seamlessly incorporating it into the built environment.

**BIPV** (building-integrated photovoltaics) – integrates solar energy components, such as solar panels or solar cells directly into building materials or architectural elements. This approach allows buildings to generate electricity from sunlight while maintaining their functionality and design aesthetics. BIPV systems can be incorporated into rooftops, façades, windows or other structural elements of a building, providing both renewable energy generation and architectural enhancement.

**IIPV** (infrastructure-integrated photovoltaics) – refers to the integration of photovoltaic elements into infrastructure systems, such as roads, bridges, noise barriers, or transportation hubs. By embedding solar panels or solar cells into existing infrastructure, IIPV aims to use underutilized surfaces to generate renewable energy while minimizing land use and maximizing energy production potential. This approach enhances the sustainability and resilience of infrastructure networks by harnessing solar energy in urban and transportation environments. [1]

**KPI** (Key Performance Indicator) – is a quantifiable metric used to evaluate the success or performance of a specific activity, process, project or organization in achieving its objectives. KPIs are selected based on their relevance to the goals and priorities of the entity being assessed and are often used to track progress, identify areas for improvement, and make data-driven decisions.

**NEB** (New European Bauhaus): The New European Bauhaus is an initiative launched by the European Commission to reimagine and redesign the built environment in Europe, integrating the principles of sustainability, aesthetics, and inclusivity. Inspired by the historical Bauhaus movement, which combined art, design, and technology in the early 20th century, the NEB seeks to promote innovative solutions for sustainable living, architecture, and urban development. It aims to initiate interdisciplinary collaboration among designers, architects, engineers, artists and other stakeholders to create aesthetically pleasing, sustainable, and inclusive spaces that enhance the quality of life and address societal challenges. [2]



## CHAPTER 1. INTRODUCTION

Increase is an innovation project aiming to promote the uptake of integrated photovoltaic (IPV) systems and use of solar energy by delivering innovations in IPV modules, systems, design, and operation. IPV systems are innovative solutions where the elements capturing solar power are integrated into construction components such as roof tiles, façade modules or noise barriers. Integrated PVs are used both in buildings (BIPV) and infrastructure objects (IIPV). The Increase project introduces innovations that reduce the environmental footprint and improve the performance and aesthetical appearance of IPV products. Through these innovations, Increase wishes to contribute to green energy transition and the development of sustainable, functional, high-quality and aesthetically pleasing built environment in the spirit of the New European Bauhaus (NEB).

It is a complex design challenge to develop innovative and effective energy solutions that are accepted and valued by users and markets. This calls for innovative and participatory approaches in interacting with diverse stakeholders who are affected or have the power to affect the uptake of IPV solutions. To stand up to the challenge, Increase integrates a strong layer of user feedback and co-creation into the project activities. Co-creation with local stakeholders is central in the nine demonstrations across different sites in Europe where IPV solutions are tested in real-life conditions. Co-creation approaches are also used to engage broader groups of stakeholders and professionals from sectors relevant to energy innovation. The aim is to understand their needs and expectations, and jointly develop solutions to overcome barriers to market uptake.

The Increase conceptual co-creation model (Deliverable 6.1) has been developed as part of Task 6.1 to support the application of co-creative approaches throughout the innovation process, from design to diffusion. It provides a general framework for engaging diverse stakeholders to the innovation process, and suggests practical tools and recommendations for the project partners leading co-creation processes. The co-creation model will be directly applied in the pilot demonstrations conducted as part of Work Package 5, adapting the approach to local needs and circumstances. The model will also provide a framework for the aesthetical evaluation of IPV modules in Task 4.3. In addition to that, Work Package 7 will explore the opportunities for starting similar co-creation processes in Ukraine, and make use of the tools and methods when conducting roundtables and engaging diverse stakeholders across the value chain to discuss the opportunities for the broader uptake of innovative IPV solutions.

This deliverable starts out by explaining the core concepts related to co-creation in Chapter 2. It then progresses to more practical guidelines for Increase partners steering co-creation processes, first outlining tools and recommendations for planning co-creation and then describing possible methods for conducting co-creation activities in Chapter 3 and Chapter 4. In Chapter 5, the methods and tools described in the previous sections are analysed in the context of Increase demonstrations to give each pilot a set of recommendations that could assist co-creation in the local circumstances. Chapter 6 discusses the evaluation of co-creation process and outcomes. It also proposes a selection of Key Performance Indicators (KPIs) and procedures for documenting and assessing progress towards co-creation goals. Lastly, a number of guiding materials, examples and templates are provided in the annex, which partners are encouraged to use in the planning, implementation and assessment of the local co-creation processes.



## CHAPTER 2. CO-CREATION: WHAT AND WHY?

The Increase project aims to enhance technological innovation in the realm of new sustainable energy sources integrated into the built environment, i.e., buildings and infrastructure objects. These objects are normally perceived as big, consistent, and stable – not exactly the qualities immediately related to innovation. At the same time, new technologies in the field of integrated photovoltaics (IPV) are still unfamiliar to the public, and their benefits and opportunities difficult to grasp. Thus, it is especially important to pay attention to how the affected individuals and groups perceive the different values arising from the innovation. In the case of energy retrofitting and adoption of renewable energy sources, these gainable values are not restricted to energy savings and efficiency but also improving the overall quality of life as well as the image and socioeconomic value of a building, site, or district. [3]

It is an enormous design challenge to develop innovative energy solutions that are optimal, accessible, appealing and useful, and to ensure the social acceptance and marketability of the proposed innovations. **Innovation acceptance** refers to the willingness of people to adopt, use, and integrate innovation into their existing practices or processes. It is a critical aspect of the innovation process, as the success of any new idea, object or technology depends on its acceptance by the intended users or stakeholders. The success of innovation depends on the stakeholders perceiving the advantages of those innovations. Good communication amongst different value chain stakeholders, including end-users, plays a key role in fostering acceptance and creating value for stakeholders. [3]

The Increase project adopts a participatory and inclusive approach to energy innovation by integrating social innovation approaches into the process. **Social innovation** is a collaborative process targeted to creating public value and producing long-lasting outcomes that address society's needs and challenges. [4] Social innovation is as much about the goals (such as green transition) as it is about the process of collaboration between diverse stakeholders, aiming to transform social relationships and foster mutual knowledge exchange. For social innovations to produce outcomes that matter, it is important that key stakeholders be involved in the design, implementation and adoption of these innovations. [3]

In technological and social innovation, relevant **stakeholders** may involve very diverse groups, organizations and individuals. The key stakeholder group to involve in collaborative processes around innovations are the users of the innovative products and services. However, in addition to end users, many other stakeholders may provide valuable perspectives or influence that can help develop or improve innovation or foster its adoption and diffusion. In the context of energy transition initiatives, relevant stakeholders include local, regional, national and European-level policymakers and regulators, supervisory bodies, technology producers, providers of energy and grid services, construction sector, architects, urban planners, designers, engineers, investors, academia and researchers, local communities (beyond direct users), and many others.

Increase has built its innovation process around active stakeholder engagement throughout the project, from innovation design to implementation and assessment.

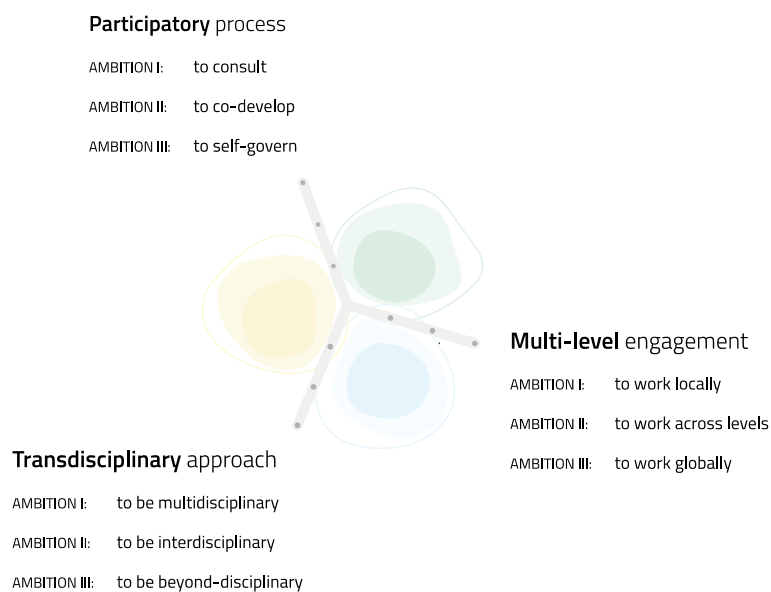
### **Stakeholder engagement in Increase relies on three main pillars:**

- 1) The New European Bauhaus principles
- 2) co-creation
- 3) open innovation.

**New European Bauhaus (NEB)** is an initiative launched by the European Commission to foster sustainable, inclusive and community-oriented approaches in urban development. NEB has three guiding principles: 1) **aesthetics** – quality of experience and style beyond functionality, 2)



**sustainability** – contribution to climate goals and environmental sustainability, and 3) **inclusion** – valuing diversity and equality of people, and securing the accessibility and affordability of sustainable innovation, particularly in the built environment. [5] NEB foresees a participatory and inclusive approach to sustainable innovation, which builds on multi-level and transdisciplinary collaboration and leverages the creative power of art and culture (see **Figure 1** below). Guided by these principles, Increase aims to co-create innovative IPV solutions with diverse stakeholders to contribute to a sustainable and aesthetical living environment. The Increase approach particularly aims to foster transdisciplinary collaboration between parties who do not often work together (e.g., the construction and energy value chain, creative industries, technology providers, local governments and citizens) to accelerate innovation, boost creativity, and enable learning across organizational and disciplinary borders.



**Figure 1. Working principles of the New European Bauhaus [5]**

**Co-creation** is broadly understood as active engagement of stakeholders who hold different types of knowledge and resources with the aim to generate valuable outcomes collaboratively [4]. Such outcomes may include new understanding of problems and opportunities, new visions and narratives, but also new products, services and solutions. By involving diverse actors in collaboration around renewable energy projects, co-creation helps make people interested and aware of the benefits of innovation, so that they value and feel ready to use innovative solutions.

Co-creation strategies can be leveraged in different contexts and for different purposes, including:

- the development of specific services or products (such as pre-fabricated IPV façades)
- implementation of specific innovative initiatives (such as Increase demonstrations)
- advancing the adoption of innovative approaches and technologies at a more general level (such as innovations in solar energy production)

In the case of product innovations, it is paramount to engage end users and stakeholders in the product value chain. In the case of local demonstration and testing projects, it is crucial to engage direct users as well as public authorities and local communities to raise awareness and create impact. In the case of high-level innovation promotion, co-creation processes may focus on policymakers and representatives of key industries rather than citizens.

In Increase, co-creation efforts focus on pilots, while co-creative approaches are also used to discuss and advance IPV innovation in collaboration with policymakers, energy and construction industries, investors, standardization organizations and the NEB and cultural heritage communities.

Co-creation generates **benefits** not only to the party engaging stakeholders in collaborative innovation but also to co-creation participants and society at large. In co-creation processes, **the benefits and value** of the solutions implemented are defined through the lens of all stakeholders, ensuring outcomes are meaningful and beneficial to the broader community [6]. This is extremely relevant in green transition and energy innovation projects where ambitious goals are combined with technological and social complexity. **Table 1** summarizes the key benefits of co-creation for different types of stakeholders.

Table 1. Benefits of co-creation. Source: [7],[8],[9]

Stakeholder	Value from co-creation
Innovation initiators	<ul style="list-style-type: none"> <li>Access to resources and expertise outside the organizational borders</li> <li>Innovative ideas</li> <li>Improved knowledge of user needs</li> <li>Inclusion of diverse perspectives to ensure usability of innovations</li> <li>Improving user/customer loyalty and support to innovation</li> <li>Prevention of adoption barriers</li> <li>Reducing costs</li> <li>Smarter and more effective organization of innovation processes</li> <li>Improved relationships with users</li> </ul>
Co-creation participants	<ul style="list-style-type: none"> <li>Personal benefits from better products/services</li> <li>Improved access to information</li> <li>Improved knowledge on a particular issue</li> <li>Increased confidence and engagement</li> <li>New and stronger social connections</li> <li>Participation and leadership skills</li> </ul>
Innovation users	<ul style="list-style-type: none"> <li>Improved usability of products</li> <li>Innovations adapted to users' needs</li> </ul>
Society	<ul style="list-style-type: none"> <li>Contribution to public value and common good</li> <li>Fostering innovation culture</li> <li>Fostering a culture of participation</li> </ul>

The term co-creation is closely related to concepts such as co-production, collaborative production, and open innovation, which originate in different disciplines but refer to the idea of collaboration beyond traditional organizational boundaries. [10] Co-creation has considerable similarities with **open innovation**, which refers to collaboration with stakeholders outside the organization, such as users, customers, neighbours, academia, and other organizations, with the aim to bring in diverse perspectives and leverage both external and internal ideas to drive innovation and enhance creativity [11]. In open innovation, the level of stakeholder engagement may vary, ranging from crowdsourcing ideas from an anonymous group of people to regular interaction with key users. **Co-creation usually involves a deeper level of interaction where stakeholders not only help achieve an organization's goals but jointly co-create value for everyone involved.** In co-creation processes, value is not produced in a top-down way but emerges through the interaction of providers and users, so that users become co-creators of value [12].

Within the wider context of public decision-making processes, the **Spectrum of Public Participation of the International Association for Public Participation (IAP2)** [13] provides a useful framework for understanding the different levels of engagement and participation. The spectrum differentiates between **five stages of participation: inform, consult, involve, collaborate, and empower** (see **Figure 2** below). The depth of stakeholder engagement in co-creation corresponds to the “collaborate” and “empower” stages of the spectrum, emphasizing collaboration, partnership, and shared decision-making. It entails active involvement and collaboration throughout the decision-making process, as stakeholders work together to develop solutions, policies, or initiatives that address shared concerns or goals.

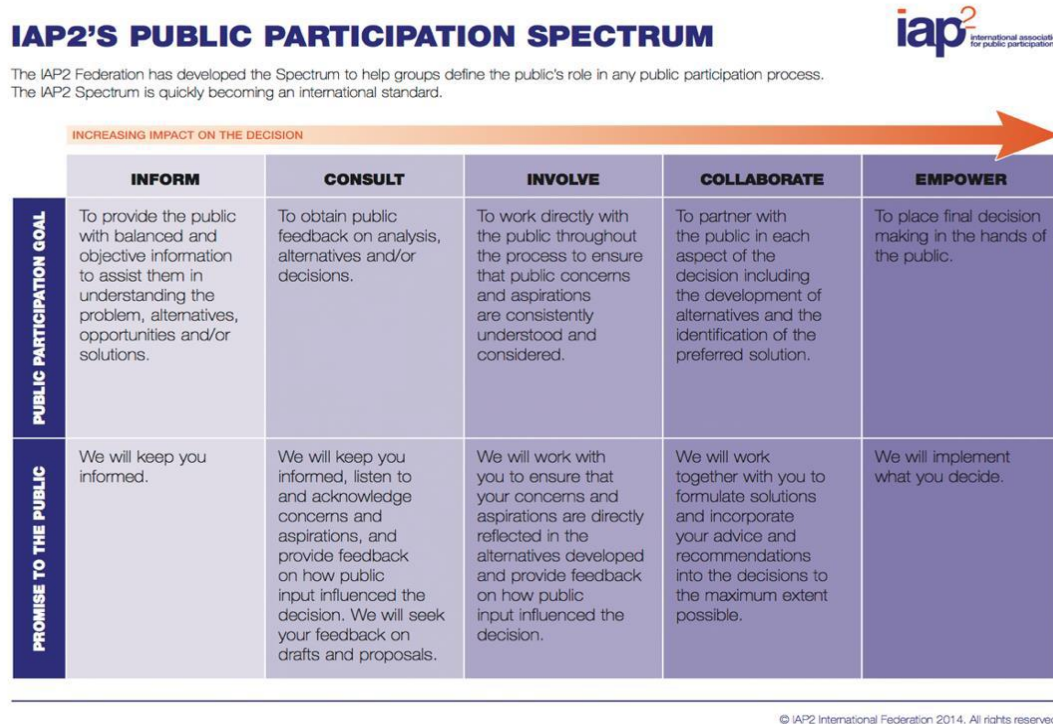


Figure 2. IAP2’s public participation spectrum. Source: [13]

Co-creation can be divided into several phases, which commonly comprise at least four key stages: **co-ideation, co-design, co-implementation and co-assessment** (see **Figure 3**).

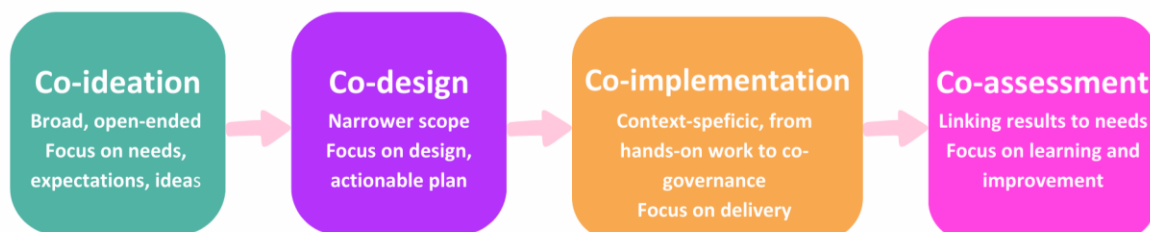



Figure 3. Key phases of co-creation. Source: authors

**Co-ideation** ensures that the innovative solutions offered within the co-creation process would gain its contents collaboratively from the start, instead of being proposed centrally. The co-ideation phase is commonly quite open-ended and targeted to learning about the problem at hand, discovering stakeholders’ needs, and developing initial ideas for solutions. This often involves conducting a baseline analysis and making it available to all interested stakeholders. The co-ideation process should



be preceded by a careful consideration of all potential stakeholders. A common mistake among co-creation practitioners is defining the list of stakeholders too narrowly. Once the stakeholders have been defined, they can be invited to co-ideate through workshops or other means of engagement.

**Co-design** is the next step which has a narrower goal of developing the design of a solution. Co-design events turn abstract ideas from the previous phase to actionable designs, using tools such as design sprints or co-design workshops. In the context of urban regeneration, co-design involves diverse stakeholders in shaping solutions, ensuring urban spaces meet the needs of those who inhabit them. [11]

**Co-implementation** is the third collective phase of the process, leveraging contributions from different stakeholders to put the design ideas into practice. Co-implementation ensures shared responsibility among stakeholders, leveraging diverse resources for effective project execution [11]. Co-implementation may involve stakeholders' contribution to building the co-designed products or objects, sharing power and responsibilities with local communities to co-govern innovative solutions, stakeholder oversight of the implementation, as well as soliciting regular feedback from users and stakeholders to improve innovations in an iterative way.

**Co-assessment** follows co-implementation and relates the results to the baseline analysis and learnings from the co-ideation phase, especially stakeholders' expectations towards the usefulness, usability and aesthetic qualities of the solution. In the co-assessment phase, specific tools are used to involve stakeholders and wider community in assessing and evaluating the solutions implemented within the co-creation process. Co-assessment is considered especially important when evaluating the outcomes of public sector projects, as stakeholder involvement helps ensure multi-perspective accountability and learning experience. [7]

In Increase, co-creation processes are used in the demonstrations of IPV solutions in nine pilot sites. All pilots are different in their context and design, hence the scope for co-creation is also different. The Increase co-creation model will largely omit the co-ideation phase as the outline of the pilot solutions has been predefined at the proposal stage. However, all pilots will use some form of co-assessment, several are able to implement co-design processes, and a few also have the potential to co-implement the solutions in collaboration with local stakeholders. Elements of co-design, co-implementation and co-assessment will thus appear in Increase pilots in different combinations (see Figure 4). Possible methods and tools that can be used in the co-design, co-implementation and co-assessment phase are described in Chapter "Methods and tools".

**Figure 3** shows the standard co-creation model, while **Figure 4** depicts the co-creation phases relevant to the Increase project.

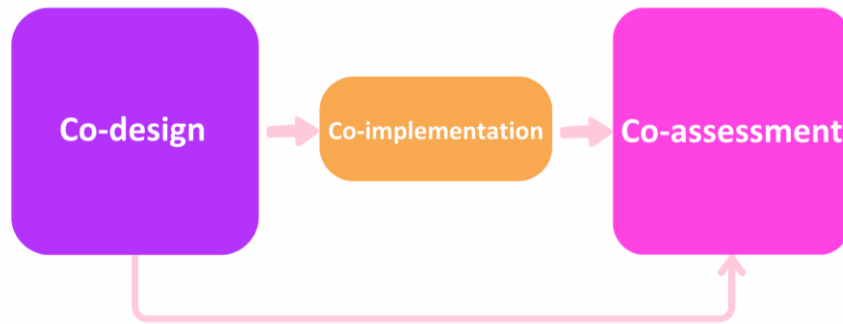


Figure 4. The Increase co-creation model. Source: authors

Nevertheless, the models above should only be regarded as simplified representations of the reality, which may be messy and where different phases of co-creation may intertwine and overlap. **Co-creation is seldom a linear path but rather engages in a sophisticated interplay of iteration and refinement** (see Figure 5). Unlike traditional, step-by-step processes, co-creation is a dynamic and evolving endeavour, marked by continuous cycles of collaboration, feedback, and adaptation.

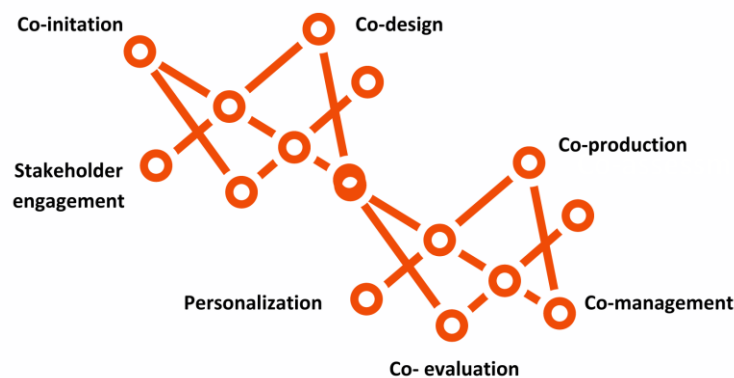


Figure 5. The iterative and non-linear nature of the co-creation process. Source: [14] and authors' own elaboration

This iterative nature means that not all plans can be set in stone at the beginning; instead, co-creation is a process of collective exploration and enhancement. The value of co-creation lies in its ability to embrace the flow of ideas, insights, and perspectives, fostering a continuous loop of improvement, recognizing that each loop brings us closer to innovation, shared understanding, and a more refined collective vision.

Because of this iterative nature as well as because co-creation processes are by default creative processes with sometimes not pre-defined outcomes, it is more difficult to **plan resources** (such as sufficient time, expertise, financial) needed for the co-creation. The perceived (higher) cost of co-creation may deter many developers from pursuing this approach, despite its potential benefits.

*"It is crucial to have the right attitude. Co-creation requires time, virtual and physical spaces and platforms. The process also benefits from its wide network of members. The allocation of resources from each organisation to the process should take into account the productivity gains to be achieved, which will be realised in other ways than by saving on co-creation resources."* (SPARCS Co-creation Model Toolkit, <https://co-creatingsparcs.fi/en/1-4-resources-and-skills/>)

Indeed, planners of co-creation need to dedicate sufficient time, expertise, and resources to facilitate meaningful engagement with stakeholders. For example, this may include investing in comprehensive needs assessments, building strong partnerships with relevant community organizations, or providing adequate training and support for participants throughout the co-creation journey. Additionally, planners should allocate resources for the development and implementation of appropriate methodologies, tools, and technologies to facilitate effective communication and collaboration among stakeholders.

This, in turn, underscores the importance of thoughtfully considering which potential outcomes of the process align with the innovation objectives. What value could co-creation bring? (see also Chapter 2 and Annex 2: co-creation coding, which further presents the model of co-creation with causes, context, consequences and potential action strategies) [10]. The outcomes of the co-creation process should be both feasible and integral to the innovation endeavour. Factors such as user roles, facilitation methods, and timelines can vary greatly depending on whether the goal is to simply gather ideas or to pursue more ambitious co-creation objectives. It's crucial to avoid potential disappointment or overwhelming challenges by carefully aligning, for example, the scope of co-creation workshops with the types of users involved. This strategic approach ensures that the co-creation efforts are effectively tailored to meet the specific needs and goals of the innovation process [15]. Methods and tools that could assist Increase pilot teams in strategically planning the co-creation process are presented in Chapter 4.

#### Useful resources for planning co-creation processes:

**Clever Cities Toolkit:** This toolkit offers a comprehensive set of resources for urban co-creation initiatives, emphasizing sustainable development and community engagement. It provides practical guidance, lessons-learned and tools for collaborative planning.


<https://clever-guidance.clevercities.eu/collaboration-empowerment>

**NPC Toolkit:** This toolkit provides a step-by-step overview of the co-design, which consists of five stages. Additionally, it offers guidelines and a framework on co-creation overall and the evaluation process.

<https://Thinknpc.org>

**ENoLL Toolkit:** This toolkit offers resources and best practices for establishing and managing Living Labs, which are platforms for open innovation and co-creation. It provides guidance on governance, stakeholder engagement, user involvement and evaluation methods for successful Living Lab initiatives.

<https://unalab.enoll.org>



**Cities Health Toolkit:** This toolkit offers a range of resources and tools for co-creating health-promoting urban environments. It provides practical guidance, recommended actions and questions to consider for collaborative planning and action.

<https://citizensciencetoolkit.eu/stories/>

**Living Innovation Co-creation Toolkit:** This toolkit provides you tools and guidelines for starting and running a responsible innovation process. Toolkit focus is on practical preparation and conduction of co-creation and co-design workshops.

<https://living-innovation.net>





## CHAPTER 3. CO-CREATION MANAGEMENT

### 3.1 STRATEGIC MODELS OF OPEN INNOVATION

Planning a co-creation process is similar to any strategic planning or roadmapping process, which sets out a way of approaching co-creation, thinking through your goals, actions, and means needed for reaching those and benefiting from the process. In the Increase project and with the help of this report, the goal is to apply open innovation principles into practical and tailored co-creation activities and to engage with key stakeholders and end-users, steering their active participation in the project, as well as supporting them to familiarize themselves with the innovations developed in the project. Even though the main focus in Increase is on technological innovations, active stakeholder engagement is a recurring and continuous value and part of the open innovation process, and it is useful to plan this approach strategically in each local pilot as well as on the transversal level of the whole project.

