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Fostering Knowledge Valorisation through Citizen Engagement

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Report

Research and Innovation

Fostering Knowledge Valorisation through Citizen Engagement

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Fostering Knowledge Valorisation through Citizen Engagement

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Directorate-General for Research and Innovation
Prosperity Directorate

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ABBREVIATIONS AND ACRONYMS

CEO	Chief Executive Officer
EIT	European Institute of Innovation and Technology
ENoLL	European Network of Living Labs
ERDF	European Regional Development Fund
EU	European Union
KPI	key performance indicator
NBS	nature-based solution
NGO	non-governmental organisation
R&I	research and innovation
SMEs	small and medium-sized enterprises
SRL	societal readiness level
TRL	technology readiness level

EXECUTIVE SUMMARY

Research and Innovation are key to responding to the challenges Europe is facing in an increasingly uncertain and fragmented world, as sources of prosperity and catalysts for social economic and environmental sustainability. The European Research Area (ERA) puts emphasis on the engagement of citizens, local communities and civil society as actors at the core of the ERA, especially for achieving greater societal impact and increased trust in science. It also highlights the need to improve the deployment of new technologies and enhance the take up and visibility of research results in the economy and society as a whole.

The European knowledge valorisation policy places much attention on a more diverse societal engagement involving a multitude of actors in order to create value through innovation benefiting all of society. Knowledge valorisation is 'the process of creating social and economic value from knowledge by linking different areas and sectors and by transforming data, know-how and research results into sustainable products, services, solutions and knowledge-based policies that benefit society' ([1]). The Council recommendation on the Guiding Principles for knowledge valorisation recommends encouraging multidisciplinary collaborations going beyond technological areas and involving disciplines such as social sciences, the humanities and the arts, as well as co-creative approaches.

This study has been conceived to support the objectives of the ERA, in particular with respect to action 7 of the ERA policy agenda for the transfer of research results to economy and society, focusing in particular on the role of citizens and other societal actors and the use of participatory, multi-stakeholder approaches for value creation. More specifically, the study aims to support the implementation of the Council Recommendation on the Guiding Principles for knowledge valorisation by providing evidence and analysis, including best practices across the EU and in the member states, on the role of participatory and citizen engagement practices for knowledge valorisation. The evidence collected by the study aimed to provide further inputs to the development of a Code of Practice in citizen engagement for knowledge valorisation, co-created with a community of stakeholders and planned to be adopted as a Commission Recommendation.

The study carries out a review of 60 selected projects across 37 EU Member States and non-EU countries, to showcase the benefits from participatory, citizen engagement processes. These can arise in multiple ways, such as:

- through the commercialisation and widespread adoption of innovative products, technologies or services that respond to users' needs and that are socially acceptable;
- by creating value for society that cannot be monetised, e.g. when a solution is developed and taken up by public, community or societal actors;
- by informing policymakers, thereby influencing policies, public investment programmes or regulations to reflect citizens' needs, ideas or perspectives;

([1]) Council Recommendation (EU) 2022/2415 of 2 December 2022 on the guiding principles for knowledge valorisation (OJ L 317, 9.12.2022, p. 141).

- by raising awareness, cultivating skills and knowledge and developing new organisational models that instigate behavioural changes and transformations in society.

Participatory approaches encompass various groups of non-academic actors, such as local authorities, citizens and groups of citizens, education institutions, non-governmental organisations, cultural entities and organised groups of professionals and workers, who can be engaged at any time in the R&I process. Several methods can be used to engage citizens. For instance, the cases analysed included several examples of civic hackathons, living labs, citizen science and innovation calls. Within these methods several tools are combined to reach out to citizens, keep them engaged and value their contributions. The choice of combination depends on multiple factors, including the objectives and stage of the engagement, the available resources, the target group and the specific context.

Starting with the evidence collected, the report describes the impacts of the participatory processes and investigates the key determinants of success and failure in knowledge valorisation. Some factors pertain to the participatory process and can therefore be considered prerequisites for knowledge valorisation when citizen engagement methods are being chosen. These factors include time and resource constraints, difficulties in reaching the target groups and engaging them for an extended period, the existence of power dynamics that can undermine the co-creation process, and the need to adapt to unexpected circumstances. Others refer more specifically to the uptake of the R&I results. Concerns often arise about the uncertainty associated with participatory approaches and the scientific validity of the outcomes that emerge from such engagements. In some instances, there was a lack of willingness to fully utilise citizens' input or a change in priorities. Other barriers to knowledge valorisation are associated with the lack of supportive legal and political frameworks, including uncertainty about how to protect intellectual property rights generated by participatory processes. Moreover, when financial support essential for the adoption and scalability of the innovation is lacking, the engagement process may conclude without leading to the innovation being adopted, an outcome that may also negatively impact trust in the process.

Building on the lessons learned from successful (and less successful) cases, the report sets out some key principles for effective participatory practices for knowledge valorisation and suggests possible action points. Such key principles revolve around the idea that structured and systematic planning is needed for both the citizen engagement and the uptake of results. This implies designing a strategy that combines the elements of engagement and value creation in a consistent action framework that includes the following elements.

- A stakeholder analysis identifying the target groups that directly pertain to the research, or that are relevant for the uptake of the innovation, and profiling them depending on their expected role in the process and in the existing power dynamics. In particular, it is important to identify the actor or actors that will ultimately make possible the uptake of the results, such as the community itself, a business or a public authority.

- The objectives of the engagement activities with the stakeholders involved and the related expectations of participation and value creation.

- The methods and tools that are most suitable for achieving the objective of value creation while ensuring an appropriate and inclusive approach to engagement.

- A valorisation roadmap to ensure that citizens' contributions translate into tangible outcomes, outlining the responsibilities of all involved as well as the financial and non-financial resources required to generate both societal and economic impacts.

- A monitoring and evaluation framework for tracking the engagement of individuals, assessing the roles played by various actors, and assessing the societal and economic value derived from the participatory process.

In addition to a well-designed and shared strategy, the best practices examined feature additional specific aspects related to managing the participatory process, such as:

- establishing trust among various stakeholders and within the research community and clarifying ownership for encouraging societal uptake.

- accepting a certain level of flexibility (and failure), mitigated with risk management, in order to remain open to the unexpected outcomes of R&I processes in an open innovation setting;

- adapting commonly used tools for citizen engagement to the local context, considering the overall dynamics of the communities that will be directly involved;

- facilitating the process by professional organisations that can design and implement strategies for value creation with citizens that are adapted to the specific research needs and objectives.

Lastly, the evidence collected points to a lack of consistent practices in employing a clearly defined measurement framework to assess the efficacy of participatory processes for value creation. To address this gap, the report presents a comprehensive framework for evaluating if and how participatory processes have led to knowledge and will be a valuable tool for both researchers and practitioners. This framework has been translated into a set of key performance indicators that can contribute to the development of overall metrics of knowledge valorisation and can be tailored to meet the unique requirements of individual projects.

1. INTRODUCTION

1.1. Background and study objectives

Knowledge valorisation is 'the process of creating social and economic value from knowledge by linking different areas and sectors and by transforming data, know-how and research results into sustainable products, services, solutions and knowledge-based policies that benefit society' ([2]).

In other words, knowledge valorisation means turning knowledge into value, regardless of whether this value comes from the development of new products or services, from evidence-based policymaking or from social transformations for the well-being of citizens. It concerns both incremental and disruptive innovation.

With a view to maximising the value of all knowledge assets generated by different types of actors in a dynamic R&I ecosystem, knowledge valorisation requires the participation of different actors, and also of the users/beneficiaries who can contribute knowledge and innovation at some or all stages of the valorisation process [3]. The importance of involving societal stakeholders in R&I has gained prominence over the last two decades, with the conceptualisation of the quadruple helix model by Carayannis and Campbell [4]. It has been increasingly acknowledged in the R&I literature that, to develop more acceptable and sustainable solutions, research trajectories should be legitimised by relevant societal stakeholders and aim to have a positive societal impact [5].

Knowledge valorisation policies can contribute to economic prosperity and strengthen the response to big societal challenges such as climate change, inequalities and digital transformation's impact by accelerating the uptake of research results and the implementation of innovations (including social innovation). While there are several channels for fostering R&I knowledge valorisation, this study will focus only on participatory value creation, i.e. those channels engaging various actors in the innovation and knowledge valorisation process, including end-users and citizens. The research will thus result in solutions that matter to citizens and have a higher potential for societal uptake.

Figure 1 depicts the main channels for knowledge valorisation identified in a 2020 European Commission policy review [6] and highlights the channel considered in this report (channel in scope).

The study covers those cases that are both participatory and valorising knowledge.

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(2) Council Recommendation (EU) 2022/2415 of 2 December 2022 on the guiding principles for knowledge valorisation (OJ L 317, 9.12.2022, p. 141).

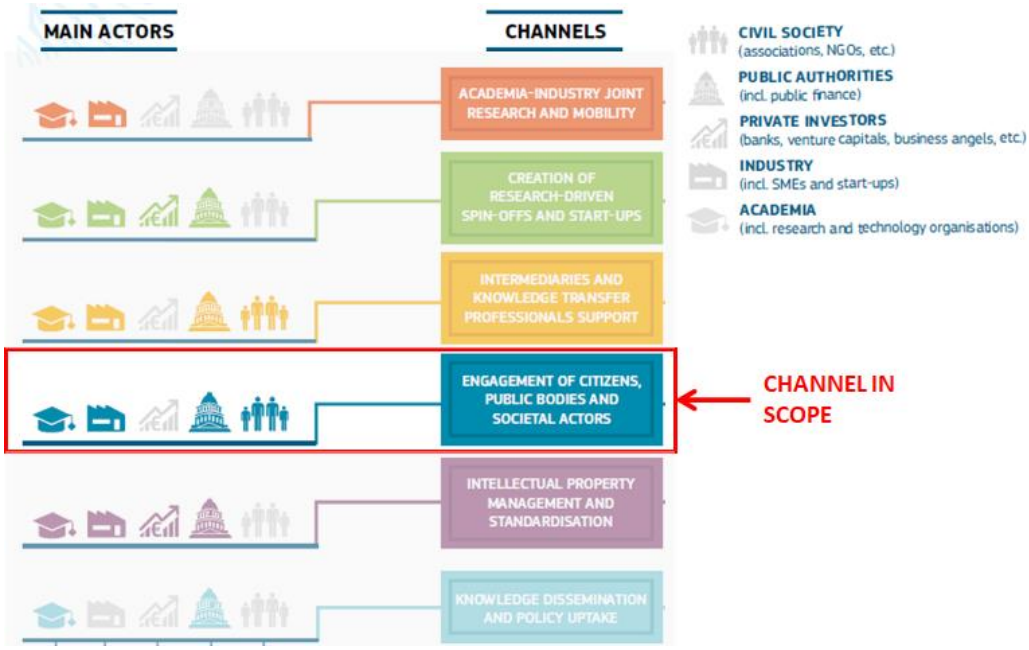
(3) Therefore, it is a broader concept than dissemination, which involves making knowledge and results known and accessible.

(4) Carayannis, E. and Campbell, D. (2009), 'Mode 3 and quadruple helix: toward a 21st century fractal innovation ecosystem', *International Journal of Technology Management*, Vol. 46, pp. 201–234.

(5) Schütz, F., Heidingsfelder, M. L. and Schraudner M. (2019) 'Co-shaping the future in quadruple helix innovation systems: uncovering public preferences toward participatory research and innovation', *She Ji: The Journal of Design, Economics, and Innovation*, Vol. 5(2), pp. 128–146.

(6) European Commission (2020), *Valorisation Channels and Tools. Boosting the transformation of knowledge into new sustainable solutions*, Publications Office of the European Union, Luxembourg.

Figure 1. Main channels of knowledge valorisation



Source: European Commission[7].

The non-academic actors that can be engaged in knowledge valorisation activities are numerous and may include government bodies, local authorities, citizens and groups of citizens (including students, patients, residents, tenants, building users), education institutions, non-governmental organisations (NGOs), non-academic research actors (e.g. hospitals), cultural entities and organised groups of professionals and workers (e.g. trade associations and unions). Each actor is engaged according to the kind of interaction that is established within the R&I process, depending on what each actor can offer in terms of expertise and/or financial contributions. For instance, municipalities are particularly active in city innovation initiatives [(8)]. The existence of different ways of interacting with stakeholders helps develop peer-learning opportunities through targeted experimentation and the exchange of best practices. For example, if local authorities' digital transformation initiatives are successful when following certain criteria, the lessons learned from the local experience can inform the action of government bodies that are exploring the possibility of adopting and replicating participatory approaches in other contexts.

The ways in which stakeholders can be involved in knowledge valorisation initiatives vary according to the stage at which they are involved and the intensity of the involvement. In particular, stakeholders can be involved in the following ways.

- Stakeholders can be engaged at any time. As explained in a 2020 European Commission policy review, while the valorisation outcomes are apparent towards the end of the R&I

[7] European Commission (2020), *Valorisation Channels and Tools. Boosting the transformation of knowledge into new sustainable solutions*, Publications Office of the European Union, Luxembourg.

[(8)] European Commission (2022), *From Research Results to Innovative Solutions – Mapping national and regional programmes and initiatives in research and innovation valorisation*, Publications Office of the European Union, Luxembourg.

process, 'citizen engagement needs to start early from the definition of the R&I agenda' [9]. According to this view, participatory practices in knowledge valorisation include co-creation and co-production processes. Co-creation refers to the active involvement of end users as co-initiators (co-design level), whereas co-production is considered the involvement of citizens in (co-)implementation [10]. The phase in which citizens are engaged depends on the goal of the engagement. The earlier stages (co-creation) concern the definition of the research agenda and the objectives, the co-generation of ideas concerning research priorities and pathways, and the collective decision about how to allocate the funds. The later stages concern shared testing, piloting, implementation, impact assessment and utilisation of research results. Stakeholders can also be involved in identifying necessary adjustments during implementation.

- Stakeholders can be included at different intensities. In 1969, Aronstein developed a 'ladder of citizen participation' theory, describing how public authorities engaged with citizens when public decisions were made [11]. A reinterpretation of the model, tailored to community engagement principles, emphasises five steps: inform, consult, involve, collaborate and empower [12].

Against this background, the present study aims to draw lessons from project cases involving citizens in value creation in innovative processes to identify action points that can help to improve the design and implementation of participatory methods in R&I processes for knowledge valorisation through citizen engagement. In particular, it:

- explores the potential of the participatory approach in knowledge valorisation and in increasing capacity for innovation;
- examines how this is achieved by analysing an appropriate, carefully selected sample of best practices;
- identifies the drivers that empower participatory approaches and highlights the variety of and differences between these approaches;
- identifies the main challenges and limitations of different participatory approaches;
- provides recommendations on how to use the potential of participatory approaches and methods for knowledge valorisation and socioeconomic benefit.

The study draws lessons from 60 good practices within and outside the EU that were identified through an extensive research process involving desk review, interviews and an exploratory workshop. A more detailed description of the study's methodology is included in Annex 1.

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[9] European Commission (2020), *Valorisation Channels and Tools. Boosting the transformation of knowledge into new sustainable solutions*, Publications Office of the European Union, Luxembourg.

[10] Voorberg, W. H., Bekkers, V. J. J. M. and Tummers, L. G. (2015), 'A systematic review of co-creation and co-production: embarking on the social innovation journey', *Public Management Review*, Vol. 17(9), pp. 1333–1357.

[11] Arnstein, S. (1969), 'A ladder of citizen participation', *Journal of the American Institute of Planners*, Vol. 35(4), pp. 216–224.

[12] Clinical and Translational Science Awards Consortium (2011), *Principles of Community Engagement*, second edition, National Defense University Press, Washington, DC.

1.2. Structure of the report

The report is structured as follows:

- 'Executive summary'
- **Chapter 1** 'Introduction'
- **Chapter 2** 'Creating value in research and innovation through citizen participation'
- **Chapter 3** 'How to measure knowledge valorisation'
- **Chapter 4** 'Lessons learned on value creation through citizen engagement'

The report also includes the following annexes:

- **Annex 1** 'Methodology'
- **Annex 2** 'Detailed project descriptions'
- **Annex 3** 'List of proposed indicators'
- **Annex 4** 'References'
- **Annex 5** 'List of interviewees'
- **Annex 6** 'Agenda for and list of participants in the exploratory workshop'
- **Annex 7** 'Summary of the discussions at the exploratory workshop'
- **Annex 8** 'Agenda for and list of participants in the validation workshop'
- **Annex 9** 'Summary of the discussions at the validation workshop'

2. CREATING VALUE FROM KNOWLEDGE THROUGH CITIZEN PARTICIPATION

This chapter discusses how value is created through citizen participation and provides insights into the achievements of the cases analysed. The findings from the projects assessed were combined with and enriched by the discussions with the experts participating in the workshops.

2.1. How do participatory processes create value?

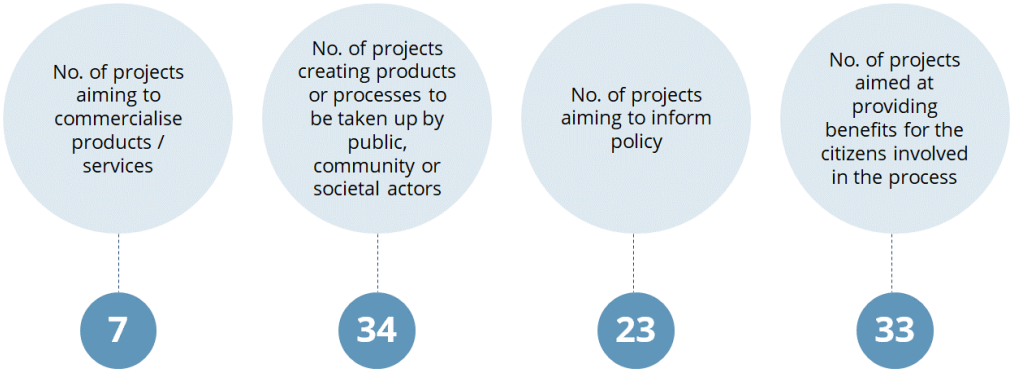
The advantages of involving citizens in R&I processes for knowledge valorisation derive from the fact that they are the users, recipients or agents of innovation, and therefore can provide insights that are key for the uptake of the project's results. Sometimes citizens contribute to finding a possible solution for a selected issue because of their original points of view and diverse backgrounds. This is often the case in civic hackathons, where the public authority defines the challenge and citizens are asked to provide ideas to tackle it (e.g. Datathon, Digital Solutions for Societal Challenges, Citython, INNOair). As highlighted during the validation workshop, the solutions generated through co-creation processes are not necessarily groundbreaking innovations or out-of-the-box ideas. However, the fact that these solutions have been thought out and designed with citizens increases the chances that they will be acceptable to society.

The analysis encompasses projects that created value (or failed to do so) in multiple ways (Figure 2), such as:

- through the commercialisation and market uptake of products, technologies or services;
- by creating value for society that cannot be monetised, i.e. when a solution is developed and taken up by public, community or societal actors;
- by informing policymakers so that policies, investment programmes or regulations reflect citizens' needs, ideas and perspectives;
- by raising awareness, developing skills and knowledge and providing new organisational models that instigate behavioural changes and transformations in society.

In more than half of the projects analysed, participatory processes are geared towards societal value and societal acceptance. In contrast, it was more difficult to find projects employing participatory processes among R&I projects aiming to commercialise products or services.

Figure 2. The ways in which the cases analysed aimed to create value



Source: CSIL, ICONS, SPI.

As it is clear from the evidence collected, these dimensions are closely intertwined (see the example in Box 1). Although some participatory practices primarily focus on one dimension, their effects often extend beyond the initial objectives and unintended effects can occur, especially for the actors that have participated in the process (e.g. awareness raising and increasing civic engagement, changing perceptions and attitudes).

BOX 1 . The various outcomes that may result from involving citizens in R&I

Using citizen science to develop solutions for healthy soils through phytomining

This research project aimed to map soil contaminants in the United Kingdom and develop a technology for the mining, retrieval and upcycling of metals from soils and for their conversion into high-value nanoparticles for use in manufacturing.

The project adopted a citizen science methodology and had multiple effects, beyond those initially expected. In particular, it:

- allowed an increase in the technology readiness level (TRL) of the technology up to its commercialisation by the spin-off company Phyona Ltd;
- developed skills and know-how in the participants who acted as co-researchers;
- raised awareness among public authorities of the potential of the solution;
- had positive impacts for the communities living in the areas where the project was replicated, as it led to decontamination plans and to the revaluation of public spaces;
- led to an increased interest in citizen science / citizen engagement approaches at the university, especially in the societal acceptance of innovation

Source: CSIL, ICONS, SPI.

Seven of the cases analysed concerned participatory projects that primarily aim to develop products, services or technologies for their commercialisation (i.e. CoHeWe, Innovation Ecosystem for Smart Elderly Care, Sendoc, Usetechlab, Terrain, WaterMining, Circular Housing). In these cases, the main reason for adopting a participatory approach in the R&I process revolves around the possibility of collecting feedback from the users or customers so that the product, technology or service can be improved to meet market demands and

ultimately be successfully commercialised. According to some interviewees, participatory approaches are especially valuable for small and medium-sized enterprises (SMEs), which usually lack the resources to carry out usability tests.