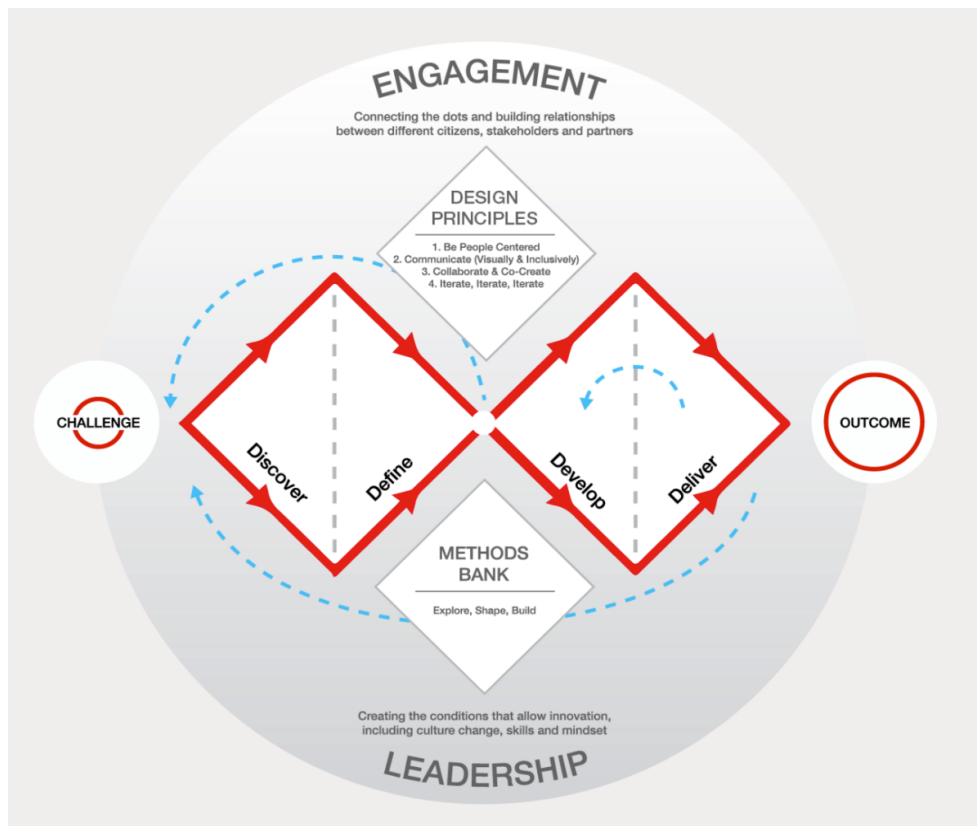
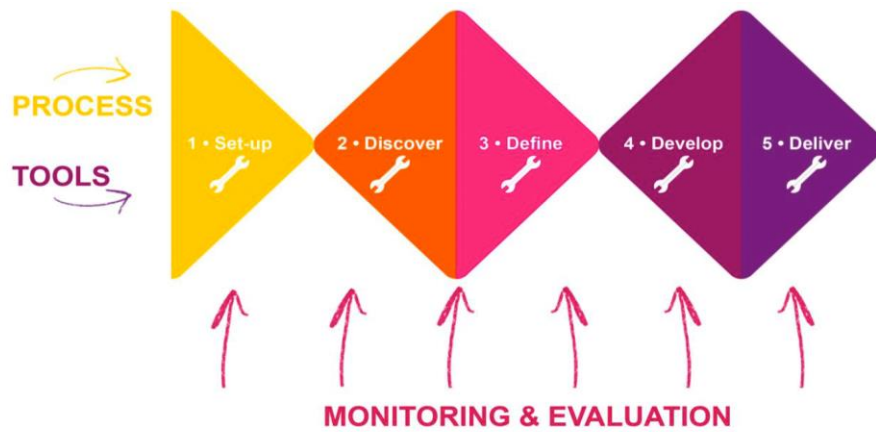
In a broad sense one could envision the co-creation process as a multi-stage process, considering the pre-conditions, available resources and tools for setting up the process and serving its ultimate goal (see also Annex 2 ). These stages build on each other and they should be monitored and evaluated. A comprehensive way to understand a strategic approach to co-creation and open innovation in practice is provided by The Design Council's [Double Diamond model](#). “The Double Diamond is a visual representation of the design and innovation process. It’s a simple way to describe the steps taken in any design and innovation project, irrespective of methods and tools used.” [16]. The main stages of co-creation and the Double Diamond model are presented on **Figure 6**.

Thus, on a high level, co-creation and co-design can be envisioned through some key steps, which align quite closely with the **Design Thinking** cycle (see **Figure 7**) often **applied in Living Labs**<sup>1</sup> [17]. Even though Increase has not defined setting up the Living labs in its course of action, it could be useful for local pilot teams to make themselves aware of the Living Lab approach as it closely resembles what Increase is aiming for when working with local stakeholders and potential end-users of IPV innovations. The Living Lab method promotes open innovation and co-creation of value among different stakeholders, especially users.

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<sup>1</sup> Design thinking is commonly described as a methodical and imaginative approach that involves individuals in exploring, creating, and prototyping ideas, collecting feedback, and refining [18]. Design thinking is perceived as a people-focused and structured method for identifying and addressing problems. It serves to foster innovation, leveraging the tools of design to merge human needs, technological potential, and business objectives. Additionally, Design Thinking has emerged as an educational phenomenon, valued for its applicability across disciplines and its role in cultivating essential skills for the twenty-first century [19]. Design Thinking approach is often applied in Living Labs as both emphasize the importance of empathizing with users to gain insights into their experiences, challenges, and aspirations; involve iterative problem-solving processes; emphasize collaboration and interdisciplinary teamwork and diverse stakeholders. Thus, Design Thinking and Living Lab methodologies are complementary, with Design Thinking providing mostly a framework for creative problem-solving and ideation, while Living Lab extends this approach by integrating real-world testing and validation of solutions within specific contexts (communities or environments).





## How to use the Double Diamond.

### DISCOVER

The first diamond helps people understand, rather than simply assume, what the problem is. It involves speaking to and spending time with people who are affected by the issues.

### DEFINE

The insight gathered from the discovery phase can help you to define the challenge in a different way.

### DEVELOP

The second diamond encourages people to give different answers to the clearly defined problem, seeking inspiration from elsewhere and co-designing with a range of different people.

### DELIVER

Delivery involves testing out different solutions at small-scale, rejecting those that will not work and improving the ones that will.

Figure 6. The Double Diamond by the Design Council [16], [9]

A Living Lab approach is a user-centered, open-innovation methodology that integrates real-world environments into the research and development of innovative solutions. It involves collaboration between various stakeholders, including researchers, businesses, public authorities, and end-users, within a living environment or ecosystem. Living Labs provide a context where new technologies, products, or services can be co-created, tested, and refined in real-world conditions. The approach emphasizes active user involvement, feedback loops, and iterative processes, ensuring that innovations are aligned with actual user needs and preferences. Living Labs aim to bridge the gap between academia, industry, and society, fostering a dynamic and collaborative ecosystem for innovation. (Enoll, 2024)

The Living Lab approach follows a structured set of stages, integrating elements from the Design Thinking [19], [20] and the Quadruple Helix Model [21] and using various tools and methodologies throughout the innovation process. There are some main phases of development [22]:

- The “Problem Space”: selecting a practice to be changed and analysing stakeholders and local context, as well as defining existing and potential barriers.
- Continue with the “Solution Space” by ideating and co-designing with stakeholders, then prototyping and testing solution at the early stage of the project.
- Finish with the “Deployment space” by implementing and demonstrating solutions, as well as thinking of potential scaling up and replication.

Figure 7 summarises the main phases of the Living lab approach. See Annex 1 how this could be applied in Increase project. Furthermore, **Figure 7** and **Figure 8** highlight the guiding principles of the Living Labs, which also apply to Increase.

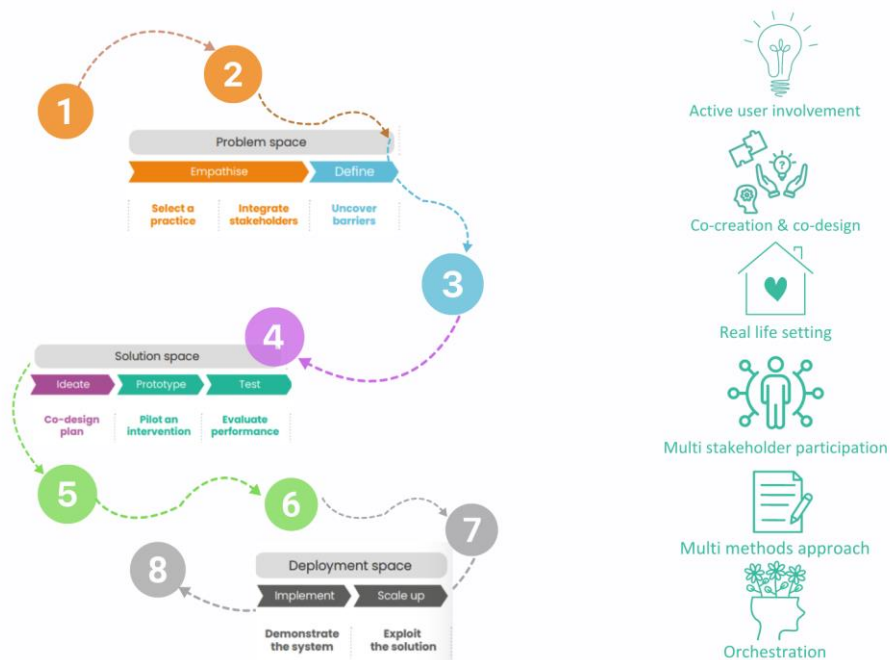


Figure 7. Living Lab Integrative Process and characteristics of the Living Labs. [23] and authors' contribution

**Example of using the Living Lab approach: Energy Living Lab HES-SO – UserGap Project (“Capacity Building Handbook and Mentoring Report”, oPEN Lab project).**

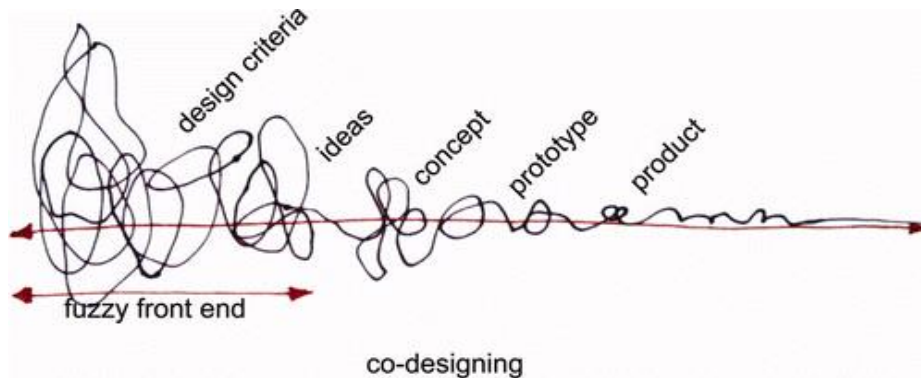
**What is the Influence of users on the performance gap in energy-efficient buildings?**

Eikenott is a sustainable neighbourhood in Gland, Switzerland, in which Living Lab methods and tools were applied. The aim was to better understand the components of the performance gap and how to reduce it. Transdisciplinary research was conducted at the neighbourhood (Macro level), buildings (Meso level) and households (Micro level). The action research allowed to co-design an energy performance plan with key stakeholders.



**Figure 8. Living Lab Integrative process [24]**

As said, the Living Lab approach could provide a framework for participative and transdisciplinary action research and co-development for Increase. Its adaptability across various themes enables a versatile application, establishing an inclusive approach that integrates key stakeholders, including non-specialists, right from the initial design phase of the respective innovation, often referred to as the "fuzzy front-end" (see **Figure 9**).



**Figure 9. Co-design principles [23][25]**

**Figure 10** below presents a set of activities representing the potential common agenda in terms of integrated implementation plans for the Increase pilots. Even though the pilots have several

differences in their socio-cultural, technological and economic contexts, in each of the phases of the Living Lab model, they have an integrated vision from the Increase proposal to contribute to a wider uptake of IPV through co-creation. There are also similarities in the way they are expected to engage stakeholders. Nevertheless, this common agenda does not imply the same pace of carrying out the actions within all pilots, as they have diverse starting points. However, it is still possible to show quite similar typologies of methods and tools that could be considered for implementing the co-creation process in pilots. The end point will be the same for all pilots and related partners, but the speed of realising the activities and specific approaches will be determined by each pilot.

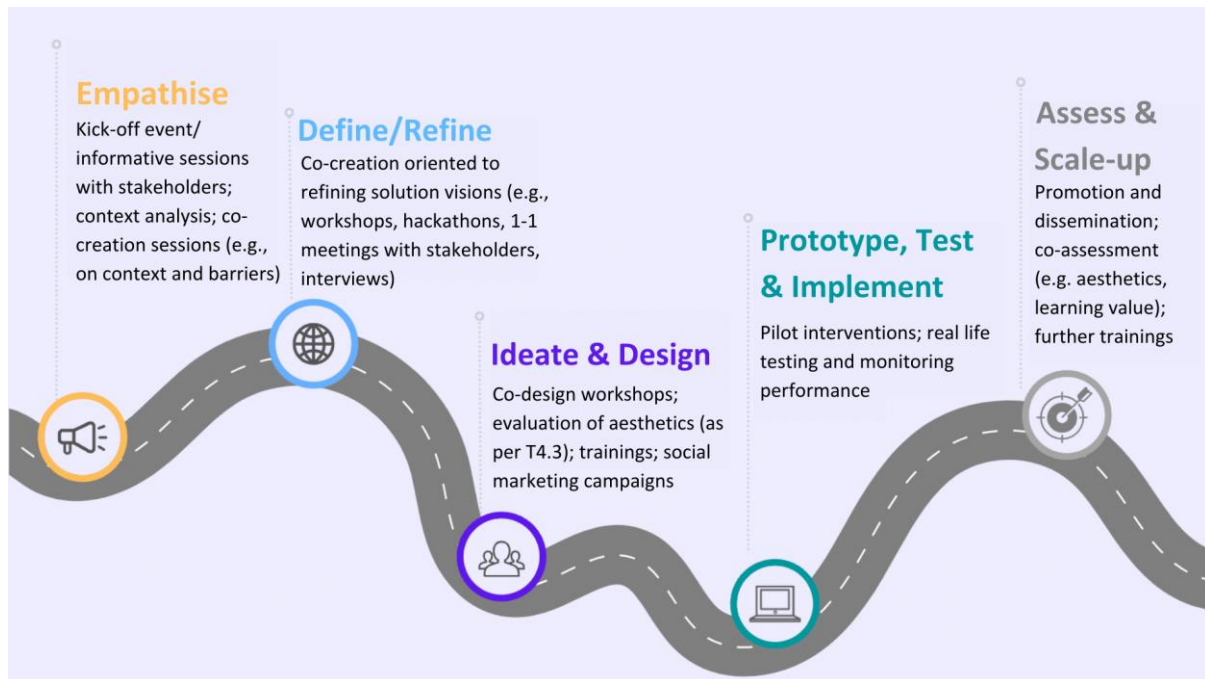


Figure 10. Increase pilots common co-creation agenda. Source: based on [23], authors' own elaboration

### 3.2 PRACTICAL PLANNING AND DEVELOPMENT OF CO-CREATION APPROACH

After understanding how the Living Lab approach could support co-creation process in the Increase project, on a global as well as local pilot levels, the following will delve deeper into **practical planning**. The planning process stands as a foundational pillar, guiding the trajectory of collaborative innovation. This phase is similar to mapping a strategic course, considering the goals, actions, and resources needed to support the co-creation endeavour. In the Increase project, the integration of open innovation principles into tailored co-creation activities takes central stage. Therefore, the planning process assumes paramount significance. As the project focuses on technological innovations, the planning process becomes a dynamic tool for steering active engagement with key stakeholders and end-users. Recognizing that effective stakeholder engagement is not a one-size-fits-all endeavour, the planning process serves as a compass to navigate the project through diverse local pilot landscapes, while maintaining a cohesive transversal vision for overall success. **Table 2** provides an overview of some key stages in the co-creation planning process.

Table 2. Key stages of co-creation management. Source: authors

Co-creation stage	Explanation
Initiation (set-up)	<ul style="list-style-type: none"> <li>• Define the scope and objectives of the co-creation process.</li> <li>• Form the team with necessary expertise and define the needed roles.</li> <li>• Identify key stakeholders and partners.</li> <li>• Establish the overall framework and guidelines for collaboration.</li> </ul>
Co-creation planning	<ul style="list-style-type: none"> <li>• Conduct stakeholder mapping and analysis.</li> <li>• Develop a detailed co-creation plan, including activities and timelines.</li> <li>• Define the problem or challenge or goals to be addressed.</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• Execute the co-creation plan, involving stakeholders in various activities.</li> <li>• Utilize tools such as design thinking and participatory processes.</li> <li>• Prototype and test solutions in a real-world context.</li> </ul>
Evaluation	<ul style="list-style-type: none"> <li>• Assess the impact and effectiveness of the co-created solutions.</li> <li>• Gather feedback from stakeholders.</li> <li>• Identify areas for improvement and refinement.</li> </ul>
Deployment and scaling	<ul style="list-style-type: none"> <li>• Implement successful solutions on a broader scale.</li> <li>• Explore possibilities for replication in other contexts or regions.</li> <li>• Develop strategies for sustained impact and scalability.</li> </ul>

### 3.2.1 CO-CREATION CORE TEAM AND GOVERNANCE

#### Set-up

This phase forms a local **pilot steering group** managed by the responsible pilot partner and consisting ideally composed of members including 1) technical experts on IPV and BIPV respectively and 2) communications and social innovation experts. The steering group will be responsible for coordinating the co-creation activities throughout the local pilot process. The pilot steering group will implement an open innovation model based on the proposed current proposed methodology and use structured governance processes to engage various stakeholders in co-creating the Increase solutions and discussing their further uptake. As part of initial setup, **the steering group is strongly advised to develop the co-creation roadmap** with a more specific timeline for co-creation events and activities and divide responsibilities for coordinating the activities (see also Annex 1).

#### Necessary competences

There are numerous sources defining the necessary roles co-creation processes need. This is dependent on the volume of the process, its goals, and settings. For example, co-creation requires skills in several areas: strong multidisciplinary expertise, organizational skills, people management and communication, and interaction. Good interpersonal skills foster trust among team members; data collection skills support the development of new solutions, and an analytical approach encourages constructive criticism and creativity in presenting alternative solutions. On the technical side, knowledge of standards, regulations and contracts is a valuable prerequisite for a successful process.



[53] As the co-creation processes widely involve interaction and workshops, one should think of facilitation and orchestration skills should be considered, as co-creation offers/requires a wide range of working methods that need to be mastered from both facilitation and participation perspectives (see also Annex 2).

*“The facilitators play an important role when conducting any form of workshop: they help pave the way for a good discussion and a fair atmosphere in a group as well as they provide guidance and context to the audience. A trained facilitator can ask the right questions to provide a constructive and creative working flow and will ensure that everybody has the opportunity to participate. A facilitator can also help designing the workshop and ensures a target-oriented and effective process. At least, a facilitator should be neutral and should not have an own agenda. When you need a neutral and/or trained facilitator, it is a good solution to consult an external facilitator who is less involved in the work of the project.”* (Living Innovation “Co-Creation Toolkit” by DIALOGIK, <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-72916-6>)

Having diverse and specialized core team ensures that all critical aspects of the co-creation process, from technological development to stakeholder engagement and legal considerations, are effectively addressed. However, it is also considered that not always all expected roles can be effectively fulfilled in co-creation processes due to several factors, mostly available resources, and this is also important to take into account while planning the co-creation implementation plan. Initial interviews with Increase pilots showed that there may be gaps in fulfilling “ideal” roles effectively. After an initial analysis of the pilots, we recommend each pilot team to make an effort to ensure that the following minimum roles are covered in their team (see **Table 3**). Some roles may be executed by the same people.

**Table 3. Suggested key roles for the Increase pilot steering groups. Source: [24] and authors’ elaboration**

Envisaged role	Responsibilities
Pilot coordination; main contact role	Responsible for the management of the entire local co-creation process. In charge of the planning and execution of the project, with a defined scope, start and end date. Pilot coordinator facilitates the implementation and testing of the innovation that is developed in the local pilot. They also plan, coordinate, and implement real-world experiments centred on users and coordinate the interaction between other potential roles (e.g., innovators, users, problem owners). This person could potentially cover other internal roles.
Managing stakeholder relationships	Identifies, recruits and interacts with stakeholders, users and other actors to facilitate communication and ensure the active participation of relevant stakeholders throughout the co-creation process. Responsible for stakeholder management, citizen engagement/outreach and co-creation. Preferably knows about social innovation, tools and methods.
Communication and Outreach	Developing communication strategies, disseminating project updates, for example, in social networks or through the local/project website and engaging with external stakeholders, media, and the public to raise awareness and build support for IPV initiatives. The goal is to provide

	an effective flow of information between the pilot steering group and different stakeholder groups.
Research expertise	Analysing results from different user-centred human interaction methods, planning the social innovation process, designing concepts and principles, need-finds studies, assesses the impact and effectiveness of co-creation activities. This role can be integrated with stakeholder management roles.
Technical expertise	Provides expertise in photovoltaic technology, system design, and integration to ensure the technical feasibility and performance of proposed solutions.
Ethics advice	Oversees the stakeholder engagement process from an ethical point of view, in alignment with the EU General Data Protection Regulation (GDPR) and principles and guidelines provided in the Increase Ethics Handbook (D9.3). Helps design procedures and tools (e.g. informed consent forms) for lawful and ethical processing of the personal data collected from co-creation participants. Advises pilot team members on how to engage diverse stakeholders in a non-discriminatory, empowering way.

### 3.2.2 CO-CREATION IMPLEMENTATION PLANS (PLANNING & IMPLEMENTATION)

The main objective of this report is to assist Increase pilot teams in understanding the requirements of their unique contextual environments, identifying targeted stakeholders at least through the Quadruple-Helix Model, and aligning a series of high-level activities throughout the project's duration. The methodology applied in Increase utilises a combination of methods and tools specifically tailored for the pilots and their associated project partners, encompassing quadruple-helix stakeholders such as companies, academia, governments, and end-users. This strategic approach unfolds in three key phases, outlined in the accompanying diagram below (**Figure 11**)

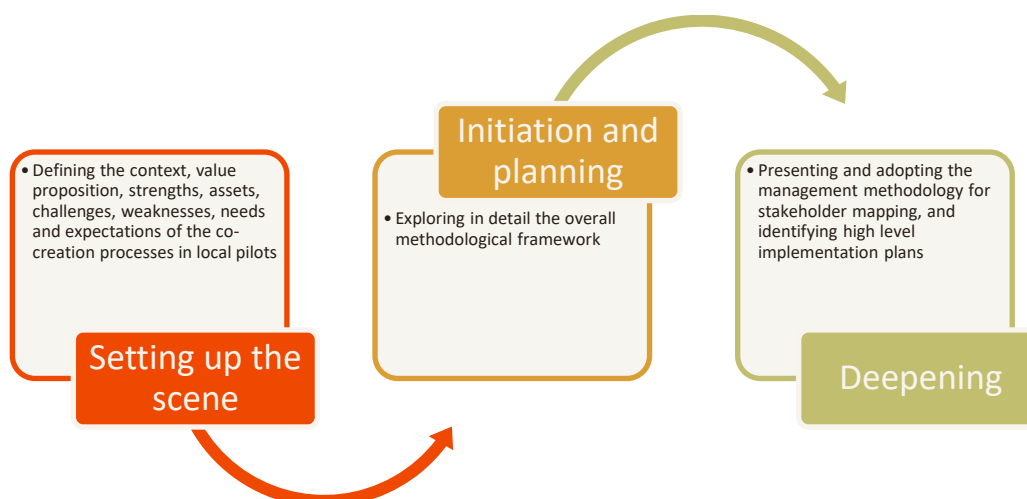


Figure 11. Main steps of defining co-creation implementation plans [23]

When setting up a co-creation process, it is essential to think about the *why*, *who*, *how* and *what* of your structure [27][9].

- **Why:** create a common vision and mission for the co-creation process, thinking about important values, goals and objectives (for example, see Chapter 2). WHY is co-creation and stakeholder engagement needed? For example, perhaps the team's aim is to reimagine a current service or product so it aligns more closely with user feedback. Or the focus might be

on delivering favourable results for stakeholders/participants, like fostering their involvement in targeted activities. Another goal could be to enhance the connections between your own staff and contributors. Ultimately, you need to know what you are trying to achieve to be able to monitor and understand if you are going in the right direction.

- **Who:** consider different roles within the internal core team/steering group. Also, think about external stakeholders to be involved in the co-creation process. WHO needs to be involved?
- **How:** covers rules, processes, methods and tools used in the co-creation process. Numerous tools have been developed to facilitate the co-creation and co-design process, many of which are listed in the next chapters. HOW will we address these challenges?
- **What:** aims to define different topics and activities of the co-creation process. For the Increase project, such topics are strongly related to the building- and infrastructure-integrated PV solutions. Relevant topics also concern uncovering barriers related to those innovations and exploring the user acceptance and market uptake through intensive collaboration and co-design as much as possible in local pilots. WHAT challenges are to be expected in this project and what needs to be done to respond to them?

Below, on **Figure 12**, these same questions with some additions (e.g., WHEN?) are converted into General Process Design for planning co-creation.

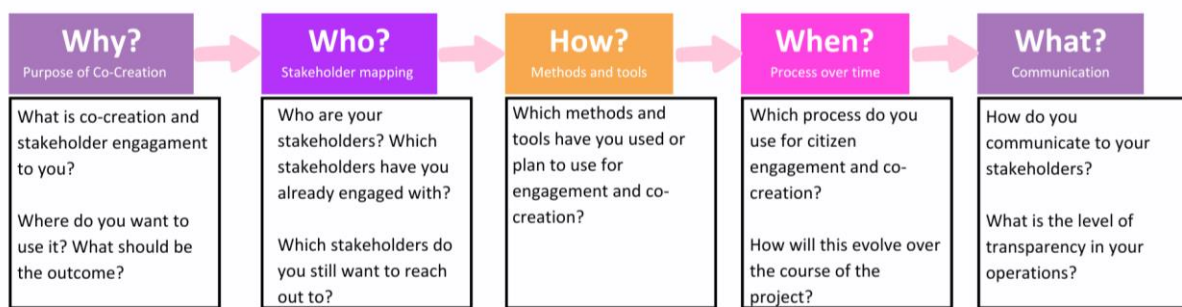


Figure 12. High level process flow. Source: [27] and authors' elaboration

Like in any strategic planning process, other aspects like timelines and milestones, available and necessary resources, risk assessment and documentation rules have to be considered. The development of the implementation plans for the pilots must be perceived as a dynamic, participatory and iterative approach throughout the whole life cycle of a project among all the relevant partners involved, which may change and improve during the lifespan of the project. Even though co-creation is sometimes a very creative and dynamic process, careful planning is paramount in guiding the co-creation journey towards success. By carefully defining objectives, identifying stakeholders, and selecting appropriate engagement strategies and co-creation methods, an implementation plan leads to meaningful collaboration and tangible outcomes. A well-designed implementation plan, supported by clear timelines, resource allocation, risk assessment, and evaluation mechanisms, ensures that the co-creation process remains focused, efficient, and adaptable to changing circumstances. Ultimately, strategic planning not only enhances the effectiveness of co-creation initiatives but also fosters trust, transparency, and shared ownership among stakeholders, laying the foundation for sustainable impact and success.



## Key points to remember

- **Understanding Objectives:** Clearly define the goals and objectives of the co-creation process, including what you aim to achieve, who will be involved, and what success looks like (see Table 4).
- **Stakeholder Identification:** Identify and analyse stakeholders who will be involved in the co-creation process, considering their interests, expertise, and potential impact on the project.
- **Engagement Strategies:** Develop strategies for engaging stakeholders effectively throughout the co-creation process, considering different communication channels, methods, and platforms.
- **Co-Creation Methods:** Select appropriate co-creation methods and tools based on the project objectives and stakeholder dynamics, such as workshops, focus groups, design sprints, or online collaboration platforms.
- **Timeline and Milestones:** Establish a timeline with clear milestones and deadlines for each phase of the co-creation process, ensuring progress can be monitored and adjustments made as needed.
- **Resource Allocation:** Allocate resources, including human, financial, and technological resources, to support the co-creation activities and implementation plan effectively.
- **Risk Assessment and Mitigation:** Identify potential risks and challenges that may arise during the co-creation process and develop strategies to mitigate them proactively.
- **Evaluation and Feedback:** Plan for ongoing evaluation and feedback mechanisms to assess the effectiveness of co-creation activities, gather stakeholder input, and make informed decisions for continuous improvement.
- **Documentation and Reporting:** Establish protocols for documenting co-creation activities, capturing insights, and reporting progress to stakeholders, partners, and funders.
- **Adaptability and Flexibility:** Recognise the iterative nature of co-creation and remain adaptable and flexible to adjust plans, strategies, and actions based on evolving stakeholder needs and project dynamics.

Table 4. Questions to be answered in the planning stage. Source: [23], [55] and authors' elaboration

### Objectives

- What do we want to achieve? (mission)
- Where? (context)
- What are the key issues to be addressed? Which problem are we trying to solve? (goals)

### Stakeholder engagement

- Who do we need? Who are the affected communities, specific categories of people/organisations?
- Why do we need them?
- What is expected from them? Which are the actions we expect them to perform?
- How many stakeholders do we need for which project/phase/activity?
- When and how often we need them?
- How and where do we recruit them?
- How actively should they be involved?
- Is there any previous experience, either positive or negative, of engaging with these stakeholders and what can be learnt from that experience?

- What is in it for them?
- How will we communicate with the stakeholders?
- How can stakeholders reach us?
- Which channels do we need to set up?
- How do we link (individual) stakeholders with our project & activities? What kind of activities are we going to perform?
- What is the likely timeframe for consultation and discussion? What is the time scale for achieving results?

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#### Resources

- Does our organisation have any experience of engaging on these issues in the past and what can be learnt from that experience?
- What level of support exists in our organisation for this engagement and on which managerial level?
- What level of resources can be allocated to this initiative? How much will this cost us?

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#### Context and barriers

- Are there any legal obligations to consider under national or international law and how may this impact on the engagement?
- What is the attitude of the local or national government to this consultation, if any?
- What are the potential obstacles? Have we identified them?

As presented above in **Table 2** (Key stages in the co-creation and co-design), also continuous monitoring, evaluation, deployment and scaling are part of the effective planning process. This is described in more detail in Chapters 4.5, 4.6 and 6 below. Pilot activities, their co-creation strategies, communication and dissemination approaches are closely integrated into Increase value chain engagement, impact creation and exploitation strategies as planned in WP7 and WP8.

Some planning tools to assist the steps needed for the proper co-creation process are presented in Chapter 4 below. Please also see Annex 1 for a template for co-creation plans that Increase pilots could use in planning their local level engagement activities.

## CHAPTER 4. METHODS AND TOOLS

This chapter presents a selection of methods and tools for engaging stakeholders in the co-creation processes conducted in the Increase project. Most of them will be relevant for the coordinators of the demonstrations but some could also be useful when leading higher-level interaction with industry and policy stakeholders to discover the needs, barriers and opportunities for broader market uptake of IPV solutions.

The structure of the chapter follows the typical flow of a co-creation process. It starts from tools that could be used for context and stakeholder mapping, followed by tips for establishing contact with stakeholders to invite them to participate in co-creation activities. The chapter then describes possible approaches and tools to assist the co-design, co-implementation and co-assessment processes in the Increase pilots (**Figure 13** summarizes the focus of each subchapter). Throughout the co-creation processes, it is important to document the activities and lessons learned, so that this information could be used in the evaluation of the project results. Indicators and tools for measurement and documentations are discussed in more detail in Chapter 6.

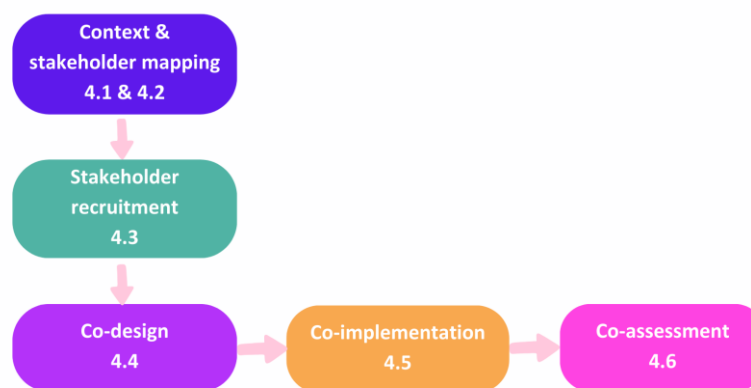


Figure 13. Methods and tools for co-creation activities in Increase. Source: authors

### 4.1 CONTEXT MAPPING IN CO-CREATION

Innovation processes are inseparable from their **context – the economic, social and cultural environment around us is a source of enablers and barriers that affect both the innovation process and its outcomes**. The broader environment also shapes the ways in which stakeholders can be involved in collaborative innovation processes. An examination of the context represents an initial phase aimed at comprehending the challenge at hand, the initial network of stakeholders, and the infrastructures needed for the co-creation. It should be treated as a map that helps to explore and make sense of everything around – not just the physical stuff, but also the social, economic, and cultural aspects that shape how innovation happens. Context mapping is shining a light on the different factors and people involved in the innovation process. It helps figure out who is interested, what they need, and what challenges might come up. This analysis helps ensure that the co-creation plan is well-suited and works for everyone involved.

The Increase project has put an emphasis on this phase by researching knowledge gaps related to integrated PV solutions in the pilot countries, and combining this with the data from consumers and stakeholders and external sources such as consumer surveys (T8.2). Transversally, a continuous high-level stakeholder mapping is planned in T8.1. Initial interviews with coordinators of Increase pilots have been conducted and the summary can be seen in Chapter 5. Pilot leaders are experts in their fields and possess necessary knowledge from their local contexts, providing a solid foundation for

understanding the context that shapes the local co-creation process. However, all pilots stand to benefit from a more detailed context analysis and stakeholder mapping to plan the co-creation strategy, actions, and suitable tools. In this phase, additional methods and tools could be employed to assist in this endeavour. One of such easy-to-grasp tools is provided by the SISCODE project Toolbox [29], namely the **Local Context Canvases** (see **Figure 14**, including description of the challenges, project/team capabilities and defining the policy environment). Each canvas can be utilised as a tool to paint a comprehensive picture of the challenge at hand, enabling a deeper understanding of the local context. Whether used individually or in tandem, these canvases are designed to prompt responses to specific questions, helping gain valuable insights into the intricacies of the particular situation. They are also flexible, so it is advised not to hesitate to find new ways to collect and gather data to provide relevant contents.

NEEDS	CHALLENGE	FACTORS	EVIDENCES
<p><b>NEEDS</b></p> <p>What is the key social need that you are addressing?</p> <p>Explain the reasons why the need is important and for who it is relevant.</p>	<p><b>CHALLENGE</b></p> <p>What is the local challenge?</p> <p>Describe the local challenge (problem) that the Lab will address, elaborate a question you would like to answer by working on this challenge.</p>	<p><b>FACTORS</b></p> <p>What social &amp; cultural factors shape / generate this challenge?</p> <p>Sociocultural factors are customs, lifestyles and values that characterize a community. Think about aesthetics, education, language, law and politics, religion, social organizations, technology and material culture, values and attitudes.</p>	<p><b>EVIDENCES</b></p> <p>What evidences do you have that this is a significant challenge?</p> <p>Describe what you know and your experience about the topic. Identify the possible effects of working on this challenge.</p>
<p>Comments:</p>			

Figure 14. Local context canvases : challenge, lab, policy. Source: [29]

**Other/additional methods can be used in the context mapping phase, for example:**

**Stakeholder Interviews:** Conducting one-on-one interviews with key stakeholders helps uncover their perspectives, needs, and expectations related to the integrated PV technology. This qualitative method provides in-depth insights.

**Surveys and Questionnaires:** Distributing surveys or questionnaires allows for a broader collection of opinions and feedback from a larger pool of stakeholders. This method is effective in gathering quantitative data to complement qualitative insights.

**Site Visits and Observations:** Immersing in the physical spaces where integrated PV technologies are implemented offers firsthand observations. This method provides insights into the real-world context, challenges, and opportunities.

**Focus Groups:** Bringing together diverse stakeholders in a group setting encourages open discussions. Focus groups facilitate the exploration of shared perspectives, differences, and potential collaborative opportunities.

**Review of Existing Literature:** A thorough review of existing research, reports, and publications related to integrated PV technology offers a historical and contextual backdrop. This method helps identify trends, challenges, and best practices.

**Mapping Workshops:** Organizing mapping workshops, such as journey mapping or stakeholder mapping exercises, engages participants in visually representing their experiences and relationships within the integrated PV context.

**SWOT Analysis:** Conducting a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis helps identify internal and external factors influencing the integrated PV context. This structured approach aids in understanding the current landscape.

**PESTLE Analysis:** originally a strategic management tool ("PESTLE" stands for Political, Economic, Social, Technological, Legal, and Environmental factors) that provides a comprehensive framework for understanding and evaluating the external macro-environmental factors that can impact a project.

**Expert Consultations:** Seeking insights from subject matter experts in the field of integrated PV technology provides a high level of expertise and guidance in understanding the technical aspects and potential challenges.

**Technology Scanning:** Exploring emerging technologies and innovations in the integrated PV sector helps anticipate future trends and potential impacts on the co-creation process.

**Community Engagement Events:** Hosting events, workshops, or forums within the community creates a platform for direct interaction. This method encourages participation and gathers localised perspectives.

**For a selection of methods, see also:**

- **SPARCS Co-creation Toolkit:** <https://co-creatingsparcs.fi/en/4-1-applicable-methods/>
- **Selected methods by I Rotterdam:** [https://issuu.com/ihsrotterdam/docs/tool\\_overview\\_matrix\\_1?utm\\_medium=referral&utm\\_source=www.ihs.nl](https://issuu.com/ihsrotterdam/docs/tool_overview_matrix_1?utm_medium=referral&utm_source=www.ihs.nl)

## 4.2 STAKEHOLDER MAPPING

**Identifying participants and issues.** Here a careful stakeholder analysis should happen where not only relevant persons and institutions are identified but also their interests, incentives, relevant decision processes and challenges understood.

Understanding relationships between stakeholders can be extremely useful in the process of engagement. Whilst there is barely time available to do so in depth, there are a range of methods, which include those to analyse social networks, map stakeholder perceptions and values, and methods to assess and analyse conflicts between stakeholders.


Adequate stakeholder mapping is one of the key steps to aid and start the practical co-creation activities. Once the problem or goal for co-creation (using insights from context analysis) is established, stakeholder mapping comes into play, assisting in the identification of key actors for various phases centred around a core group (i.e., local pilot team in Increase). It is important to identify and understand the needs, expectations, and concerns of diverse stakeholders affected by the innovation process. Inclusive collaboration with the right stakeholders helps ensure that the final product or service aligns with the broader interests and requirements of the relevant parties. This engagement can foster support, enhance the adoption of innovations, and contribute to the overall success of the co-creation project. Especially in many high-tech projects, user engagement still tends to be overlooked; however, initiating user involvement right from the outset becomes paramount also in such projects. The need for co-creation approach is underscored by the advancement – and increased complexity – of technological solutions [30] which represents a huge design challenge for developing innovative solutions that are optimal, accessible and helpful for their intended user/customer and for ensuring the social acceptance and marketability of the proposed solutions.

The Increase project is dealing with a wide range of target groups and stakeholders on the EU level as well as local level. **Table 5** presents the key target groups as indicated in the Increase Description of Action (DoA). Currently, a [stakeholder mapping database](#) is being created with a focus on mapping out a clear landscape of stakeholders in the IPV sector and the linked construction sector at the European and pilot country national levels. This database will serve as a basis to support the outreach and engagement activities in Increase. Depending on the pilot activities, stakeholder groups are varied (see also Chapter 5) and Increase partners need to understand these groups and their relevance for the project. To engage with a group of people, time is needed to learn about their concerns and interests. This highlights the importance of stakeholder mapping and identification, and several tools can assist in this process (see below).

**Table 5. Increase target groups. Source: Increase DoA**

Nr	Target Group	EU	L	Nr	Target Group	EU	L
1	Citizen	X	X	7	Facility managers, engineers	X	X
2	Local and regional authorities	X	X	8	PV and construction industry (manufacturers)	X	
3	Architects, building designers, and students in these fields	X	X	9	One-stop shops for renovation	X	X
4	Project developers, urban planners, social housing companies	X	X	10	Investors, banks, ESCOs, operators of highways or railways.	X	X
5	Infrastructure developers	X	X	11	Policy makers	X	X
6	Installers, construction companies, contractors	X	X	12	R&D industry, knowledge centres, academics	X	





“Involving all the necessary expertise and all the relevant stakeholders is essential for the success of co-creation processes. This requires, for example, inviting experts from both the supplier and consumer sides, or people influencing and affected by a decision. For this reason, the quality of the selected participants and the capacity of the organisers to facilitate their participation in the process are critical. Before selecting participants, a topic-specific mapping exercise helps to get an overview of what range of expertise is needed, the stakeholder landscape and what might be a constructive diversity.”


(“Co-creation for Policy.”, EC, 2022, p.23)

Often, the stakeholder mapping and selection phase receives too little attention in co-creation processes [31], [32], [33]. Stakeholder constellations often arise from seizing windows of opportunities [31] and relying on apparent stakeholder selection [34], which tends to considerably extend the initiation phase and cause delays in the implementation processes [35].

Another misunderstanding that often appears in stakeholder engagement planning is trying to include as wide a group of stakeholders as possible. However, observations of cases have shown that the “the more, the better” principle does not increase success in participative planning [36]. A prior study on stakeholder constellation analysis indicates that the mean number of participants [31] serves merely as an orientation for recruiting stakeholders in a co-creation process. While acknowledging the importance of quantity, the emphasis pivots toward involving the “right” stakeholders as well as not forgetting some important stakeholder groups. This underscores the criticality of precision and strategic selection in stakeholder involvement, acknowledging that the success of co-creation projects hinges not just on numbers but on the **meaningful engagement of stakeholders** best positioned to contribute to the project objectives.

### Example

Imagine a local pilot project focused on the co-creation of integrated photovoltaic (PV) solutions within a residential community. In this scenario, the project team mistakenly primarily focuses on a stakeholder group composed of commercial real estate developers, assuming their involvement would be beneficial due to their experience in construction and property management. However, as the co-creation process unfolds, it becomes evident that the needs and perspectives of the residential community, consisting of homeowners and tenants, significantly differ from those of the commercial real estate developers. The developers may prioritise profitability and large-scale projects, while the residents are more concerned with the practicality, affordability, and aesthetics of integrated PV solutions for individual homes. This misalignment can lead to a disconnect between the intended benefits of the IPV solutions and the actual preferences and requirements of the end-users. The inclusion of the “wrong” stakeholder group (or only one group while overlooking the other(s)) might result in solutions that are not tailored to the residential community's needs, potentially causing dissatisfaction, hindering adoption, and undermining the overall success of the co-creation initiative. This example underscores the importance of precisely identifying and engaging the right stakeholders to ensure the relevance and success of the co-creation process.



The selection of stakeholders strongly influences the outcomes of any engagement process. When crafting a stakeholder mapping for targeted participants, the primary consideration lies in grasping the incentives for their involvement, power and the definition of their roles across various activities within a co-creation process. It thus needs **an effective representation of stakeholders including those who are highly interested even with low power as well as strategic stakeholders with high influence, power and means.**

Thus, in each local Increase pilot, it is crucial not only to identify specific organisations and individuals, but also to analyse them. Literature emphasises that characterising stakeholders is valuable for comprehending power dynamics and their specific interests in the project, helping to sidestep potential pitfalls and failures in the co-creation process [37]. In the Increase project, the stakeholder mapping therefore aims to do more than just identifying the individuals and groups who are likely to make use of the innovations and are able to contribute to the co-creation of the solutions. It also gives the necessary insights on needs and constraints of the main stakeholder groups like citizens, policymakers, economic actors, research, universities and education, other networks and projects, etc. Finally, it gives insights on the kind of issues to be expected when engaging in greater depth within the consultations and co-creation processes.

In the realm of co-creation projects, the significance of stakeholder mapping cannot be overstated and it is worth to dedicate some time to this step as it may define a lot of how the overall innovation project and co-creation activities will evolve. Systematic methods to identify the relevant stakeholders are crucial to enable higher planning efficiency and reduce bottlenecks and time needed for planning, deciding, and implementing innovative solutions in the society.

Another aspect to remember is that **engaging both new actors and keeping your original stakeholders interested and engaged are equally important.** Stakeholder engagement is not one step along the co-creation path, even though it is the most crucial in the initial starting phases. Thus, a linear map is not ideal for understanding co-creation (see also **Figure 5** above). Activities to support the engagement need to occur throughout the whole process, while different strategies are needed for different types of stakeholders [14]. Several tools can assist in doing that effectively.

#### Key points to remember

- Stakeholder mapping and analysis is crucial for the successful co-creation process.
- Often, stakeholder mapping and selection phase still receives too little attention.
- Stakeholder mapping and characterisation requires some time but is worth this investment.
- “The more, the better” principle does not usually hold true in successful co-creation processes. It is more important to involve the right stakeholders and pursue for meaningful participation.
- Timeline and Milestones: Establish a timeline with clear milestones and deadlines for each phase of the co-creation process, ensuring progress can be monitored and adjustments made as needed.
- Co-creation is not a linear path and strategy, and also stakeholder mapping and opening ways to add new stakeholders are important throughout the process.

#### 4.2.1 METHODOLOGIES/TOOLS SUGGESTED FOR STAKEHOLDER MAPPING

This section presents some known stakeholder identification and analysis techniques and tools that could be considered while planning co-creation in Increase pilots. These tools, though straightforward, can be highly effective. They only require a modest investment of time and effort, a resource

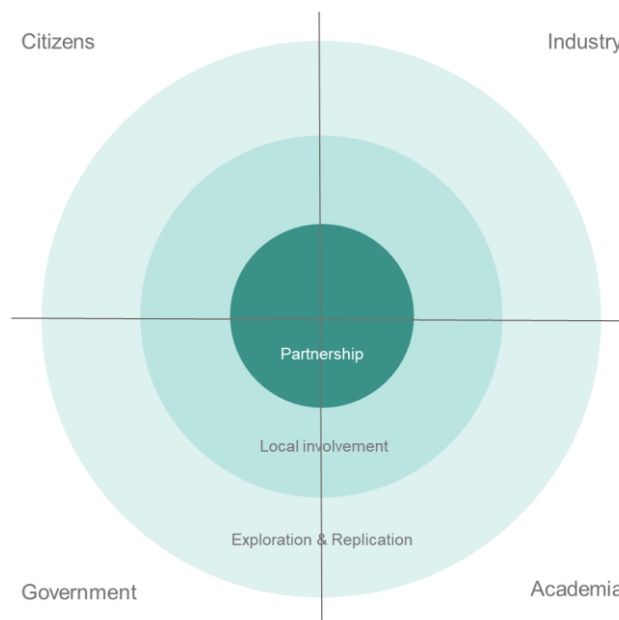


expenditure that is generally minimal when contrasted with the potential drawbacks of suboptimal planning.

**Tip:** The following tools are provided as a source of inspiration. Each Increase pilot team can adapt the tools, integrate their elements and create their own tools, if deemed necessary and provided it is useful for the effective planning.

### Quadruple Helix Model

The Quadruple Helix Model (see **Figure 15**) is used to identify stakeholders from citizens, public, private and research and their relationship in the project/co-creation process. It maps a collaborative approach involving government, industry, academia, and the public. This framework encourages the active participation of these four key stakeholders in the innovation process. By leveraging the unique strengths and perspectives of each helix, the model aims to drive effective co-creation, fostering innovation and addressing multifaceted challenges.



**Figure 15. Quadruple Helix Model. Source: [24]**

Note: Keeping with the dynamic nature of innovation ecosystems, it is increasingly valuable to acknowledge the emergence of a quintuple helix model as well. The quintuple helix extends the collaborative framework of the quadruple helix by introducing a fifth dimension - the inclusion of the environmental sector. In addition to government, industry, academia, and the public (also media), the quintuple helix model recognizes the vital role of environmental stakeholders in co-creation efforts. This broader approach emphasises the integration of sustainability and environmental considerations into innovation processes, ensuring a comprehensive and responsible approach to collaborative endeavours. [39]

### Stakeholder map

The stakeholders map (see **Figure 16**) serves as a valuable resource for gaining insight into existing and potential partners within the ecosystem, providing clarity on their roles and contributions. It enables to identify the target audience for the solution, delineating the roles which each stakeholder could undertake in the co-creation strategy. Moreover, it facilitates the envisioning of the collaborative efforts required to engage with them directly and outlines the channels through which this engagement will be conducted.

While using the map, “start by jotting down who is involved in co-managing the solution: internal personnel, proactive stakeholders and beneficiaries. Then move outwards and list your strategic stakeholders and technical providers who might codesign and co-produce the solution with you. Conclude by noting down the stakeholders who are impacted by the solution and dividing them into groups: those with whom you may have consulted for advice and insight when designing the solution and those who are merely informed of the solution.” [29, pp 42]

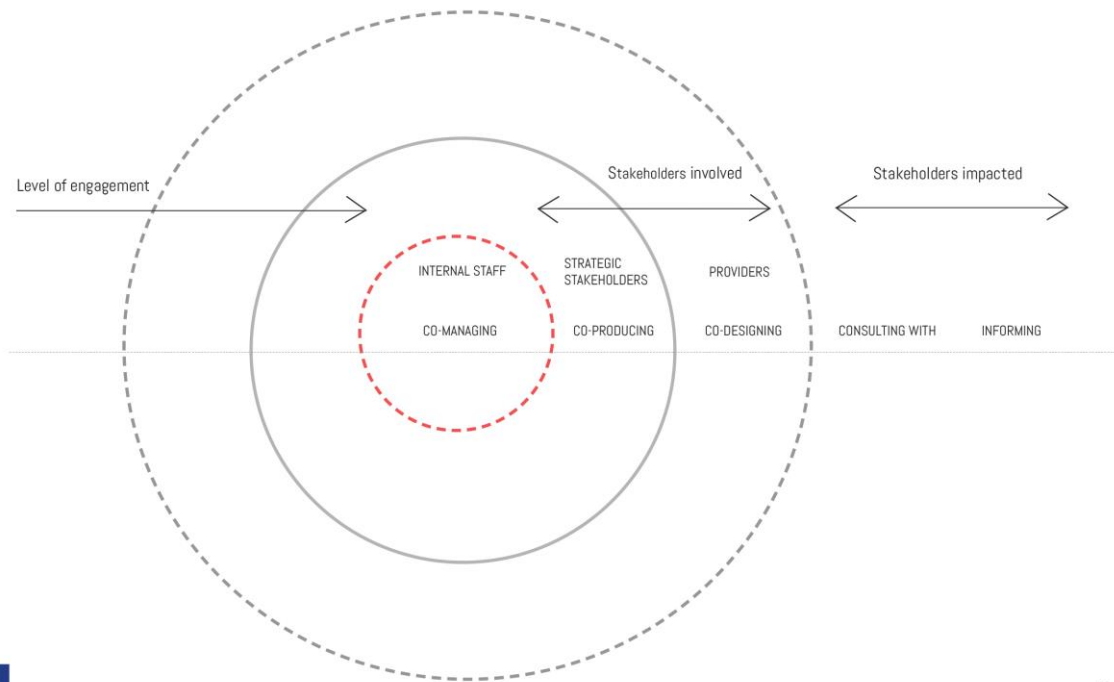


Figure 16. Stakeholder map. Source: [29]

### The core team, the close community and the broader community

In parallel with the Quadruple Helix mapping, another exercise included in the “Co-creation for Policy Toolkit.”[40] can prove effective for understanding the core team requirements and necessary stakeholder groups. According to this, the co-creation process, driven by specific needs and objectives, reveals three interconnected layers of stakeholders:

- The Core Team
- The Close Community
- The Broader Community

Each layer introduces new participants and stakeholders (see **Figure 17**). The core team plays a pivotal role in coordinating various overarching aspects of the co-creation process. This involves setting goals, determining the specific societal challenge or subject to be addressed, and identifying the transversal theme to be tackled across individual challenges. Additionally, the core team is responsible for devising effective stakeholder engagement strategies aimed at enhancing involvement and interaction over time, generating results, fulfilling objectives, facilitating knowledge transfer, circulation, and communication, as well as fostering engagement with partners and sponsors (see also **Table 3** above).