The majority of the cases reviewed that employed participatory approaches with a view to commercialising the innovative solution are in the health sector. As explained by some interviewees, participatory, multi-stakeholder approaches are important for companies in this sector, since the collaboration with hospitals and other organisations (e.g. community centres, NGOs) gives them access to end users that would otherwise be difficult to reach. Unlike clinical trials, the participatory process focuses on aspects such as the usability and acceptability of the proposed solutions.

Thirty-four of the projects analysed primarily aimed to create societal value. In these projects participatory processes are employed to facilitate societal acceptance and promote the uptake of innovative solutions by the targeted citizens or the entire community. Within these processes, the valorisation of knowledge is achieved by:

- transforming public goods, spaces or services into solutions that have an impact on the everyday life of the community (e.g. Move21, Merezzate+, Furnish, Urban Lab Rzeszów, CityMart);
- adopting and continuing using tools and methodologies developed by the R&I project (e.g. Parkli, Foodiverse);
- changing citizens' attitudes or habits in relation to a certain issue (e.g. InnoAir, YouCount, ECF4CLIM, MUV).

Move21 aimed to create three mobility hubs, which could also provide social services. Civil society organisations were involved in defining the mobility hubs' social use and co-designing the spaces to ensure the uptake of these services in the new mobility hubs.

Through active engagement with citizens, ***Parkli*** sought to developed applications and technologies that could be easily incorporated into the everyday lives of citizens and used as early warning systems to monitor local climate change impacts.

Twenty-three of the projects analysed primarily aimed to inform policy. Engaging citizens in R&I processes that inform policymaking can trigger transformative policies. In particular, they have the potential to do the following.

- Improve the understanding of citizens' needs. In these cases, citizens contribute to the definition of the problem by providing their perspectives and experiences on a specific topic. On the one hand, this leads to a better understanding of citizens' needs and, on the other, it provides the potential to address those needs. The examples range from signalling issues with urban mobility (e.g. PING, Better Reykjavík) to identifying locality-specific environmental challenges (e.g. Adáma, Laboratorio de Salud Urbana, GrowGreen) and contributing to a better understanding of issues such as mental health (e.g. CoAct), ageing (e.g. Shaping the Future of South Australia: Ageing Well) or the impact of digital transformations on children and young people (e.g. DigiGen).
- Improve the acceptability of policies and measures. In these cases, citizens contribute to the design of the solution (e.g. roadmaps, action plans, pathways) and may provide feedback on its feasibility. In this way, it is more likely that the resulting policies are socially acceptable, as the ownership is 'shared' with citizens. This aspect was underlined especially with regard to the definition of measures to tackle climate change (e.g.

decarbonisation pathways – Engage, Localised – and urban mobility innovations – MUV, Mosaic, InnoAir).

- Support policy changes. Sometimes, citizens' engagement in R&I projects may reveal policy gaps or inadequacies in the existing policy to tackle specific problems (e.g. D-Noses, Transform, DigiGen, Laboratorio de Salud Urbana). In these cases, the input provided by the participatory approach invites the policymakers to initiate a change of policy or to implement new measures. In addition, some projects aimed to foster collaboration among pertinent local stakeholders to take actionable steps towards actual policy changes and the development of regional visions and roadmaps (PANEL 2050).

Lastly, participatory processes provide benefits for the citizens involved insofar as they contribute to raising their awareness and understanding of certain societal issues, enhancing skills linked to the R&I process or initiating transformative processes in the individuals or communities involved. Thirty-three of the projects included these possible benefits among the initial objectives of the participatory process.

2.2. Who should be involved and at what stage in the participatory process?

Successful knowledge valorisation initiatives focus their engagement efforts on specific target groups directly relevant to the objectives. For example, the evidence collected for this study shows that, to increase the chances that a solution will have a successful market uptake, the participatory approach should involve citizens who are a representative sample of the potential users or customers.

Targeting is vital. However, selecting and engaging citizens through a targeted approach can be costly and difficult. One way to reduce costs is to engage with existing organisations, e.g. collective actors that can bring the needs, interests and perspectives of larger groups of citizens into the process. Leveraging existing groups reduces the time and resources necessary to engage citizens individually. It also helps to create trust, since citizens are more willing to engage with (formal or informal) organisations that they already know. These intermediaries can connect more easily with the grassroot societies they represent, as they speak a common language. The projects included in this analysis often involve NGOs, associations or other civil-society actors (e.g. schools, cooperatives, cultural centres) either to mobilise citizen interests or to represent their point of view. In addition to their pivotal role during the project, these actors can act as a 'multipliers' when the project concludes, accelerating the broader adoption of the solution within society. They are also more used to interacting in multi-stakeholder contexts than individual citizens.

The CoHeWe project engaged nurses in the collaborative design of healthcare solutions, capitalising on their deep understanding of patients' requirements. This approach was more cost-effective than engaging single patients.

The Localised project focused on social groups that are less likely to be engaged (women, people with disabilities, minorities)

Moreover, the experts participating in the workshops underlined the importance of involving citizens with different socioeconomic backgrounds, including vulnerable groups, as they might have different needs, points of view or concerns. This aspect was taken into account in

some of the cases analysed (e.g. Localised, Transform, Adáma), as it is key to designing inclusive policies that reflect the views and the needs of society as a whole.

With regard to the different types of stakeholder to be involved, the cases analysed have highlighted the importance of engaging, among others, the actors that will ultimately make possible the uptake of the results, for example the community itself or a business actor or public authority. It is not sufficient that these actors are informed about the process; they should actively participate in it and commit to exploiting the outcomes. As noted by the experts participating in the workshops, in successful cases it is clear from the project's outset what is expected from the different actors and who should follow up the process until its impacts materialise.

In the ***Circular Housing*** project the involvement and commitment of a business actor was a key driver for the continuation of the process up to the commercialisation of the solution.

The involvement of public authorities early in the process was noted as a key driver for success in many projects (e.g. Mosaic, PANEL 2050, Localised, Digital Solutions for Societal Challenges, Citython, InnoAir). Public authorities often play a vital role in supporting the participatory process through public budgets but also in the uptake of the innovation, including through additional financial resources to implement the solution or adopting new policies, strategies and regulations. At the same time, in many cases public authorities are not familiar with participatory approaches and may be difficult to engage in the process (e.g. Engage, Adáma). In addition, already existing policy landscapes and regulations, as well as changes in the political agenda or lack of resources, may hamper the uptake of the results (e.g. PING, Pass Trabool).

The ***Engage*** and ***Adáma*** projects revolved around the co-creation with citizens of strategies and pathways in the field of environmental protection and the fight against climate change. The outcomes of the processes are unlikely to result in policy changes, primarily due to challenges in involving institutional bodies.

The two examples in Box 2 testify to the role of public authorities in ensuring knowledge valorisation from participatory processes.

Box 2. Examples of public authorities actions to support valorisation

PING

The PING project empowers cyclists to establish direct communication and engagement channels with the municipality, with the aim of enhancing the comfort and safety of cycling in the city. The project has been implemented in various cities. In Brussels, despite the fruitful engagement achieved, the project's objectives were unfulfilled, primarily due to budget constraints. However, in Amsterdam policymakers actively incorporated the recommendations derived from the collaborative workshops with cyclists and the cycling federation, as well as the data collected, to formulate an all-encompassing plan comprising short-, medium-, and long-term actions. This ongoing dialogue between the city

Pass Trabool

The Pass Trabool project aimed to enhance a service, the Lyon Metropole Urban Pass, at the request of the Grand Lyon authority. This pass aimed to streamline multiple subscriptions and metropolitan services, encompassing public transport, bike-sharing and parking facilities, as well as a range of recreational activities. In order to optimise the Pass Trabool and align it with the preferences of Lyon residents, an experimentation phase was carried out in collaboration with TUBÀ, an innovation support organisation specialising in participatory approaches. As a tangible outcome of the project, TUBÀ presented the municipality with a set of valuable recommendations for enhancement. However, the service has never

and the cycling federation continues to play an important role during the plan's implementation phase.	been implemented, primarily due to a shift in the political agenda.

Source: CSIL, ICONS, SPI.

In the majority of the good practices analysed, the participatory approach was applied from the design phase through the development phase to the uptake of the solution. However, in R&I processes aimed at developing a technology, product or service for commercialisation, citizens are typically engaged either at the outset to co-design the solution or during the testing phase after the solution has been designed. According to some interviewees, for the participatory process to add value and yield insights that can be seamlessly integrated into the solution, it is imperative that the solution is in the prototype phase, minimising the cost and complexity of adaptations. Moreover, effective participatory approaches recognise that R&I processes are non-linear and that knowledge valorisation emanates from actions undertaken at various stages. This requires a good degree of flexibility and the design of a shared risk management strategy that clearly sets out the expectations and possible trajectories at the project's outset.

The Foodiverse project adopts a living lab approach to co-create, explore, experiment and evaluate with local stakeholders supporting a transition towards a more diverse local food system. The involvement of citizens (farmers) in the living lab in all the stages, from the identification of the topic to be address to the test of the solution and its implementation is crucial for the societal uptake.

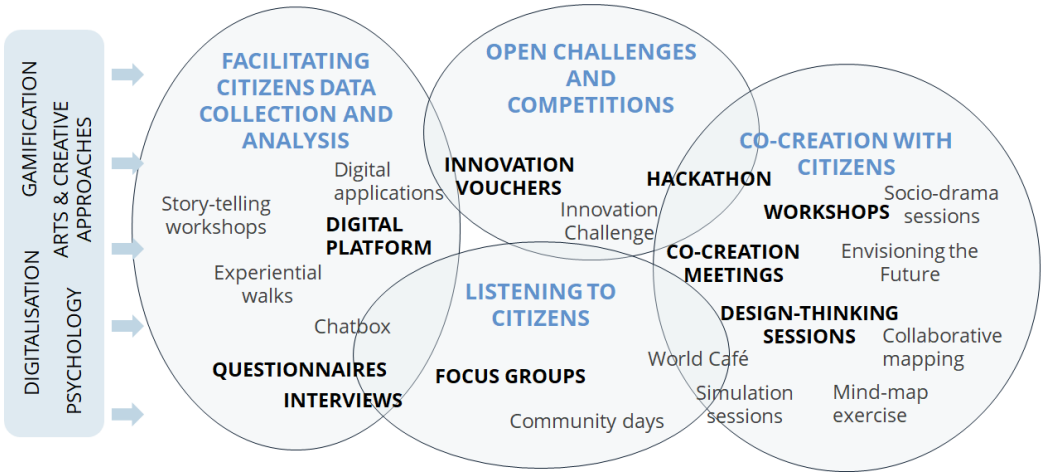
2.3. Methods and tools used in the cases reviewed

Creating a comprehensive catalogue of methods of and tools for knowledge valorisation through citizen engagement presents a notable challenge. This challenge arises from these dual dynamics: the constant emergence of new methods and their integration with existing tools and approaches within various processes [(13)].

The majority of the cases reviewed have combined multiple methods and tools, and their choice reflects the goals, stage of engagement, budget, issue at hand and context of the project. Figure 4 provides an overview of the methods and tools employed in the cases reviewed, but it is not intended to be an exhaustive compilation of all the tools available for citizen engagement. The tools can be categorised according to their primary purposes, although it is important to recognise that these categories often intersect and that a single method may serve multiple functions. In addition, these tools can be enhanced and customised by integrating elements stemming from digitalisation, gamification, artistic and creative approaches, and techniques used in psychology. The following figure provides a summary of the key characteristics of the tools encountered most frequently during this study.

[(13)] Glenn, J. C. (2003), 'Participatory methods', in Glenn, J. C. and Gordon, T. J. (eds), *Futures Research Methodology*, The Millennium Project. Sheedy, A., MacKinnon, M. P., Pitre, S. and Watling, J. (2008), *Handbook on Citizen Engagement – Beyond Consultation*, Canadian Policy Research Networks, Ottawa, ON. Stephens, R. and Robinson D. K. R. (2022), *Co-creation Review – Experiences of cocreation from science with and for society initiatives.*

Figure 3. Overview of tools used in the cases reviewed (not exhaustive)



Source: CSIL, ICONS, SPI.

Hackathons are considered an effective tool for generating new ideas through the collaboration of diverse stakeholders who bring their different perspectives to address a specific challenge [(14)]. One of the primary challenges is bridging the knowledge gap among participants, given their varying levels of expertise. Effective facilitation is critical to creating an environment where all participants feel comfortable expressing their ideas freely, regardless of their expertise. The following elements are drivers for the success of hackathons: the involvement of different types of stakeholders, including citizens and subject experts as facilitators and mentors, the engagement and commitment of the entity/entities responsible for implementing the innovation generated through the participative process (to ensure that the action is taken forward), and a strategy that already embeds follow-up initiatives and identifies possible sources of financing. It is also important for a hackathon to take place within broader innovation ecosystems in which the participants can find the support (including financial support) to further develop their ideas.

Urban hackathons are competitions of teams that include many actors such as architects, designers, information technology (IT) developers, engineers, urban planners and ecologists, who jointly create pilot projects for cities. *Synchro Space* is a hub of innovations for cities in Ukraine. Since 2019, Synchro Space has cooperated with 12 cities and united territorial communities, organising urban hackathons.

[(14)] European Commission (2022), *Valorising Research through Citizens' Engagement – How to run hackathons with citizens*, Publications Office of the European Union, Luxembourg.

Another approach that is used to enable citizens to share ideas and co-design small-scale innovations for public spaces is innovation vouchers / calls for proposals (e.g. Unalab, Urban Lab Rzeszów, CityMart). A public authority usually leads these initiatives and provides calls for ideas from civil society.

The ***CityMart*** initiative is revolutionising the way cities approach procurement by crowdsourcing ideas from citizens and stakeholders through open calls for ideas published on a digital platform. An example of innovation developed with this system is a smarter, less polluting street lighting system implemented in San Francisco.

When the engagement process aims to collect citizens' opinion (on a topic, from their experience, on a specific solution, etc.), interviews, questionnaires and focus groups are the methods most commonly used. Although the engagement can be organised in small groups in the design phase, in the test phase the interaction is often one to one, as the feedback is linked to personal experience.

Methods that favour collaboration intend to create spaces (physical or virtual) where the actors can co-create solutions through iterative exchanges. These methods often rely on design-thinking methodologies. The design-thinking approach is characterised by being user centric and process oriented. These characteristics make it particularly suitable for finding solutions to social problems and for creating social innovations with the collaboration of citizens [(15)]. Participatory R&I processes sometimes draw on established methodological frameworks that encompass some or all of the tools mentioned earlier, along with additional ones. For example, 20 of the 60 cases analysed are R&I projects adopting a citizen science methodology. Citizen science has been traditionally used as a cost-effective way of collecting large amounts of data[16]. Interviews and questionnaires, as well as digital platforms and applications, are often used in citizen science projects to facilitate data collection [(17)]. However, beyond data collection, citizen science projects have the potential to empower participants and contribute to broader societal goals. These processes have a lasting societal impact when researchers manage to involve citizens in the design of the research and methods, and they provide communities with the knowledge and tools to continue the initiatives after the project has ended. Key drivers for success are continuous communication and openness about sharing information and results and using novel approaches to engage citizens. One of the main challenges lies in structuring projects to incorporate follow-up actions by anticipating the involvement of relevant stakeholders who can use the results. Whether the beneficiary is a community or another actor, empowering participants is vital to achieve knowledge valorisation. In certain cases, such as Laboratorio de Salud Urbana, D-Noses, iNaturalist, distrust in the methodology and concerns about data quality risk hindering the adoption and utilisation of results and

D-Noses collaborated with Spanish authorities to establish a technical standard outlining the prescribed methodology for data collection. This standard represents a significant milestone in promoting confidence and credibility in the field of citizen science methodologies.

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(15) Hoe Chin, G. and We Lian, T. (2021), 'Design thinking as a means of citizen science for social innovation', *Frontiers in Sociology*, Vol. 6 (doi:10.3389/fsoc.2021.629808).

16 "citizen science" refers to the voluntary participation of non-professional scientists in research and innovation at different stages and at different levels of engagement, from shaping research agendas and policies, to gathering, processing and analysing data, and assessing the outcomes of research. European Commission, Directorate-General for Research and Innovation, *Citizen Science – Elevating research and innovation through societal* engagement, Publications Office of the European Union, 2020.

(17) Hecker, S. Haklay, M. Bowser, A. Makuch, Z., Vogel, J. and Bonn, A. (2018), *Citizen Science. Innovation in Open Science, Society and Policy*, UCL Press, London.

knowledge. Mitigation actions to promote confidence and credibility can be implemented to avoid this risk (e.g. D-Noses).

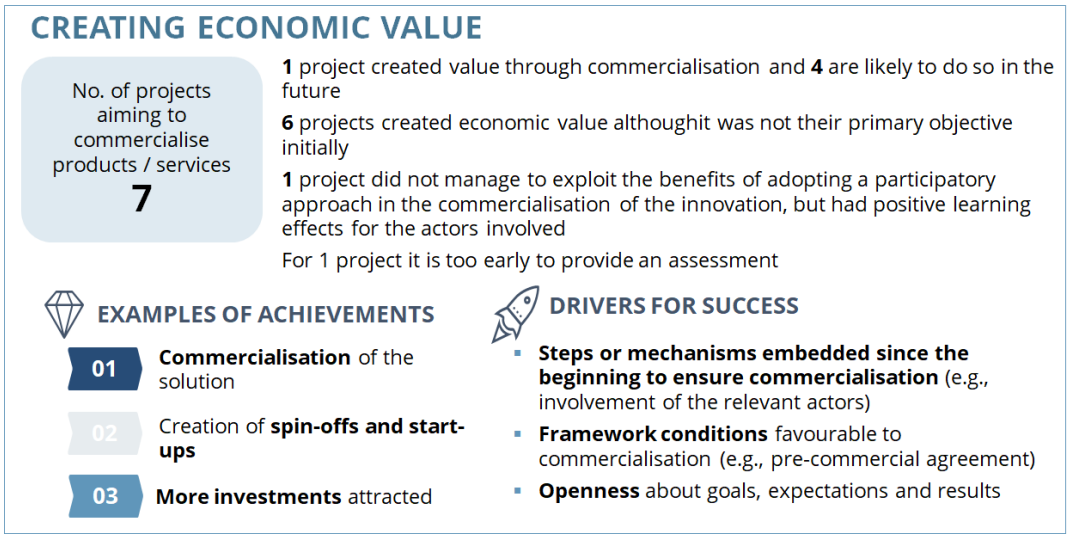
Twelve of the cases analysed refer to the concept of a **living lab** for co-creating solutions with citizens. According to the European Network of Living Labs (ENoLL), living labs entail 'user-centred, open innovation ecosystems based on systematic user co-creation approach, integrating research and innovation processes in real life communities and settings' [18]. While the concept of the living lab has been explored and standardised by ENoLL, it provides fertile ground for the use of a diverse range of engagement tools, specifically tailored to the project's goals and the unique local context.

> The ***Phusicos*** project adopted the living lab approach within which it developed an extensive toolbox including moderation techniques (focus groups, card enquiry, World Café), mapping tools (e.g. sketch mapping, digital participatory mapping, node-link diagrams) and tools for retrospective reflection and future planning (e.g. participatory scenario planning, storyboards). It also developed tools to encourage creative thinking and mutual understanding (e.g. multiple perspective wheel) and decision support tools (e.g. ranking methods).

2.4. Exploring key determinants of success and failure

This section illustrates the achievements of the projects analysed and identifies key determinants of success and failure based on the evidence collected.

Figure 4. Overview of cases creating economic value



Source: CSIL, ICONS, SPI.

[18] ENoLL (2018), *Introducing ENoLL and its Living Lab Community*, European Network of Living Labs.

In successful cases where the goal is to commercialise an innovative product or service, the participatory approach often leads to additional revenues from the market's uptake of the solution (Figure 5). Actively engaging citizens in the iterative testing phase of these solutions not only expedites the refinement and optimisation of innovations but can also enhance the product's reputation when it enters the market. Successful cases typically embed some steps or mechanisms from the outset to ensure the commercialisation of the solution. A key driver in this process is the involvement of stakeholders, such as business partners, who have an interest in applying the innovation and the capacity to bring it to the market. Favourable framework conditions and a well-defined commercialisation strategy, agreed upon by the project partners, also serve as driving forces for achieving successful commercialisation. The agreement should include provisions for how intellectual property rights should be treated, as this is often a matter of controversy in R&I processes adopting participatory approaches.

In the Circular Housing project the drivers for success were (i) involving the relevant business actor (REDO) as a key partner of the project and (ii) signing a pre-commercial agreement among all the parties when the funding was awarded to clarify how the profits would be shared and how intellectual property rights would be treated. The funder (European Institute of Innovation and Technology (EIT) Knowledge and Innovation Community) indicated that commercialisation was a primary objective of the project.

In some of the cases analysed (e.g. Terrain, Usetechlab, Sendoc), the participatory process successfully contributed to enhancing the solution or advancing the technology to a higher TRL, but the projects did not monitor the eventual commercialisation of the innovation. Hence, it not possible to assess the effects on market uptake.