A community, in this context, is defined as a group of individuals with a shared interest interacting in a common environment, functioning as a common denominator to establish a specific innovation ecosystem. While the core team executes the co-creation practice, stakeholders within the local and broader community are crucially involved and targeted through specialized and tailor-made conclusive messages.

When engaging the local community, adherence to guiding principles such as clarity of scope and purpose, a focus on outcomes, transparency, and ensuring inclusiveness and representativeness becomes paramount for ensuring the quality of outcomes.

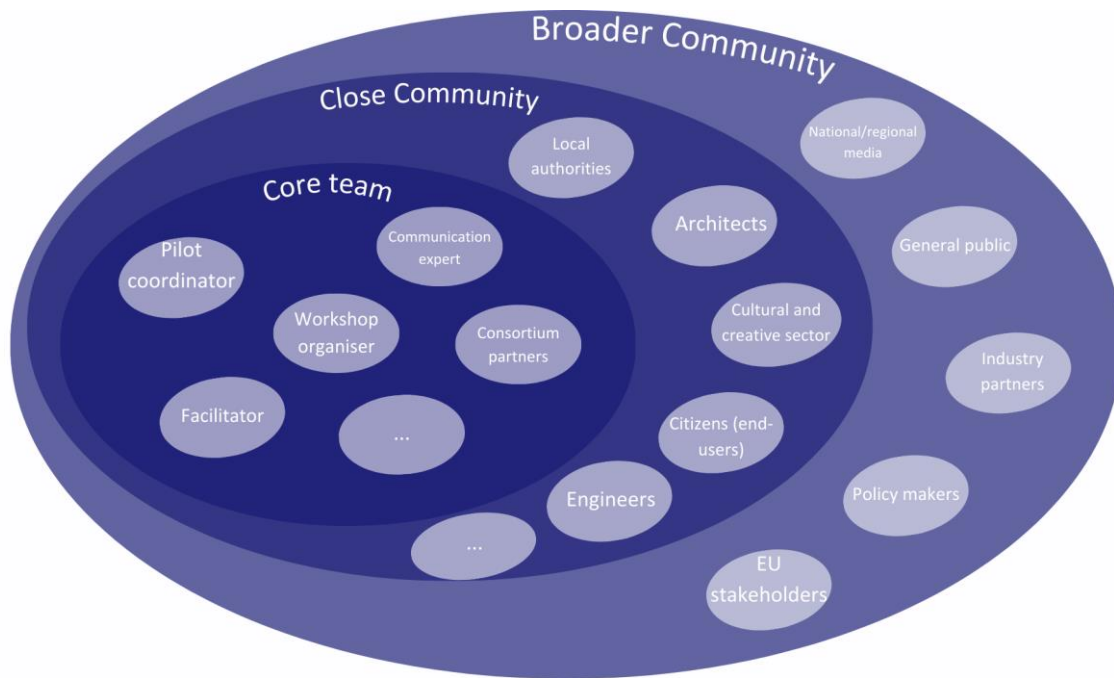


Figure 17. The ecosystem of co-creation actors. Source: [40] and authors' elaboration

### Interest/influence matrix

The Interest/Influence Matrix is one of the widespread and easy-to-use tools that should be completed for each co-creation process as it helps identify changes in power and understand who are the new and potential players. It is a very effective tool to tailor the co-creation and engagement strategies towards specific stakeholders.

After identifying the main target and stakeholder groups for the co-creation process for the topic at hand, stakeholders are analysed in order to prioritise them in terms of necessity for engagement. The most commonly used approach is to categorise stakeholders in relation to **their relative level of interest and influence**. Stakeholders are plotted on a grid with one axis representing their level of interest and the other their level of influence (see **Figure 18**). This matrix helps identify key stakeholders who hold significant influence or interest, allowing co-creation practitioners to prioritise engagement efforts. Stakeholders in the high-interest, high-influence quadrant, for instance, warrant closer collaboration, while those in the low-interest, low-influence quadrant may require less intensive engagement. By utilising this matrix, the co-creation team can tailor their strategies, ensuring targeted and meaningful interactions with stakeholders throughout the co-creation journey. **For example, in Increase pilots, stakeholders who are mapped as high-interest, high-influence could be potential participants in the co-creation workshops** (see also [41]).

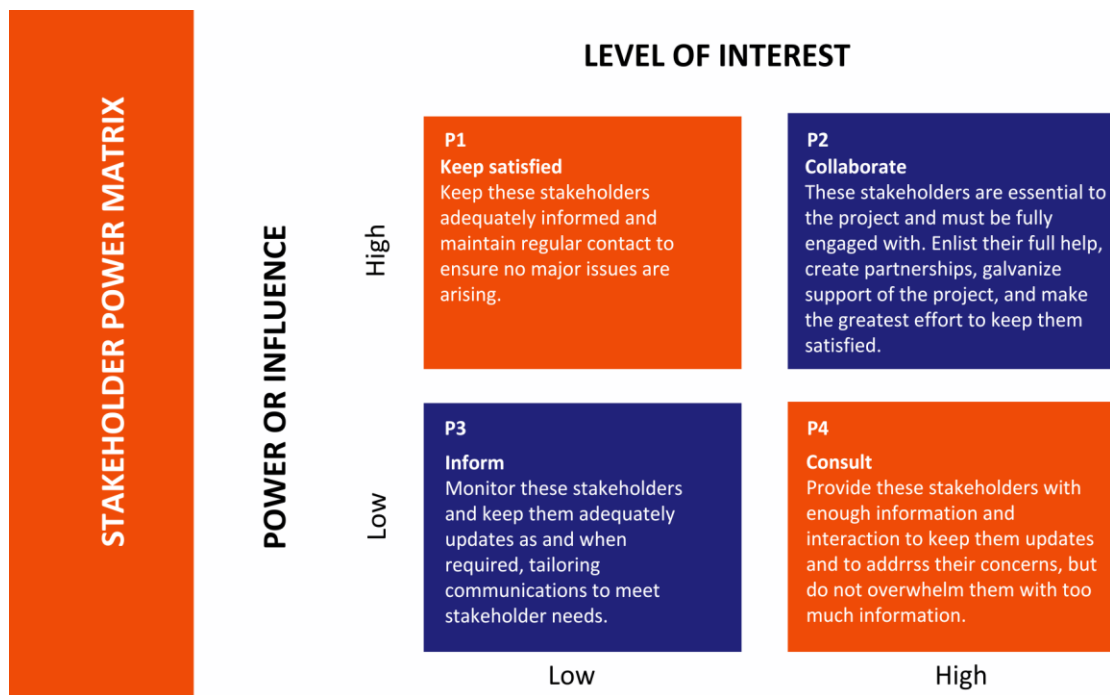


Figure 18. Stakeholder Mapping to their likely contribution and interest in the project. Source: Adapted from [41], [42] and authors' elaboration

### Three levels of involvement

- **High-involvement stakeholders** are people with significant interest in your project who could be critically affected by its success or failure. **In Increase**, such stakeholders could be, for example, end users of pilot objects (residents of a private house, school students and staff, tenants of office building), architects and designers, IPV installers, insurance companies.
- **Medium-involvement stakeholders** are moderately interested in your project but not as much as high-involvement stakeholders. **In Increase**, this group could comprise people living near or visiting the pilot area (e.g., visitors of the city park or national park, users of a public garage, inhabitants of building, also those neighbouring pilot objects)
- **Low-involvement** stakeholders have a minimal interest in your project or and will not be hugely impacted by the outcome but should be informed of the progress. **In Increase**, this group could comprise, for example, national authorities and the general public.

### Stakeholder journey

The stakeholder journey methodology [43] is a powerful tool for revealing in a single visual and storytelling approach both the macro and subcategories of stakeholders to be involved in the co-creation activities, as well as their potential needs and a set of actions to be implemented with and for them at a very high level. The stakeholder journey methodology offers a visual interpretation of

the main targeted stakeholders to be involved in the process and the relationship with the project/organisation.

The journey represents a stakeholder’s expectations and needs, but also reflects the common points of interaction with the project. In the SISCODE version [29], it was usually adopted to create a better stakeholder experience throughout the whole relationship process, thus including touchpoints exploring the intersection between stakeholders and the effective co-creation process [23] (see **Figure 19**). In the stakeholder mapping process this comprehensive tool can be effectively adapted, for example to focus on the identification of the stakeholders and the two main building blocks of the tool (e.g., needs and stakeholder storyboard or series of actions).

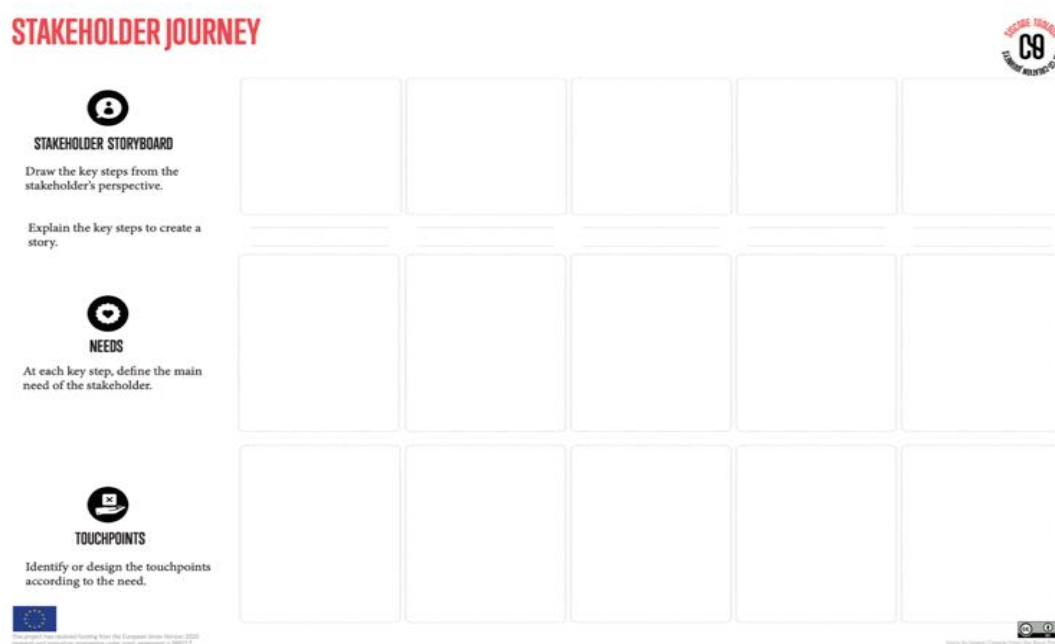


Figure 19. SISCODE Stakeholder Journey Tool. Source: [29]

### Different possibilities to organise the mapped stakeholders

Considering both the initial mapping and analysis of stakeholders, **a simple Excel-based organisation of stakeholders could be developed.** This is probably one of the most basic and essential approaches in each Increase pilot already capturing the elements of the previously introduced tools. While developing such table and database and selection of stakeholders, consider aspects like geographical location of stakeholders, their role, their capacities and availability of resources needed for the engagement, who do you know already, etc.

The importance of stakeholders may vary in different stages of the process and mapping usually is an ongoing process. If useful and necessary, the actors on the list can be grouped in various ways, e.g. spatially (local, regional, international), by their contribution in terms of engagement (e.g., who needs to only be informed, who needs to be consulted with, etc. – see also **Figure 2**), their access to key resources (e.g., logistical, human, institutional or informational), or their certain behaviour. [41] One simple and rather straightforward way to organise the stakeholder list is provided below in **Table 6**. Some tips for the stakeholder mapping process can be found in **Table 7**.



Table 6. Stakeholder list template, own elaboration, based on [41], [23]

Stakeholder	Category (e.g., Public; Academia; NGO; citizen...)	Reasons to involve the stakeholder	Needs and expectations	State (supportive, neutral, critical)	Impact/influence (relevant, neutral, moderate)	Interest (big, neutral, moderate)	Contacted (yes/no)

Table 7. Tips for assisting the stakeholder mapping process. Source: [41], authors' elaboration

<p><b>Useful methods for identifying stakeholders</b></p>	<ul style="list-style-type: none"> <li>• Consulting colleagues to share knowledge about who may have an interest in the project</li> <li>• Developing a mind map (see above) that can be used to identify suitable stakeholders; assessing secondary data (e.g. historical records, media articles)</li> <li>• Initiating self-selection by promoting the engagement process and encouraging individuals with an interest to join</li> <li>• Brainstorming with other organisations that have been involved in similar activities or those working in similar locations</li> <li>• Using snowball sampling techniques, where one stakeholder identifies further stakeholders until no additional new stakeholders are identified</li> <li>• Using existing members lists of organisations in order to identify specific groups, networks and agencies who represent relevant elements of society</li> <li>• Consulting with forums used by government and other organisation (e.g. local authorities, town councils, emergency services etc.)</li> <li>• Using government statistics and data (e.g. census information)</li> </ul>
<p><b>Important points to consider when identifying stakeholders</b></p>	<ul style="list-style-type: none"> <li>• Are stakeholders aware of the concepts under focus?</li> <li>• Who is responsible for making decisions that might affect the project topic?</li> <li>• Are there policies emerging or in existence that will benefit from or be affected by the project innovations? If so, who needs to be informed?</li> <li>• Which individuals are likely to be affected by the outcomes of the project development? Who, although not directly affected, may be interested in the results of the project?</li> <li>• Are there stakeholders that have been involved in similar projects on previous occasions?</li> <li>• Which groups or individuals may be able to provide relevant information, equipment or resources?</li> <li>• Who is likely to have a negative view of the topic and results you aim at?</li> <li>• Which stakeholders are essential to involve? Who is preferably to involve? Who needs to be consulted? Who needs to be informed?</li> </ul>



	<ul style="list-style-type: none"><li>• Which parties are likely to be the most influential?</li><li>• What are the relationships between the stakeholder groups and individuals?</li><li>• What are their perceived benefits of this project?</li><li>• Who are the key opinion leaders?</li><li>• What are their motivations for contributing to or supporting your project?</li><li>• Are there any barriers to this group participating?</li><li>• Criteria to be considered when starting a stakeholder mapping process (see Annex 3)</li></ul>
<b>Understand your stakeholders</b>	<p>After identifying and prioritising the stakeholders who may be valuable contributors to the co-creation process, it is beneficial to analyse the prioritised stakeholders to get a better understanding of their needs, constraints, what they may contribute to the project and how to communicate with whom. The following questions and key points can help to analyse the stakeholders:</p> <ul style="list-style-type: none"><li>• Is there an existing relationship between the project and the stakeholders? Do relationships already exist between stakeholders?</li><li>• What knowledge do the different stakeholders have that may be relevant to the project?</li><li>• What views are the stakeholders likely to hold about the project and its outcomes, will these views be positive or negative? Is there the potential for any conflict arising amongst stakeholders or between stakeholders and the project?</li><li>• What are the appropriate means of communication and will this need to be adapted in order to reach certain groups or individuals?</li><li>• Is there a willingness to engage; if not, why not, and how could this be overcome? Are there any barriers to participation and/or engagement (e.g. technical, physical, linguistic, geographical, political, time, information or knowledge)?</li></ul>

#### Useful materials on stakeholder mapping and organisation:

- “What To Do When Stakeholders Matter: A Guide to Stakeholder Identification and Analysis Techniques“ (J M. Bryson 2004):  
[https://www.researchgate.net/publication/228940014\\_What\\_to\\_do\\_when\\_stakeholders\\_matter\\_A\\_guide\\_to\\_stakeholder\\_identification\\_and\\_analysis\\_techniques](https://www.researchgate.net/publication/228940014_What_to_do_when_stakeholders_matter_A_guide_to_stakeholder_identification_and_analysis_techniques)
- A toolkit for co-creation in public services (COSIE 2020):  
<https://cosie.turkuamk.fi/arkisto/uploads/2021/05/03f68026-toolkit-public.pdf>
- Stakeholder mapping workshop (User Innovation Toolkit):  
<https://userinnovationtoolkit.ugent.be/#/methods/stakeholdermapping>
- Tools overview matrix for different phases in co-creation (IHS):  
<https://www.ihs.nl/en/advisory-training-and-research/tools-and-toolkits/co-create-your-city-toolkit/tools-overview-matrix>



## 4.2.2 CO-CREATION PLANNING TOOLS

In a sense, all of the techniques introduced under stakeholder identification and mapping are relevant to planning for stakeholder participation. The **participation planning matrix (Figure 20)**, however, is specifically designed for this purpose. This matrix outlines distinct levels of participation, ranging from basic information dissemination to full empowerment, where stakeholders hold decision-making authority (see also **Figure 2** in Chapter 2). Each level carries specific goals and implicit promises – from keeping stakeholders informed to implementing their decisions. By prompting planners to consider tailored approaches for various stakeholders throughout the co-creation initiative, the matrix ensures the benefits of sincere stakeholder engagement are realised while mitigating the risks of inappropriate responses or engagements.

It is envisaged that basic analysis techniques for stakeholder identification will be used at first, e.g., power versus interest grid, stakeholder influence, or ethical analysis (include other analyses as needed). Then fill out the matrix with stakeholders’ names in the appropriate boxes and then develop action plans for how to follow through with each stakeholder.

	<b>Inform</b>	<b>Consult</b>	<b>Involve</b>	<b>Collaborate</b>	<b>Empower</b>
<b>Initial Agreement</b>					
<b>Problem Formulation or Issue Creation (including Problem Formulation and Search for Solutions)</b>					
<b>Policy or Plan Development, Review and Adoption</b>					
<b>Implementation</b>					
<b>Monitoring and Evaluation</b>					

Figure 20. Participation planning matrix. Source: [33][13]

**The Stakeholder Engagement and Dissemination Plan (Figure 21)** serves as a strategic guide for defining how to effectively engage and communicate with stakeholders. Utilizing this template ensures a clear plan for each phase, detailing the stakeholders to be involved and the communication strategies to employ. The plan requires specifying communication objectives, key messages tailored for each stakeholder, proposed actions, and the channels through which communication will occur (e.g., web, Facebook, Twitter, Instagram, etc.). Anticipating potential barriers enables proactive measures and alternative communication approaches. This plan plays a vital role in Increase pilots and is important also in the light of Increase WP8 T8.2.



one or two days before the focus group/workshop as a reminder of the importance of their participation.

### Keeping stakeholders involved over time

In co-creative initiatives, it is important to build strong collaboration and a strong community to ensure the solution is accepted by participants and will not meet significant resistance. The following recommendations may assist effective community building (see also **Figure 22** below)[27]:

- Make **community-building** a focus of your activities – make sure the co-creation group involves strong supporters but also integrates those who resist or oppose the solution.
- Focus on a **common learning process** – make sure all participants have the chance to learn from each other.
- Ensure **systematic and transparent communication** – publish the agenda and results of stakeholder meetings, create a space for ‘Frequently Asked Questions’ (e.g., on the pilot website) to demonstrate what issues have been discussed and answered.
- **Keep open opportunities** for new interested parties to join in the co-creation process. If needed, prepare newcomers for effective participation by providing background information and training before co-creation sessions.
- Manage the system in an **integrated way**, make sure all stakeholders have the level and type of information that they need to contribute in meaningful ways.




Figure 22. Principles of long-term stakeholder engagement strategies. Source: [27], slightly adapted by authors

## 4.4 CO-DESIGN

Co-design is driven by the idea that involving stakeholders in designing solutions helps develop solutions that are more effective and better correspond to stakeholders’ needs. It is especially important to involve end users to ensure their motivation and capability to use the solution. In the Increase project, the IPV solutions to be tested in pilots have been predefined at the proposal stage. However, there is some space for co-design in most pilots. In some of them, the final appearance of the objects powered by solar energy (e.g. greenhouse in Tartu, urban furniture in Avila, noise barrier in Bizkaia) can be co-designed with users and stakeholders. In others, the end solution (e.g. roof of an existing building) is fixed but the aesthetical appearance or technical details of the IPV modules can be co-designed to some degree within the limitations defined by technological possibilities.

The aim of co-design is to **design with, not for, the people**, using creative participatory methods. [44] In genuine co-design processes, participants not only make suggestions but also make decisions (See **Figure 2**). The selection of stakeholders to be involved in co-design should be based on the stakeholder



mapping conducted in the planning phase (see Chapter 4.2 for tools and tips for stakeholder mapping). For the co-design phase, the selected stakeholders could be further divided into two groups [20]:

- **Primary stakeholders** – the people who are the most directly affected by the outcome of the design process, in particular end users of the solution (e.g., inhabitants of a building with an IPV roof) but also those who need to directly implement the solution (e.g. roofers installing IPV roof tiles). Primary stakeholders should be closely involved in the co-design process.
- **Secondary stakeholders** – those with an indirect interest in the result of the process (e.g., architects, construction companies, PV producers, energy service providers, policymakers). Secondary stakeholders could be involved in the co-design process only occasionally.

In some contexts, a distinct group of **opposition stakeholders** may exist – the people and organizations who oppose the solution and/or have the capacity to influence the outcomes in a negative way [20]. It may be useful to involve these people in the co-design process to start an open dialogue, understand their perspectives and enable them to learn about the benefits of the solution.

The following guidelines may help prevent and manage conflict between stakeholders with opposing views [15]:

- Do not exclude critics, make sure they are heard;
- Critics that tend to become very vocal should not be allowed to dominate meetings. If co-design processes engage opposition stakeholders, skilled facilitation of the discussions is important to carefully balance the influence of critical stakeholders. One way to manage discussion is to divide larger groups into smaller working groups and have facilitators summarize the results from the groups' work.
- In case of persisting conflict that affects the success of co-design activities, a brief mediation session between conflict parties may help.


Compared to other types of co-creation processes (e.g., co-ideation), which may be quite open-ended, the co-design process usually has rather clear goals, boundaries and timeframe as the process should result in a concrete decision on what a solution would look like. The co-design process commonly consists of several key phases [45]:

- **Discovery:** gaining a deeper understanding of the issue and stakeholders' needs
- **Brainstorming:** creative idea generation
- **Refinement:** feedback to different design options and selecting the design to be implemented

**The main aim of co-design activities in Increase is to collect and synthesize stakeholders' ideas, opinions and preferences regarding the physical appearance (and in some cases the functionalities) of the pilot solutions, and jointly specify the final design.**

The following types of events could be used in the co-design phase:

- **Co-design workshops** – highly recommended for Increase pilots.
- **Discussions and roundtables with experts** – suitable for engaging particular groups of stakeholders (e.g., architects, urban planners, construction sector, energy sector, regulators, etc.) to collect information on their know-how, needs, and expectations to IPV solutions.
- **Online surveys** – these do not provide the qualitative depth desired for genuine co-creation but can be used to collect basic information on different stakeholders' expectations and needs regarding IPV, or to ask stakeholders to rate pre-selected design options. In the Increase project, surveys are one of the main methods to use in the value chain engagement activities (Work Package 7) and communication and dissemination activities (Work Package 8). Surveys are also useful when collecting stakeholders' feedback on the co-design process and satisfaction with their engagement as part of Work Package 5.

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- **Design competitions** – since most Increase pilots need to make design choices for the IPV modules to be used in their pilots, a local design competition could be used to rate and select the designs that best meet stakeholders’ expectations.

**The choice of appropriate co-design methods should be driven by the following considerations:**

- **Objectives** – if the aim is to collect qualitative information and foster discussion, workshops should be preferred over surveys; if the aim is to make a final selection out of a shortlist rather than discuss different viewpoints, competitions and surveys may work better.
- **Desired depth of engagement** – for deeper engagement where participants should make joint decisions, workshops and face-to-face events work better than online events.
- **Number of participants** – if the aim is to reach a lot of people, online surveys work better than physical workshops.

## CO-DESIGN WORKSHOPS

Workshops are a widely used method in co-design and can serve different purposes, from collecting information about stakeholders’ needs and preferences to creating shared visions and making collective design decisions. Co-design workshops are face-to-face, online or hybrid events where invited stakeholders meet to discuss and collectively develop design ideas for a solution such as an IPV module or a pilot object (e.g. a building, a public infrastructure object, a piece of urban furniture, depending on the pilot).

The optimal number of workshop participants is usually no more than views [53]. It is important to decide whether the goals of the workshop would best be met by bringing a diverse group of stakeholders together (e.g., users, IPV producers, construction companies, local authorities, etc.) or by working in smaller and more homogeneous groups (e.g. only users). Work in smaller groups may be useful if the aim is to gain an in-depth understanding of the particular group’s preferences and needs (and may thus be more suitable in the early phases of co-design). At the same time, conducting co-design workshops with a diverse group of participants may be useful in the stage of defining the final design, to make sure the selected design meets the needs and preferences of a broad set of stakeholders and avoid future resistance to using the solution because of design faults (e.g., poor usability, unappealing form, etc.).

The duration of the workshops depends on the objectives and ambition of the workshop. A 2-3-hour workshop is usually sufficient to complete about two tasks. [53] Usually, co-design workshops do not last for more than 3-4 hours (including breaks) to maintain participants’ full attention and keep them actively involved. Instead of one full-day co-design workshop, it may thus be more effective to conduct two half-day workshops.

The number of co-design workshops in Increase pilots may vary. In pilots where the pilot object has already been built before the start of the pilot (e.g. the residential buildings in La Toussuire and St Sulpice), the scope for co-design may be limited and it may be sufficient to conduct one or two workshops to discuss stakeholders’ needs and design preferences regarding the IPV elements to be integrated. In pilots where the final solution is more open-ended and will only be constructed as part of Increase (e.g. the PV greenhouse in Tartu or the PV park furniture in Avila) more workshops may be needed to divide the co-design process into smaller bits. The recommended elements of a co-design workshop are described in **Table 8**. A checklist with key questions to assist in workshop planning can be found in Annex 4 of this document.