Lastly, in one case (Innovation Ecosystem for Smart Elderly Care) the innovations only partially benefited from citizens' inputs, since it was not clear from the beginning how the data collected from the needs assessment would have informed the co-creation process. In addition, the project encountered difficulties in engaging companies in co-creation processes. Nonetheless, it created a basis for long-term collaboration among the different actors in the ecosystem and raised awareness about the potential benefits of participatory processes for businesses.

For the project Innovation Ecosystem for Smart Elderly Care there was no follow-up on whether or how the feedback collected was integrated into the designs or concepts of the innovators. Moreover, the data from the needs assessment were not used.

In some cases, the success of the participatory process can lead to unexpected benefits such as attracting more investment or creating start-ups (Box 3).

Box 3. Additional benefits – attracting investment, start-up creation

Telraam

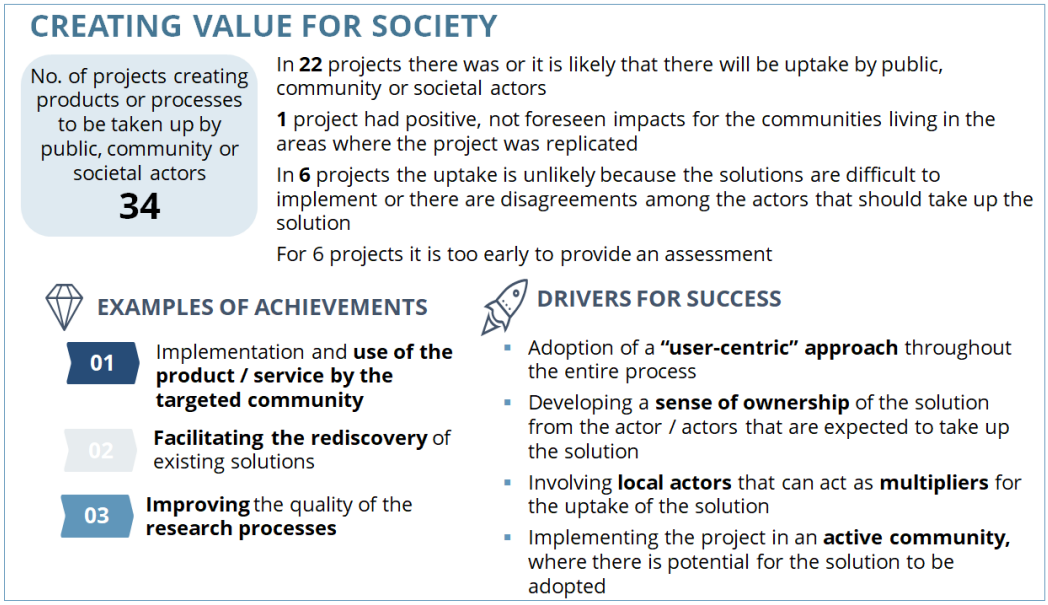
Telraam is an initiative spearheaded by the NGO Mobiel21. Initially, it received funding from the Belgian government. In collaboration with Mobility Leuven, Mobiel21 developed a cost-effective and widely applicable traffic data collection sensor with the active participation of citizens. Approximately 100 volunteers were involved in designing and testing this innovative solution.

Subsequently, Telraam secured a Horizon 2020 grant, enabling the development of a structured framework for citizen science and the expansion of the solution's use. As a result of the Horizon 2020 project, a spin-off company called Rear Window BV was established. This spin-off now commercialises the solution and continually enhances the sensor's capabilities.

Urban hackathon in Bila Tserkva

The city of Bila Tserkva organised a hackathon to gather ideas on how to facilitate citizens' interaction with some newly installed sculptures. The winning team proposed a solution using augmented reality. Subsequently, the city entrusted the winning team with the implementation of this solution, leading to the project becoming an important attraction. It enticed visitors and generated additional resources for the municipality. Following this successful experience, the winning team established its business in the augmented reality industry and applied similar solutions to other projects.

Figure 5. Overview of case studies creating value for society



Source: CSIL, ICONS, SPI.

The commercialisation of the solution is often only one the achievements of the participatory process, especially when the level of engagement is high (e.g. Telraam, Using citizen science to develop solutions for healthy soils through phytomining). Citizen engagement creates value for society as the community positively responds to the innovation, which is likely to have lasting effects on the everyday life of communities, perceptions or habits (Figure 6).

This is facilitated by the fact that the participatory approach develops a sense of ownership of the solution as it incorporates citizens' viewpoints (Box 4). The higher the level of engagement, the more likely it is to have societal impacts. In total, 34 of the 60 cases studied co-created products or processes that were intended to be taken up by public, community or societal actors. These cases comprise hackathons, living labs, projects using different combination of tools and one citizen science project.

Box 4. Changing citizens' perception of public spaces

Furnish

This project aimed to develop furniture for public spaces in urban areas through a participatory approach in different European countries (i.e. Spain, Finland, Italy, Hungary and Portugal). Citizens were involved in co-creation workshops to contribute ideas to the furniture design and in its co-fabrication and installation. After the prototypes were installed, the team collected users' feedback through observation forms and interviews.

End users not only contributed their thoughts and creativity to their own public space but were also empowered by actively participating in the physical construction process. This aspect significantly influenced their perception of the public space and enhanced their capacity to effect tangible change through their own efforts.

Source: CSIL, ICONS, SPI.

In some instances, participatory processes have served as a powerful means of re-establishing a vital connection with a community's rich background and knowledge base. These processes have facilitated the rediscovery of pre-existing solutions that may have been overlooked or forgotten. By engaging directly with the community and tapping into its collective wisdom, participatory practices have revived valuable insights and age-old practices that offer innovative and sustainable solutions. This reconnection with a community's historical and cultural context has not only allowed the revitalisation of traditional knowledge but also ignited a sense of pride and ownership among community members (e.g. Phusicos). It has thus contributed to fostering a renewed appreciation of community heritage and local wisdom, while simultaneously promoting the adoption of time-tested solutions to address contemporary challenges.

The ***Foldit*** project revolves around a crowdsourcing computer game in which anyone can help to predict the structure of proteins. The participatory process taps into the collective intelligence and problem-solving abilities of non-academic actors such as gamers. By involving a diverse range of participants, Foldit has harnessed their insights and creativity, leading to advances in protein folding research. The participatory process has increased the efficiency of research into protein folding, fostered a deeper understanding of protein folding among non-academic actors and promoted public engagement and awareness of protein folding research, by making scientific research accessible and enjoyable through the game.

Significant knowledge valorisation through participatory processes has also been observed in the enhancement of the quality of research processes, particularly within projects that embrace citizen science methodology such as in YouCount, Teqfor1, Foldit, iNaturalist, Airbox. In such initiatives, the active involvement of citizens extends beyond mere data collection; it has permeated the very core of the research process. By co-designing and involving citizens in research processes , these participatory projects have

harnessed the collective wisdom of communities. On the one hand, this approach yields more robust and relevant research outcomes by leveraging the knowledge and experience of the people primarily affected by the issue, breaking down silos and making available more data. On the other hand, it democratises the research process itself and promotes trust in the research actors. It has empowered citizens to shape the direction of research, ensuring that investigations are tailored to real-world challenges and informed by the lived experiences of those affected.

Figure 4. Overview of case studies creating value for the citizens involved in the participatory process

Source: CSIL, ICONS, SPI.

Raising awareness of specific issues is a typical effect of participatory processes, as evidenced in the majority of the cases (Figure 6). In certain instances, this heightened awareness translates into greater civic engagement (e.g. generating public debate, contributing to the uptake of the research results, supporting initiatives from civil society). This phenomenon is particularly noticeable in projects addressing socio-environmental issues such as climate change, the transition to clean energy, sustainable urban mobility and biodiversity conservation (e.g. iNaturalist, Energise, Phusicos, FoodE, CoAct, Laboratorio de Salud Urbana, Zooniverse, InnoAir, Coastwatch Portugal). Often, these participatory procedures initiate transformative experiences on a personal level. However, occasionally, engaged citizens become so empowered that they take on the role of 'ambassadors' to disseminate the research results (Box 5).

In the ***Transform*** project, in the case study on endometriosis carried out in Catalonia, participants experienced a personal change as they learned to talk more openly about the disease. In addition, some participants started sharing their experience on social media and interviews and have joined civil society associations to further improve the understanding of endometriosis in the society. This social impact was unexpected at the start of the project.

Box 5. The transformative power of citizen engagement in society

iNaturalist

iNaturalist is a non-profit social network of naturalists, citizen scientists and biologists built on the concept of mapping and sharing observations of biodiversity across the globe. As at January 2023, there were 3.2 million registered users. The engagement of citizens in the research has allowed the creation of an extensive and accurate database, which has been exploited in scientific research – with scientific articles using iNaturalist data. iNaturalist has also provided a platform for individuals to engage with and contribute to the documentation of biodiversity.

The project's emphasis on involving citizens underscores the tangible impact of grassroots involvement in scientific research, making users realise the profound influence their collective efforts can have. Through these combined elements, the iNaturalist community has fostered a deeper connection to the natural world, promoting environmental awareness and appreciation. The iNaturalist project continues to leverage the data collected to develop educational materials, outreach programmes and initiatives that promote environmental literacy.

Source: CSIL, ICONS, SPI.

The ***Merezzate+*** project, implemented in Milan, introduced organisational innovations by stimulating the creation of groups of interest in the community, which have mobilised on specific topics.

At the local level, the awareness-raising process implies an impact on the community, with regard both to the specific topic of engagement (e.g. climate, environment) and, more generally, to the way the community perceives its role and organises itself to further adopt participatory approaches.

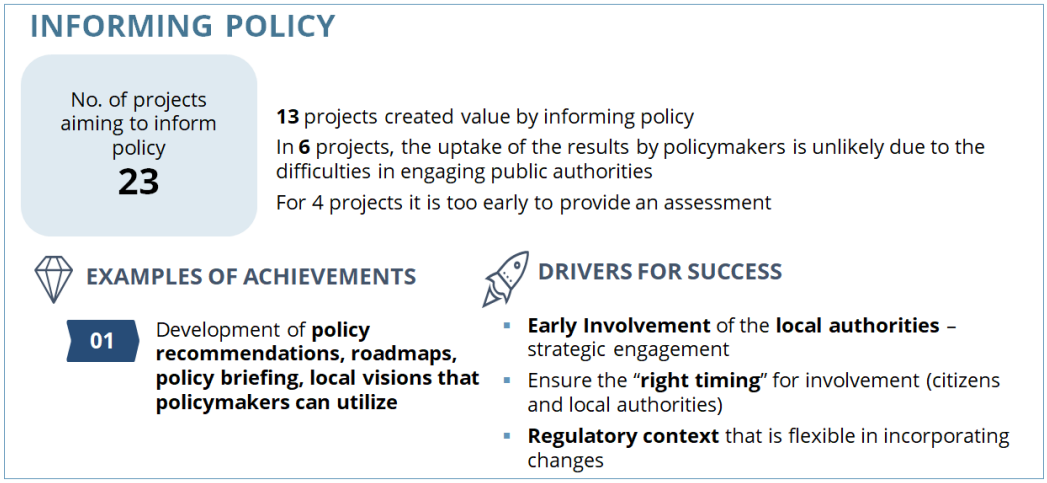
In the ***Parkli*** project, the researchers organised around 50 experiential workshops to show citizens how to implement the research methodology, use the tools, collect feedback on the research tools, and answer questions about the project and possible future developments,

In the ***D-Noses*** project, the input from citizens was collected using a variety of methods to ensure a wider participation (e.g. an app for young people and diaries for older people). However, the researchers also offered training on how to use the app to improve the digital literacy of elderly people.

Depending on the level of engagement, the engagement tools, the contribution expected from citizens, and the context and target group, skills development can be an essential step in R&I processes involving citizens. For example, in citizen science projects, participants often need to be trained to apply a research methodology, to use data collection tools (e.g. a specific device, an application) and to read and interpret data. In many cases, the training is provided in participatory workshops, where participants interact with the researchers. These moments are also important for building trust in the process and in the researchers.

Civic hackathons, especially when they involve students or young professionals (e.g. Digital Solutions for Societal Challenges, Citython), are considered opportunities for participants to learn from each other, to take a hands-on approach and to **develop an entrepreneurial mindset**. The latter is encouraged by exchanges and contact with possible investors.

Figure 7. Overview of case studies informing policy



Source: CSIL, ICONS, SPI.

In total, 13 of the cases analysed have achieved or are likely to achieve their objective of **informing policy.** These projects have resulted in the co-creation of policy recommendations, White Papers, roadmaps or policy briefings aiming to inform policymakers. Although, as emphasised in the workshops, it may take some time for public authorities to fully embrace these insights following the conclusion of the project, in some cases, the citizen engagement process has already stimulated and contributed to policy development (box 6). As discussed in Section 3.2, the involvement of public authorities early in the process is a key driver of success in these cases. In addition, the potential impacts of the initiatives depend on the **specific regulatory context**, as some systems are more flexible than others in incorporating changes.

The ***D-Noses*** project had pilots in 9 countries. Whereas in some cases (e.g., Spain) the municipalities can adapt the legislation on odour pollution at local level, in other cases (e.g., Portugal) it is a responsibility of the national government. This difference affected the results obtained in the two countries.

Box 6. Informing policies

Citique

Citique is a citizen science project aimed at advancing the comprehension of tick ecology and tick-borne diseases, ultimately enhancing disease prevention strategies. Citique asked citizens to report data on tick bites in a repository and welcomed citizens from diverse backgrounds into a dedicated laboratory environment, where they took part in research training courses. This inclusive approach has yielded notable scientific breakthroughs. For example, participants in the programme successfully identified a connection between tick bites occurring in proximity to homes and those on pets.

At a policy level, the Citique project team had the opportunity to engage with deputies at the National Assembly in France, playing a significant role in the creation of two parliamentary reports addressing the field of health management for tick bite prevention and the treatment of Lyme disease. The Ministry of Health developed a comprehensive plan to combat Lyme disease, recognising the role of the Citique project in informing policies and recommendations related to disease prevention. Additionally, the health authority issued guidelines to healthcare professionals based on evidence collected by the project, highlighting the importance of reporting tick bites through the Citique app.

Source: CSIL, ICONS, SPI.

3. HOW TO MEASURE THE EFFICACY OF PARTICIPATORY PROCESSES FOR KNOWLEDGE VALORISATION

Starting with the assessment measures employed in the projects analysed, this section introduces a comprehensive framework for assessing knowledge valorisation with a specific focus on participatory processes. The latter are widely used in projects that aim to create value from knowledge: well-defined engagement strategies are in fact key to valorising knowledge.

The necessity of devising indicators to measure projects' effectiveness and outcomes is commonly acknowledged by all the actors involved. Nonetheless, the establishment of a comprehensive set of indicators to assess the results or influence of participatory processes in knowledge valorisation and value creation is often underemphasised. The analysis conducted in this study reveals a lack of consistent practices employing a clearly defined measurement framework to assess the efficacy of participatory processes – specifically, to assess whether and how participatory processes have led to knowledge valorisation.

As Table 1 indicates, around half of the projects reviewed focused on **output measurements**, often associated with the outreach aspects of the participatory process.

Table 1. Number of projects that considered output and outcome key performance indicators (KPIs) ([1])

	Output KPIs	Outcome KPIs
Number of projects	39 (65 %)	19 (31.6 %)
Total number of projects	60 (100 %)	60 (100 %)

([1]) **Outputs** are normally measures and metrics that assess the immediate, tangible and short-term results of a process, initiative or project. **Outcomes** focus on assessing the intermediate and often medium-term results that occur as a consequence of achieving specific objectives.

While output-oriented key performance indicators (KPIs) provide valuable insights, they fall short of providing a comprehensive understanding of the effectiveness of the participatory process itself. Only 31 % of the projects analysed considered outcome KPIs for the participatory process. Even in projects in which the engagement activities played a prominent role and have achieved important objectives, such as supporting policy changes or designing innovative solutions, in-depth explanations of the assessment and the indicators used to evaluate such activities are rarely provided or not publicly available. The limited use of outcomes and impact KPIs in this area hinders the potential for assessing the full effects of the participatory process. Given the relevance of these findings, it is essential to formulate a robust measurement framework with the aim of guiding forthcoming projects and serving various types of professional, including researchers, practitioners and policymakers.

However, it is important to emphasise that the applicability of the measurement framework presented hinges on the clear definition of objectives during the early stages of the participatory process. The reason for this is that the selection of the most suitable indicators is inherently tied to the initial objectives that were set. In other words, **the chosen indicators should align with and be determined by the objectives established at the outset of the project.** Otherwise, it will be challenging to make informed decisions regarding the selection of appropriate KPIs and the rationale behind choosing them. Moreover, the specific indicators and metrics for evaluating a project should be part of a common vision that has been jointly

discussed, defined and understood by all interested parties, including the stakeholders internal and external to the project.

3.1. Measurement framework

As previously mentioned, the research conducted in this study has revealed a significant challenge in measuring participatory processes: the inconsistency in applying a well-defined measurement framework to gauge their impact, particularly concerning knowledge valorisation and added value. In response to this, the framework developed here is derived from the study conducted but is also grounded in the rationale that underpins participatory processes and engagement practices in a broader sense.

Participatory processes, as a comprehensive concept, adhere to a specific underlying logic, characterised by three foundational pillars. Initially, there is the pivotal task of discerning and identifying the key stakeholders who should be actively engaged in the process. This foundational step serves as a bedrock for ensuring effective engagement. Next, careful consideration is given to how to engage with stakeholders and interact with them meaningfully. Lastly, the participatory process is characterised by a definition of the outcomes and impacts stemming from this collective engagement [(19).] Therefore, to assess the effectiveness of participatory processes that engage citizens in valorising knowledge we suggest drawing on these pillars and focusing on the following three dimensions.

- **Outreach.** This dimension is about the project organisation's capacity to establish meaningful connections with its intended audience and key stakeholders. It assesses the reach and engagement of the project and connection with relevant participants.

- **Participatory activities.** This dimension evaluates the potential of participatory activities for cultivating collaboration and engaging the target audience in a meaningful manner. It assesses the depth of involvement and the extent to which participants actively contribute to the process.

- **Value creation.** This dimension delves into the tangible outcomes of the participatory process, particularly regarding its impact in relation to knowledge valorisation. It scrutinises the value added and innovations generated. This dimension is grounded in the various objectives that R&I projects can have:

    - creating economic value,

    - creating value for society,

    - informing policy.

These dimensions collectively form a comprehensive framework for measuring the success of a participatory process. By assessing outreach, participatory activities and value creation, we gain a holistic understanding of the efficacy of the process and its ability to contribute to knowledge valorisation.

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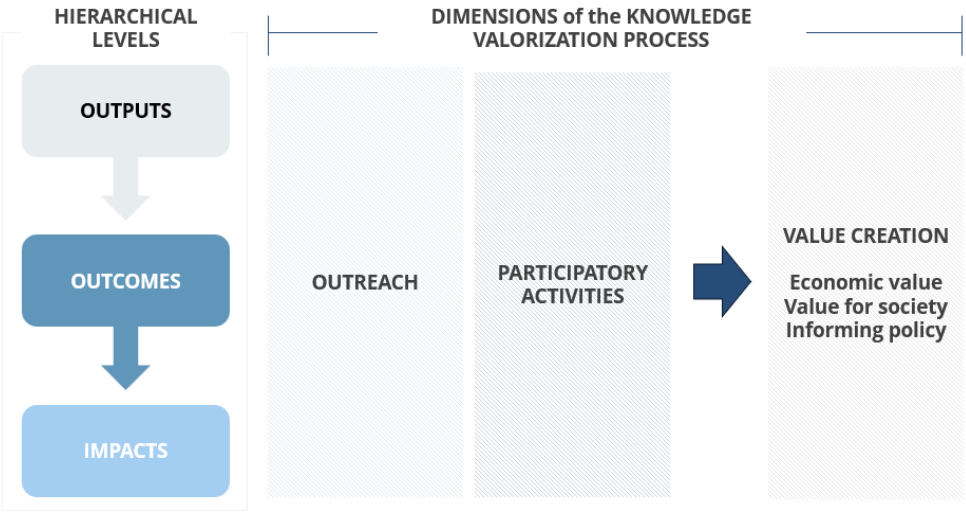
(19) Weaver, L. and Cousins, J. B. (2007), 'Unpacking the participatory process', *Journal of MultiDisciplinary Evaluation*, Vol. 1(1), pp. 19–40.

Figure 5. Proposed framework for participatory processes for knowledge valorisation



Source: CSIL, ICONS, SPI.

Tables 2, 3 and 4 are matrix tables including a set of KPIs, which serve as a tool for organising and categorising indicators according to the different levels and dimensions of the measurement framework each KPI refers to. These matrix tables start by outlining the various dimensions proposed by the measurement framework. Subsequently, the KPIs selected as a baseline are presented, each characterised by its hierarchical assessment level and the intended user for each KPI. It is important to note that the list of proposed KPIs is by no means exhaustive. These KPIs represent some baseline examples of indicators recommended for assessing the participatory process's progress towards its objectives. Nevertheless, this list of indicators can and should be customised and adapted to the specific objectives of each individual project.

These descriptive tables provide:

1. the dimension of the knowledge valorisation process;
2. the KPI name;
3. the hierarchical level (output, outcome or impact);
4. the potential 'user', namely for whom the KPI could be of relevance and/or interest; it should be noted that one dimension, namely 'value creation', can be of interest to all three beneficiaries: researchers, practitioners and policymakers;
5. the objectives associated with each KPI (see Table 4), corresponding to the value creation set of indicators shown in Figure 8.

Additional details (such as the calculation formula, description or other KPI-pertinent information) are provided in the KPI cards (see Annex 3), accessible through the hyperlinks included below. The KPI card contains:

- the overall objective of each KPI,
- the aim of the KPI,
- the calculation formula and the unit of measurement,
- the collection interval, namely when the data should be collected (during or after the engagement activity),
- data requirements.

Table 2. Proposed KPIs for outreach

Dimension	KPI name	Hierarchical level	kpi users
Outreach	KPI.01 Participant attendance	Output	Researchers and practitioners
	KPI.02 Key stakeholders	Output	Researchers and practitioners
	KPI.03 Participation retention	Outcome	Researchers and practitioners

Table 3. Proposed KPIs for participatory activities

Dimension	KPI name	Hierarchical level	kpi users
Participatory activities	KPI.04 Adherence to the initial objectives	Outcome	Researchers and practitioners
	KPI.05 Level of engagement	Outcome	Researchers and practitioners
	KPI.06 Stakeholder satisfaction	Output/outcome	Researchers and practitioners

Table 4. Proposed KPIs for value creation

Dimension	Objectives	KPI name	Hierarchical level	KPI users
Value creation	• Creating economic value • Value for society • Informing policy	KPI.07 Viable solutions	Outcome	Researchers Practitioners Policymakers
	• Creating economic value • Value for society	KPI.08 Jobs created	Impact	Researchers Practitioners Policymakers
	• Creating economic value • Value for society • Informing policy	KPI.09 Integration of stakeholders needs	Outcome	Researchers Practitioners Policymakers
	• Creating economic value • Value for society • Informing policy	KPI.10 Social acceptance analysis	Impact	Researchers Practitioners Policymakers
	• Creating economic value • Value for society	KPI.11 Capacity building	Outcome	Researchers Practitioners Policymakers
	• Informing policy	KPI.12 Informing policy	Outcome	Researchers Practitioners Policymakers

NB: The users for whom a KPI is most relevant are highlighted in bold.

4. LESSONS LEARNED ON VALUE CREATION THROUGH CITIZEN ENGAGEMENT

4.1. Most frequent challenges in participatory processes for knowledge valorisation and possible mitigation measures

The analysis has highlighted a number of elements that might affect knowledge valorisation through citizen engagement. However, best practice examples and suggestions from the experts participating in the workshops indicate that these challenges can be addressed through specific approaches.

- **Harnessing pre-existing networks and initiatives can offset the limited time and resources available for citizen engagement.** These factors must be carefully considered when designing the engagement process, including the selection of appropriate methods and the establishment of achievable levels of level of engagement. Time constraints can be a significant challenge, as engaging in inclusive and participatory processes requires a considerable amount of time and resources. Nevertheless, these constraints may be partially alleviated by leveraging existing networks and initiatives, such as pre-existing platforms for citizen engagement or active NGOs that engage with key stakeholders.

- **Engaging traditionally hard-to-mobilise citizens can be facilitated by collaborating with associations, local networks and local authorities, as well as by selecting channels and tools that align with the capabilities and preferences of the target group.** Reaching and mobilising the chosen target group is one of the main challenges in participatory processes. In interviews conducted for this study, several experts emphasised the existence of consultation fatigue and a general deficit in participatory engagement. One effective approach to addressing this issue is to collaborate with associations, leverage existing networks or involve local authorities. This is particularly important when engaging with target groups that may be less inclined to participate, including individuals with limited incomes or educational backgrounds, as well as those whose time is constrained by work and family commitments. Furthermore, it should be acknowledged that some channels or tools risk cutting out certain groups (e.g. digital tools used with elderly people). Adapting the engagement strategy to align with the capacities and preferences of the target group is therefore essential. This often necessitates specialised knowledge and skills within project teams, including proficient communication skills.

- **When there is limited control over participant selection and engagement, selecting appropriate dissemination channels, crafting messages that resonate with the target groups, and using suitable tools are effective strategies for attracting the relevant target group.** While best practices aim to involve a sample of citizens that is representative of the target group, in many cases the participants are self-selected volunteers, and there is limited control over the representativeness of the population initially targeted. Nonetheless, there are ways to encourage a diversified participation and to attract relevant target groups. For example, the use of digital tools, such as hybrid meetings, can help people with a constrained schedule to take part in these processes. The absence of financial compensation and/or of welfare frameworks (e.g. paid leave, excused absence from work) for participating citizens was cited as a constraint in some projects, as it can diminish their motivation and the quality of their contributions.

- **Continuous and transparent exchange with participants is crucial in maintaining the momentum throughout the engagement process.** Sustaining engagement with citizens throughout the R&I process can be challenging. Participants may perceive their contributions as undervalued or struggle to allocate the necessary time for an iterative process that spans multiple stages of interaction. To address these challenges effectively, it is imperative to establish a continuous and transparent exchange with participants. This effort involves managing their expectations concerning the outcomes, clearly articulating the significance of their input and providing transparent insights into how their contributions will be used and when they can expect to see results. Flexibility in accommodating their needs, such as adjusting the level of engagement or permitting participants to join or exit the process as needed, is essential. These are pivotal measures to incentivise and facilitate ongoing participation.

- **Ensuring that all participants have an equitable platform for meaningful engagement is key to the success of co-creation processes involving stakeholders with different roles, expertise and knowledge.** For instance, while having local authorities engaged in participatory processes has proven essential, citizens may not always feel comfortable expressing views that diverge from those held by these authorities. The same problem arises when the collaboration involves citizens with different levels of expertise or familiarity with the topic at stake. To address this challenge, it is crucial to establish 'safe spaces' and employ methods that mitigate information and power imbalances. Strategies such as gamification, using the creative arts and sociocracy techniques can prove instrumental in achieving this objective, ensuring that all participants have an equitable platform for meaningful engagement, regardless of their position or affiliation.

- **While it is crucial to establish a well-defined engagement and uptake strategy, it is equally vital to be able to adapt swiftly to mitigate unexpected challenges.** Participatory processes are rarely rigid structures. All the stakeholders involved in the participatory process (e.g. researchers, innovation agencies, local authorities, civil society) must be aware that the process might need to adapt to changing circumstances and that the results of the R&I process are not fully predictable. An adaptive approach, characterised by regular monitoring and adaptation to both external and internal factors, enables organisations to remain responsive to evolving conditions and maximise the effectiveness of their engagement and uptake strategies.

- **Clear and transparent communication and expectation management throughout the entire process can play a pivotal role in mitigating the fear of failure linked to the uncertainty associated with participatory approaches.** The inherent uncertainty associated with participatory approaches may trigger concerns about reputational damage for entities initiating and supporting such initiatives. Consequently, these stakeholders may lean towards more predictable, albeit less exploratory, processes. However, it is essential to recognise that fully anticipating the outcomes of participatory processes is often neither feasible nor desirable, as it can significantly limit the potential for creative and innovative outcomes. To navigate this delicate balance, clear and transparent communication, coupled with ongoing expectation management throughout the entire process, can play a pivotal role in mitigating the fear of failure. Setting objectives that are both challenging and attainable can further assuage concerns and foster a more conducive environment for productive engagement and exploration.

- **Awareness raising activities may counter scepticism towards participatory approaches by some stakeholders.** Sometimes knowledge valorisation through citizen engagement is seen as a 'box-ticking activity', a project feature required to get access to

financing. This perspective often stems from scepticism about the tangible outcomes achievable through such processes or a perception that these processes are excessively challenging, time consuming and often unpredictable in their implementation. In these cases stakeholders are only partially inclined to embrace and use citizens' input. For instance, some public authorities may fail to fully recognise the value of citizens' input, particularly when it pertains to suggesting actionable measures. Conversely, in other cases, researchers may be open to involving citizens in data collection but hesitate to engage them in data interpretation. Although the implementation of the insights garnered through citizen participation depends on several variables, such as the quality of the outputs or the feasibility of the actions, raising awareness about the potential of participatory processes is essential to avoid missing opportunities for knowledge valorisation.

- **The commitment of the key actors responsible for delivering economic and societal benefits is crucial for knowledge valorisation**. In the course of designing R&I processes, identifying the individuals or entities responsible for driving the project's outcomes is a crucial step, yet it is not always sufficient. In some cases, commitment is ambiguously defined, allowing room for potential disengagement from the implementation of solutions identified through the participatory process. When this occurs the knowledge valorisation is often negatively affected, and the perceived value of citizen engagement is eroded.

- **Recognising the complexity of changing institutional and legal conditions when setting expectations mitigates disengagement and frustration among participants.** In certain instances, the absence of a conducive legal and political framework can hinder the integration of participatory process outcomes, leading to disengagement and frustration among participants. This situation typically arises when it becomes evident early in the process that the proposed solution necessitates regulatory changes, yet there is no commitment or follow-up in this regard. To establish and maintain trust, it is imperative that the relevant regulatory frameworks are considered from the outset of the process. These frameworks set the boundaries within which the co-creation process can operate effectively. For instance, the rules governing public procurement often impose limitations on R&I processes involving citizens, thereby obstructing the uptake of results. If such frameworks are not considered, achieving the uptake of outcomes becomes unlikely.

- **A clear strategy to protect intellectual assets reduces the risk of legal disputes in participatory processes aiming to commercialise innovative solutions**. To facilitate the uptake of the results of the participatory process, it is essential that it is clarified from the beginning how the intellectual property rights will be treated and who are the owners. In this way, all the stakeholders involved, including citizens, have a common understanding and the risk of legal disputes is reduced.

- **Planning and identifying funding sources for the continuation of the R&I process until its conclusion is crucial to avoid the discontinuation of funding undermining the creation of economic and societal value.** Most projects depend on ongoing funding to sustain their activities and facilitate scaling up, which is essential for generating economic and societal value. Examples include participatory approaches adopted for technological development at a low or medium TRL and innovation applied to urban spaces. As soon as the project deliverables become clear, it is also important to budget for the next phase to support the future trajectory of the process until its conclusion and the desired outcome is achieved.

4.2. Action points for effective participatory practices for knowledge valorisation

This section explores potential action points that aim to address some of the most common challenges encountered in participatory value creation in R&I processes.

Having a structured and systematic plan for both citizen engagement and uptake. Engagement strategies, such as stakeholder mapping and analysis, actor profiling and engagement roadmaps, are – more often than not – well-thought out and planned. However, often there is no clear roadmap on how to use citizens' inputs. It is vital for the engagement strategy to integrate aspects related to knowledge creation and exploitation. By doing so, it is possible to effectively bridge the gap between engagement activities and the successful uptake of results.

Put in place continuous and institutionalised support for knowledge valorisation, including both funding support and soft support, instead of funding sporadic, ad hoc initiatives.

Signal a strong commitment to participatory value creation by allocating financial and human resources to support participation, engagement and exploitation of innovation. It is important that all elements are covered to avoid creating distrust in the processes.

Identifying the target group. Effective knowledge valorisation initiatives concentrate their engagement activities on specific target groups that directly pertain to the research objectives or innovation. To achieve this precision, conducting a methodical and structured stakeholder mapping exercise is essential. This helps in identifying and differentiating various groups, including internal stakeholders (those directly involved in the project, such as consortium partners) and external stakeholders (those indirectly involved but impacted by the project). Within these stakeholder groups, the exercise also distinguishes between key actors and optional participants.

Explore the possible role of SMEs, social enterprises, NGOs and local communities as the activators of the engagement process. Depending on the specific project objectives, it is vital to discern the most suitable actors and communication channels for effectively catalysing the engagement process.

Classify participants depending on their role in the R&I process. A clear understanding of the role of each actor is needed to design appropriate incentive mechanisms and engagement structures and anticipate power dynamics.

Establish beneficiary diversity metrics to identify individual target groups for impact measurement.

Carrying out a stakeholder analysis. Profiling actors involves understanding their interests, needs, expectations, constraints and potential contributions. This may require carrying out surveys and/or workshops to have a comprehensive overview of the social, economic and cultural aspects that can have an impact on the engagement process (e.g. using specific

engagement methods and tools if one of the target groups is elderly people). Moreover, it is important to spot 'alpha users', i.e. individuals who are highly interested in specific projects, have the charisma to mobilise a broader community and can act as advocates and influencers. Alpha users are often the 'entry points' to local communities. Leveraging their enthusiasm and commitment can significantly contribute to the success and impact of initiatives.

Collect data to understand the local context through ad hoc socioeconomic questionnaires, surveys and workshops.

Include dynamic stakeholder interaction analysis in the stakeholder mapping, looking at the interactions and interdependencies among the different actors in detail.

Setting the objectives and the related expectations for participation and value creation. The objectives of the engagement activities should clarify the purpose of involving citizens in product development, highlight the value added by their participation and outline the methods through which they can contribute. For each engagement or participatory initiative, these objectives should be collectively defined with the stakeholders directly involved. Moreover, it is useful to place these objectives on an 'engagement ladder,' which delineates the level of citizen involvement. This can range from a more passive role, such as listening to citizens, to a more active role, in which citizens are directly responsible for the exploitation phase.

Identifying the expected outcomes of participatory activities and devising a strategic pathway to achieve these objectives are also of paramount importance. Citizen involvement can create value across all phases of the R&I process, spanning from initial research framing to real-world application. Therefore, when crafting engagement tools for citizen participation, it is vital to consider the specific stage of the R&I process, such as its TRL or societal readiness level (SRL). This comprehensive understanding of the stages helps manage expectations and provides a realistic perspective on what can be achieved within a given time frame.

Design an evolution map of knowledge valorisation, indicating the objectives and expectations as well as the expected outputs/steps throughout the R&I process.

Set up KPIs and define the responsibilities of the actors involved for monitoring and following up.

Choosing the most appropriate methods. The choice of the engagement method and tools depends on several factors: the objectives of the engagement, level of engagement, resources and time available, target group and experience of the researcher. However, best practices often rely on a combination of methods, especially when citizens are engaged at different stages of the process and with different purposes. In recent times, particularly in the wake of the COVID-19 pandemic, digital tools have gained significant prominence. While harnessing these technologies can streamline engagement with specific groups, notably digital natives, there is a risk of excluding individuals with limited digital skills who may struggle with the transition from in-person to digital interactions. Finding the right equilibrium between these two modes often depends on available resources. Using digital tools is often a cost-effective option, but it should be weighed against the characteristics of the primary target group from which contributions are sought. This will ensure an appropriate and inclusive approach to engagement.

Involve experts in engagement methodologies in the project, when possible, who can help identify the most appropriate methods.

Use digital tools to optimise outreach and engagement, while also offering opportunities for more conventional in-person interactions.

Establishing an uptake and exploitation roadmap. This is crucial to maintain a sharp focus on the core objective of knowledge valorisation. Frequently, many participatory processes are designed as an end in themselves, as if the success of citizen engagement activities could be determined by the dissemination of results from a particular R&I initiative. Unfortunately, genuine uptake is often overlooked and left unmonitored once projects reach the end of their funding cycles, resulting in a significant loss of untapped value and potential. Furthermore, the credibility of a participatory approach depends on the ability to translate citizens' contributions into tangible outcomes. This necessitates the development of a well-defined roadmap that clearly outlines the responsibilities, as well as the financial and non-financial resources required to generate sustainable societal and economic impacts. These roadmaps should be shared and discussed openly from the outset of the project to facilitate engagement, cultivate trust and secure commitment from all stakeholders.

Publicly commit to taking swift action to address regulatory or financial barriers that prevent the exploitation of results.

Embed mechanisms in the funding scheme to incentivise the uptake of results. These mechanisms should incentivise the practical integration of engagement outcomes in the use of research findings. This includes planning for commercialisation, monitoring the impacts even after the project has ended, and conducting assessments of participatory approaches in R&I actions, with a focus on the economic and social values they can generate.

Link participatory valorisation, social value creation and public procurement, e.g. through socially responsible public procurement, sustainable procurement, green public procurement and circular procurement. These strategies align public procurement practices with the broader objectives of social responsibility, sustainability, environmental responsibility and circular economy principles. This integration further reinforces the connection between participatory processes and the public sector's role in driving positive economic and societal outcomes.

Developing a tailored evaluation framework. The unique nature of each research project needs a carefully designed evaluation framework and indicators, thoughtfully tailored to align with the specific objectives of the participatory processes. Our study findings strongly underscore three key areas that warrant particular attention when crafting evaluation frameworks: (i) outreach, which involves a detailed examination of who is engaged and the terms under which engagement occurs, (ii) participatory activities, which delve into how the various actors are involved in the process, and (iii) value creation, which entails identifying and assessing what the project gains from the participatory process.

The timing of the evaluation is also important. By keeping track of the progress of the participatory process at the midpoint, it is possible to implement corrective actions if they are needed. As an example, this may occur when a certain target group disengages from the

process or a dominant actor captures and steers the project's course without consent from other stakeholders. Evaluation following the end of the project is also important. Such assessments serve as valuable tools for learning lessons and enhancing practices, thereby advancing the field.

Design KPIs that hold stakeholders responsible for their part in the R&I process.

Along with regular monitoring, keep stakeholders informed about interim milestones, obstacles and changes in the original project plan.

In addition to a well-designed and shared strategy, this study has also identified other important common traits in good practice cases. These include several aspects that focus on the management of these processes. In particular, regardless of the type of chosen interaction, a number of elements are relevant to all methods: building trust and ownership and being ethical, transparent and inclusive, putting everyone on the same level.

Building trust and clarifying ownership. Establishing trust among various stakeholders and within the research community is of paramount importance. This trust necessitates a shared comprehension of the roles, responsibilities, needs and interests of all actors involved. Fostering ownership is of paramount importance to guarantee that the outcomes of engagement activities are collaboratively designed by the very actors who will ultimately employ them.

Before co-creation, introduce a preparatory phase in which each actor acknowledges the interests and needs of the others involved to achieve a shared understanding of the objectives. Likewise, citizen engagement should not be about only including citizens in the research but also about broadening the perspective and experiences of researchers to embrace that of citizens (including by experiencing their real-life environment).

Tailoring communication and outreach strategies. Selecting suitable engagement methods and effectively managing expectations, tailored to the characteristics and needs of the target groups, are vital elements of good practice. Expectation management involves clear and transparent communication about the objectives, processes and anticipated outcomes. This approach aligns expectations, mitigates the risk of misunderstandings and disillusionment, fosters trust and ensures that stakeholders have a realistic understanding of achievable outcomes. Simultaneously, showcasing the results of participants' engagement reinforces their commitment and yields positive effects in terms of skills development and civic engagement.

Participatory R&I processes with citizens can encounter high levels of uncertainty and social norm conditioning. This requires a certain degree of adaptation and risk mitigation throughout the process.

Adopting a flexible approach. When designing a participatory process with citizens, it is important to keep in mind that innovation is a non-linear process. Participants and activity leaders should be open to embracing unexpected pathways and research results. In citizen

engagement there should be opportunities for 'learning by doing' and experimenting to adapt to the research challenges and the specific project context (the actors involved, the relevant regulatory frameworks, the timeline, and the available resources)**.**

Adopt regulatory sandboxes or similar tools. These spaces serve as interactive environments where experimentation and sharing and validation of ideas can take place, ultimately dismantling hierarchical structures in an acceptable manner.

Accept failure as possible outcome. R&I processes are experimental and often do not achieve the expected results. Such outcomes can be deemed undesirable from a policymaker's standpoint and may also erode confidence in participatory approaches. In such instances, it is imperative to extract valuable lessons from these processes and to be prepared to recalibrate expectations without diminishing the valuable contributions made by citizens.

Integrate risk assessment and mitigation into the engagement strategy. Researchers may find it necessary to adapt the initial engagement strategy, the expected outcomes or both as the project progresses. Having alternative strategies in mind from the project's inception can aid expectation management and facilitate the quickest path to a jointly designed solution. This proactive approach ensures that contingencies are considered right from the start.

Considering sociocultural aspects and adopting local approaches. Each citizen engagement experience is unique and context dependent, deeply rooted in the characteristics of the research project, of the actors involved and of the community where it takes place. This does not mean that a best practice cannot be replicated, but taking a cautious approach is highly recommended. Citizens' engagement activities must always be tailored to the needs, expectations and overall dynamics of the communities that will be directly involved rather than rigidly adhering to standardised blueprints implemented elsewhere. Regulatory frameworks and funding mechanisms also vary considerably and have an impact on what is feasible and achievable within a specific context.

Based on the guidelines established at the EU level, local public authorities have the opportunity to craft specialised 'playbooks' for practical on-the-ground implementation. It is also important to leverage relevant case studies or examples from similar or the same contexts whenever possible. This approach helps instil confidence in the potential benefits and opportunities provided by these engagement processes within a familiar context.