Table 8. Recommended elements of co-creation workshops. Source: authors

Introduction	Explain the ground rules and structure of the workshop. Also explain how the participants' ideas and data will be used in the project and ask participants to read and sign informed consent forms to ensure they explicitly agree to the data processing (see D9.3 Ethics Handbook for more information on informed consent procedures). Please note that most Increase co-design workshops will likely involve the collection of some personal data, such as name, organizational affiliation, or contact details of participants – hence, you will likely need informed consent forms.
Presentation of the topic and giving background information for discussion	Give adequate background information for participants to be aware of the core concepts and be able to give a meaningful contribution to the discussion. Background information is especially important in the first co-design sessions where participants need to be familiarized with the objectives of the Increase project, the local pilot, and the concept of IPV. It is very important to try to explain difficult technical concepts in simple language as most participants will likely not be experts in IPV. See some <b>tools for explaining innovation</b> further below.
Warm-up for discussion	This may involve a few icebreakers to energize participants and start a conversation between them in a fun, informal way. Some ideas for icebreakers: <a href="https://www.sessionlab.com/blog/icebreaker-games/">https://www.sessionlab.com/blog/icebreaker-games/</a>
Group discussion	Discussion among participants should be the main focus of the co-design session. Group discussions may be used both to generate ideas on the desired design of IPV solutions and to select the best design options. Depending on the number of participants, this may involve forming smaller subgroups for part of the workshop to first ideate in smaller groups and then bring the ideas back to the whole group.
Presentation of the results of group discussion	After the main part, the facilitator(s) should summarize the main findings from the group discussion. If participants are divided into smaller groups for breakout sessions, each breakout group can select a participant to report their discussion results to the bigger group. Alternatively, the facilitator(s) could gather input from all groups and present the findings themselves. Having each group summarize their own work can make participants feel more engaged but will usually take much more time than the facilitator's presentation.
Wrap-up and next steps	A workshop should end with a quick reminder of the aim of the workshop, overview of what was achieved as a result, and how the input from participants will be used in the next steps of the pilot/project. If any follow-up workshops are planned, organisers should give an overview of the approximate timeline and explain who is expected to participate. Also let participants know how they can stay informed about the project (share link to project website and social media accounts, explain how they can sign up for newsletters, and who they can contact for more information).

When planning workshops, please note:

- The PV innovations that are the focus of the Increase project have a technical and complex nature. In order to receive meaningful input from non-expert participants, it may be necessary to **involve technical experts** and representatives of PV producers in (some of) the workshops to help participants understand how IPV systems work and what design features can or cannot be changed in the individual PV modules used in the local pilot.

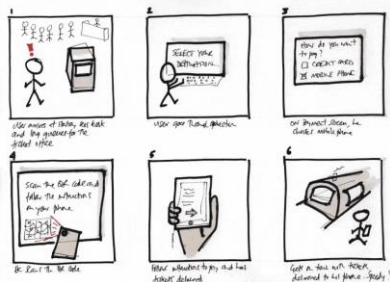
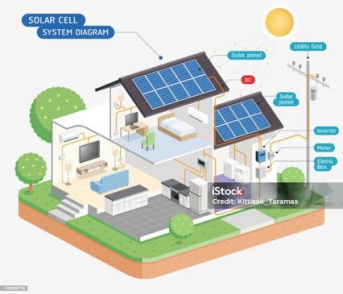






designs, it could be useful to apply specific methods for selection and prioritization of design options. Some possible methods for supporting the selection process are described in **Table 11**.

Table 9. Methods for explaining innovations. Source: authors

Method	Description	Useful tools & tips
<b>User scenario</b>	Stories in natural (easy-to-understand) language to describe how a persona uses a product. E.g.: <i>“Paul built his house in 1995 and wants to upgrade it to a net zero energy building. He studies different options and decides to replace his old roof by IPV roof tiles that generate solar energy. To maximize the use of the solar energy produced by his roof, he also installs the Increase smart control system, which provides a dashboard for Paul to monitor his energy consumption data in real time. The system also lets him know when it is the best time to do laundry and turn on his dishwasher to make the best use of the available solar energy...”</i>	<a href="https://www.justinmind.com/blog/how-to-design-user-scenarios/">https://www.justinmind.com/blog/how-to-design-user-scenarios/</a>
<b>Storyboard</b>	Sequence of images to describe the use of a product or solution <sup>2</sup>	 <a href="https://www.mindtools.com/a0a9htx/storyboarding">https://www.mindtools.com/a0a9htx/storyboarding</a> <a href="https://www.toolshero.com/problem-solving/storyboard/">https://www.toolshero.com/problem-solving/storyboard/</a>
<b>Concept poster</b>	Design thinking tool to define the core components of a complex concept <sup>3</sup>	<a href="https://fourwaves.com/blog/how-to-make-a-scientific-poster/">https://fourwaves.com/blog/how-to-make-a-scientific-poster/</a>
<b>Mental model</b>	Visualization of the main concepts a user needs to understand to use a product <sup>4</sup>	 <a href="https://www.interaction-design.org/literature/topics/mental-models">https://www.interaction-design.org/literature/topics/mental-models</a>

<sup>2</sup> Image source: Mulder, P. (2018). Storyboard. Retrieved on 17 February 2024 from Toolshero: <https://www.toolshero.com/problem-solving/storyboard/>

<sup>3</sup> Image source: <https://renewableteacher.wordpress.com/the-science-of-renewable-energy/>

<sup>4</sup> Image source: Kittisak\_Taramas, <https://www.istockphoto.com/vector/solar-cell-system-diagram-gm910289776-250694238>

**Computer simulation**



Use of digital tools to simulate and demonstrate the behaviour of a system<sup>5</sup>


Table 10. Methods for ideation. Source: authors

Method	Description	Useful tools & tips
Storyboard	Similarly to explaining innovation, storyboarding can also be used to generate ideas. For example, participants of a co-design workshop can visualize their needs regarding the use of IPV systems by sketching a simple storyboard	<a href="https://www.indeed.com/career-advice/career-development/ideation-techniques">https://www.indeed.com/career-advice/career-development/ideation-techniques</a>
Mind mapping	A visual technique that establishes relationships between an issue and potential solutions	
SCAMPER	A technique used to improve a product by looking at it from seven different perspectives: Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse	
PPCO	Identifying Pluses (what is liked about an idea), Potentials (what might result from the idea), Concerns (what concerns the idea creates) and Overcomes (how to fix the concerns) to further develop a first idea of a solution.	<a href="https://rapidbi.com/swot-and-ppco/">https://rapidbi.com/swot-and-ppco/</a>

Table 11. Methods for selection and prioritization of design options. Source: authors

Method	Description	Useful tools & tips
Bull's-eye diagramming	A focus group method to prioritize the order of items, e.g. product functionalities by dividing the items into different priority categories.	<a href="https://www.templatesformanagers.com/template/bulls-eye-diagram-template">https://www.templatesformanagers.com/template/bulls-eye-diagram-template</a>
Scenario analysis	A focus group method to identify and discuss the consequences of choices (e.g. potential benefits and pitfalls of a specific innovation design) by imagining alternative future states.	<a href="https://designnotes.blog.gov.uk/2023/03/13/using-scenario-building-to-think-through-options-for-your-service-or-policy/">https://designnotes.blog.gov.uk/2023/03/13/using-scenario-building-to-think-through-options-for-your-service-or-policy/</a>
Photo elicitation	Probing exercise that asks participants to reflect, sort or group photos to answer a question. This can be used, for example, to discover which IPV module designs are preferred over others.	<a href="https://www.andimplementation.ca/post/photo-elicitation#:~:text=Eliciting%20Data,group%20of%20people%20are%20involved">https://www.andimplementation.ca/post/photo-elicitation#:~:text=Eliciting%20Data,group%20of%20people%20are%20involved</a>
COCD-box	A technique to prioritize ideas after a creative brainstorm by dividing the ideas into three	<a href="https://creativesolvers.com/methods/cocd-box-how-now-wow-matrix/">https://creativesolvers.com/methods/cocd-box-how-now-wow-matrix/</a>

<sup>5</sup> Image source: [https://www.freepik.com/free-vector/illustration-digital-twins-testing-simulation\\_20878564.htm](https://www.freepik.com/free-vector/illustration-digital-twins-testing-simulation_20878564.htm)



categories: 1) “How” – innovative but not yet feasible, 2) “Now” – known ideas which are easy to implement, 3) “Wow!” – innovative ideas which are also feasible.

When engaging stakeholders and conducting workshops, the following principles should be respected:05/03/2024 09:16:00


- **Transparency** – provide participants clear and barrier-free information throughout the process. Before the workshops, give participants sufficient information on the aims of the workshop and their role in it. During workshops, help keep all participants on track by quickly summarizing what was done or achieved after key workshop phases (either verbally or using flipcharts or visuals). After workshops, share the summary of the key results with the participants (in a generalized format, without names or other identifiable information) and give them feedback on how their contribution has been/will be used. Be fully transparent on how participants’ ideas and personal data will be used. Use informed consent forms to explain what data will be recorded for each participant, how it will be processed (respecting the EU’s General Data Protection Regulation and other relevant legislation), and what are participants rights regarding their data (see D9.3 Ethics Handbook for guidance on the ethical aspects of stakeholder engagement).
- **Fairness** – ensure equal treatment of all participants in the workshops, regardless of their background, and make sure everyone has a chance to contribute. Careful facilitation is key to ensure every participant feels empowered to speak without being judged. During workshops, it is useful to provide participants opportunities to give input both verbally and in written (e.g. using post-its) or visually (e.g., sketching on a flipchart) as some may not feel confident to speak in public.
- **Accessibility and inclusiveness** – select meeting venues that are accessible for people with different needs (including impaired mobility) and try to ensure all information and working materials are easily understandable for the target group.

See also Annex 3 for key criteria for stakeholder identification.

**Skilled facilitation** of co-design workshops is important to make sure the workshop meets its goals, all participants have the chance to contribute, and everybody is on the same page regarding the results of joint ideation and decision-making. Depending on the size of the group, at least one facilitator is needed for each event. The facilitator’s tasks include:

- Helping prepare the workshop agenda and select appropriate methods and tools.
- Guiding participants through the workshop agenda – explaining what and when is going to happen.
- Moderating discussions, keeping in mind the goals of the discussion, reminding participants of the discussion questions if needed, and keeping time to respect the planned time schedule.
- Providing quick recaps and summaries after key phases of the workshop to keep everyone on the same page.
- Paying attention to the discussion dynamics and balancing stakeholder input, looking out for people who are more vocal and may influence the discussion too much, and giving the word to other participants who may want to contribute.
- Ensuring all participants feel safe, comfortable and empowered to contribute to the discussion.

**A facilitator** will need at least a basic level of understanding of the workshop topic but should ideally be someone who can be **perceived as neutral**. For example, if possible in the pilot setting, the



facilitator could be a professional moderator instead of a representative of the PV industry. In case external facilitators are used (i.e. not from among the project team), it is important to brief the facilitators on the main aims of the Increase project, and make sure they have a basic understanding of key concepts such as BIPV and IIPV.

#### Tools for facilitating workshops:

- **Seeds for change** guide: <https://www.seedsforchange.org.uk/shortfacilitatingworkshops>
- A **self-reflection sheet** for facilitators can be found in Annex 5 of this deliverable

**Synthesis** of results is an important process following the co-design workshops. Synthesis means turning all the ideas expressed at the workshops into a cohesive and actionable body of knowledge, which identifies relationships between ideas, draws attention on important similarities and differences, and clearly highlights the most important findings. Synthesis is needed both after individual workshops and at the end of the co-design process as a whole. To synthesise results, the following approaches could be useful:<sup>6</sup>

- Creating visual summaries (e.g., mind maps, flow charts)
- Organizing ideas into common themes (using sticky notes, spreadsheets, etc.)
- Looking for similarities between ideas and merging or clustering similar ideas
- Identifying contrasts and differences between ideas
- Maintaining diverse voices – if interesting differences emerge between co-design participants, it may not always be the best strategy to try to merge diverse ideas into those of an “average” person. Instead, the diversity of perspectives could be creatively highlighted in the summaries produced of co-design events.

**Feedback.** After workshops, it is important to ask for participants’ feedback to the process to learn what did or did not work and adjust any subsequent co-design activities. Chapter 6 provides a detailed explanation of the aspects of the IPV innovation and co-creation that need to be assessed by all pilots. When it comes more specifically to co-design workshops, the following questions are central when collecting feedback:

- How do you assess your participation experience?
- What worked well at the workshop?
- What did not work? How could these aspects be improved for future co-design activities?

Different methods can be used to collect feedback, including:

- A brief reflection session at the end of each workshops, where participants can work in pairs or groups to assess their experience
- Written feedback forms distributed to participants at the end of the event, to be filled out in place.
- A short post-workshop online survey: to improve the response rate, keep the survey short and easy to fill out, send it immediately after the workshop, and send reminders to participants

Whatever form you use, make sure you provide possibilities for participants to give feedback anonymously. A sample feedback form is provided in Annex 6 of this deliverable.

Furthermore, make sure you also give adequate feedback to participants on how their inputs were considered and how their participation contributed to the project.

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<sup>6</sup> Inclusive Design Research Centre, Co-designing synthesis, <https://co-design.inclusivedesign.ca/resources/co-designing-synthesis/>

### Tips for workshop organizers:

- Set a clear objective for each workshop: define the expected end result of the workshop in clear terms. For example, a good objective is not “co-design the solution” or “engage stakeholders” but something more specific, e.g “collecting first ideas for the physical appearance of the pilot object” or “selecting preferred colour options for the PV module”.
- Define a clear task for the workshop participants and manage their expectations. Explain what is in their power to influence, and what aspects of the products and pilots have already been defined.
- Plan the timeline of workshops well in advance to have the necessary stakeholder input on time for the demonstration. A back-casting approach can be useful, planning the process “from the end” and setting up the timeline of the events that need to happen before the end point. Do not forget to plan sufficient time for preparing and sending invitations to participants, and for registration.

## ROUNDTABLES WITH EXPERTS

In cases where input is needed from a narrower set of experts instead of a diverse stakeholder group, focused roundtables with experts could be used instead of classical co-design workshop formats. A roundtable discussion is a form of interactive meeting where participants are encouraged to actively contribute to the discussion. It usually involves a facilitator to make sure the discussion follows the objectives and everyone has the chance to speak up.

Whereas the aim of co-design workshops is usually quite practical (e.g., jointly developing ideas for designing a solution), roundtables may be more suitable if the aim is to discuss the problem or solution at a more general level with experts who can share their know-how of the problem, technology, solutions, etc. Relevant experts whose contribution may be valuable in the Increase project include technology experts and engineers (IPV, PV, energetics, construction), the cultural and creative sector (architects, landscape architects, designers), market and funding experts, and many other.

The basic principles for organising co-design workshops also apply when planning expert roundtables:

- Set a clear objective to the event – what question do you want answered as a result of the meeting?
- Make sure you have the right people around the table and the number of participants is conducive to interactive discussion (i.e., usually not more than 20-30).
- Avoid lengthy events, plan for 3-4-hour sessions (including breaks) maximum.
- Follow the informed consent and ethics procedures described in the Increase Ethics Handbook (D9.3) when collecting personal data from participants (this includes name and organisation!).
- Ensure skilled moderation and facilitation of the event to effectively guide the discussion towards the objectives.
- Inform participants of how their inputs are used in the project and how they can stay in the loop on project progress.

Combinations of the methods and tools for explaining innovation, ideation and prioritization described above can also be used in expert roundtables.



## DESIGN COMPETITIONS

After stakeholders' expectations, needs and preferences regarding IPV systems have been discussed through in-depth engagement methods like co-design workshops and expert roundtables, pilots could select the preferred design options by organising a design competition. To proceed from the design to the pilot implementation phase, up to five potential designs per pilot case need to be selected by the end of the third project year. The shortlisted design options could be put up to a local contest where local residents and stakeholders can pick the one that best meets their collective preferences.

The contest could be held either online or offline or in a hybrid format. In order to allow a diverse set of participants to have a say, a hybrid format combining both online and offline participation would be preferable. For the online contest, the following steps should be taken:

- Create an online survey form (e.g. Google forms, SurveyMonkey, SurveyGizmo, Mailchimp).
- Take high-resolution photos of the shortlisted designs and add or link them to the survey form.
- Develop a uniform rating system to enable the selection of one preferred design option out of several.
- Launch the survey, send emails to pilot stakeholders with an invitation to take the survey, and disseminate the survey broadly in channels whereby key stakeholders such as local residents or frequent visitors can be reached (think about the local municipality's communication channels, community social media groups, etc.). Also ask stakeholders who are already engaged in the co-design process to share the survey in their networks. This helps both select a design that is broadly accepted by the community, and raise local awareness of the increase in pilot and innovations.

For an offline contest, it would be desirable to make use of samples of IPV module designs, if producers are able to make them available on time. The samples could be showcased in a public space (e.g., city hall, public park) and be accompanied with a mechanism allowing to rate the designs (e.g., a paper survey form which people can use to vote for the best design, and/or a QR code directing participants to the online survey form). Alternative and fun rating systems could also be explored, such as attaching a transparent jar next to each design alternative and asking people to insert a green ball to indicate their most preferred design and a red ball to indicate the least preferred design, etc. Pilot coordinators are encouraged to come up with creative voting and rating systems that attract the attention of the local target groups.

When developing the ranking scale, some of the following options could be considered:

- ranking each alternative on a scale from 1-5 where 5 denotes the most preferred option and 1 the least preferred one.
- asking people to vote for one design that they prefer the most.
- asking people to vote against 1-3 least preferred designs to eliminate them from the contest, and organizing a "final" round for the 2-3 most preferred designs.

Pilots are free to develop and use additional options depending on the resources and time available for the contest. For contests in a hybrid format, make sure to use a harmonized rating/ranking system both in offline and online channels.

### Useful resources for the co-design phase:

- LIV\_IN toolkit provides useful guidelines on recruitment and selection of stakeholders: [https://www.sustainability.eu/liv\\_in/LIV\\_IN\\_Co-Creation\\_Toolkit.pdf](https://www.sustainability.eu/liv_in/LIV_IN_Co-Creation_Toolkit.pdf)
- Cristian Matti & Gabriel Rissola "Co-creation for policy" (2022) Chapter 3 contains tools and self-assessment checklists to guide the preparation, implementation and follow-up





phases of co-creation activities:

<https://publications.jrc.ec.europa.eu/repository/handle/JRC128771>

- Increase [Ethics Handbook \(D9.3\)](#) describes the ethics principles for stakeholder engagement and guidelines for processing data collected from participants

## 4.5 CO-IMPLEMENTATION

Co-implementation involves stakeholders from outside the organisation or project team in the delivery of products, services and innovative solutions. The aim is to benefit from diverse expertise and assets and/or strengthen stakeholders' interest and sense of ownership of the end result. Co-implementation may involve a variety of activities depending on the nature and context of an initiative – see, for example, the co-implementation possibilities described in SUNRISE 2019 [54]. In the context of Increase, four types of co-implementation activities are the most relevant:

- Contribution to the **technical delivery** of an innovative solution – this could comprise light manual labour to jointly construct, install or renovate objects, clean a public space, plant trees or seeds, etc., but also performing non-manual tasks (e.g. organising, provision of skills or other resources) related to the delivery of innovation.
- **Communication** – promoting and raising local awareness of an innovation, providing access to one's networks and communication channels to disseminate information, acting as innovation champions.
- **Capacity-building** – volunteering to mentor and train people to use an innovation.
- **Monitoring and problem reporting** – observing the state of a service, object, co-created public space, etc., and reporting problems that need fixing. This is closely related to the co-assessment phase described in Chapter 4.6 below.

In the Increase project where the focus is on installing and monitoring IPV solutions, the space for co-implementation is limited due to the technical and regulated nature of the activities. As the installation of IPV modules and construction of bigger and more complex objects needs to be undertaken by professionals, the role of voluntary contributors from outside the project team and subcontractors could mainly lie in communication-, capacity-building and monitoring-related tasks. These could include:

- **Monitoring the pilot solution:** maintaining and monitoring the pilot solutions, e.g., gardening and taking care of the plants in a greenhouse, monitoring and documenting the performance of the IPV greenhouse in different weather and light conditions.
- **Raising local awareness of the pilot solution** and promoting the adoption of IPV solutions in the pilot area, e.g. volunteering as guides to inform visitors of the Avila city park of the innovative IPV-powered objects in the park, explaining how the mobile charging stations work, how the energy generated by canopies or the walkable floor is used, and what are the benefits of embedding PV elements in objects that people use on a daily basis, etc.

However, three pilots that are located in public spaces (the greenhouse in a schoolyard in Tartu, city park in Avila, and public entrance gate of a the Hoge Kempen national park in Belgium) could also aspire to jointly implement small-scale construction and installation tasks related to the pilot objects:

- **Preparation of the sites** for installation of new objects (e.g., collective cleaning actions, preparing soil for planting, etc.)
- **Building/installing small-scale, low-technology parts** of the pilot objects, e.g., constructing planter boxes for the IPV greenhouse in Tartu, planting and sowing seeds to grow in the greenhouse.



When planning the opportunities and steps for co-implementation, it is important to answer a set of questions, starting from an analysis of the aspects of the project implementation that can realistically be outsourced to contributors from outside the project team. It is also important to carefully plan the coordination of collaboration with the stakeholders involved in the co-implementation to ensure smooth implementation. **Table 12** below provides a tool to assist the planning process.

Table 12. Co-implementation planning tool. Source: adapted from [22]

Key questions	Activities
WHAT should happen?	<p>Analyse what elements of the pilot implementation could be outsourced to non-experts outside the project.</p> <p>Crowdsource ideas for co-implementation opportunities from stakeholders who participated in the co-design phase.</p>
WHO can make it happen?	<p>Analyse:</p> <ul style="list-style-type: none"> <li>• what type of stakeholders are needed to co-implement the activities</li> <li>• what type of stakeholders could potentially be interested in contributing</li> <li>• what background information do potential co-implementers need to contribute meaningfully</li> </ul> <p>Review the pilot’s stakeholder list to establish if the pilot team already has contact with potential contributors.</p> <p>If no previous contact exists, analyse what communication channels and networks could be used to reach these stakeholders.</p>
HOW should it happen?	<p>Set up procedures for inviting stakeholders to co-implement the solution.</p> <p>Decide what form of agreement (e.g., formal contract, verbal agreement) would be needed with the contributors to ensure everyone’s understanding of their role and responsibilities in the project.</p> <p>Set up procedures and methods for jointly implementing the solution (e.g., practical workshops, days for joint action).</p> <p>Set up a coordination structure to facilitate close communication between the pilot team and individual contributors and align activities.</p> <p>Make sure to provide the necessary equipment and resources for individuals to contribute to the project.</p> <p>Create opportunities (e.g., informal meetings) for the interested stakeholders to propose and refine co-implementation activities.</p>
WHEN should it happen?	<p>Set up a clear timeline for the co-implementation process (tools such as Gantt diagrams may be useful for more complex co-implementation settings).</p> <p>Establish interim milestones to divide co-implementation into manageable bits and keep track of progress.</p>
HOW is it working?	<p>Request (regular) feedback from contributors to assess how the co-implementation approach is working.</p> <p>Adjust the process if needed based on feedback.</p>



## 4.6 CO-ASSESSMENT

The essence of co-assessment and evaluation is leveraging feedback from users and other stakeholders to assess and evaluate the performance of innovative solutions, as well as to understand how the co-creation approaches applied in the design and implementation phases work from the perspective of stakeholders. Often, co-assessment is conducted as a continuous process where the coordinators of co-creation processes regularly solicit input from stakeholders throughout the co-design and co-implementation phase to improve the qualities of the innovation and adjust the co-creation process in an iterative way. Co-assessment usually has two levels:

- **Impact evaluation** – monitoring, assessment, and evaluation of the impacts of the innovation. In the case of Increase, such impacts concern the performance, aesthetical evaluation and acceptance of IPV solutions.
- **Process evaluation** – monitoring, assessment, and evaluation of stakeholders' perceptions of the pilot implementation and co-creation process. Here, the focus is on stakeholders' satisfaction with the ways in which they were engaged, their views on the effectiveness of the engagement (whether their participation made a difference) and suggestions for improving the co-creation process so that it is a pleasant and meaningful experience for all.

Co-assessment can be divided into three phases:

1. Monitoring – observation of processes, collection of data
2. Assessment – structured analysis of the data
3. Evaluation – determining the value of the outcomes vis-à-vis the expected results, extracting the lessons learned from the experience

**In the Increase project, partners responsible for pilots and stakeholder engagement activities are responsible for collecting monitoring data and engaging their stakeholders in the co-assessment of the results, whereas the evaluation of impacts and co-creation will be conducted at project level.**

The overall Increase approach to assessment and evaluation is described in Chapter 6.1. The indicators that should be monitored, and methods for collecting stakeholder input for co-assessment are described in Chapter 6.2.

### Key points to remember

- Select appropriate co-creation methods based on the objectives, desired depth of engagement and number of participants
- Participatory workshops are a key method to use in the co-design phase
- Although co-implementation may not seem relevant to all Increase pilots at first glance, most pilots could consider involving stakeholders in communication, dissemination and public awareness-raising around the pilot
- All pilots should prioritize co-assessment and provide means for stakeholders to give feedback to the pilot solution and co-creation process
- Attention should be paid to skilled facilitation to enable everyone to contribute meaningfully

## CHAPTER 5. CO-CREATION IN INCREASE PILOTS

### 5.1 OVERALL CO-CREATION PROCESS IN INCREASE

While developing IPV innovations, Increase applies open innovation principles to practical and tailored co-creation activities to engage with key stakeholders and end-users in order to steer their active participation in the project as well as familiarise them with the innovations. In the Increase project, Task 6.1 (coordinated by IBS) provides a conceptual framework outlined in this report (D6.1), which is adopted by coordinators of demonstrations (Work Package 5) to facilitate the local co-creation process. **Pilot coordinators and partners have a key role in facilitating co-creation with stakeholders at the local level.** The overall coordination process of co-creation activities is summarized on **Figure 24. Figure 24. Co-creation steering and coordination in Increase. Source: authors**

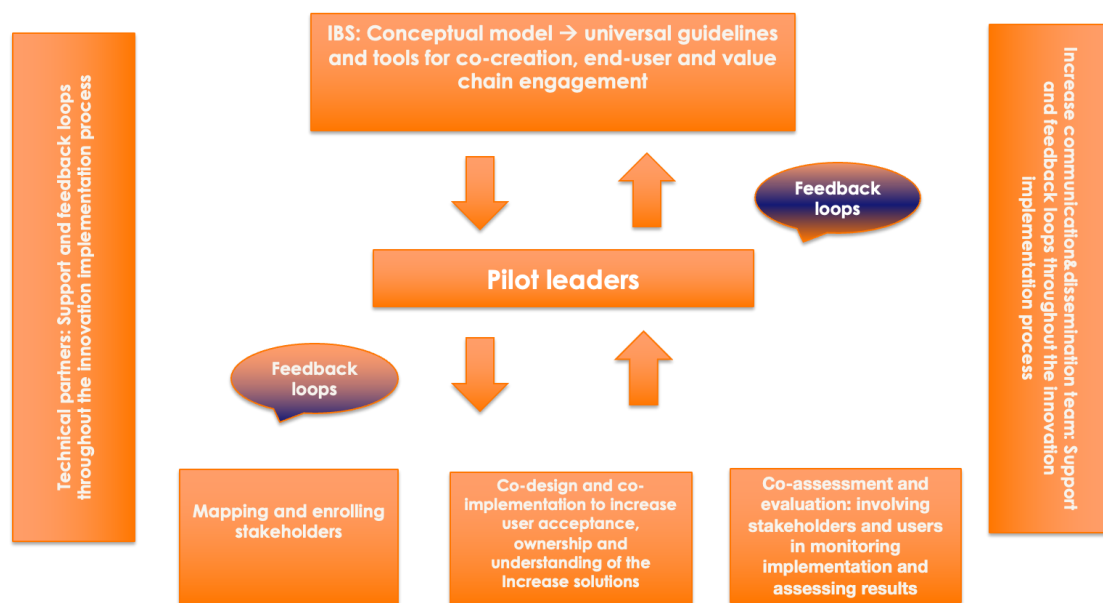



Figure 24. Co-creation steering and coordination in Increase. Source: authors

Throughout this journey, Increase Task 6.1 offers continuous support and guidance to the pilots, aiding in their understanding and adaptation of the framework as necessary. Regular exchanges with partners directly and indirectly involved in the technology development, and demonstration activities will be set up – mainly in the form of joint online meetings, which foster discussions on emerging issues and the sharing of experiences.