Engaging a high level of expertise on participatory methods. Projects involving social science researchers or specialised companies with expertise in participatory methods, including those who have received training such as that from ENoLL, are more likely to achieve their objectives. The presence of skilled facilitators plays a pivotal role in designing a structured and systematic engagement plan and in evaluating the impact of engagement activities. Their expertise significantly contributes to the success of the overall engagement process.

Develop guidelines at EU level for valorisation through citizen engagement. The guidelines should detail in a practical way how certain engagement methods could be used, how they should be implemented, the drivers and barriers, etc. At the same time, capacity building based only on best practices can have a negative effect on valorisation activities because people may stick with the best practice methodology, learning about only a niche set of typical cases that do not necessarily represent their reality. There are other learning processes such as learning by doing, or constructing networks of best practices and common problems, that can serve as crucial activities for capacity building.

Implement capacity-building programmes for public officers. Capacity building can help develop staff with strong expertise in co-creation inside public administrations. These experts should not limit their expertise to informing and consulting citizens but built capacity for co-creation practices.

Measure skills diffusion through pre- and post-project self-assessment and competency testing.

The action points presented in this section are derived from the analysis based on the 60 case studies and have been formulated following the validation of the study's results at a workshop (29 September 2023) with the help of invited independent experts (see annex 8).

The findings of the study aim to inform, as additional evidence-based inputs, the Code of Practice on citizen engagement for knowledge valorisation, the development of which started with the establishment of a Community of stakeholders to provide the main elements of the Code, which is expected to be adopted by the Commission early 2024.

ANNEX 1. METHODOLOGY

The methodological design

The methodological design of the study relies on the following building blocks.

Repository of cases

The study primarily builds on the evidence collected from a pool of **60 cases** that have involved citizens in the R&I process to increase the social and/or economic value of the new knowledge created. The review of cases was used to answer questions such as 'What works?' and 'What does not work?' but also 'Where?', 'Why?', and 'How?', i.e. what are the assumptions and cofounding factors that influence the outcomes? The comparison across cases showed the functioning of those factors and mechanisms in multiple contexts (similar and different).

The cases were selected according to the following criteria.

- Geographical coverage. The projects had to cover at least 17 Member States and include 10 practices outside the EU.

- Funding programme. Not more than 50 % of the cases received financing from Horizon 2020 or Horizon Europe projects.

- Diversity of engagement models/processes and tools. To reflect the diversity of engagement processes, methodologies and tools, it was ensured that the cases encompassed different types of projects (e.g. citizen science projects but also living labs and consultation platforms) and relied on various methods and tools (e.g. design-thinking sessions, hackathons and open innovation challenges).

Furthermore, at least 10 examples of cases that were initially promising but failed to deliver knowledge valorisation were included.

The 60 final projects included in the study were identified using a systematic methodology designed to include all pertinent projects that could contribute to a more in-depth understanding of how participatory processes contribute to knowledge valorisation in the context of a research project. The approach adopted comprised four distinct phases, each serving as a filtering mechanism to exclude projects that ultimately proved to be less relevant than others.

Phase 1. The initial selection criteria were sufficiently flexible to generate a substantial pool of projects, primarily determined by the funding programme and emphasising projects that claimed to have involved participatory processes with various stakeholders that adhered to specific criteria in accordance with the contractual terms of the study. In the first phase, the project repository included:

- 124 projects were identified by the European Commission and data on these was provided for the purpose of this study;

- more than 50 cases scouted by searching existing databases and repositories, including the monitoring database for European Regional Development Fund (ERDF) R&I funding

in 2014–2020, the repository of best practices on the Knowledge Valorisation Platform and the list of citizen engagement projects supported by the EIT community;

- additional cases were found with targeted searches on specific methods and tools (e.g. civic hackathons, living labs).

In total, **more than 180 projects** were initially considered for inclusion in the study's project pool.

It should be noted that the project scouting was not limited to the inception phase but continued during the data collection phase. Specifically:

- After the exploratory workshop, some of the experts suggested possibly interesting projects or existing databases of participatory activities, such as the Public Engagement Observatory of the UK Energy Research Centre (20).

- During the data collection phase, the study team contacted agencies specialising in citizen engagement (e.g. Stickydot, Society for Change, DOLL Living Lab) to ask whether they would like to contribute relevant project examples to the repository.

- In addition, during the interviews, the study team asked the interviewees whether they would like to suggest additional cases. In this way, a 'snowball effect' was created, whereby the people involved in the projects could suggest cases that might be of interest for the study, and multiple projects could be discussed in a single interview.

The filtering phases described below were thus applied systematically throughout the study.

Phase 2. During this phase, two distinct aspects were taken into consideration when filtering out the set of projects:

- the first aspect pertained to the involvement of citizens in the participatory process;

- the second aspect was connected to whether the initial objectives were geared towards adding value in one or more ways such as:

- through the commercialisation and market uptake of products, technologies or services;

- by creating value for society that cannot be monetised, i.e. when a solution is developed and taken up by public, community or societal actors;

- by informing policymakers so that policies, investment programmes or regulations reflect citizens' needs, ideas and perspectives;

- by raising awareness, developing skills and knowledge and providing new organisational models that instigate behavioural changes and transformations in society.

In phase 2, a final project pool of **79 projects** for the study was created. During these two phases, the project descriptions were reviewed as initial sources of information on the home page of the official project websites. This approach allowed a preliminary assessment of each

(20) https://ukerc-observatory.ac.uk/.

project's potential relevance and alignment with the study's objectives before delving into a more comprehensive evaluation. In particular, it was assessed whether sufficient information was available from desk research (including contacts to be interviewed) and whether the status of the project allowed researchers to collect any evidence to answer the questions.

Phase 3. The third phase comprised a deeper dive into the projects, involving a more comprehensive examination through public deliverables and semi-structured interviews. The selection criteria set for this phase encompassed two pivotal aspects:

- the extent to which the participatory process was a central element of the project and whether it incorporated a well-structured engagement model;

- consideration of whether the outcomes of the participatory process had the potential to be, or had been, seamlessly integrated into the core research and development aspects of the project.

This phase aimed to identify projects where participatory processes played a substantial role in shaping the project's direction and outcomes, thus enriching the overall understanding of knowledge valorisation. During this phase, 12 projects were excluded, leaving a total of **67 projects** in the project pool.

Phase 4. The final phase had particular significance, as it served a dual purpose.

- Confirming the presence of knowledge valorisation elements, as supported by the evidence reviewed in the project documentation (e.g. public deliverables). The assessment relied heavily on the evidence presented in the project documentation and insights shared by project members in semi-structured interviews. One of the pivotal factors scrutinised was the establishment of a potential connection between the added value claimed and the participatory process. More specifically, the objective was to ascertain whether there existed a correlation between the value that projects were said to create and the active involvement of stakeholders in the participatory processes.

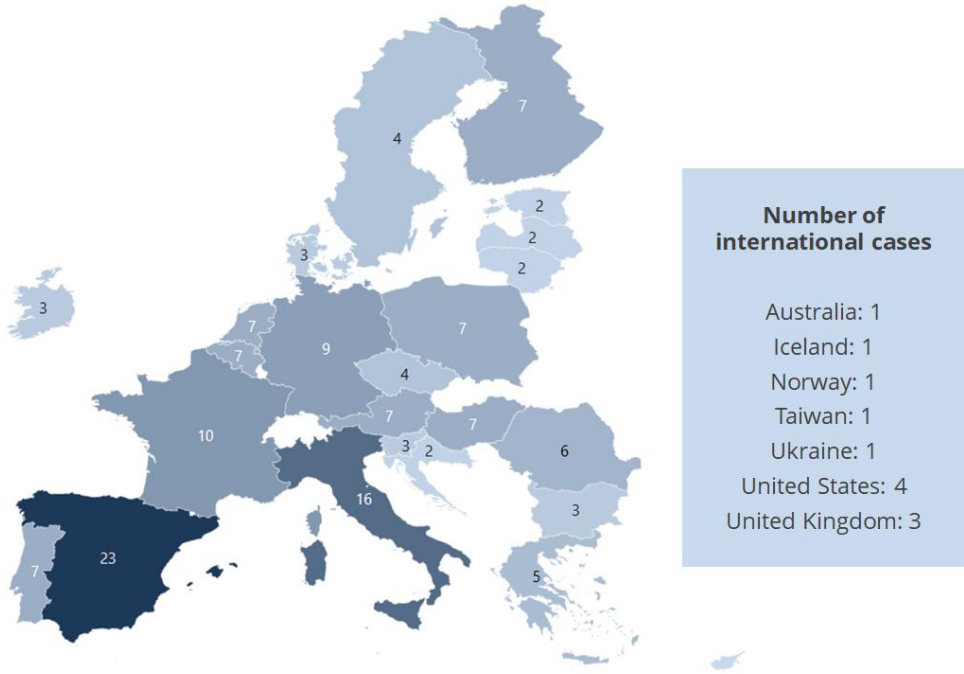
- Diversifying the repository of projects according to contractual terms. This diversification was achieved by considering factors such as the funding programme, geographical coverage, the variety of engagement models employed, and the inclusion of both successful and unsuccessful project stories.

Seven projects were removed during this phase, resulting in a **total of 60 projects** being included in the final repository.

The final sample of 60 cases covers **37 countries** (24 EU Member States and 13 non-EU countries) receiving funding from various levels of government (local, regional, national, regional EU co-funded, EU). The repository includes 12 cases not supported by EU funds and implemented outside the EU, spanning different continents (Figure 8). The findings from these cases have been integrated into the overall analysis, since they addressed the same objectives identified for the other cases. A peculiarity of some of these projects is the fact that they are long-standing initiatives (e.g. iNaturalist, Airbox, Zooniverse

, Better Reykjavík, CityMartCityMart, Foldit) that have engaged large numbers of citizens and, sometimes, have expanded across borders (e.g. iNaturalist, Zooniverse, Foldit).

Figure 8. Number of cases in EU Member States and number of international cases



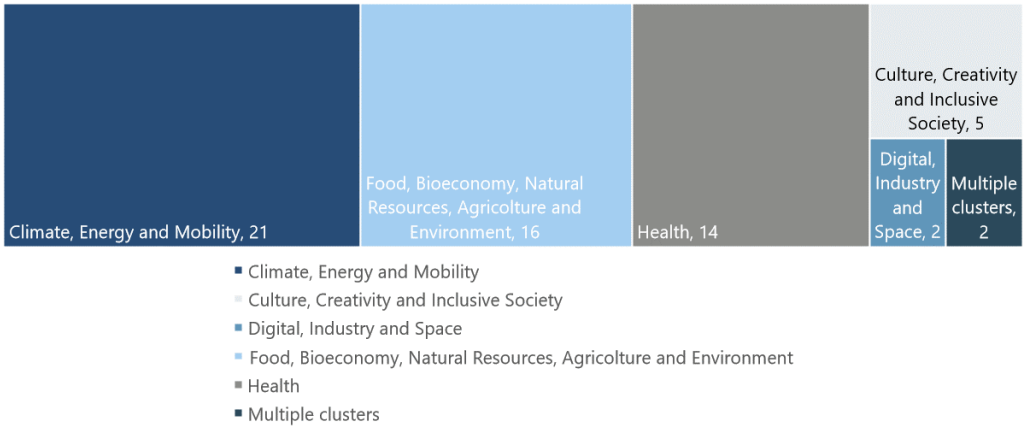
Source: CSIL, ICONS, SPI.

As their initial objective, most of the projects intended to co-create solutions with R&I actors and citizens, but many also addressed other objectives (Figure 9). The cases encompass several thematic areas, even if most of them concern topics related to societal challenges such as the fight against climate change, climate adaptation, biodiversity conservation, environmental protection, sustainable urban mobility and sustainable energy (Figure 10).

Figure 9. Initial objectives of the participatory approach in the sample of cases

Source: CSIL, ICONS, SPI.

Figure 10. Thematic areas covered by the sample of cases



Source: CSIL, ICONS, SPI.

The study team collected detailed information on each case through desk reviews of project documents, project websites, presentations and deliverables and, for 53 of the 60 cases, through semi-structured interviews with the project manager and/or the person responsible for the citizen engagement activities [(21)].

The **desk review** was the primary source of information, particularly about the action's objective(s), the key features, the time and modes of implementation, the actors involved, the results and outcomes achieved and the KPIs used (for selected cases). However, the amount of publicly available information varied greatly from case to case.

The semi-structured **interviews** involved the project or programme managers (or anyone responsible for citizen engagement) and were used to fill in information gaps and collect additional information on the action's rationale, implementation mechanisms and achievements and the difficulties encountered. In a limited number of cases, the project managers preferred to provide information in writing instead of participating in a telephone interview. The team asked about the positive and negative aspects they experienced and the lessons they learned from implementing the action. The team took note of the key points discussed in each interview to facilitate the compilation of the repository.

The information collected was recorded in a **structured repository of projects** in Microsoft Excel to allow the study team to analyse different cases horizontally, compare how different engagement models and methods had worked to achieve the initial objectives, and identify recurrent challenges and drivers of success. The repository of projects provides a well-structured overview of the characteristics and performance of 60 participatory actions for value creation.

It includes five groups of variables: the first group includes variables that describe the cases (e.g. project description, geographical coverage, funding programme, actors involved, stage and degree of engagement); the second group includes variables concerning the project

(21) Annex 5 includes the list of interviewees.

assessment (e.g. objectives achieved, drivers of success, barriers encountered, assessment of replicability); the third group of variables records information on how KPIs were used in monitoring and assessing value creation in the participatory approaches and was instrumental in designing the KPI cards; the fourth and fifth groups of variables indicate respectively the expected and realised impact of the projects (i.e. commercialisation / market uptake, value for society, informing policy, educational / awareness raising / new organisational models). These last two groups of variables allowed the study team to cluster the cases according to the main focus of knowledge valorisation.

When possible, to facilitate analysis across different cases, the information was classified according to standard categories; some categories were defined a priori, while others depended on the data collected (bottom-up approach). Some of the variables simply report the information collected, whereas others include the expert judgement of the study team, based on the evidence (notably the variables 'Expert assessment of the reached outcomes' and 'Type of impact (realised)'.

The study team analysed the evidence collected by clustering the cases according to different variables. The findings illustrated in this report are based on the recurrent and diverging paths and traits observed within and across the different clusters.

Table 5 provides an overview of the repository structure.

Table 5. Repository structure

Group	Variable	Description
Project identification	Title	Title of the project
	Project description	Qualitative description of the project
	Status of the project	Indication of whether the project is finalised or ongoing
	Start date	Indication of the year the project started
	End date	Indication of the year the project ended. For ongoing projects, this is indicated as 'Present'
	Website	Website of the project
	Contact person	Names of the interviewees who shared information about the project
	Geographical coverage (EU or not)	Closed variable indicating if the project covers extra-EU countries
	Geographical coverage	Member States or countries covered by the project
	Geographical level of support	Indication of the type of actor supporting/financing the project
	Source of funding	Indication of the main source of funding of the project
	Cluster (1)	Indication of the main field of research of the project according to Horizon Europe clusters
	Cluster (2)	Further specification of the cluster that has been chosen
	Initial objectives	Initial objectives of the engagement practices (multiple answers possible)
	Type of actor involved	Indication of the types of actors involved in the project according to the quadruple helix model
	Explanation of the type of actor	Specific indication of the groups of citizen or civil society involved
	Stage of involvement	Indication of the stage of the R&I process in which non-academic actors are involved

	Explanation of stage of involvement	Qualitative explanation of the previous variable
	Model of engagement	Specification of the model of engagement that has been adopted (citizen science / living lab / combination of methods / hackathon)
	Specific engagement tools	Indication of the specific tools used to engage the external stakeholders
	Explanation of the engagement	Overall explanation of the engagement process
	Degree of engagement	Indication of the degree of engagement (listen, collaborate, empower). This variable is chosen according to the level of engagement/decision-making in the project that citizens have
Project assessment	**Expert assessment of the outcomes**	Closed variable assessing the outcomes of the project
	Achieved objectives	Qualitative description of the objectives achieved through the participatory process, including how this fostered (or will foster) exploitation
	Added value of participatory approach	Closed variable specifying how the participatory approach improved uptake
	Drivers of success	Qualitative explanation of the drivers of success
	Main barriers	Qualitative explanation of the main barriers
	Assessment of scalability/replicability	A description of the project's provision for scalability and replicability
KPIs	KPIs on engagement activities initially planned	Indication of whether there were KPIs to measure the success of the project (yes/no)
	KPIs (outputs)	Description of the KPIs used to measure the outputs of the project
	KPI (outcomes/impact)	Description of the KPIs used to measure the outcomes/impact of the project
	KPIs monitoring challenges	Qualitative description of the monitoring challenges identified
Type of impact (expected)	Commercialisation / market uptake	Binary variable (yes / Not targeted) to identify cases aiming to create economic value through commercialisation
	Value for society	Binary variable (yes / Not targeted) to identify cases aiming to create value for society
	Informing policy	Binary variable (yes / Not targeted) to identify cases aiming to inform policy
	Educational / awareness raising / new organisational models	Binary variable (yes / Not targeted) to identify cases aiming to create value by raising awareness, increasing civic engagement, encouraging new models of research or organisation
Type of impact (realised)	Commercialisation / market uptake	**Expert assessment** of whether the project created economic value through commercialisation (yes / likely to achieve / unlikely to achieve / no / Not targeted)
	Value for society	**Expert assessment** of whether the project created value for society (yes / likely to achieve / unlikely to achieve / no / Not targeted)
	Informing policy	**Expert assessment** of whether the project informed policymaking (yes / likely to achieve / unlikely to achieve / no / Not targeted)

	Educational / awareness raising / new organisational models	**Expert assessment** of whether the project created value by raising awareness, increasing civic engagement, encouraging new models of research or organisation (yes / likely to achieve / unlikely to achieve / no / Not targeted).

Literature review

In the context of this study, the literature review was used to guide the research strategy and, at a later stage, to complement and validate the findings from the review of empirical cases of participatory approaches. Relevant covered through the literature review include:

- conceptual frameworks on knowledge valorisation in R&I,
- participatory value creation models,
- co-creation and participatory processes,
- measurement frameworks for co-creation processes.

The validation of the findings also took into consideration previous reviews of projects concerning citizen engagement practices such as those developed under Horizon 2020 and Horizon Europe projects [(22).]

Exploratory workshop

The exploratory workshop was held on 9 June 2023 in Brussels and involved **13 experts** who are actively involved in designing and implementing activities and programmes that engage citizens in co-creation for innovative, knowledge-based solutions [(23).] The workshop aimed to explore the following key questions.

- Do participatory practices involving citizens contribute to fostering the knowledge valorisation of R&I?
- What are the conditions and enabling factors that determine the effectiveness of different citizen engagement models? This includes considering the phase of engagement, the objectives pursued and the actors involved.
- What are the main drivers and challenges in the process of designing and implementing various participatory approaches for value creation?
- What metrics and KPIs can be used to assess the success of participatory practices for knowledge valorisation?

During the workshop, the above questions were addressed in three different stages. First, the study team presented some preliminary findings from the cases collected and the experts

(22) Annex 4 includes the list of references reviewed.
(23) Annex 6 includes the list of participants in the exploratory workshop.

provided their insights and reactions based on their own experiences. Second, the experts, divided into small groups, discussed possible engagement strategies for listening to citizens, collaborating with citizens and empowering citizens. Lastly, the experts proposed some action points to assist practitioners in designing and implementing different engagement approaches and made some recommendations for policymakers to foster citizen engagement practices [24].

The input from the exploratory workshop was used to:

- improve the conceptual framework and definitions used by the study;
- broaden the spectrum of engagement models considered by the study;
- have a preliminary overview of challenges and enablers that occur across different research areas and socioeconomic contexts;
- develop some preliminary recommendations and action points.

Validation workshop

The validation workshop was held on 29 September 2023 with a hybrid format. The workshop aimed to receive informed feedback on the findings of the study from the participating experts. Six experts joined the workshop in person. They acted as discussants in all the sessions. They were asked to prepare questions and comments to deepen the discussion of the findings, point out possible limitations and help the consultants refine the synthesis, conclusions and recommendations based on the evidence collected. Another four experts joined the workshop online and contributed to the discussion by presenting a selection of cases from the repository [25]. The discussions helped refine and enrich the findings, conclusions and action points included in this report [26].

Methodological challenges

The following challenges affected the work of the study team.

Shared understanding of the concept of knowledge valorisation. The interviews and the exploratory workshop revealed that there is **no agreed definition** or good understanding of knowledge valorisation among relevant stakeholders (e.g. researchers, policymakers and civil society). While experts seem to grasp the meaning of knowledge valorisation, the concept as defined by the EU is not widely disseminated within the field.

Assessing expected versus real outcomes. Several tools have already been successfully tested to engage citizens in the R&I process. However, when looking at tangible outcomes it is important to differentiate between the expected objectives of participatory approaches and what has been achieved using these methods (was it a box-ticking exercise or a genuine process that led to measurable economic and societal impacts?).