These exchanges are meant to discuss the process, ideas and feedback from the co-creation activities, including aesthetical validation (see also Chapter 5.3), assess the cost or yield implications of the proposed ideas, and feed the results of the co-creation processes back to the research and development activities. Cooperation with other tasks and work packages, especially WP5 Demonstrations (including T5.2) is important in implementing co-creation. When needed, technical partners in pilot solutions will assist the co-creation process, e.g., in providing materials and explanations, participating in stakeholder events or trainings, providing advice and assistance. The same applies for the partners coordinating overall value chain engagement, communication and dissemination work in Increase project (WP7 and 8).

As part of their role, **pilot partners should document co-creation activities** and gather feedback from involved parties. IBS subsequently compiles this information and feedback for project evaluation purposes. While the specific details of processes such as the frequency and format of pilot experience exchanges are still being determined, the collaborative efforts between IBS and pilot partners ensure



the effective execution of the co-creation process across the Increase project. **Figure 24** summarizes the procedure of steering and implementing co-creation with stakeholders in Increase with different main responsibilities of the parties.

## 5.2 OPPORTUNITIES AND RECOMMENDATIONS FOR CO-CREATION IN INCREASE PILOTS

Nine pilots in six European countries will play a key role in testing and disseminating the Increase innovations. This section provides a comprehensive overview of the pilot projects, highlighting their potential for co-creation and offering recommendations tailored to the specific nature of each pilot and its stakeholders. The pilot sites are different in nature, comprising buildings and public spaces with educational or heritage value, public infrastructure improvements, commercial developments and private residential buildings. **Table 13** below summarizes the main characteristics and co-creation elements in each pilot.

To analyse co-creation possibilities within the Increase pilots, IBS conducted interviews with the pilot project teams to gain insights into the potential scope of co-creation in each pilot, learn about their prior experience with co-creation, assess their needs for assistance, and understand their expectations for guidance. Most participants lack prior co-creation experience and need support to develop effective models. Highlighting the pivotal role of stakeholder engagement, the pilots recognize challenges in trust and awareness, particularly noting the perceived lack of local people's confidence in and understanding of the technology.

**According to preliminary interviews with pilot coordinators, the adoption of IPV solutions faces several challenges:**

1. High implementation costs: IPV seemingly costs more to implement than regular PV systems because IPV combines the photovoltaic element with construction material, and obtaining permits can be costly.
2. Energy law vs. aesthetics: Energy laws prioritize functionality over aesthetics, making traditional PV systems easier to install.
3. Legal uncertainties: The legal framework for IPV installations may be unclear, leading to compliance issues.
4. Awareness and trust: Lack of awareness and trust in IPV among the public and professionals.
5. Educational barriers: Educating stakeholders about IPV benefits and safety is challenging due to perceived novelty.

Co-creation with stakeholders could help overcome some of these barriers by raising awareness and understanding, and jointly developing solutions to address the barriers. After the summary table, Increase pilot cases are briefly described from the perspective of their prior experience or primary challenges related to IIPV/BIPV, as well as the co-creation process specific to each pilot, as discussed during the preliminary interviews with pilot coordinators.



**Table 13. Short summary of Increase pilots**

	<b>Pilot object</b>	<b>Piloted technology</b>	<b>Key co-creation stakeholders</b>	<b>Opportunities for co-creation in the pilot</b>
<b>Tartu city (Estonia)</b> Lead: IBS (research institute)	Greenhouse attached to a school (Hansa Kool), made of semi-transparent PV glass	Integrated semi-transparent PV glass based on new colour encapsulants (surface area 150 m2)	Students Teachers & school staff Local residents Students of local university Local municipality Construction companies	Co-design of greenhouse Co-implementation (e.g. parts of construction, planting) Co-assessment – performance, aesthetics, acceptance
<b>Avila city (Spain)</b> Lead: Onyx (PV producer)	Urban furniture in Avila city park, around the city wall: 2 street lights, 2 canopies, 2 mobile charging tables, 1 PV walkable floor 5m2	Flexible lightweight PV composites as construction material of urban furniture. Focus on comparison between 1) typical PV glass solutions (glass/glass panels) and 2) composite material	University students Local municipality City architect Heritage office Local artists Citizens, visitors of park Urban furniture producers Construction companies	Co-design of urban furniture – selection between different shapes and designs Co-implementation (e.g. parts of construction, installation) Co-assessment – performance, aesthetics, acceptance
<b>Bizkaia province (Basque country, Spain)</b> Lead: ETS (regional public railway company)	Noise barrier for railway: length 50m, height 2,5m (total 125 m2).	Integrated asymmetrically composed laminated PV modules for acoustic insulation. Monitoring of acoustic performance and energy generation	Citizens living near the railway Local municipality (could potentially use the energy created by the PV element) Users of railway line Maintenance workers	Co-design of the appearance of the barrier Co-assessment – performance (acoustic insulation), aesthetics, acceptance
<b>Hoge Kempen national park (Belgium)</b>	Sanitary block, walkway and bike parking of the park's Terhills	Non-transparent and semi-transparent PV panels. Testing variations in colour, glare, lightweight, and modules with	Park manager Municipality Citizens	Co-design of walkway, bike parking, sanitary block Co-implementation (parts of construction, installation)

Lead: SOLT (PV producer)	(main) entrance gate	easier separation of materials. Walkway – prefabricated tiles with integrated PV	Visitors of park Architect Construction companies	Co-assessment – performance, aesthetics, acceptance
<b>Echirolles commune, Grenoble (France)</b> Lead: BYCN (construction company)	New 6-story office building in a dense urban area	Installation of 150 m <sup>2</sup> prefabricated curtain wall panels with integrated anti-glare PV. The building will be connected to a district heating system.	Companies using the office building Local residents Municipality	Co-design of the curtain wall panels Co-assessment - performance, aesthetics, acceptance
<b>La Toussuire ski resort, region Auvergne-Rhône-Alpes (France)</b> Lead: SuS (PV producer)	Residential building hosting a ski shop and rental apartments	Roof tiles with PV element. Tiles installed in 2020 will be removed, refined and reinstalled. Focus on testing de-icing foil and snow management technologies	Roofers, construction companies Owner of building	Co-design of the construction aspects of roof tiles Co-assessment – performance, aesthetics, acceptance, ease of installation
<b>Podgorica city (Montenegro)</b> Lead: POD (municipal government)	Public 4-floor parking garage in city centre	Renovation of the facade (up to 100m <sup>2</sup> coloured PV), testing innovative colouring techniques	Citizens Local municipality	Co-design of the exterior of the building Co-assessment – performance, aesthetics, acceptance
<b>Podgorica city (Montenegro)</b> Lead: POD (municipal government)	Administration building of capital city	Ventilated PV façade (250 m <sup>2</sup> ): low glare modules, modules with improved fire safety, and combinations	Citizens Architects Local municipality	Co-design of the façade Co-assessment - performance, aesthetics, acceptance
<b>St-Sulpice municipality, suburb of Lausanne (Switzerland)</b> Lead: CLIM (PV producer)	Single-family residential building seeking energy upgrade to a net-zero energy building	Existing roof tiles (200 m <sup>2</sup> ) will be replaced by lightweight insulated PV elements; testing smart control systems and different grid strategies	Inhabitants of the building	Co-assessment – performance, aesthetics, acceptance



## **PILOT 1 – AVILA (SPAIN), CITY PARK**

In this pilot, citizens and stakeholders can be engaged in co-designing the urban furniture for the park and co-assessing the results. Depending on the technical details of the solutions, citizens could also be involved in co-implementation by installing or constructing parts of the furniture, or volunteering as park guides to raise park visitors' awareness of the diverse applications of IPV technologies.

This pilot team exhibits considerable experience with co-creation. Challenges are perceived as minimal, with municipal support and construction companies showing substantial interest. Communication efforts have generated positive attitudes, especially among construction companies seeking renewable energy solutions within the city. Despite being a heritage city, Avila's pilot is not foreseen to face regulatory restrictions.

### **Recommended co-creation events**

- University partnerships – organise a seminar for architecture students on the content and objectives of the pilot project. Emphasise that they can have a say in the design of the pilot solution and future of the technology; after generating interest, organise a hackathon with students where they can share their ideas for improving the final solution.
- Local citizens – create an interactive exhibit near the pilot installation to educate the public about the benefits of IPV. The exhibit could involve a feedback station, where citizens can leave their suggestions.
- Co-design workshops with diverse stakeholders to develop the pilot solution and select designs.
- Roundtables – host roundtable discussions and networking events that bring together business leaders, investors, and entrepreneurs to explore the economic and environmental benefits of IPV technology. These events could facilitate partnerships and investment opportunities, driving forward the city's renewable energy goals.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.

## **PILOT 2 – NATIONAL PARK HOGE KEMPEN (BELGIUM), MAIN ENTRANCE GATE**

This pilot is located in a national park – a nature reserve, which is a public space open to visitors. Citizens, visitors of the park and stakeholders such as landscape architects, the construction sector, and other related fields can be involved in the co-design of the IPV walkway, bike parking and sanitary block near the entrance gate of the park. In addition to that, the demonstration could also involve some level of co-implementation. This could potentially involve citizens' hands-on contribution to installing and constructing the pilot objects, but also disseminating information on the pilot solution via their networks. As all other pilots, diverse stakeholders can be involved in the co-assessment of the performance, aesthetics and social acceptance of the pilot solutions.

This pilot has some experience with co-creation, mainly engaging professional stakeholders such as architects and the construction sector, with standard procedures. They aim to use the pilot to demonstrate the benefits and potential use of IPV. The pilot implementation faces no significant challenges related to permits, given municipal support for sustainability solutions and an existing park development plan. The local level awareness issue stems from public perceptions of IPV as new and potentially problematic.





### Recommended co-creation events

- Park manager – host a workshop focusing on sustainable park management and the role of IPV; organize guided tours led by the park manager for community members, highlighting how this project helps to achieve the park’s sustainability goals.
- Innovation challenge – host an innovation challenge inviting engineering companies to propose novel uses of IPV in natural spaces.
- Co-design workshops with diverse stakeholders to develop the pilot solution and select designs.
- Visual aids – provide an attractive visual of the potential design and include a QR code to read about the pilot project and its objectives, as well as the possibility for citizens to write anonymous comments and suggestions.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.

### PILOT 3 – ECHIROLLES (FRANCE), OFFICE BUILDING

This pilot could provide opportunities both for co-design and co-assessment. The curtain wall panels installed to the office building could be co-designed with users and tenants of the building as well as architects, designers and other types of stakeholders. Users, visitors and the local community could also be involved in co-implementing the pilot by contributing to communication and dissemination of the solution, and in co-assessing the performance, aesthetical aspects and social acceptance of the solution.


This pilot partner has no prior experience in co-creation. Challenges include the difficulty of convincing and involving end-users when the technology is unfamiliar, and doubts persist about the timing of communication to the building users and the public.

### Recommended co-creation events

- Breakout session – bring municipality officials, engineers and end-users together, put them in small groups to tackle aspects like design preferences and ethical considerations.
- Q&A session – host seminars led by experts in renewable energy, architects and engineers involved in the project, with sessions specifically designed to demystify the technology for non-experts.
- Co-design workshop – use collaborative design tools and methodologies, where participants can suggest modifications to the design.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.

### PILOT 4 – TARTU (ESTONIA), GREENHOUSE ATTACHED TO SCHOOL

This pilot tests IPV solutions on a school greenhouse built in the framework of the Increase project. The pilot offers several opportunities for co-creation, starting from engaging students, teachers, school staff, the local community and other stakeholders in the co-design of the greenhouse. Due to being implemented by a school, the pilot can also involve co-implementation, for example by involving students in the construction of simple objects such as planter boxes to be used in the greenhouse, as well as planting and taking care of the plants as an educational project. In addition to that, diverse stakeholders can be involved in co-assessing the performance, aesthetics and social acceptance of the pilot solution.



Tartu pilot coordinators has strong prior experience in co-creation. However, the local awareness of BIPV in Estonia is moderate. Despite several companies engaging in IPV installation, the general perception is that traditional solar panels are more affordable and practical. The challenge lies in the overload of information, necessitating a focused and effective approach to reach the right audiences.

#### **Recommended co-creation events**

- Hackathon for students and teachers – interactive workshops and seminars, featuring demonstrations of PV technology, hands-on activities related to solar energy, discussions on environmental sustainability and gathering ideas for the greenhouse design.
- Smaller co-design workshops/meetings with relevant experts, like architects, technical consultants, electricians.
- Partnership meetings with local authority – meetings with city government officials to present the project and its benefits to the local community, and align with the city’s sustainability goals.
- Open day and project showcase – organizing open days at the school where visitors can tour the school, observe the PV technology in action, and participate in educational activities designed to explain the project’s impact.

#### **PILOT 5 AND 6 – PODGORICA (MONTENEGRO), ADMINISTRATIVE BUILDING AND PUBLIC GARAGE**

Two pilots take place in Podgorica, the capital of Montenegro. An IPV façade will be installed to an administration building, which offers opportunities for the local administration and citizens to co-design the façade. At the same time, the second pilot – a public garage – provides a chance for citizens and users of the parking space to co-design the façade, with a particular focus on colouring options. Some elements of co-implementation are possible, e.g., involving locals in communication and dissemination around the pilot solutions. In both pilots, citizens and experts of related fields can be involved in co-assessing the performance, aesthetics and social acceptance of the innovations.


This pilot team lacks direct co-creation experience but possesses a background in project management and stakeholder engagement, particularly in action plan development and strategic planning. Challenges involve navigating the undefined legal framework and uncertainties in public acceptance, especially with integrated façade solutions.

#### **Recommended co-creation events**

- Interactive workshops – workshops held in community centres, incorporating presentations on the project’s objectives, potential benefits, and design options. Use visual aids, models, and digital simulations to facilitate discussions.
- Co-design workshops – collaborative sessions that bring together architects, city planners, project team members and users of the pilot buildings. Utilize sketches, 3D models, and sustainability assessments to explore creative solutions and designs.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.

#### **PILOT 7 – LA TOUSSUIRE (FRANCE), RESIDENTIAL BUILDING**

In this pilot, the IPV roof tiles could be co-designed with architects and roofers to ensure a smooth installation process. Since the building offers apartments for rent, it does not have permanent residents who could be involved in co-design processes. However, local residents living near the pilot site and the owner (a former skiing champion) of the ski shop located in the building could serve as



innovation champions, raising local awareness of IPV solutions. Locals and experts could be involved in co-assessing the performance, aesthetics and acceptance of the pilot solution, while roofers can assess usability and the ease of installation.

The pilot coordinators have experience working with local communities in wind and solar farm projects but seek comprehensive assistance for engaging stakeholders effectively. Challenges involve the busy schedule of roofers, insurance concerns related to building-integrated photovoltaics, and the lingering impact of a failed solar panel project from 10 years ago, contributing to a lack of trust in the technology. Awareness is high among officials and municipalities but needs improvement among citizens.

#### **Recommended co-creation events**

- Co-design workshop for roofers – hands-on workshops focusing on the installation process, benefits of the new technology, and addressing any technical challenges. These sessions should build on previous training, incorporating feedback to simplify installation and maintenance. It ensures they are well-equipped to install and promote the new technology.
- Insurance industry roundtable – a roundtable with insurance industry representatives, highlighting the safety, reliability, and long-term benefits of the tile system to address concerns and foster insurance support.
- Promotional event featuring the ski shop owner – meet-and-greet events, and talks at the ski shop, linking the technology's benefits to the community's interests and values. Outcome: Increased local interest and support for the project, utilizing the owner's influence to foster a positive perception of the technology.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.

#### **PILOT 8 – ST- SULPICE (SWITZERLAND), SINGLE-FAMILY RESIDENTIAL BUILDING**

Due to the pilot building being a private family home, this pilot has the least opportunities for direct co-creation with stakeholders. As much as possible, the family living in the building could be involved in the co-assessment of the performance, aesthetics and acceptance of the IPV roof tiles (including the usefulness of the smart energy control system). The pilot could also further analyse opportunities for engaging the residents of the building in refining the design of the roof tiles.

The pilot coordinator commonly interacts with the customers through informal communication rather than structured surveys or feedback forms, given its start-up phase. The pilot's main goal is to assess the impact on the legal framework, and influence legislation to prioritize aesthetics over simple energy yield. Challenges involve the need for awareness-raising due to the novelty of IPV technologies for the public.

#### **Recommended co-creation events**

- Expert workshops – discussion of technical planning and challenges with various experts to dive into the technical specifics.
- Regular informal meetings to keep the residents of the building informed about the progress, changes and impacts; opportunities to provide feedback on their experience.
- Policy discussion roundtable – online meeting with local and national energy agencies, regulatory bodies and industry associations to discuss IPV technologies, their implications for energy policy and potential barriers in the legal framework.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.



## PILOT 9 – BIZKAIA (SPAIN), NOISE BARRIERS FOR RAILWAY

This pilot builds a noise barrier integrating IPV technologies to insulate noise coming from a railway. Residents and officials of the local municipality where the noise barrier will be located could be involved in the co-design of the appearance of the barrier to design a socially and aesthetically acceptable solution. Experts such as landscape architects and engineers could help further refine the design based on their expertise. Co-design sessions may also be needed with (in-house) maintenance workers who will need to ensure the solution remains functional over time. Various stakeholders could contribute to the co-assessment of the performance (in this case not only energy generation but also acoustic insulation), aesthetics, and social acceptance of the solution.

This pilot lacks prior co-creation experience but draws on the pilot coordinator's expertise in gathering feedback from municipalities during infrastructure projects. The pilot is in its early development stage and there are pending decisions on the location and technical aspects of the solution which currently make it more difficult to finalise clear co-creation plans. Local-level awareness hinges on overcoming potential resistance and leveraging public support, focusing on the double benefits of green energy generation and reduction of noise.

### Recommended co-creation events


- Information sessions for citizens living near the noise barrier – community meetings in local centres, in both Spanish and Basque, with visual aids, models, and easy-to-understand materials outlining the project details, benefits, and expected outcomes.
- Co-design workshops with diverse stakeholders such as representatives from the local municipality, citizens, experts, and pilot coordinator's project and maintenance teams to discuss design, functionality, and community benefits.
- Q&A sessions – Q&A sessions with the pilot coordinator, local municipality representatives, experts and the public, providing detailed explanations of maintenance procedures, safety measures, and energy monitoring practices. It would be reassurance to the community and stakeholders about the sustainability and safety of the project, addressing any operational concerns upfront.
- Feedback/follow-up meetings – meetings with representatives from each stakeholder group to review the outcomes of the co-creation events, and discuss any concerns.

You can discover detailed case studies illustrating various co-creation projects in Annex 7. These case studies provide insights into the practical application of co-creation, highlighting successes, challenges and valuable lessons learned from real-life experiences. Whether you seek inspiration or a deeper understanding of co-creation dynamics, exploring these case studies offers valuable insights and perspectives.

## 5.3 AESTHETICAL EVALUATION

Increase project pays attention to aesthetical evaluation of IPV solutions and has dedicated a separate task (T4.3) for such assessment, which will be supported by the co-creation approach in pilots:

*Task 4.3: Aesthetical evaluation. This task will apply various methods to collect feedback on the aesthetical aspects of the innovations at module level, as coordinated through the transversal task 6.1. In this task different approaches for aesthetical validation will be used. First, partners TECN and CSTB will organise 2 stakeholder workshops each at the site with the panels and systems installed. Stakeholders invited include architecture studios, contractors, owners, students, city administration, staff of TECN and CSTB, and press. Following the approach developed in Task 6.1, they will be providing feedback on the aesthetical aspects. Next, video and photo*



*images will be prepared under different weather conditions, and they will be communicated to Task 6.1 who will coordinate online feedback from diverse audiences. Finally, IBS and THNK will coordinate a selection of panels or samples to be sent to the pilot coordinators to support the co-creation and being evaluated by the co-creation groups. This includes new samples and samples resulting from the accelerated aging. IBS and THNK will collect and summarize all feedback and share that with all task partners.*

Thus, the final designs of the demonstrations will undergo thorough evaluation to ensure they meet aesthetic, economic, and environmental criteria. This involves promoting diverse aesthetically pleasing examples of integrated PV through various channels and conducting performance evaluations. Stakeholder workshops will gather feedback on aesthetic aspects, while online feedback from diverse audiences will be coordinated through T6.1. Samples will be sent for co-creation support, and colour measurement tools will be utilized. Monitoring will encompass dynamic energy performance, economic parameters, aesthetic appraisal, colour stability, and technical issues, with feedback coordinated through T6.2 KPIs for design to demonstration and beyond.

**Note:** For the means of verification the Increase DoA has set: Aesthetical evaluation through an external panel indicating improved visual performance (colour) reaching 90% confirmation on a 0-5 Likert scale

In each Increase pilot with co-creation activities, aesthetical evaluation of solutions is thus important. This will be transversally coordinated and pilot partners are assisted to conduct such evaluation and gather feedback on aesthetic aspects within their local co-creation processes. The exact methodology that will be applied is still under development and will be provided within the first year of the project.


#### Potential ways for aesthetical assessment

**Number of designs meeting predefined aesthetic criteria:** This is about checking how many designs meet the specific aesthetic standards set by the project or stakeholders beforehand. These standards could include things like blending well with the surroundings, using suitable materials, following architectural guidelines, or fitting into the cultural and historical context. Setting these criteria ensures that the designs match the project's aesthetic goals and standards. By counting how many designs meet these criteria, stakeholders can easily eliminate options that do not meet the basic aesthetic requirements, making the selection process smoother and more efficient. [47], [48], [49]

**Quality assessment (Ratings or scores assigned to designs based on aesthetic appeal):** This step involves assigning ratings or scores to designs based on their aesthetic appeal. Design evaluators or experts might use predefined criteria to evaluate factors such as creativity, originality, visual impact, coherence, and attractiveness. Assigning ratings or scores based on aesthetic appeal allows for a more objective evaluation of design quality. This ensures that designs are assessed on their artistic merit, creativity and visual impact, helping to identify standout options that excel in terms of aesthetics. [47], [48], [49]

**Voting phase:** During this phase, stakeholders vote on the designs based on their aesthetic preferences. Each design receives a certain number of votes, and the one with the highest number of votes or the most favourable ranking may be selected for further consideration or implementation. Involving stakeholders in the voting process empowers them to express their aesthetic preferences and influences the final selection decision. By soliciting input from diverse stakeholders, including community members and experts, the voting phase ensures that the chosen design resonates with the broader audience and reflects their collective aesthetic sensibilities. [47], [48], [49]

**Economic parameters (cost-effectiveness analysis of design implementations):** This is about how much it costs to bring the designs to life and whether they make financial sense. While making things look good is important, it is also necessary to think about whether they're practical and



affordable. When talking about economic parameters, things like how much the materials will cost, how expensive it will be to build and maintain the design and whether it'll be sustainable in the long run should be considered. So, even though it's essential for designs to look nice, think about whether they're worth the money too. By doing a cost-effectiveness analysis, one can figure out the financial impact of different design choices. This helps us pick designs that strike the right balance between looking good and being cost-efficient. [47], [48], [49]

**Aesthetic appraisal:** Feedback from stakeholders on the visual appeal of designs. This entails gathering feedback from stakeholders on the visual appeal of the designs. Stakeholders can provide qualitative input on aspects such as overall impression, emotional response, suitability for the intended purpose or location and any specific likes or dislikes they have regarding the designs. Gathering feedback from stakeholders provides valuable insights into the subjective aesthetic preferences and perceptions of the target audience. By collecting qualitative input on aesthetic aspects, the appraisal phase captures perspectives that quantitative assessments may overlook, leading to a better understanding of aesthetic appeal. [47], [48], [49]

## CHAPTER 6. MEASUREMENT & DOCUMENTATION

### 6.1 GENERAL APPROACH TO EVALUATING CO-CREATION


While there is widespread agreement on the value of involving end users in the design process of products or services they may eventually use, there is a need for concrete evidence regarding the impact of such involvement [50] and **co-creation processes need to be evaluated**. Evaluation serves as an important component in understanding the strengths and weaknesses of co-creation initiatives, guiding future improvements and decision-making. By systematically assessing co-creation processes, organizations can gain insights into various aspects such as stakeholder engagement, collaboration dynamics, innovation generation and overall project success. Evaluation helps in identifying areas of improvement, best practices and lessons learned, contributing to continuous learning and development. Thus, an important part of any participatory approach is its measurement and evaluation to understand the quality and impact of the process. This entails monitoring the process from inception to conclusion and gathering various types of data on the users engaged, activities conducted, and results achieved. [41], [51]

Co-creation processes are usually evaluated through a combination of **qualitative and quantitative methods** that capture both process dynamics and outcomes. Qualitative approaches, such as interviews, focus groups and participant observations, provide insights into stakeholder experiences, collaborative dynamics and the co-creation process's effectiveness in creating mutual learning and knowledge exchange. These methods enable to uncover nuanced perspectives, identify barriers and enablers of collaboration and assess stakeholder satisfaction with the co-creation experience. The user experience and satisfaction with the process is an important criterion for successful co-creation and co-design. [52 pp 64-66]

On the other hand, quantitative metrics, data on users/participants, e.g., age, gender, how participants are engaging, how often, how long, measured through counting, surveys, KPIs and related indicators, offer objective measures of project outcomes, innovation outputs and societal impact. [9] metrics help quantify the reach, relevance and effectiveness of co-creation initiatives, providing stakeholders with evidence of their contributions and accomplishments.

However, the sometimes non-linear nature of co-creation (see also Chapter 2) can pose a challenge for evaluation, especially because co-creation and co-design can include a wide range of activities which can make it difficult to directly link the co-creation and co-design with the outcomes; co-design





may not even have pre-defined outcomes and different participants in co-design may engage in different ways or have different experiences. As such, **monitoring the co-creation process and co-design throughout its various stages and recording constantly users' behaviour, engagement patterns, and opinions can provide the main insights into assessing the impact of the co-creation and co-design approach.** If available, quantitative data such as participant numbers can support evaluation, providing both additional information and a means of validating the qualitative input, but it alone provides an insufficient basis for evaluating the involvement of stakeholders [40 pp 86-87].

It is therefore important **to combine several methods** and tools to gather input for evaluation, especially highlighting collective discussions between participants, using interviews and direct contact with evaluation target groups, combined with more quantifiable and standard surveys helping to keep track of progress over time and collecting standardised information from the evaluation target groups. By combining qualitative and quantitative evaluation approaches, a comprehensive understanding of co-creation processes can be gained, from their inception and implementation to their long-term impact on stakeholders and society.


**Evaluation must be thought about before the engagement process starts!**

Considering evaluation before the engagement process starts is important for several reasons. Firstly, it allows for the careful selection of appropriate evaluation tools and methodologies tailored to the specific objectives and nature of the co-creation initiative. Secondly, early consideration of evaluation ensures that key user and stakeholder groups are identified and involved from the outset, maximizing the richness and relevance of the data collected. Additionally, pre-planning evaluation facilitates the establishment of clear benchmarks and objectives against which the success of the co-creation process can be measured, aiding in the identification of areas for improvement and optimization as the process unfolds.

For any evaluation to be successful, it **needs to be planned out carefully** before the object of evaluation is implemented. The **stages of evaluation** are:

1. **Defining the object of evaluation** – which process/activity/intervention do you wish to evaluate? Where does it take place (geographical), when (temporal) and in which field (sectoral)?
2. **Setting indicators and defining evaluation questions** – what do you wish to achieve with the process/activity/intervention? Phrasing clear and concise evaluation questions that relate to, for example, the effectiveness, efficiency, sustainability, or utility of the object of evaluation. If relevant, **setting easy to understand performance or success indicators**, e.g., quantifiable (the number of X increases by Y) or qualitative (target group X feels more knowledgeable about Y) that can be measured after the process/activity/intervention. NB! Setting baselines and target objectives early in the evaluation process is paramount for accurate assessment later on. These benchmarks facilitate more precise evaluation, but also empower stakeholders to monitor their own progress and make informed adjustments as needed throughout the co-creation journey.
3. **Choosing evaluation methods and tools** – which tools or methods do you wish to use to answer your evaluation questions or measure your indicators? Do some tools need to be used continuously (e.g., for gathering data) or only once? Choosing the tools, you use based on your needs and goals. These can be tools and methods you have used previously, or you can test new approaches to evaluation. It is always best to combine quantitative tools (e.g., surveys, statistical analyses) with qualitative ones (e.g., interviews and conversations) to gain deeper insight into the topic.
4. **Planning time and resources for evaluation** – assigning roles within the evaluator team – who collects which data, who is responsible for analyses, etc. Allocate time for evaluation and be mindful that it may take longer than planned.





**Every evaluation is closely related to setting suitable key performance indicators (KPIs).** KPIs offer a structured framework for assessing the performance and progress of co-creation initiatives against predefined objectives and benchmarks. They enable the core team and stakeholders to track progress, measure success and identify areas for improvement throughout the co-creation process. By defining specific KPIs aligned with the goals and objectives of co-creation projects, organizations can effectively monitor key aspects such as stakeholder satisfaction, engagement levels, innovation outcomes, resource utilization and overall impact. [47]

When evaluating co-creation processes, distinguishing between **output indicators and outcome indicators** is necessary for comprehensively understanding their effectiveness and impact. **Output indicators** typically measure the immediate results or outputs generated directly from the co-creation activities. These indicators focus on quantifiable elements such as the number of participants involved, the completion of specific tasks, or the creation of tangible deliverables. On the other hand, outcome indicators assess the broader and longer-term effects or outcomes resulting from the co-creation process. These indicators delve into the changes, impacts, or benefits experienced by stakeholders or the community as a whole, often reflecting progress toward larger goals or objectives. **Outcome indicators** provide valuable insights into the overall effectiveness and impact of the co-creation efforts beyond the immediate outputs.

Monitoring and assessing KPIs **requires proper attention to documentation and tracking of the co-creation process** since the beginning. Some more universal KPI groups and documentation approaches in co-creation processes are [43][47]:

- **Stakeholder engagement results and impact:** Number of participants, engagement levels. Tracking metrics such as the number of participants and engagement levels provides a quantitative measure of the project's impact, indicating its reach and effectiveness. Methods: Metrics tracking.
- **Demographic considerations:** Insights into participant demographics influencing co-creation. Gathering demographic data through surveys helps in recognizing how participant characteristics may influence co-creation dynamics, enabling a more nuanced understanding of the local context. Methods: Demographic surveys.
- **Participant satisfaction:** Overall satisfaction, perceived value of participation. Surveys provide quantitative data, while interviews and feedback sessions offer qualitative insights into participant experiences, helping to grasp overall satisfaction and identify areas for improvement. Methods: Surveys, interviews, feedback sessions.
- **Awareness levels:** For example, changes in awareness of IPV technology. By utilizing surveys before and after participation, the project can measure changes in awareness, ensuring that the co-creation process effectively contributes to increased understanding of IPV technology. Methods: Pre- and post-participation surveys.
- **Aesthetical evaluation of IIPV/BIPV:** see Chapter 5.3
- **Attitudes toward innovations, e.g. IPVs/behavioural changes:** Shifts in perceptions and acceptance of IPV. Surveys capture quantitative shifts in attitudes, while focus group discussions allow for in-depth exploration of participant perceptions, aiding in understanding the nuanced changes in attitudes towards IPV. Methods: Surveys, focus group discussions.
- **Process documentation:** Standard procedures for documentation. Project management tools, collaborative platforms. **For example, in Increase project local level communication, dissemination and co-creation activities, e.g., workshops will be monitored through the standard monitoring tool provided together with WP8 task coordinators.**

- **Detailed records of co-creation activities.** This helps to document the co-creation process, ensuring that timelines, tasks, and responsibilities are clearly recorded, facilitating efficient management. See also **Table 14**. Methods: planning documents, reports, meeting records.

It is a common mistake to overlook the establishment of baseline values and target objectives in the evaluation of co-creation processes. Without these benchmarks in place, it becomes challenging to accurately measure progress, assess the impact of the co-creation efforts, and determine whether the desired outcomes have been achieved. Failure to define such parameters can result in ambiguity, making it difficult to track progress effectively and evaluate the success of the co-creation initiative. Therefore, it is essential for evaluators to prioritize the establishment of baselines and targets to ensure a comprehensive and meaningful evaluation of co-creation processes.

Thus, understanding the direct impact of co-creation and co-design activities on participants throughout the process is crucial. In order to facilitate this understanding, NPC Toolkit suggests **utilizing the five types of data framework, which suits well also for the Increase purposes**. This framework offers a comprehensive view of the data that should be gathered during the co-creation process. The following table outlines these five types of data, detailing what each can reveal about the effects of participant involvement in co-creation and co-design activities. Additionally, it provides recommendations for suitable data collection tools. It is essential to prioritize data collection based on relevance and feasibility, focusing on information that will be actively utilized. [9]

**Table 14. Evaluating co-creation and co-design. Source: [9] and authors' elaboration.**

Type of data	What will it tell you about the benefits for participants	Tools	
All organisations should collect regularly	<b>User data</b> About participants, e.g. age, gender, socio-economic status	<b>Whether the intended participants are involved</b> User data can be compared with data for your target audience more broadly to determine whether users reflect your target group. You may want to consider whether any particular groups are over- or under-represented, and whether some steps to engage participants were more effective than others. It may be possible to explore the relationship between these characteristics and the other types of data, including the type and level of engagement, the positivity of their experience, and the outcomes achieved.	Registration or sign-up forms, referrals, partner records (e.g. from schools, municipalities).
	<b>Engagement data</b> How participants are engaging with you: how often, how long for, in which activities	<b>Whether participants are engaging with the co-design process as intended</b> You can explore which types of co-design activities are being provided, which activities participants are engaging with the most, the extent to which they engage (e.g. staying for the full session, consecutive sessions), and the extent to which engagement is sustained. You may find you need to design particular types of approach to engage different groups. The impact of co-design on outcomes for participants is likely to be greatest when engagement is sustained.	Registers, sign-in sheets, website analytics, digital tools e.g. smartphones.
	<b>Feedback data</b> About participants experiences	<b>Whether participants are experiencing the co-design process as intended and where you can improve</b> Effective co-design is about sharing power with participants as equals. Whether participants feel they have experienced this is critical. You need to provide consistent ways for all participants to tell you what they have experienced, anonymously, and for you to respond by explaining what you heard and what you've changed as a result. Feedback data should be light-touch-to minimise the burden of data collection-and, ideally, systematic-to increase consistency and allow for comparability.	Conversations, social media, instant feedback tools (e.g. 'Rate your visit'), short surveys, self-assessments, peer observations.
Some organisations should collect	<b>Outcomes data</b> How participants have been influenced in the short term	<b>What has changed in the short term-for organisational processes and services, and the participants involved</b> It is likely that observed changes will relate to skills, knowledge and awareness, and behaviour. There may also be changes, for example, to participants' levels of self-efficacy, motivation, and empowerment. Some of these changes will be "intended" and some will be "unintended"— i.e. you didn't expect or plan for them to happen. Unintended outcomes can be positive or negative, so it's important to check what else might be happening alongside the outcomes "of interest". You are not trying to "prove" that these outcomes were caused by the co-design process. This data will tell you how participants think they have been helped.	This will often draw on a mix of quantitative (numerical) and qualitative (non-numerical) data.
	<b>Impact data</b> The long-term difference experienced by participants	<b>Whether the changes reported by participants have helped them to make longer-term positive changes in their lives and organisations</b> In some cases there may be long-term impacts you want to capture, such as better health and wellbeing, or stable housing. The key is that users achieve these changes for themselves, sometimes several years after leaving your provision. It is likely that these changes will also have been influenced by other factors in people's lives.	High-quality evaluation, sometimes carried out externally and/or with a comparison group.

In assessing the quality but also the value of the co-creation process (see also Chapter 2), it is important to reflect on how the process was experienced by everyone involved, considering that different participants are likely to engage in different ways and have different experiences. **No less**

**important is self-reflection of the core team** steering the co-creation process. In short, while planning evaluation and assessment of success and outcome of the co-creation process, the assessment approach and measures could be conceived as shown on **Figure 25**.

Steering group (e.g. Increase project partners/pilot coordinators and their team)	Participants/stakeholders in the co-creation process	Increase innovations/aesthetics
<ul style="list-style-type: none"> <li>• Process and project: Milestones; Barriers; Success factors; Planned Targets; Risks; Unanticipated changes; Budgetary issues, challenges, and status</li> <li>• How did the events/workshops go? What could be improved?</li> <li>• Self-reflection</li> </ul>	<ul style="list-style-type: none"> <li>• Their level of involvement;</li> <li>• Are the materials and concepts easy to understand for them?</li> <li>• Their satisfaction with the co-creation process.</li> <li>• Counting participation data; Feedback surveys (using also Likert scale type questions); Interviews</li> </ul>	<ul style="list-style-type: none"> <li>• Were stakeholders' ideas taken into consideration in the final solution?</li> <li>• Overcoming the challenges and existing knowledge gaps;</li> <li>• Potential market uptake of Increase solutions</li> <li>• Roundtables, surveys, interviews; satisfaction with final pilots (surveys using Likert scale type questions)</li> </ul>

**Figure 25. Potential focus on co-creation evaluation and measures. Source: authors**

Some key questions for evaluating co-creation are given in **Table 15**.

**Table 15. Questions in co-creation evaluation process. Source: [9], adapted by authors**

Ask from the core team/yourself	Ask from the participants
<ul style="list-style-type: none"> <li>• Were the right user and stakeholder groups involved? Were any groups missing?</li> <li>• Did a sufficient number of members of the appropriate target group participate to represent the group as a whole?</li> <li>• Was the right tool chosen for the key problem and objectives?</li> <li>• Was the process carefully planned and organised as intended?</li> <li>• Were there any shortcomings or surprises?</li> <li>• Did anything emerge that did not work as expected, or were there unexpected changes to the plans?</li> </ul>	<ul style="list-style-type: none"> <li>• What was the feedback from participants, i.e., were they satisfied or dissatisfied?</li> <li>• Do participants feel they were provided enough support to participate in the activities?</li> <li>• Was enough time provided for stakeholder involvement?</li> <li>• Was the material shared with all participants appropriate and the language understandable?</li> <li>• Was equal partnership promoted?</li> <li>• Did the stakeholders feel their contribution was valuable?</li> <li>• Did their behaviour/knowledge change or will potentially change due to the co-creation process?</li> </ul>

**For additional information related to evaluation of co-creation, see also:**

- **NPC Toolkit:** This toolkit delivers a structured framework for evaluating the co-design process. It gives a step-by-step guideline for assessing the process and outcomes of co-creation, ensuring comprehensive evaluation and informed decision-making. Available at: <https://Thinknpc.org>
- **Reflexive Monitoring for self-reflection:** Reflexive Monitoring is an approach to learning and adaptation. It emphasizes continuous reflection and adjustment based on ongoing feedback and insights. Reflexive Monitoring has been utilized to encourage self-reflection and collective learning among project participants. Available at: <https://www.wur.nl/nl/show/reflexive-monitoring-in-action.htm>

## 6.2 MONITORING AND EVALUATION INDICATORS IN INCREASE

Increase outlines a need for comprehensive strategy to engage local stakeholders and end-users effectively. It emphasizes the design of tailored co-creation processes to ensure active participation and familiarity with project innovations. Regular exchanges among partners are planned to discuss ideas, feedback and actions for uptake in research and development activities. WP7 Value chain engagement and acceptance and WP8 Impact creation pay a lot of attention to understanding current challenges and barriers in IPV innovations and uptake and how to overcome with them proposing several communication and dissemination measures also applied to Increase local pilot contexts. Additionally, the aim is to use KPIs for all project phases, ensuring adequate monitoring and assessment of co-creation and of aesthetical aspects.

In relation to co-creation, the following indicators set in the project's description of action (DoA) are important to consider also for the pilot coordinators (see **Table 16**). The last one in the table is directly related to co-creation process while the others are more communication & dissemination related KPIs.

**Table 16.** KPIs from the Increase communication and dissemination plan according to DoA, related to co-creation

Activity	Timing (months)	Total min. # during project duration
At least 5 videos, showing the co-creation process, various realisations with PV integrated in buildings and infrastructure, production and installation processes, widely promoted through various local and European channels, and partner outreach networks	34,42	2 000 views each
Pilot specific information, engagement, and spill-over campaigns, including social media	20-54	100 views each
Local workshops dedicated stakeholders (contractors, designers, cities, ...), 6 in total	9-52	250 attendees in total
Webinar, focussing on interesting renovation cases with integrated PV	40-50	200 participants in total, another 400 watching the recordings
Training for experts in renovation	36-48	120 participants

Even though the DoA considers participant numbers as the main KPI for the co-creation process in Increase, given the anticipated benefits of the process, it is strongly advised for pilot coordinators to utilize the KPIs outlined **Table 17** as standard in their evaluation of the co-creation process. This not only facilitates mutual learning and a more universal approach among the pilots but also provides crucial information for lessons learned and replication efforts.

Table 17. Suggested KPIS for the Increase co-creation processes in pilots

Indicator	Measure	Method
Co-creation activities organized involving the different type of stakeholders	Number	Counting; event records
<p>Number of participants/stakeholders involved in the co-creation activities</p> <p><b>Tip:</b> It is suggested to ask some demographic background information from the participants when they register or provide information through the feedback surveys, e.g., their gender and stakeholder type. This could be valuable information in making conclusions about the process.</p> <p>Also, it is suggested to differentiate between different stakeholder categories in the events as per <b>Table 6</b></p>	Number	Counting; event records; registration sheets or data
Satisfaction with co-creation and engagement activities and workshops by the participants (established of an average score)	%	Feedback surveys; discussions and interviews
Satisfaction with Increase solutions (including different aspects, aesthetics, energy efficiency etc.)	%	Survey among the participants of co-creation (e.g., using Likert scale questions); if possible using user friendly assessment tools (e.g., on spot, online)
<p>Local perception/trust shift: Examining the shift in local perceptions toward integrated PV technology at start of the co-creation process and at the end of the process</p> <p><b>Tip:</b> It's suggested to include relevant questions in the feedback surveys right from the beginning of the process, as it's often the case that the same stakeholders participate in concurrent events of co-creation.</p>	% who claim perception shift	Survey among the participants of co-creation (e.g., using Likert scale questions)
<p>Increase of IPV awareness among the people involved in the co-creation process.</p> <p>This supports in assessing overcoming barriers and challenges on wider level and evaluating the potential impact of Increase.</p> <p><b>Tip:</b> It's suggested to include relevant questions in the feedback surveys right from the beginning of the process, as it's often the case that the same stakeholders participate in concurrent events of co-creation.</p> <p><i>Overcoming barriers and challenges on wider level and evaluating the potential impact of Increase as per WP7 and 8 is handled in WP7 and WP8.</i></p>	%	Survey among the participants of co-creation (e.g., using Likert scale questions);








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## ANNEX 1: TEMPLATE FOR LOCAL CO-CREATION PLAN

*This template can be used as a minimum basis for co-creation implementation plan, strongly advised to be set by each Increase pilot team doing co-creation with stakeholders. Pilot teams are encouraged to add planning elements and use additional methods and tools as relevant to their specific case.*

### Introduction

*A brief overview of the pilot's location, content, need and outcome.*

### Mission and goal for co-creation

### Co-creation matrix

Reason	Context and conditions	Activities	Outcomes
Why is co-creation necessary for your pilot?	Description of external context and conditions that may affect the project (e.g. cultural, social, economic environment, prior stakeholder relationships, etc.)	What activities do you plan to carry out collaboratively	What are the expected outcomes or results?
Type here:	Type here:	Type here:	Type here:

### Team and roles (see Table 3 for more information)

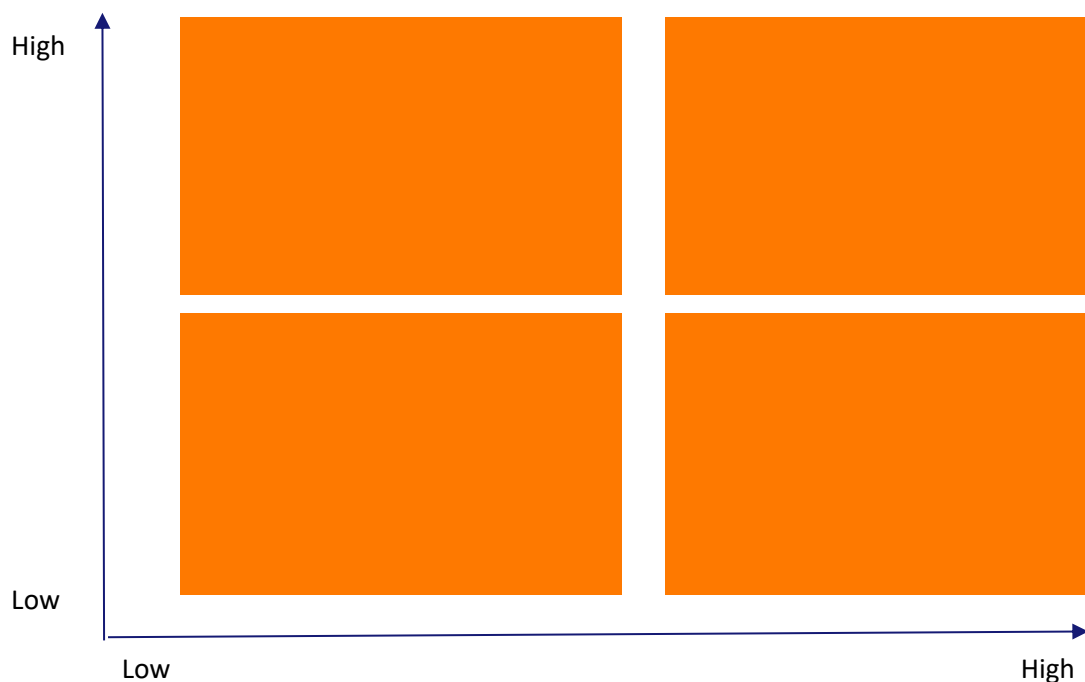
Role, task description	Responsible person

## Stakeholders and target groups

The stakeholder analysis table is crucial for project planning as it identifies (presumption) key stakeholders, assesses their attitudes, impact, and interest levels, enabling a targeted approach for effective engagement and management throughout the project. Stakeholders are individuals, groups, or organizations that have an interest or stake in the outcome of the co-creation process. Stakeholders often have a vested interest in the success of the project and may contribute resources, expertise, or influence to shape its direction. **Stakeholders** encompass a broader range of individuals or entities with an interest in the co-creation process, the **target group** represents the specific subset of stakeholders who are the primary beneficiaries or end-users targeted for engagement and collaboration in the development process. For example, in case of Pilot 4 (Tartu Hansa School), target groups are the students, school personnel, nearby kindergartens employees and children, the public while the stakeholders are the city government, architects; technical consultants and construction companies, etc.








### Stakeholder power/interest matrix

Here you will find a matrix to identify which category a stakeholder belongs to (see **Chapter 4 Stakeholder power/interest matrix** for inspiration)



Stakeholder/ target group	Category (e.g., public, academia, NGO, citizen...)	Reasons to involve the stake- holder	Needs and expec- tations	State (supportive, neutral, critical)	Impact/ influence (relevant, neutral, moderate)	Interest (big, neutral, moderate)	Contacted (yes/no)

## Stakeholder/target group engagement plan

 Phase, activity	 Stakeholders/target groups	 Objectives in terms of com.	 Barriers	 Key messages	 Actions	 Channel				
						W	FB	X	LI	O

## Risks

Risks	Mitigation measures

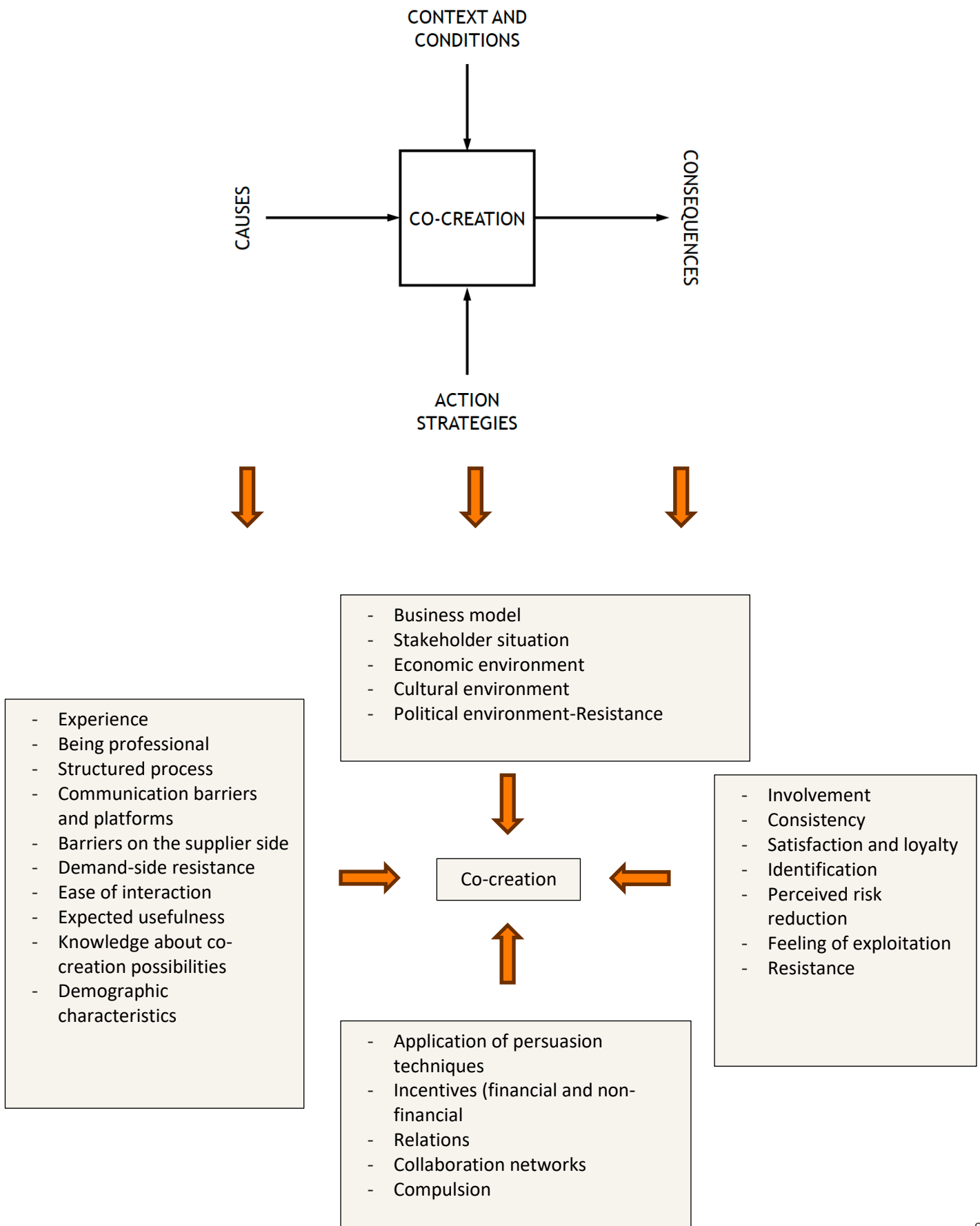
## Indicators (See Chapter 6.2 for more information on indicators)

Indicator	Description of indicator and means of measurement	Outcome 2024	Outcome 2025	Outcome 2026	Target value (for the whole project) - forecast



## ANNEX 2: CO-CREATION CODING PARADIGM

Co-creation coding paradigm according **The I-Care Smart Co-Creation Handbook**, slightly adapted by authors. [10]





## Notes on the coding paradigm:

This model assumes that multiple actors have tangible or intangible resources such as capital, knowledge or skills at their disposal, which they integrate to a jointly coordinated and executed co-creation process. This process is framed by a specific context (roughly the situation and environmental factors in which the co-creation process is executed). One or more actors take over the main steering and coordination tasks. As a result, new resources (tangible or intangible) for each actor are created that can be integrated into subsequent processes. These new resources include the innovation itself, new experiences, new expertise, and so on.