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[24] The summary of the discussions at the exploratory workshop is provided in Annex 7.
[25] Annex 8 includes the list of participants in the validation workshop.
[26] The summary of the discussions at the validation workshop is provided in Annex 9.

Paucity of evidence on outcomes. This aspect of the value creation process is often neglected as KPIs focus more on the quality of the participatory process per se without exploring further down the transmission chain from output to outcome.

Diversity of projects included in the repository. The repository includes projects of different scope, duration and type and implemented in different contexts. All these factors made the cross-project analysis challenging. Context variables are crucial in these processes, and we had to isolate them from principles of good practice that could be leveraged in different circumstances and research areas.

ANNEX 2. CASE STUDIES

No	Project	Country [1]	Main source of funding	Commercialisation / market uptake	Value for society	Informing policy	Awareness raising / skills development / new participatory models
1	Adáma	Greece	EIT	Not targeted	Not targeted	**Yes**	**Yes**
2	Airbox	Taiwan	Private funding	Not targeted	**Yes**	Not targeted	**Yes**
3	BE-Rural	EU	Horizon 2020	Not targeted	Not targeted	**Yes**	**Yes**
4	Better Reykjavík	Iceland	National funds	Not targeted	**Yes**	**Yes**	Not targeted
5	Circular Housing	Italy	EIT	**Yes**	Not targeted	Not targeted	Not targeted
6	Citique-Lorraine	France	ERDF; national funds	Not targeted	Not targeted	**Yes**	**Yes**
7	CityMart	United States	Private funds; national funds	Not targeted	**Yes**	Not targeted	Not targeted
8	Citython	Spain	EIT	Not targeted	**Yes**	Not targeted	**Yes**
9	CoAct	EU	Horizon 2020	Not targeted	Not targeted	**Yes**	**Yes**
10	Coastwatch Portugal	Portugal	National funds	Not targeted	Not targeted	Not targeted	**Yes**
11	Co-Created Health and Wellbeing (CoHeWe)	Finland	ERDF	**Yes**	Not targeted	Not targeted	Not targeted
12	Datathon	France	ERDF	Not targeted	**Yes**	Not targeted	**Yes**
13	Democit	Norway	National funds	Not targeted	Not targeted	**Yes**	**Yes**

14	DigiGen	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	**Yes**
15	Digital Solutions for Societal Challenges – Hackathon	Austria	Municipality funds	Not targeted	**Yes**	Not targeted	**Yes**
16	D-Noses/ OdeurColle ct	EU	Horizon 2020	Not targeted	Not targeted	**Yes**	Not targeted
17	ECF4CLIM	EU	Horizon 2020	Not targeted	**Yes**	Not targeted	**Yes**
18	Energise	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	**Yes**
19	Engage	EU	Horizon 2020	Not targeted	Not targeted	**Yes**	Not targeted
20	Foldit	United States	National funds; university funds	Not targeted	Not targeted	Not targeted	**Yes**
21	FoodE	EU	Horizon 2020	Not targeted	**Yes**	Not targeted	**Yes**
22	Foodiverse	Poland	Horizon 2020	Not targeted	**Yes**	Not targeted	Not targeted
23	Furnish	EU	EIT	Not targeted	**Yes**	Not targeted	Not targeted
24	GrowGreen	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	Not targeted
25	iNaturalist	United States	Private funds; university funds; national funds	Not targeted	Not targeted	Not targeted	**Yes**
26	InnoAir	Bulgaria	ERDF	Not targeted	**Yes**	Not targeted	**Yes**
27	Innovation Ecosystem for Smart Elderly Care	Hungary	ERDF	**Yes**	Not targeted	Not targeted	Not targeted

28	Laboratorio de Salud Urbana	Spain	Municipality funds	Not targeted	Not targeted	**Yes**	**Yes**
29	Living lab for restoration of rural biodivesity	Netherlands	National funds	Not targeted	**Yes**	Not targeted	Not targeted
30	Living lab salud	Spain	Horizon 2020	Not targeted	Not targeted	**Yes**	Not targeted
31	Localised	Austria; Spain	Horizon 2020	Not targeted	**Yes**	**Yes**	Not targeted
32	Merezzate+	Italy	EIT	Not targeted	**Yes**	Not targeted	**Yes**
33	Mosaic	Italy; Sweden	Horizon 2020	Not targeted	**Yes**	Not targeted	Not targeted
34	MOVE21	EU	Horizon 2020	Not targeted	**Yes**	Not targeted	Not targeted
35	MUV	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	**Yes**
36	Nachtlict	Germany	National funds	Not targeted	Not targeted	**Yes**	Not targeted
37	PANEL 2050	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	**Yes**
38	Parkli	Germany	Regional authority	Not targeted	**Yes**	Not targeted	**Yes**
39	Pass Trabool	France	Municipality funds	Not targeted	**Yes**	Not targeted	Not targeted
40	Phusicos		Horizon 2020	Not targeted	**Yes**	Not targeted	**Yes**
41	PING	Belgium; Netherlands	Municipality funds	Not targeted	**Yes**	Not targeted	Not targeted
42	Public Lab	United States	Mozilla Open Source Support programme, National Academies' Gulf Research Program, Save the Hills Alliance,	Not targeted	Not targeted	Not targeted	**Yes**

			11th Hour Project, a programme of the Schmidt Family Foundation, Gordon and Betty Moore Foundation, United Nations Digital Impact Alliance , Wayne Resa				
43	Repair	Belgium	Horizon 2020	Not targeted	**Yes**	Not targeted	Not targeted
44	RiskPacc	EU	Horizon 2020	Not targeted	**Yes**	Not targeted	Not targeted
45	Sendoc	United Kingdom	ERDF	**Yes**	Not targeted	Not targeted	Not targeted
46	Shaping the Future of South Australia: Ageing Well	Australia	National funds	Not targeted	Not targeted	**Yes**	**Yes**
47	Smartdest	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	Not targeted
48	Socatel	EU	Horizon 2020	Not targeted	**Yes**	Not targeted	Not targeted
49	Synchro Space	Ukraine	Municipality funds	Not targeted	**Yes**	Not targeted	Not targeted
50	Teqfor1	Germany	Federal Ministry of Education and Research	Not targeted	Not targeted	Not targeted	**Yes**
51	Terrain	Germany	Federal Ministry of Education and Research	**Yes**	Not targeted	Not targeted	Not targeted
52	Transform	EU	Horizon 2020	Not targeted	Not targeted	**Yes**	**Yes**
53	Unalab	EU	Horizon 2020	Not targeted	**Yes**	Not targeted	**Yes**

54	Urban Lab Rzeszów	Poland	ERDF	Not targeted	**Yes**	Not targeted	Not targeted
55	Usetechlab	France	ERDF	**Yes**	Not targeted	Not targeted	Not targeted
56	Using citizen science to develop solutions for healthy soils through phytomining	United Kingdom	University funds	Not targeted	Not targeted	Not targeted	**Yes**
57	WaterMining	EU	Horizon 2020	**Yes**	**Yes**	**Yes**	Not targeted
58	Telraam (WeCount)	Belgium	Municipality funds; Horizon 2020 (for scaling up)	Not targeted	Not targeted	**Yes**	**Yes**
59	YouCount	EU	Horizon 2020	Not targeted	**Yes**	**Yes**	**Yes**
60	Zooniverse	United Kingdom	Private funds; national funds	Not targeted	Not targeted	Not targeted	**Yes**

([1]) EU means that the case covers more than two countries.

Adáma	European Institute of Innovation and Technology	Greece
The project concerned developing a sustainable strategy in collaboration with citizens. The residents of Eleusis (Greece) were invited to identify the relevant environmental challenges of their city, to jointly inspire possible solutions, through participatory cultural actions and the ideation process to adopt more sustainable practices, and to trigger change through a bottom-up approach.	Target groups: local associations, individual citizens of Eleusis, minority groups Engagement methods: survey, World Café, open discussions, experiential walks, sociodrama sessions Degree of engagement: listen; collaborate; empower	
Results achieved Proposal with targeted actions to address environmental issues (no policy change) Civic engagement of the community Raising awareness of environmental issues	Factors driving success Using a combination of methods that are suitable for the different stages of the project High level of familiarity with engagement process methodologies (including innovative methods) Understanding the local context and having existing relationships with local associations and the community	
https://mentorinculture.com/en/projects/adama-2/		

Airbox	Private funding: initially self-funded, later received a 4-year government grant	Taiwan
The Airbox project is a citizen-led initiative targeting the construction of a comprehensive, nationwide air quality monitoring system in Taiwan. The motivation was to improve public health, especially for children with respiratory conditions, due to the high levels of air pollution in Taiwan.	Target groups: community members, school students, and other citizens interested in environmental monitoring and improvement Engagement methods: real-time data visualisation, education and awareness raising, community engagement, open data and collaboration with schools Degree of engagement: collaborate; empower	
Results achieved Nationwide air quality monitoring system established Over 15 000 devices deployed in 58 countries by March 2020 Large Data portal Supported public health initiatives through evidence-based policymaking	Factors driving success Affordable and accessible low-cost air sensors Enabled large scale deployment Strong focus on public health Relevance of the issue (particular concern from parents about children's health) Significant support from local government	
https://pm25.lass-net.org/AirBox/		

BE-Rural	Horizon 2020	Bulgaria, Latvia, North Macedonia, Poland, Romania
BE-Rural aimed to realise the potential of regional and local bio-based economies by supporting relevant actors in the participatory development of bioeconomy strategies and roadmaps. BE-Rural investigates the particular characteristics of the selected regions at a macro level, as well as existing best practices and business models geared towards the bioeconomy	Target groups: citizens, academia, industry, local administration Engagement methods: educational events, physical and virtual pop-up stores showcasing bio-based products, summer school for teachers, capacity-building and knowledge-exchange seminars, meetings of the regional stakeholder working groups and the Task Forces on Market Assessment and Business Model Design Degree of engagement: listen; collaborate; empower	
Results achieved Development of local roadmaps Civic engagement of the community Raising awareness of the bioeconomy Developing an entrepreneurial mindset Developing skills and know-how on the bioeconomy	Factors driving success Working with already organised stakeholder networks, such as existing clusters	
https://be-rural.eu/		

Better Reykjavík	National programme (City of Reykjavik)	Iceland
Better Reykjavík is an online platform developed as a co-creation project with the Citizens Foundation, Reykjavik city, and its citizens. The platform fosters connectivity, trust and improved policymaking, allowing the crowdsourcing of solutions to urban challenges. It serves as a multifunctional platform for democratic engagement, including agenda setting, participatory budgeting and policymaking.	Target groups: citizens of Reykjavik Engagement methods: online platforms, gaming techniques, public meetings in civic centres and city halls Degree of engagement: listen; collaborate; empower	
Results achieved Large citizen engagement in decision-making Improved policy decisions aligned with community needs Results shaped urban planning, digital services and social services in Reykjavik Enhanced trust between citizens and government Empowered citizens with a sense of ownership Fostered a collaborative environment	Factors driving success Interactive platform environment Addressed post-2008 financial crisis disconnection Responsive to complex city operations Integration of technological innovations and artificial intelligence	
https://betrireykjavik.is/		

Circular Housing	European Institute of Innovation and Technology	Italy
The Circular Housing project aimed to define a new business model for leasing to be applied within social housing apartments. It explored offering fully circular furniture and electrical appliances to tenants at a fair monthly rate to instigate behavioural and market changes and to redesign the economic systems around these products.	Target groups: citizens living in social housing Engagement methods: questionnaires, simulation workshops, testing in real-life conditions Degree of engagement: listen; collaborate	
Results achieved Trademark registration Commercialisation of the service	Factors driving success Involvement of a business partner with the necessary level of interest and the capacity to bring the solution to the market Pre-commercial agreement among the parties when the funding was awarded	
https://redosgr.it/circular-housing/		

Citique	European Regional Development Fund; other national funds	France
Citique is a participatory research programme aimed at enhancing the understanding of tick ecology and tick-borne diseases to improve disease prevention. The programme consists of three components: an app allowing users to report tick bites on themselves and their pets, a unique tick library where users can send ticks for further analysis, and a database to integrate all the information collected.	Target groups: citizens who have been bitten by ticks Engagement methods: app for data collection, surveys, workshops Degree of engagement: collaborate	
Results achieved Enhanced scientific knowledge of tick ecology and diseases Raising awareness of tick prevention Policy change (mentioned in the guidelines for healthcare professionals issued by the health authority)	Factors driving success Training of the stakeholders involved Role of dedicated to citizen engagement actors Use of 'third places' that are neutral and provide a comfortable environment for everyone Openness and effective communication throughout the project	
https://www.inrae.fr/en/news/citique-citizens-making-invaluable-contribution		

CityMart	Private funds; national authority	United States
CityMart aims to revolutionise public procurement by transforming these processes into opportunities for innovation and value creation. The project encourages cities to view procurement as a chance to innovate, save money and enhance the quality of life for city residents and workers. Through its platform, CityMart connects cities with a global database of vendors, leveraging technology to match procurement opportunities with potential solutions, fostering innovation and promoting a culture of continuous improvement.	Target groups: general citizens, community members, business owners and entrepreneurs, academic institutions, local governments and city authorities Engagement methods: consultation, digital/collective awareness Degree of engagement: listen; collaborate	
Results achieved Introduced innovative solutions in multiple cities (service and infrastructure improvements) Improved service delivery and cost efficiencies Influenced policy changes and decision-making in local governments Fostered stakeholder inclusion and sense of ownership Promoted long-term thinking and sustainability	Factors driving success Proactive marketing and outreach Leveraging technology and engagement expertise Understanding local contexts Adaptability Showcasing successful implementations Inclusion of diverse stakeholders	
https://www.citymart.com/		

Citython	European Institute of Innovation and Technology	Spain
Citython aims to analyse urban mobility challenges and identify possible solutions. Multidisciplinary teams consisting of students and professionals from different fields and specialisations compete to provide the city and its inhabitants with innovative solutions to the challenges and needs identified.	Target groups: international students and young professionals (architects, designers, geographers) Engagement methods: hackathon Degree of engagement: collaborate	
Results achieved Gathering innovative ideas Knowledge exchange among stakeholders Developing an entrepreneurial mindset and skills	Factors driving success Interest and commitment of the city Excellent project management and communication skills Monetary prize for the winning team	
https://citython.eu/		

CoAct	Horizon 2020	Spain, Argentina, Austria
CoAct is a citizen social science project that engages vulnerable citizens as co-researchers to tackle global social issues such as mental healthcare and gender equality. Through a combination of R&I activities, CoAct aims to develop a general framework for citizen social science and promote social change through socially robust knowledge.	Target groups: citizens with experience in mental health issues and their relatives, civil-society associations Engagement methods: workshops, focus groups, chatbox, hackathon Degree of engagement: listen; collaborate; empower	
Results achieved Policy recommendations and White Papers on mental health Raising awareness of mental health issues	Factors driving success Having enough time to engage citizens (3 years) Openness about the data collected and the results	
https://coactproject.eu/		

Coastwatch Portugal	National programme	Portugal
Coastwatch Portugal is a European environmental education project that engages citizens in monitoring and protecting coastal ecosystems. The project is led by GEOTA and uses citizen science to collect data on coastal ecosystems. These data are then used to inform research and environmental policymaking.	Target groups: teachers, students, schools, companies, NGOs, families and the general public Engagement methods: digital applications Degree of engagement: collaborate	
Results achieved Raised environmental awareness Supported scientific research and policymaking with the data generated	Factors driving success Hands-on activities Adaptation to the local context Longevity and consistency Involved a diverse range of citizens in data collection	
https://coastwatch.pt/SOBRE-1		

Co-Created Health and Wellbeing (CoHeWe)	European Regional Development Fund; other national funds	Finland
The Co-Created Health and Wellbeing project set up a co-creation process model, involving companies, cities, research organisations and citizens, to develop innovative health and well-being services. By gathering input from healthcare professionals (nurses and doctors) and patients, new services were co-created and piloted in four cities. Companies' benefots included a deeper understanding of social and health sector needs, receiving validation for new service concepts and gaining market links on a national level.	Target groups: healthcare professionals, patients Engagement methods: surveys, interviews Degree of engagement: collaborate	
Results achieved Commercialisation of some of the solutions Increased familiarity of research actors in the health sector with participatory approaches (adaptation of public procurement rules)	Factors driving success Flexibility to adapt to the target groups' constraints Clarity, openness and effective communication on how the results of the engagement process are used	
https://6aika.fi/project/cohewe-co-created-health-and-wellbeing/		

Datathon	European Regional Development Fund; other national funds	France
Datathon brought together diverse stakeholders to explore the potential of digital data in tackling local waste challenges at neighbourhood and regional levels. By analysing and leveraging datasets provided by the municipality, participants collaborated to identify innovative solutions. Three mixed teams consisting of public, private, non-profit actors, designers and data technical experts were formed around three challenges: managing organic waste at the neighbourhood scale, multi-waste collection points and electronic waste in businesses.	Target groups: students Engagement methods: hackathon Degree of engagement: collaborate	
Results achieved Protype of one of the solutions that was co-designed by the hackathon participants Knowledge exchange among stakeholders Developing an entrepreneurial mindset and skills Instigating behavioural change on waste management	Factors driving success Using design-thinking methods (e.g. design fiction) to stimulate creative thinking	
https://www.tuba-lyon.com/projet/datathon-dechets/		

Democit	National programme	Norway
The Democit project, based at Oslo Metropolitan University, is a comprehensive investigation into the dynamics of democratic citizenship in educational environments.Through a number of subprojects it aims to provide policy recommendations. The ultimate goal is to improve teaching methods related to citizenship and democracy in Norwegian schools.	Target groups: students, teachers and teacher educators Engagement methods: surveys, interviews, classroom observations, workshops, longitudinal qualitative research and action research Degree of engagement: listen; collaborate	
Results achieved Detailed qualitative data on political efficacy and citizenship education Identified gaps in civic and citizenship education in Norway Findings will inform adjustments to teacher education methods at Oslo Metropolitan University Results to be publicly shared to inform broader educational practices and democratic citizenship policies.	Factors driving success Objectives of the project were clearly defined from the start Inclusive method incorporated a wide variety of participants Direct participant engagement enhanced the quality of data and resulted in relevant recommendations based on real-world experiences Employed rigorous methodology, resulting in dependable results Collaboration with experts ensured practical relevance	
https://www.oslomet.no/en/research/research-projects/democit		

DigiGen	Horizon 2020	United Kingdom, Spain, Germany, Greece, Romania, Austria, Belgium, Estonia, Norway
The DigiGen project used participatory methodologies to understand why and how some children and young people take advantage of information and communications technology (ICT) while others are negatively affected. The methodologies used by the project consisted of moving the centre of attention from a 'research on' to a 'research with' approach that makes children and young people co-creators and co-researchers. DigiGen aimed to develop significant knowledge about how children and young people use and are affected by technological transformations in their everyday lives.	Target groups: children, parents, teachers, youth community organisations, NGOs Engagement methods: video workshops, digital story-telling workshops, community days, questionnaires, interviews, gaming sessions, digital app (research online diary) Degree of engagement: listen; collaborate	
Results achieved Enhanced scientific knowledge on the impact of ICT on children and young people Instigating a change of attitude in parents and teachers Research results integrated into policy development in one country	Factors driving success User-centric approach with children as co-researchers	
https://www.oslomet.no/en/research/research-projects/democit		

Digital Solutions for Societal Challenges	Local programme	Austria
The objective of the hackathon was to provide a platform for interdisciplinary cooperation between students, early career researchers and city managers to develop digital solution concepts for specific challenges faced by the city. Interdisciplinary teams were formed to work on the challenges and received support from trainers and mentors throughout the project development process. Expert support from professionals in business and society further aided the teams. At the end of the hackathon, teams presented their projects to a jury, which selected a winning team.	Target groups: students Engagement methods: hackathon Degree of engagement: collaborate	
Results achieved Initiation of innovation projects, some of which were further developed (either by the city itself or by start-ups) Knowledge exchange among the stakeholders Developing an entrepreneurial mindset and skills Harvesting innovative ideas	Factors driving success Strong partnership network and early involvement of activators of knowledge valorisation (city managers) Integration of the hackathon into an ecosystem, which provides opportunities for follow-up activities Interdisciplinarity / active involvement of Social Sciences and Humanities (SSH) lead to innovative digital solutions Involvement of a communications expert	
https://forschung.univie.ac.at/services/veranstaltungen-trainings/sonstige-veranstaltungen/hackathon/		

D-Noses/OdeurCollect	Horizon 2020	Bulgaria, Chile, Greece, Portugal, Spain, Uganda, United Kingdom
D-Noses is a research project adopting a citizen science approach and co-creation tools to map and measure odour pollution and to co-design solutions with key quadruple helix stakeholders. An engagement plan at global, national and local levels was defined to engage stakeholders and communities, collect evidence and propose local solutions.	Target groups: citizens (no specific categories), NGOs Engagement methods: online citizen science app, rapid appraisals, focus groups Degree of engagement: empower	
Results achieved Development of an international odour observatory Green Paper and strategic roadmap for governance of odour pollution Development of scientific guidelines for policymaking and do-it-yourself guidelines for project replication National standard on measuring odour pollution using citizen science (in Spain) Increased awareness of citizen science methodology by policymakers at local, national and EU levels	Factors driving success Development of engagement roadmaps that take into account the local context Building trust among the stakeholders and in the method Co-designing communication materials with citizens Localised activities and training Early and inclusive involvement	
https://dnoses.eu/		

ECF4CLIM	Horizon 2020	Spain, Portugal, Romania, Finland
The ECF4CLIM project developed, tested and validated a European competence framework (ECF) for transformational change to empower the educational community to act. The project applied an innovative hybrid approach based on participatory action research and citizen science to co-design an ECF that is adaptable to a range of settings and integrates digital and social competences related to science, technology, engineering and mathematics. To encourage learning by doing, several innovative tools were co-designed with and made available to citizens, including a digital platform for crowdsourcing, internet of things solutions and a digital learning space.	Target groups: students, teachers, organisational staff, parents, experts in education Engagement methods: focus groups, diaries, sustainability competences committees, deliberative workshops, crowdsourcing Degree of engagement: listen; collaborate; empower	
Results achieved Draft ECF Development of an environmental footprint calculator Raising awareness of and promoting civic engagement with climate change in the target groups	Factors driving success Not available	
https://www.ecf4clim.net/		

Energise	Horizon 2020	Denmark, Finland, Germany, Hungary, Ireland, Netherlands, Switzerland, United Kingdom
Energise sought to enhance understanding of changes in energy consumption practices across 30 European countries through a social science programme. By adopting a living lab approach and investigating the socioeconomic, cultural, political and gender aspects of the energy transition, Energise aimed to support public and private decision-makers in reducing household energy consumption.	Target groups: citizens living in residential buildings Engagement methods: interviews, focus groups, questionnaires, community day, innovative engagement activities (e.g. energy diary, a working box with different tools to modify behaviours regarding energy use) Degree of engagement: listen; collaborate	
Results achieved Uptake of more efficient energy consumption patterns Raising awareness of energy consumption	Factors driving success Presence of local actors supporting and enabling local engagement activities	
https://energise-project.eu/		

Engage	Horizon 2020	Denmark, Finland, Germany, Hungary, Ireland, Netherlands, Switzerland, United Kingdom
Engage aimed to co-produce knowledge for designing cost-effective, technologically sound, socially and politically feasible pathways that are aligned with the objectives of the Paris Agreement. The project work was intended to inform the Intergovernmental Panel on Climate Change's sixth assessment report. To achieve these objectives, Engage used integrated assessment models and incorporated cutting-edge social science knowledge.	Target groups: Associations interested in climate transition Engagement methods: workshops, surveys, bilateral interactions Degree of engagement: collaborate	
Results achieved Development of country-specific decarbonisation pathways through modelling techniques Policy brief on decarbonisation actions	Factors driving success Not available	
https://energise-project.eu/		

Foldit	National programme; university funds	United States
Foldit is a crowdsourcing computer game that allows participants to help predict protein structures, crucial for understanding their functions and for drug development.	Target groups: primarily gamers and citizens, including those without scientific backgrounds Engagement methods: digital platform with gaming elements Degree of engagement: collaborate; empower	
Results achieved Enhanced scientific knowledge on proteins, leading to a better understanding of disease and improved drug design and other medical/scientific applications Enhanced public knowledge of protein folding Change in attitude to science (making it more accessible, encouraging citizen-driven research)	Factors driving success Engaging game interface Inclusive approach Active community Scientific recognition Effective feedback mechanisms	
https://fold.it/		

FoodE	Horizon 2020	France, Germany, Italy, Netherlands, Norway, Romania, Slovenia, Spain
The FoodE project aims to accelerate the growth of citizen-led city/region food systems in diverse European cities and regions. By bringing together local initiatives and co-developing tools with academia, citizens and food system start-ups, the project seeks to apply the most up-to-date cross-sectoral knowledge and address the unique challenges of each context. Start-ups play a crucial role in understanding the needs of key stakeholders, facilitating the development of resilient citizen-driven food systems. The project's main challenge is to aggregate sustainable models of city/region food systems and enable the co-creation of innovative pilot experiences that promote the health and well-being of European citizens. The projects adopted a co-created mechanism based on citizen science and responsible R&I principles.	Target groups: schools, NGOs, cultural centres, social cooperatives Engagement methods: Science fair, workshops, participatory working sessions, envisaging the future, innovation challenge, community days, hackathon, interviews, laboratories, open challenge Degree of engagement: listen; collaborate	
Results achieved Fifteen co-design pilot projects in 11 European cities Raising awareness of sustainable food models (11 000 people participating in dissemination and promotional events)	Factors driving success Definition of an engagement strategy, including detailed stakeholder mapping Effective communication (including through social media) Use of local connections	
https://foode.eu/		

Foodiverse	Horizon 2020	Poland
The Foodiverse project examines how increasing the diversity of species in fields and on farms, diversity of products in markets, diversity of policies concerning food and diversity of meals on our plate can help us to create more sustainable food systems and gain a higher level of food security. It adopts a living lab approach to co-creating, exploring, experimenting and evaluating with local stakeholders, supporting a transition towards a more diverse local food system. The user-centred open innovation ecosystem not only translates the results into practice but also experiments with potential solutions (social innovation) and future scenarios. Living labs nourish the whole project with diverse stakeholders' and other actors' perspectives, options, practices and ideals.	Target groups: schools, NGOs, food cooperatives Engagement methods: informal meetings, workshops, events Degree of engagement: collaborate; empower	
Results achieved Testing of the solution in progress (the project is not yet concluded)	Factors driving success Flexibility to adapt to the needs and preferences of civil society (definition of the research topic and solution, the tools and the degree of engagement) Pre-existing collaboration with local organisations Definition of an engagement roadmap to involve the relevant actors at the right moment	
https://foodiverse.eu/foodiverse-living-labs/		

Furnish	European Institute of Innovation and Technology	Spain
The project aimed to develop furniture for urban areas through a participatory approach. Citizens were engaged to aid understanding of the chosen area and their needs and to co-create the furniture. The project had three phases: the first focused on furniture that could be used to make social interaction possible while maintaining distance during the COVID-19 emergency, the second focused on areas around schools and the third focused on areas for children.	Target groups: users of public space during COVID-19 (first edition), the school community (children, parents and teachers) (second edition) and children (third edition). Engagement methods: workshops, co-creation activities (drawings, models and discussions), testing of the furniture, surveys Degree of engagement: collaborate; empower	
Results achieved Multiple scalable and easily fabricated prototypes with open source designs, which enable fuller use of the public space and strengthen the local community Formalisation of the methodology in a research paper so that it can be replicated by policymakers Social value: drawing people to the public space; strengthening the sense of community and the economic ecosystem of the area	Factors driving success Good relationship with the local public authority and understanding of the community Project management skills Building trust among the project partners	
https://furnish.tech/		

GrowGreen	Horizon 2020	China, Croatia, France, Italy, Poland, Spain, United Kingdom
GrowGreen aimed to create climate- and water-resilient, healthy and liveable cities by investing in nature-based solutions (NBSs). The project focused on developing an evidence-based, easy-to-use replicable approach to support the development and implementation of NBS strategies in cities, including through awareness raising and capacity building. Six cities were supported in using this approach to produce their own NBS strategies.	Target groups: neighbourhood communities, rural communities Engagement methods: focus groups, consultations, a mobile app, workshops Degree of engagement: listen; collaborate	
Results achieved Development and implementation of NBS strategies and action plans in six cities Raising awareness of NBSs	Factors driving success Not available	
https://growgreenproject.eu/about/project/		

iNaturalist	Private funds; university funds; national authority	United States
iNaturalist serves as a global platform connecting people to nature through technology. It facilitates the sharing of biodiversity observations, such as photos and sounds, allowing the community to collaboratively identify and verify these observations. This open data-sharing mechanism is instrumental in advancing scientific knowledge and conservation efforts and in connecting people to the natural world.	Target groups: citizens spanning various age groups, from teenagers to senior citizens, biologists, and non-biologists Engagement methods: Digital platform Degree of engagement: collaborate	
Results achieved Civic engagement (over a million global users) Creation of a vast, open dataset (more than 50 million observations of plants and wildlife) Advancing scientific knowledge and conservation: data from iNaturalist used in scientific research Fostering a dedicated community enhancing scientific literacy Informing policy, management and conservation initiatives Empowering and educating citizens on local biodiversity	Factors driving success Strong community engagement Emphasis on open data sharing User-friendly interface Integration of continuous feedback Partnerships with organisations such as the Global Biodiversity Information Facility and National Geographic	
https://www.inaturalist.org/		

InnoAir	European Regional Development Fund	Bulgaria
The project co-designed and tested in a real environment transport services and sustainable urban solutions in two neighbourhoods to provide citizens with alternative forms of travel, reduce car traffic and improve air quality. The project included several citizen engagement activities such as hackathons, student competitions and co-design workshops.	Target groups: designers, students, people living in the area where the solution had to be implemented, other interested Bulgarian citizens Engagement methods: hackathons, student competitions, co-design workshops Degree of engagement: collaborate	
Results achieved Raising awareness about the urban mobility issue Changing the mindset of public authorities on the importance of listening to citizens' ideas to solve issues, develop policies and implement innovations Commercialisation of some of the ideas (some solutions procured by the city of Sofia)	Factors driving success Explaining the issue in a way that resonates with citizens' direct experience In hackathons, providing at least a couple of challenges, e.g. different aspects of /ways of seeing the same problem to attract participants with different expertise Clarity about expectations and expected outcomes (including rules on intellectual property rights) Creating a 'neutral' setting for the engagement Effective communication and openness about the results	
https://innoair-sofia.eu/en/challenges.html		

Innovation Ecosystem for Smart Elderly Care (I-Care-Smart)	European Regional Development Fund	Hungary
The I-Care-Smart project supported the development of smart solutions in elderly care across central European regions. The project aimed to mobilise the elderly and businesses to bridge the gap between innovators and the target group and implement a user-focused co-creation process for smart elderly care solutions.	Target groups: elderly people Engagement methods: interviews, focus groups and usability workshops Degree of engagement: listen	
Results achieved No concrete results in terms of solutions development – not clear how citizens' input was exploited Increased awareness of the public authority of participatory approaches	Factors driving success Consulting users when the solution is at a very low TRL Relying on intermediary actors, such as social centres, networks and associations, to engage citizens and innovators	
https://programme2014-20.interreg-central.eu/Content.Node/I-CARE-SMART.html		

Laboratorio de Salud Urbana	European Regional Development Fund	Spain
The project aimed to implement a health citizen lab pilot in partnership with Barcelona City Council. The consortium, composed of a research centre and a social innovation entity, engaged citizens in identifying neighbourhood issues related to air quality, noise and mobility. Residents contributed their expertise to address the lack of neighbourhood-level data on air and sound pollution and to propose possible solutions.	Target groups: residents of the neighbourhood, civil-society organisations Engagement methods: collaborative workshop, collaborative manufacturing, open calls for ideas Degree of engagement: empower	
Results achieved Two prototyped solutions Raising awareness of and promoting civic engagement in pollution issues Fostered a sense of community Ongoing discussions with the public authority to bring about a policy change	Factors driving success Definition of a comprehensive engagement strategy Effective communication Involving citizens from the project's outset to create a sense of ownership Relying on existing relationships and networks with the community	
https://www.labcsu.com/es/home-es/		

Living lab for restoration of rural biodiversity	National Programme	Netherlands
The research programme aims to develop measures and replicable tools to maintain biodiversity in the Netherlands through research in three different living labs. The living labs involve the Dutch Research Council, public authorities and farmers.	Target groups: farmers Engagement methods: workshops, bilateral interactions and consultations, focus groups Degree of engagement: collaborate	
Results achieved Improved collaboration between farmers and researchers, but in many cases collaboration with public authorities is still difficult Uptake of the solutions is still uncertain	Factors driving success Regular and frequent informal meetings Monetary compensation of participants Definition of an engagement and valorisation strategy (impact pathway) including a monitoring and evaluation framework Flexibility to adapt the approach to unexpected developments	
https://www.nwo.nl/en/researchprogrammes/dutch-research-agenda-nwa/thematic-programming/living-labs-for-the-restoration-of-rural-biodiversity		

Living lab salud	Horizon 2020	Spain
The project aimed to design and pilot a system-oriented dialogue model for identifying the systemic barriers to implementing non-pharmaceutical interventions for SARS-Cov-2 (the virus causing COVID-19) prevention in schools and co-designing recommendations on how to address those barriers in community partnerships.	Target groups: students, parents, teachers Engagement methods: focus groups, interviews, questionnaire Degree of engagement: empower	
Results achieved Recommendations for policymakers	Factors driving success Not applicable	
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10186344/		

Localised	Horizon 2020	Spain, Austria
The project aims to develop end-user products and services for local and regional administrations, citizens, policymakers and business decision-makers in a co-design process. It focuses on creating downscaled national decarbonisation trajectories consistent with Europe's net-zero target. In addition, the project supports the implementation of mitigation and adaptation measures at the local level, including the establishment of sustainable energy and climate action plans.	Target groups: citizens, in particular vulnerable groups (e.g. women, minority groups, people with disabilities) Engagement methods: workshops, focus groups, interviews, surveys Degree of engagement: collaborate; empower	
Results achieved The project has not yet produced results (end date: 2025)	Factors driving success Involvement of public authorities as project partners since the beginning of the project Expertise in citizen engagement techniques Detailed stakeholder mapping	
https://www.localised-project.eu/		

Merezzate+	European Institute of Innovation and Technology	Italy
The project aimed to integrate innovative solutions in a new urban development model conceived for social inclusion, clean energy, sustainable mobility and the circular economy. The activities were driven by strong engagement of new residents in the Redo Milano district, the main local public actors and demand-side stakeholders (e.g. housing associations, utility providers) in co-designing actions to better reflect users' needs. They also aimed to support the development and uptake of new technological solutions and new organisational models.	Target groups: residents of the district Engagement methods: workshops, webinars, gaming techniques, surveys Degree of engagement: listen; collaborate	
Results achieved Refinement and uptake of the technological solutions (installed in the neighbourhood) Implementation of social initiatives of interest to citizens and that can benefit society. The social uptake, however, depends on the willingness of citizens Increased awareness of citizens of the value of participatory approaches for new organisational models	Factors driving success Collaboration with a partner expert in social engagement	
https://www.merezzateplus.it/		

Mosaic	Horizon 2020	Italy, Sweden
The project aimed to co-create and pilot innovative solutions to improve urban mobility (in Gothenburg) and air quality (in Milan). The project adopted a quadruple helix open innovation approach. Citizens were engaged in defining the issue, proposing solutions (through calls for proposals) and testing them.	Target groups: citizens and local associations Engagement methods: co-creation workshops, design-thinking tools, gaming techniques, drawings, crazyting Degree of engagement: listen; collaborate	
Results achieved Solutions have been piloted The cities are committed to implementing the solutions – the uptake of the results is likely Collaboration among different stakeholders has been fostered	Factors driving success Commitment of the public authorities and involvement of key industrial actors Definition of common ground at the beginning of the project to avoid conflict situations Choice of issues that are very relevant to citizens	
https://mosaic-mission.eu/		

MOVE21	Horizon 2020	Sweden, Germany, Norway
The project comprises three living labs and three replicator cities in Europe, where different types of mobility hubs and associated innovations are tested and means of overcoming barriers for clean and smart mobility are deployed.	Target groups: neighbourhood associations, NGOs Engagement methods: community day, workshops, interviews, digital participation Degree of engagement: listen; collaborate; empower	
Results achieved The mobility hub is operating and local associations are responsible for some of the services offered	Factors driving success Approach and solution customised to the local context	
https://move21.eu/		

MUV	Horizon 2020	Belgium, Spain, Italy, Portugal, Netherlands, Finland
The project aimed to instigate behavioural change in local communities to reduce urban traffic. It raised citizen's awareness of the quality of the urban environment to promote a shift towards more sustainable and healthy mobility choices. MUV solutions are co-created and validated with learning communities in six diverse urban neighbourhoods.	Target groups: citizens of the targeted neighbourhoods (elderly people, young people, young adults) Engagement methods: workshops, focus groups, user journey map, conferences, digital application, gaming techniques Degree of engagement: collaborate; empower	
Results achieved Raising awareness of and promoting civic engagement in urban mobility issues Provision of input for policy development	Factors driving success Definition of a strategic plan for the co-creation activities Profiling of social actors and target groups Entertaining engagement activities Paying attention to the local culture and key social actors	
https://www.wepush.org/en/projects/muv-mobility-urban-values/		

Nachtlict	National programme	Germany
The project adopted a citizen science methodology to collect data about light pollution. The data were collected using an ad hoc application, developed in a co-design process with a group of citizen scientists. The citizen scientists are involved in the presentation of the project at conferences, in the evaluation of the data and in the scientific publications.	Target groups: individual citizens Engagement methods: digital app, workshops, events Degree of engagement: collaborate	
Results achieved Open access database on lights over an extended area (that can be used for scientific purposes or for policymaking) Raising awareness of and promoting civic engagement in light pollution	Factors driving success Co-design of the app made it user friendly Collaboration with local actors	
https://nachtlicht-buehne.de/		

PANEL 2050	Horizon 2020	Bulgaria, Czechia, Estonia, Hungary, Latvia, Lithuania, North Macedonia, Poland, Romania, Slovenia
The project aimed to create durable and replicable sustainable energy networks at local (municipality/community) level, where relevant local stakeholders collaborate on the creation of local energy visions, strategies and action plans for the transition to low-carbon communities in 2050. The PANEL 2050 project focused on the creation of these sustainable local energy networks in central and eastern European countries.	Target groups: organisations active in / working with (clean) energy, NGOs, customers, entrepreneurs, young people Engagement methods: workshops, training, bootcamps Degree of engagement: listen; collaborate; empower	
Results achieved Ten regional visions for transitioning to a low-carbon economy, regional roadmaps and action plans The visions and roadmaps have sparked the transition process in 10 eastern European regions that have identified a reduction in emissions of 50–85 % Central Eastern European Sustainable Energy Network established	Factors driving success Detailed stakeholder mapping Structured engagement strategy	
https://ceesen.org/panel-2050/		

Parkli	Regional programme	Germany
The project aimed to develop participatory early warning systems to address local climate change impacts through citizen science activities in environmental informatics. Through active engagement with citizens, the project sought to identify specific applications and technologies that could be easily incorporated into the everyday lives of citizens.	Target groups: individual citizens, schools, NGOs Engagement methods: workshops, gaming techniques Degree of engagement: collaborate; empower	
Results achieved The project has not yet produced results (end date: 2024)	Factors driving success Flexibility to adapt the approach to citizens' needs Effective and continuous communication	
https://www.os4os.org/en/projekte/parkli		

Pass Trabool	Local programme	France
The project aimed to enhance a service, the Lyon Metropole Urban Pass, at the request of the Grand Lyon authority. This pass aimed to streamline multiple subscriptions and metropolitan services. In order to optimise the Pass Trabool and align it with the preferences of Lyon residents, an experimentation phase with citizens was carried out.	Target groups: residents of Lyon Engagement methods: interviews, focus groups Degree of engagement: listen	
Results achieved Set of recommendations developed on how to improve the service. However, the service has never been implemented, primarily due to a shift in the political agenda	Factors driving success Collaboration with local actors (cultural associations) to reach citizens who are difficult to mobilise Engagement protocol to ensure the representativeness of the sample Monetary reward for participation	
https://www.tuba-lyon.com/projet/pass-trabool/		

Phusicos	Horizon 2020	Andorra, Austria, France, Germany, Italy, Norway, Spain
The project focused on demonstrating the effectiveness of NBSs in reducing the risk of extreme weather events in rural mountain landscapes. The project co-designed and implemented NBSs at various European case study sites. These sites have secured external financing and are in the process of implementing disaster risk reduction measures, which could be extended to broader implementation of NBSs through the application of key innovation actions developed by Phusicos.	Target groups: rural communities Engagement methods: focus groups, card enquiry, World Café), mapping tools (e.g. sketch mapping, digital participatory mapping, node-link diagrams), tools for retrospective reflection and future planning (e.g. participatory scenario planning, storyboards), tools to encourage creative thinking and mutual understanding (e.g. multiple perspective wheel) and decision support tools (e.g. ranking methods) Degree of engagement: listen; collaborate	
Results achieved Raising awareness of NBSs Enhancing knowledge and skills on natural hazards Implemented NBSs	Factors driving success Involving local authorities Creating and disseminating knowledge through the living lab Detailed stakeholder mapping Neutral facilitation, discussion of topics, building trust and commitment help to break down silos	
https://phusicos.eu/		

PING	Local programme	Belgium; Netherlands
The PING project is a citizen engagement campaign aimed at promoting cycling and improving the cycling infrastructure. Cyclists are provided with a Bluetooth button (developed by Mobiel21 and the association Bike Citizens) which they can press whenever they encounter something they want to report to the municipality. The information gathered through the PING project is used to formulate recommendations for policy and infrastructure improvements in workshops involving citizens and civil-society organisations.	Target groups: cyclists, cycling federation Engagement methods: co-designed data collection tool, digital application, workshops Degree of engagement: listen; collaborate	
Results achieved In Amsterdam the data collected served as a basis for developing a comprehensive plan with short-, medium- and long-term actions that the municipality is implementing Initiated dialogue between the municipality and the cycling federation	Factors driving success User-friendly, co-designed technology The positive attitude of the public authority to receiving and implementing input from civil society	
https://www.bikecitizens.net/ping-campaign/#how		