- Co-creation is a process that involves joint activities of a provider of a solution/service/policy with other stakeholders and aims to generate value for the parties involved and for other beneficiaries.
- Co-creation is not identical with the term value (co)creation. Co-creation refers to joint action, interaction and communication. Value creation refers to the benefit emerging from co-creation.
- Numerous terms are used to describe similar phenomena from different theoretical and practical perspectives, e.g. co-production, open innovation, collaborative production and consumption.
- The central **causes** (willingness and actual involvement in co-creation) for the phenomenon can be named as follows:
  - Experience: The more experience the provider has with the management and co-creation with the target group, the higher the probability of success. The more experience and positive experiences with co-creation on the customer's side, the higher the probability of success.
  - Being professional: The more professionally co-creation is initiated, coordinated and executed, the higher the probability of success. The relationship between the parties involved must be taken into account: A positive personal relationship enhances this effect.
  - Structured process: The more structured and transparent the presentation of objectives and the path to joint achievement of objectives, the higher the probability of success.
  - Communication barriers and platforms: The more the participants speak a common language (i.e. understand each other based on the same language milieu), the higher the probability of success. This includes the use of communication platforms that the parties involved are familiar with and trust.
  - Barriers on the provider side: The less willing the employees are to integrate the target group in the development of innovative offers, the lower the probability of success. Typical examples of unwillingness are mistrust in the target group's ability to evaluate new technologies or bureaucratic structures.
  - Demand-side resistance: The higher the resistance on the part of the target group to change habitual everyday processes and the higher the desire to stick to habitual patterns of behaviour, the lower the interest in co-creation.
  - Ease of interaction: The simpler, less bureaucratic and less complicated the interaction between the participating parties, the higher the probability of success.
  - Expected usefulness: The parties involved must feel that they benefit from co-creation without being taken advantage of. The higher the perceived usefulness, the higher the probability of success.
  - Knowledge about co-creation possibilities: The parties must know where and in which projects they can carry out co-creation activities and be involved.
  - Demographic characteristics: Demographic characteristics (age, gender, nationality, etc.) influence the willingness to participate in co-creation. The higher the fit between these characteristics and the concrete innovation project, the higher the probability of success.
- Co-creation goes hand in hand with **consequences**, which can be positive or negative from the perspective of those involved:
  - Involvement: Stakeholders identify more with the innovation when they realize that their involvement has influenced the outcome. These people are more willing to participate in further co-creation projects.



- Consistency: People who have contributed positively to an innovation tend to behave consistently in the sense of acceptance of the innovation. The more influence was exerted on the outcome of an innovation, the higher the acceptance of the innovation.
- Satisfaction and loyalty: Contributors who have co-created an innovation are more satisfied, which leads to more loyalty and positive word-of-mouth advertising to customers.
- Identification: Contributors who have co-created an innovation identify more with the result.
- Perceived risk reduction: The more customers are involved in the co-creation of an innovation, the less risk they perceive in using the innovation.
- Feeling of exploitation: Customers who participate in co-creation may feel exploited if they feel that they are being used as co-workers without receiving the appropriate recognition from the partner.
- Resistance: Bad experiences with the co-creation process leads to resistance against further co-creation processes and to resistance against the innovation.
- Each co-creation activity is embedded in a concrete **context** (roughly: situation) that influences this process. The following aspects are of particular relevance:
  - Business Model: The business model of the provider influences the way co-creation can be carried out. It also influences the willingness of customers to participate in co-creation. The more social the business model is perceived, the higher the willingness to cooperate.
  - Stakeholder situation: The specific situation of those involved must be considered. This refers to the ability to cooperate, to the intellect, to personal goals and to the personal life situation.
  - Economic environment: The economic situation is not identical in the partner regions. This influences the ability and willingness to co-create for all parties involved.
  - Cultural environment: Cultural influences (signs, language but also basic assumptions, e.g. regarding the way of doing business) have to be considered and incorporated into the design of a co-creation platform
  - Political environment: The political system may determine the willingness to participate and the possibilities of co-creation.
- In order to increase the readiness for co-creation, several **strategies** seem to be suitable:
  - Application of persuasion techniques: To initiate co-creation, classical influencing techniques are suitable. In particular:
    - Reciprocity (showing mutual favours),
    - Consistency (co-creation initially on a small scale and gradually expanding),
    - Liking (building up sympathy, for example by showing common goals),
    - Authority (presenting expertise),
    - Social proof (showing that other stakeholders are also involved) and
    - Scarcity (co-creation as an exclusive process).
  - Incentives (financial and non-financial): Financial and non-final grants support the readiness for co-creation. The latter aspect can, for example, be achieved by acknowledging the performance of the person concerned.
  - Relations: The development and expansion of personal relationships can be used as a strategy for initiating and implementing co-creation.
  - Collaboration Networks: Support through professional networks for collaboration increases the willingness and ability to participate in co-creation.
  - Compulsion: In certain situations, it is impossible to develop an innovation and position it on the market if customers do not participate, for example if the innovation is specifically tailored to a particular life situation and can only be functional if the customer cooperates by providing information or other resources.

## ANNEX 3: CRITERIA FOR STAKEHOLDER IDENTIFICATION

Criteria to be considered when starting a stakeholder mapping process ([41] pp 13-14)

Criteria to be considered when starting a stakeholder mapping process		
Criteria	Specification	Stakeholder identification
	<i>Indicator/ sub-criteria</i>	<i>Questions that invite thinking about criteria and indicator</i>
Engaging a variety of stakeholder groups	Wide range	Is there a wide range of stakeholders involved, such that there is a diversity of values and diversity of types of knowledge/expertise (i.e., experiential knowledge, scientific knowledge) represented and/or generated?
	Relevant voices	Is there diversity in the stakeholders engaged such that all relevant voices are heard – silent as well as loud (i.e., stakeholder groups that might not feel immediately empowered to let their view know and groups that do, or groups that are difficult to reach)?
	Demographic diversity	Is there diversity within the stakeholder groups involved in terms of gender, ethnicity, class, age and other demographics?
	Sufficient number	Are a sufficient number of perspectives and participants included, such that eventual outcomes are robust?
Engagement of public(s)	Pertinent engagement	Is it considered to have the right publics involved in the right phases of the project?
Institutional diversity	Internal social differences	Is there attention and respect paid to group/social differences (e.g., gender, race/ethnicity, class, sexual orientation, and ability as well as cultural, political, religious, or other affiliations)?
	Minority recruitment strategies	Are there minority recruitment strategies in place to increase, within the mapping for future practices, a balance in race/ethnicity, class, gender, sexual orientation, country of origin, and ability, as well as cultural, political, religious, or other affiliations?
Flexible attitudes to revise views and actions	Individuals	Are the individuals involved willing and able to revise their views and actions?
	Organisations	Do the organisations involved offer adaptive space to respond flexibly to changing circumstances, changing needs and values of other stakeholders and organisations involved?
Change responsibilities	Role responsibilities	Are actors involved prepared to take, enlarge and/or redefine their role responsibilities?
	Acceptance of accountability	Are actors prepared to accept, through processes of dialogue, accountability fitting their role for potential positive and negative impacts, choices and processes?
Application of results	Stakeholders	Are (affected) stakeholders willing and equipped to apply new knowledge, values/norms and competencies?
	Organisations and systems	Do the organisations and systems involved offer adaptive space to respond flexibly to changing knowledge, values/norms and learned competencies?



## ANNEX 4: CHECKLIST FOR EVENTS

### Checklist for focus groups/workshops/events

This is a checklist for workshops organizers to check if all aspects of an upcoming event have been considered and prepared. If a statement does not apply to your event or circumstances, skip it and feel free to add your own reminders and notes-to-self at the end of the checklist. See also Chapter 4 of this report for practical advice and guidelines on how to conduct a workshop. The second part of the checklist document also includes useful best practice examples and tips to keep in mind. Have a productive, engaging event!

#### BEFORE

- I have a **clear goal** in mind for my event.
- I know **who** I want to engage and invite (I have mapped all my target groups and contacts).
- I know **how** to engage and invite my participants (which communication channels I will use, which type on invitations I will send out).
- I know **where** the event will be held and have made all practical arrangements (selected online environment or venue).
- I have informed my participants of any **ethical or privacy-related considerations** (they have received information and responded permission to take photos, record the event, if relevant, use their contact information in the future).
- I have prepared an **agenda and time schedule/moderation sheet** for my event.
- I have prepared my **registration forms**/means of registration.
- I have secured all necessary **equipment** for my event (e.g., paper, pens, whiteboard, microphones etc).
- I have sent any necessary **materials** to my participants (e.g., fact sheets), if relevant.
- I know which **additional tools** I want to use during my event (e.g., digital tools such as Mentimeter, Kahoot; physical tools such as voting, mapping, flash interviews).
- I have **tested** all my equipment and tools.
- I have **clear roles** for all the organizing team members.
- I know how to **evaluate** my event and have prepared the tools (e.g., via feedback forms, online tools, interviews).
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

#### AFTER

- I have **summarized** all the results and data from my event (e.g., participants' notes and input, results of digital polls/quizzes).
- I know my participants' **private information** and other sensitive information is secure.



- I have **thanked** my participants for their participation (e.g., send thank you and sum-up e-mail after each event).
- I have **informed** my participants of the next steps of the process.
- I have **evaluated** my event and reflected on whether it met my expectations **using the facilitator's self-reflection assessment**.
- I know what worked well at my event and what did not, and **what to do better next time**.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### Best practices and tips

- **Start inviting participants early and cooperate with local organizations** – do not leave sending out invitations to the last minute, ensure that you have enough time to contact all your participants. Be mindful that your participants may be a varied group and you may not be able to reach everyone through a single channel, several methods may need to be used.
- **Choose a date and time based on the everyday reality of your participants** – e.g., if your participants are working, daily events that overlap with working hours may be good to be avoided.
- **In case of physical events, think of organizational issues** – for example, is your venue accessible and easily located (think of the characteristics of your target groups and potential participants and what their requirements or preferences may be), do you have refreshments and drinks available, do you have planned for enough breaks in the agenda, etc.
- **Send reminders** – be sure to confirm everyone's participation, e.g. calling your participants a day before as a reminder is a good idea.
- **Creative thinking requires creative spaces** – if you are embarking on a journey of (co)creation, ensure that your setting is appropriate, e.g., your venue is bright, welcoming and engaging.
- **Keep introductions short and language clear** – avoid overly lengthy introductions or instructions; if you are using field specific terms then be sure to explain these. Ensure that the participants understand everything you say – encourage asking questions, or if you know your participants may be hesitant to speak up in front of others, consider using digital tools for leaving anonymized feedback.
- **Avoid 'groupthink'** – sometimes group expression can interfere with personal expression, resulting in participants abandoning their personal opinions for the sake of the group's. This can be combated by introducing other means of feedback, e.g., using digital tools, ensuring that all voices are heard.
- **Let participants know what happens next** – if you are embarking on a series of events with the same participants, this is especially important. Be sure to inform participants of this both at the start and at the end of the event and also in any follow-up emails.



## ANNEX 5: WORKSHOP FACILITATOR'S SELF-REFLECTION SHEET

*Tip: Consider using electronic formats like MS Forms or Google Forms to easily insert and store information.*

1. Insert the location and date of the event: \_\_\_\_\_

2. Was the co-creation activity held online or in-person?

- a. Held online.
- b. Held in-person.

3. How many participants were present in the workshop? \_\_\_\_\_

4. Are you satisfied with the participation rate? Please explain, if not?

- a. Yes
- b. No
- c. More or less

Explanation \_\_\_\_\_

5. Are you satisfied with the group composition? Please explain, if not?

- a. Yes
- b. No
- c. More or less

Explanation \_\_\_\_\_

6. Please indicate the extent to which you agree with the following statements.

	Agree	Somewh at agree	Somewh at disagree	Disagree	I don't know
<i>Participants seemed interested and attentive.</i>					
<i>Participants participated actively.</i>					
<i>The co-creation activity was productive.</i>					
<i>There were participants who seemed less engaged.</i>					
<i>There were questions about the instructions.</i>					

Please explain \_\_\_\_\_

7. What was the highlight for the co-creation activity?



**8. Did you experience any challenges during the co-creation activity?**

**9. Would you do anything differently for the next meeting? Or if this is the last activity, what would you change for future projects?**

**10. Are there additional comments you would like to make about the meeting?**

## ANNEX 6: FEEDBACK SURVEY EXAMPLE

**Note: Uniform feedback from participants in Increase activities:** This document makes a proposition for the pilots concerning the questions which could be asked from participants in their pilot co-creation activities (e.g., co-creation workshops, events, visits...)

Today's date: \_\_\_\_\_

On a scale of 1-10, how knowledgeable are you about the IPV solutions (1 being the least knowledgeable and 10 being the most knowledgeable). Mark with an X.

1	2	3	4	5	6	7	8	9	10

In your current understanding and confidence in the technology, would you prefer IPV solutions over traditional PV solutions, if applicable?

- Yes, certainly
- Mostly yes
- Mostly no
- Certainly no
- I don't know

*Note: Short explanation of both technologies may be necessary to add as a background*

Please explain \_\_\_\_\_ (voluntary option)

How satisfied are you about the event you participated in.

- Very dissatisfied
- Dissatisfied
- Neutral
- Satisfied
- Very satisfied
- No opinion

Please rate the quality of the different aspects below: (1-very bad; 5-very good). Mark with an X.

	Very bad	Bad	Neutral	Good	Very good	No opinion
The communication before the activity						
The timing of the activity						
The practical organization of the activity						
The catering during the activity (only offline)						
The topic/content of the activity						
The location of the activity						



**On a scale of 1-10, do you feel like your opinion and ideas were valued?** (1 being that you did not feel your opinions and ideas were valued and 10 being that you felt your opinions and ideas were valued). *Mark with an X.*

1	2	3	4	5	6	7	8	9	10

Please explain \_\_\_\_\_ (voluntary option)

**On a scale of 1-10, do you feel that the meeting leaders created an inclusive and safe space?** (1 being that the activity leaders did not create a welcoming and safe space where I can share my ideas and 10 being the activity leaders absolutely created an inclusive and safe space for me to share my ideas). *Mark with an X.*

1	2	3	4	5	6	7	8	9	10

Please explain \_\_\_\_\_ (voluntary option)

**Were the event/workshop materials and content clear, understandable, and easy to read?**

- Yes
- No
- Not sure

**Do you feel you had enough opportunity to speak up and express your views?**

- Yes
- Somewhat
- No

**Do you have the feeling your participation was valuable to the organizers?**

- Yes
- No
- No opinion

**Do you have the feeling your participation was valuable for yourself?**

- Yes
- No
- No opinion

**Which part of the programme interested you the most?**

---

**Which part of the programme interested you the least?**

---



**What can we improve the next time?**

---

**What topics should be covered at the next meetings?**

---

**Have you participated in similar events before?**

- Yes
- No
- Not sure

**Are you willing to participate in future similar events?**

- Yes
- No
- Not sure

Please feel free to add any other comments or suggestions here below.

---

**Note:** It is advisable to include questions about the participants' background data to the survey for later evaluation purposes and for adjusting the co-creation and communication strategy, if needed. Below you find examples of adding such questions to your survey.

**Note:** these surveys should be anonymous and participants clearly informed about how this data will be handled (see also Increase D9.3 „Ethics Handbook“ and chapters above).

**Note:** If necessary in the local circumstances (e.g. language barrier), it is recommended to translate the survey to your local language.

In this section, we kindly request information about your demographic characteristics. Please mark your response to each question with an "x".

**Please specify your gender**

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>
Non-binary	<input type="checkbox"/>
Prefer not to say	<input type="checkbox"/>

**Please specify your professional background**

Public sector organisation	<input type="checkbox"/>
Private sector organisation	<input type="checkbox"/>
Not-for-profit organisation	<input type="checkbox"/>
Media	<input type="checkbox"/>

Other (please specify)	
------------------------	--

**Please specify your regional location**

Urban	
Suburban	
Rural	

**Please specify your age**

Under 18	
18-24	
25-34	
35-44	
45-54	
55-64	
65 or older	

**To which stakeholder group do you consider yourself belonging? You may select multiple options.**

Citizen	
Local and regional authorities	
Architects, building designers, and students in these fields	
Project developers, urban planners	
Infrastructure developers	
Installers, construction companies	
Facility managers, engineers	
PV and construction industry (manufactures)	
One-stop shops for renovation	
Investor, banks, insurance	
Policy maker	
R&D industry, knowledge centres, academics	
Other (please specify)	





## ANNEX 7: CO-CREATION CASE STUDIES

In this Annex you can discover detailed case studies illustrating various co-creation projects. These case studies provide insights into the practical application of co-creation, highlighting successes, challenges and valuable lessons learned from real-life experiences. Whether you seek inspiration or a deeper understanding of co-creation dynamics, exploring these case studies offers valuable insights and perspectives.

### Case study 1:

#### Barcelona's solar neighbourhood project

Barcelona's solar neighbourhood project focused on transitioning residential communities to renewable energy sources, particularly solar power, to reduce carbon emissions and increase energy independence. The project aimed to empower residents to actively participate in the energy transition while promoting community resilience and social cohesion.

Co-creation process: Local residents, renewable energy experts, urban planners and local authorities collaborated through community workshops, energy audit, and participatory design charrettes. Co-creation sessions created the development of neighbourhood-level energy plans, rooftop solar installations and community-owned energy cooperatives.

Outcomes: Installation of solar panels on residential buildings, implementation of energy efficiency measures and adoption of demand-side management strategies have reduced energy costs and carbon footprints. Enhanced community engagement in energy decision-making and strengthened social networks have created a sense of ownership and shared responsibility for sustainability.

Challenges and lessons learned: Overcoming regulatory barriers to grid integration and securing financing for renewable energy projects were challenging. The initiative highlighted the importance of policy alignment, stakeholder engagement and capacity-building initiatives to support decentralized energy transitions.

Link to the project: <https://www.energia.barcelona/en>,  
<https://www.theguardian.com/world/2022/jul/24/barcelona-school-residents-create-solar-energy-community>

## Case study 2:

### Ghent's Smart City Initiative

Ghent's Smart City initiative aimed to leverage technology to enhance urban living, focusing on environmental monitoring, energy efficiency and citizen engagement through co-creation.

Co-creation process: The initiative included hackathons, open data challenges and citizen forums, inviting residents, tech enthusiasts and experts to co-develop smart solutions. This participatory approach aimed to ensure that technological developments were grounded in the needs and aspirations of the city's inhabitants.

Outcomes: Implementation of smart lighting systems, development of an open data platform for environmental monitoring and enhanced citizen participation in urban governance through digital tools.

Challenges and lessons learned: Ensuring data privacy and security while fostering innovation was challenging. The initiative demonstrated the potential of smart technologies to engage citizens actively in urban development and the need for strong governance frameworks to support innovation.

Link to the project: <https://www.beesmart.city/en/smart-city-blog/city-portrait-getting-smart-in-ghent>

## Case study 3:

### Lyon Confluence

Lyon Confluence aims to promote sustainable urban mobility by prioritizing cycling infrastructure, pedestrian-friendly streets and public transportation enhancements. The project seeks to create a more livable, equitable and environmentally friendly cityscape while reducing reliance on private car travel.

Co-creation process: Local residents, transportation planners, cycling advocacy groups and business associations collaborate through public forums and pilot projects. Co-design workshops and idea incubators determine the development of cycling networks, bike-sharing schemes and traffic calming measures tailored to the needs of diverse communities.

Outcomes: Expansion of cycling lanes, implementation of bike-sharing programs and introduction of traffic-calmed zones have encouraged active transportation and reduced traffic congestion. Improved access to public transit hubs and enhanced pedestrian amenities have made the city more accessible and enjoyable for residents and visitors alike.

Challenges and lessons learned: Addressing concerns related to safety, convenience and equity in cycling infrastructure provision has been challenging. The initiative has underscored the importance of user-centered design, multi-modal integration and data-driven decision-making in promoting sustainable urban mobility.

Link to the project: <https://www.lyon-confluence.fr/en/lyon-confluence-exceptional-urban-project>

#### Case study 4:

##### The Pollinator Highway in Tallinn

The Pollinator Highway in Tallinn is a biodiverse natural habitat, functioning as a green corridor traversing six city districts. It follows the path of a former railway embankment and the current high-voltage line corridor. Once the high-voltage lines are relocated underground the potential for establishing a city-wide linear park becomes feasible.

Co-creation process: The development of the Pollinator Highway engages various stakeholders, including local communities, urban planners, environmental experts, and local authorities. Public consultations, workshops and exhibitions are organized to gather input and ideas from residents, ensuring their active participation in shaping the project. Additionally, a dedicated website facilitates ongoing collaboration, enabling residents to share their suggestions, provide feedback, and initiate partnerships related to the initiative.

Outcomes: The implementation of the Pollinator Highway project will result in the creation of a vibrant city-wide linear park, fostering biodiversity and providing green spaces for recreational activities. By relocating high-voltage lines underground, the initiative aims to enhance connectivity between neighbourhoods and offer environmentally friendly mobility options within the urban landscape. The project contributes to improving the overall quality of urban life by integrating nature into the city fabric.

Challenges and Lessons Learned: Balancing biodiversity conservation with urban development presents a significant challenge in the Pollinator Highway project. Managing the interface between natural habitats and urban infrastructure requires careful planning and innovative solutions. The initiative underscores the importance of community engagement and interdisciplinary collaboration in achieving sustainable urban development objectives. Overcoming regulatory hurdles and securing funding for large-scale infrastructure projects necessitates strategic partnerships and long-term planning to ensure project success.

Link to the project: <https://www.putukavail.ee/?lang=en>

### Case study 5:

#### Kotor Bay Initiative

The Kotor Bay initiative focused on preserving the cultural heritage of Montenegro's coastal region while promoting sustainable tourism. The project sought to balance conservation efforts with community development needs.

Co-creation process: Local communities, international heritage organizations, tourism professionals and government entities collaborated through workshops, heritage days and public consultations. These activities aimed to raise awareness of conservation issues and develop sustainable tourism practices that respect the area's cultural and natural assets.

Outcomes: Enhanced conservation measures for historic sites, improved guidelines for sustainable tourism and increased local engagement in heritage preservation efforts.

Challenges and lessons learned: Balancing tourism growth with heritage conservation presented challenges, especially in managing visitor impacts on sensitive sites. The initiative highlighted the importance of community education and involvement in sustainable tourism management.

Link to the project:

[https://expeditio.org/index.php?option=com\\_content&view=category&id=159&Itemid=441&lang=en](https://expeditio.org/index.php?option=com_content&view=category&id=159&Itemid=441&lang=en)

### Case study 6:

#### Energies Partagées Network

The Energies Partagées network supports community energy projects across France, focusing on developing renewable energy sources such as solar and wind power through local stakeholder involvement.

Co-creation process: The network facilitates co-creation by providing tools and platforms for communities to plan, finance, and manage renewable energy projects. This includes workshops, training sessions, and collaborative planning tools that enable residents to contribute to project development actively.

Outcomes: Several communities have successfully launched renewable energy cooperatives, significantly reducing carbon footprints and fostering local economic development through energy independence.

Challenges and lessons learned: Navigating regulatory and financial landscapes was a major challenge. The network's experiences underscored the importance of clear, supportive policies for community energy and the need for accessible financing mechanisms.

Link to the project: <https://energie-partagee.org>

### Case study 7:

#### Zurich's participatory mobility planning project

The city of Zurich launched a participatory mobility planning initiative aimed at redesigning its urban transportation system to prioritize sustainability, efficiency and inclusivity. The project sought to integrate public transportation improvements with bike-sharing programs and pedestrian pathways.

Co-creation process: Zurich's approach involved extensive public consultations, workshops and digital platforms for idea submission and feedback. Residents, local businesses, transportation experts and environmental advocates were invited to contribute their visions for a future mobility plan. This collaborative effort was supported by the Swiss Federal Railways (SBB) and Zurich's local municipality to ensure alignment with broader transportation strategies.

Outcomes: The co-creation process led to the implementation of several key initiatives, including expanded bike lanes, improved public transport connections and the introduction of green spaces along pedestrian pathways to enhance urban livability.

Challenges and lessons learned: Balancing diverse stakeholder interests and integrating new mobility solutions within the existing urban fabric posed significant challenges. The initiative demonstrated the importance of transparent communication and the need for iterative feedback loops to refine proposals based on community input.

Link to the project: <https://local-social-innovation.eu/holistic-mobility-plans/>

### Case study 8:

#### The Bilbao Ría 2000 Project

Bilbao's transformation through the Ría 2000 project is an example of urban regeneration involving extensive co-creation. The initiative focused on revitalizing the city's post-industrial landscape, introducing cultural landmarks, green spaces and waterfront developments.

Co-creation process: The project engaged local residents, businesses and cultural institutions in envisioning the city's redevelopment. Public forums, exhibitions, and participatory design sessions were organized to gather input and foster a shared sense of ownership over the city's transformation.

Outcomes: Key achievements include the development of the Guggenheim Museum Bilbao, which became a symbol of the city's renewal, and the creation of accessible public spaces that improved the quality of urban life.

Challenges and lessons learned: Managing expectations and ensuring the inclusivity of the regeneration process were challenges. The project highlighted the value of integrating art and culture into urban redevelopment as catalysts for economic and social revitalization.

Link to the project: <https://www.bilbaoria2000.org/en/bilbao-ria-2000/what-is-bilbao>



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