Public Lab	National programme; private funds	United States
Public Lab is a platform for community-driven science focused on environmental issues. It empowers citizens to investigate, document and address environmental concerns, promoting scientific literacy, knowledge sharing and collective problem-solving.	Target groups: individual citizens, communities (both urban and rural) and public institutions / societal actors. Engagement methods: living lab, do-it-yourself technology kits, online platform, community projects, research notes, mapknitter, spectral workbench, infragram, events, workshops Degree of engagement: collaborate; empower	
Results achieved Civic engagement in environmental research and monitoring Empowered communities enabling informed decision-making and action by citizens	Factors driving success Open and collaborative approach Accessible tools and resources Supportive community Adaptability of the approach	
https://publiclab.org		

Repair	Horizon 2020	Belgium
The project aimed to support the transition to a circular economy by providing local and regional authorities with an innovative geodesign decision support environment. Implemented in living labs across six metropolitan areas, the decision support environment enables the development of eco-innovative spatial strategies to reduce waste flows and promote resource use. The initial workshops were conducted to understand the context and identify important stakeholders such as local government, waste management organisations, research institutes and representatives of citizens. The second phase of workshops aimed to find solutions to the challenges identified beforehand. Possible ideas were generated, and research centres and students were involved in further developing these ideas. A closing workshop showcased all these ideas. However, the feasibility of these ideas was never tested.	Target groups: students, NGOs Engagement methods: workshops (including co-design sessions) Degree of engagement: listen; collaborate	
Results achieved Gathering ideas, which were not put into practice because of the limitations of the regulatory framework	Factors driving success Representativeness of the sample Project management skills	
https://h2020repair.eu/		

RiskPacc	Horizon 2020	Belgium, Czechia, Greece, , Israel, Italy, United Kingdom
The RiskPacc project seeks to further understand and close the risk perception action gap in the context of disaster resilience. Through its dedicated co-creation approach and its seven case studies, RiskPacc facilitated interaction between citizens and civil protection authorities to jointly identify their needs and develop potential procedural and technical solutions to build enhanced disaster resilience.	Target groups: individual citizens, NGOs, teachers Engagement methods: design thinking, participative technology development, participatory mapping Degree of engagement: listen; collaborate; empower	
Results achieved Identified solutions (no information on their implementation)	Factors driving success Project management skills	
https://www.riskpacc.eu/		

Sendoc	European Regional Development Fund	United Kingdom
The project aimed to test the use of wearable sensor systems in ageing communities located in remote northern areas of Europe. Furthermore, it aimed to bring about changes in existing rehabilitation programmes by implementing research and development in wearable systems, establishing community networks, creating platforms for data and experience sharing, testing technical and social acceptability, and assessing functionality in cold climate conditions.	Target groups: health professionals, elderly people Engagement methods: surveys Degree of engagement: listen	
Results achieved Improved solutions at a higher TRL	Factors driving success Engaging elderly people through intermediary actors (community centres, charities, NGOs, third sector)	
https://sendoc.interreg-npa.eu/		

Shaping the Future of South Australia: Ageing Well	National programme	Australia
The Ageing Well project was initiated to address the demographic shift in South Australia and the untapped economic and social opportunities presented by the ageing population. The project emphasises the importance of understanding the lifestyles and preferences of individuals aged 60 and over and aims to design new social support models through research, innovation and commercialisation.	Target groups: senior citizens, public authorities, communities, NGOs Engagement methods: consultations, focus groups, design-thinking sessions, participatory design sessions Degree of engagement: listen; collaborate	
Results achieved Fostered meaningful connections addressing social isolation Change in attitudes: challenged ageism and promoted age inclusivity Enhanced accessibility to services and products for older individuals	Factors driving success Co-design approach addressing real problems Training older peers to increase engagement Raising awareness and educating stakeholders Mobilising communities for improved outcomes Building trusted relationships and leveraging existing resources Spreading innovation and learning from successful strategies	
https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/about+us/department+for+health+and+wellbeing/office+for+ageing+well/south+australias+plan+for+ageing+well+2020-2025/south+australias+plan+for+ageing+well+2020-2025		

Smartdest	Horizon 2020	Israel, Italy, Netherlands, Portugal, Slovenia, Spain
The project examined and sought consensus for viable solutions to forms of social exclusion taking shape in cities that are global human mobility hubs. The project aimed to develop innovative solutions addressing the conflicts and externalities produced by tourism-related mobility in cities by informing the design of alternative policy options for more socially inclusive places.	Target groups: individual citizens, NGOs Engagement methods: creative thinking, co-creation and testing workshops, focus groups, design thinking, collaborative mapping Degree of engagement: collaborate; empower	
Results achieved Shared understanding of specific socio-spatial dynamics Better understanding of social conflicts in some urban areas Understanding opportunities for changes and potentially setting agendas for emerging issues Identification of future scenarios and tools for realising those scenarios	Factors driving success Creating a common ground for fruitful dialogue	
https://smartdest.eu/		

Socatel	Horizon 2020	Ireland, Spain, Hungary, Finland
The project catered to the needs of the growing ageing populations in Europe with a view to improving the accessibility, responsiveness, efficiency, transparency and transferability of social and care services. The aim was to develop a useful, transparent and easy-to-use platform following a quadruple helix approach, in which service users, care professionals, researchers and innovators collaborate throughout the process.	Target groups: individual citizens (mostly elderly people), health professionals, care givers, social service professionals Engagement methods: focus groups, World Café, design-thinking sessions Degree of engagement: collaborate; empower	
Results achieved Open source Socatel platform	Factors driving success Expertise in stakeholder engagement	
https://www.socatel.eu/		

Synchro Space	Local programme	Ukraine
Synchro Space is a hub that assists cities in addressing their challenges through the organisation of hackathons. It develops the most effective urban development practices responding to specific municipality's needs. Since 2018, Synchro Space has collaborated with 12 cities in Ukraine. During the hackathons, citizens and professionals are organised in teams. Implementation of the ideas depends on the availability of funding, which has to come from the public sector or donors.	Target groups: individual citizens Engagement methods: hackathon Degree of engagement: collaborate	
Results achieved Public procurement of the solution by the municipality	Factors driving success Extensive stakeholder engagement Targeted communication campaigns Interdisciplinary approach Understanding citizens' motivation	
https://hub-synchro.space/en		

Teqfor1	National programme	Germany
The Teqfor1 project sought to address the lack of systematic research on the effectiveness of do-it-yourself artificial pancreas system (DIY-APS) technologies in improving quality of life and addressing therapeutic events and technical issues. Teqfor1 allowed citizens to actively participate in defining the criteria or factors that should be assessed to determine quality of life. By giving people with a chronic disease the opportunity to make informed decisions and contribute to academic research, Teqfor1 acknowledges both social responsibility and the responsibility of academic research to include and raise the profile of individuals with chronic conditions.	Target groups: citizens using any type of DIY-APS and possibly other DIY technologies Engagement methods: surveys, workshops, online platform Degree of engagement: empower	
Results achieved Enhanced scientific knowledge (new insights into automated insulin delivery systems) Raising awareness among doctors about the challenges faced by individuals living with diabetes and the potential impact of DIY-APS technology	Factors driving success Training of citizen scientists	
https://www.itas.kit.edu/english/projects_woll19_teqfor1.php		

Terrain	National programme	Germany
The Terrain project aimed to develop a support and guidance system for blind and visually impaired individuals to enhance their orientation and navigation in urban spaces, promoting their independence and social inclusion. The project involved citizens in contributing to the development of a system for real-time auditory, tactile and haptic information about the user's environment. In addition, the project assessed the potential societal effects, aligning them with societal perspectives, values and normative ideals. The participatory process also allowed non-visually impaired participants to experience visual impairment through simulation glasses, increasing their sensitivity to and understanding of the challenges faced by visually impaired individuals.	Target groups: both visually impaired and non-impaired citizens Engagement methods: workshop, field tests, interviews, role-playing game, brainwriting pool Degree of engagement: collaborate	
Results achieved Improved technological solution at higher TRL Improved acceptability of the solution	Factors driving success Role-playing game to increase participants' perspectives Maintaining an unbiased environment by excluding technology developers from citizens' discussions	
https://www.itas.kit.edu/english/projects_wein16_terrain.php		

Transform	Horizon 2020	Spain
The Transform project used participatory approaches to inform policymakers on R&I issues. In Catalonia, the project implemented citizen science methodology in two pilot projects: one on waste management and one on women's health, specifically endometriosis. The topics were chosen through a co-creation exercise with thematic groups bringing together different stakeholder categories. Women with endometriosis participated in the research, providing valuable insights and recommendations for improving healthcare services.	Target groups: women suffering from endometriosis Engagement methods: therapeutic sessions, mindmap exercise, other participatory workshops, survey, online meetings Degree of engagement: empower	
Results achieved Innovative clinical approach applied in the hospital Revised Catalan healthcare model for endometriosis – following meetings with policymakers Citizen science introduced into the new Catalan smart specialisation strategies as a methodology for R&I Raising awareness of and promoting civic engagement in endometriosis and women's health	Factors driving success Appropriate timing and relevant topics to align with policymakers' agenda Early involvement of policymakers Empowering citizen as co-researchers Understanding the local context	
https://www.transform-project.eu/		

Unalab	Horizon 2020	Czechia, Finland, France, Italy, Netherlands, Norway, Spain, Turkey
The Unalab project aimed to enhance the climate and water resilience of cities by developing an evidence-based European framework of innovative NBSs through co-creation with stakeholders and the implementation of living lab demonstration areas. The project involved three front-runner cities (Eindhoven, Genoa and Tampere) with expertise in citizen-driven solutions for sustainable development, supported by seven follower cities and two observer cities.	Target groups: individual citizens, NGOs, schools Engagement methods: round tables, co-creation meetings, workshops, innovation vouchers Degree of engagement: Listen; Collaborate; Empower	
Results achieved Public procurement of solutions in the three front-runner cities Skills and capacity building in the community	Factors driving success Supportive legal framework Alignment of the themes with local visions Building on informal networks and relationships, empowering informal networks Detailed stakeholder mapping and value models Monitoring plans	
https://unalab.eu/en		

Urban Lab Rzeszów	European Regional Development Fund	Poland
The Urban Lab is an instrument (organisation and physical space) for cooperation between municipal authorities and residents, enterprises and scientific entities, aimed at improving the quality of life of residents through innovative solutions to identified problems (initiating, testing, implementation and evaluation of projects) and generating additional value using municipal resources.	Target groups: individual citizens, NGOs, schools, students Engagement methods: calls for ideas, workshops Degree of engagement: collaborate	
Results achieved Public procurement and implementation of the proposed ideas Civic engagement Development of skills and an entrepreneurial mindset	Factors driving success Commitment from the public authority to implement the ideas	
https://urbanlab.erzeszow.pl/828-urban-lab.html		

Usetechlab	European Regional Development Fund	France
This project aims to investigate the impact of technologies on high-stress healthcare professions by actively involving healthcare professionals in applied research. The objective is to understand how digital tools can improve patient care in both home and healthcare facility settings. The Usetechlab methodology involves engaging healthcare professionals, and partnering them with technology developers, to understand their needs, gather insights and improve healthcare practices.	Target groups: healthcare professionals Engagement methods: participatory workshops and discussions, simulation sessions, focus groups Degree of engagement: collaborate	
Results achieved Improved technologies at higher TRL (technologies tested in real-life environment) Improved acceptability of technologies	Factors driving success Team building with healthcare professionals Small groups to facilitate sharing of opinions Use of simulations Exchange of knowledge and insights among professionals	
https://usetechlab.com/		

Using citizen science to develop solutions for healthy soils through phytomining	University funds	United Kingdom
The research project aimed to map soil contaminants in the United Kingdom and develop a technology for the mining, retrieval and upcycling of metals from soils and for their conversion into high-value nanoparticles for use in manufacturing. The project adopted a citizen science approach, with around 200 citizens being involved in testing the solution (collecting the soil samples, planting the metal-extracting seed mix, monitoring the growth), but also in providing suggestions on how to improve the solutions (e.g. how the mix of plants could be changed) and making observations that helped redefine the research questions. The project attracted the interest of some municipalities and associations in the United Kingdom, which contacted the research group to replicate the citizen science project in other areas.	Target groups: individual citizens (interested in gardening) Engagement methods: bilateral interactions, workshops Degree of engagement: collaborate	
Results achieved Improved technologies at higher TRL up to their commercialisation by the spin-off company Phyona Ltd Skills development and increased know-how in the participants Raising awareness in public authorities of the potential of the solution Positive impacts for the communities living in the areas where the project was replicated, as it led to decontamination plans and to the revaluation of public spaces Increased interest in citizen science / citizen engagement approaches in the university	Factors driving success Continuous communication Openness about the results Entrepreneurial mindset	
https://www.brunel.ac.uk/research/Projects/Project?entryid=4285002e-7d46-44b7-b5d0-ba8dcbe43410		

WaterMining	Horizon 2020	Spain, Italy, Cyprus Netherlands, Portugal
WaterMining aims to address the challenge of global water demand by helping to ensure access to clean water and sanitation. This is done by exploring alternative water sources and developing alternative solutions for sustainable water management. The project produces science-based, market-oriented policy recommendations, designs circular business models and engages stakeholders, leading to sustainable management of water resources.	Target groups: farmers, NGOs Engagement methods: online platform, small group discussions, workshops on business plans, interviews, focus groups Degree of engagement: listen; collaborate	
Results achieved The project has not yet produced results (end date: 2024)	Factors driving success Relevance of the issue to the local context	
https://watermining.eu/		

WeCount (Telraam)	Local programme; Horizon 2020	Belgium
Telraam is an initiative carried out by the NGO Mobiel21. Initially funded by the Belgian government, Mobiel21 developed with Mobility Leuven a sensor to collect traffic data cheaply and widely. The sensor was co-designed and tested with citizens. After that, the project received a Horizon 2020 grant that made it possible to design a framework for citizen science and scale up the use of the solution. As a result of the Horizon 2020 project, a spin-off (Rear Window BV) was founded, which has commercialised the solution, works as a citizen science service provider and is continuously improving the sensor.	Target groups: individual citizens Engagement methods: workshops, co-designed tool (sensor), online platform Degree of engagement: collaborate; empower	
Results achieved Commercialisation of the product Launch and scale-up of a start-up with a business model based on citizen engagement Civic engagement of participants	Factors driving success Long-term (3–5 year) project Sufficient time and resources for scaling up	
https://we-count.net/page/legacy		

YouCount	Horizon 2020	Austria, Denmark, Hungary, Italy, Lithuania, Norway, Spain, Sweden, United Kingdom
YouCount is a citizen science project that brings together young people and relevant stakeholders to co-create new knowledge and innovations to address social inclusion. YouCount involves young people (aged 15–29 years) as citizen scientists in the research process to co-create knowledge about positive drivers of social inclusion in young people at risk of exclusion and to co-create better approaches to and policymaking for social inclusion.	Target groups: young people (different types of youth groups, e.g. migrants, hearing impaired, rural, urban, youth council) Engagement methods: focus groups, interviews, dialogue forums, online platform, visual matrix techniques, World Café Degree of engagement: Listen; Collaborate	
Results achieved The project has not yet produced results (end date: 2024)	Factors driving success Fostering a sense of ownership of the process in young people	
https://www.youcountproject.eu/		

Zooniverse	Private funds; national programme	United Kingdom
Zooniverse is the world's largest platform for people-powered research, allowing over a million volunteers globally to assist professional researchers across disciplines, from astronomy to zoology. The platform democratises science, enabling anyone to contribute to real, cutting-edge research.	Target groups: citizens, online community of volunteers, schools (through Zooniverse in the Classroom), museums and cultural organisations Engagement methods: digital/collective awareness platforms, gaming techniques Degree of engagement: collaborate; empower	
Results achieved Civic engagement Enhanced scientific knowledge (led to scientific advances in astronomy, ecology and humanities) Raised awareness of scientific issues among citizens Promotion of the citizen science methodology Educational impacts Attracted additional investment	Factors driving success Open access and ease of use Community engagement Recognition of volunteers' efforts Strong institutional support Consistent feedback and updates Robust technological infrastructure	
www.zooniverse.org		

ANNEX 3. LIST OF PROPOSED INDICATORS

The following KPIcards facilitate the implementation of the measurement framework by capturing in a nutshell:

- the overall objective of each KPI;
- the aim of the KPI;
- the calculation formula and the unit of measurement;
- the collection interval, namely when the data should be collected (during or after the engagement activity);
- data requirements.

KPI.01. Participants' attendance Dimension: outreach Hierarchical level: output	
Objective	Evaluate the effectiveness of the organisation of the engagement activity in terms of participant engagement.
Description, including justification	This KPI measures the retention rate of participants in engagement activities throughout the project's participatory process.
Calculation formula	Number of active participants in a given period / total number of active participants at the beginning of the participatory process × 100
Unit of measurement	Percentage
Collection interval	This KPI is monitored at least twice (at the beginning and at the end of the participatory process). The monitoring can be planned according to the length of the project.
Data requirements	This KPI requires data to be collected for each engagement activity on the total number of participants.

KPI.02. Key stakeholders Dimension: participatory activities Hierarchical level: outcome	
Objective	The aim of this KPI is to evaluate whether the stakeholders involved in the participatory process represent all the interests, needs and perspectives of a community.
Description, including justification	This KPI measures the number of key stakeholder groups engaged in the participatory process.
Calculation formula	Number of stakeholders groups representing the community / number of stakeholder groups in the community × 100
Unit of measurement	Percentage
Collection interval	This KPI is monitored for each engagement activity and calculated at the end for the whole participatory process.
Data requirements	This KPI requires keeping track of the stakeholder groups involved and also an initial analysis of the relevant stakeholder groups in the community.

KPI.03. Participation retention Dimension: outreach Hierarchical level: outcome	
Objective	The aim of this KPI is to measure the potential of the participatory process to keep stakeholders engaged over time. It relates to the engagement power of the participatory process.
Description, including justification	This KPI measures the retention rate of participants in engagement activities throughout the project's participatory process.
Calculation formula	Number of active participants in a given period / total number of active participants at the beginning of the participatory process × 100
Unit of measurement	Percentage
Collection interval	This KPI is monitored at least twice (at the beginning and at the end of the participatory process). The monitoring can be planned according to the length of the project.
Data requirements	This KPI requires data to be collected for each engagement activity on the total number of participants.

KPI.04. Adherence to initial objectives Dimension: participatory activities Hierarchical level: outcome	
Objective	The aim of this KPI is to provide an evaluation of the degree to which the activities carried out have remained aligned with the core objectives of the participatory process. The aim is to qualitatively measure the extent to which activities have adhered to and advanced the initial goals set for the participatory process. For example, if the initial objective was to co-design the interface of a new control panel, but the participatory process consisted in a questionnaire to end users, it could be concluded that stakeholders were consulted but their involvement did not include the co-design of the interface.
Description, including justification	This KPI measures the strategic alignment and effectiveness of the engagement activities within the context of the participatory process.
Calculation formula	Qualitative assessment of the objectives of the participatory process and the type of engagement activities performed
Unit of measurement	Not applicable
Collection interval	At the end of the participatory process
Data requirements	This KPI requires keeping track of the type of engagement activities performed and the objectives of the participatory process.

KPI.05. Level of engagement Dimension: participatory activities Hierarchical level: outcome	
Objective	The purpose of this KPI is to evaluate the extent to which the participatory process has advanced towards achieving the desired level of engagement outlined in the project's goals. The objective is to qualitatively assess how various engagement activities conducted during the process have played a role in attaining specific levels of engagement. In addition, it aims to ascertain whether the levels attained are aligned with the objectives initially established at the commencement of the participatory process.
Description, including justification	This KPI measures the level of engagement reached at the end of the of the participatory process, according to the initial engagement plan.
Calculation formula	Qualitative assessment of the level of engagement reached at the end of the participatory process according to the following three levels: listen (i.e. collecting feedback, requirements and consulting); collaborate (i.e. involvement of stakeholders in the co-design, co-creation of solutions, tools, etc., at a specific phase); empower (i.e. stakeholders are involved in the decision-making process in all phases).
Unit of measurement	Not applicable
Collection interval	At the end of the participatory process
Data requirements	This KPI requires keeping track of the type of engagement activities performed and the type of interaction with stakeholders achieved.

KPI.06. Stakeholder satisfaction Dimension: participatory activities Hierarchical level: outcome	
Objective	The purpose of this KPI is to assess the degree of stakeholder satisfaction with the engagement activities, measured against the specific objectives set for the engagement activity or participatory process. This KPI allows insights to be gained into how effectively the engagement efforts are meeting their intended goals from the stakeholder's perspective.
Description, including justification	This indicator serves as a critical measure to assess whether stakeholders perceive that the objectives of engagement activities have been successfully achieved. For instance, if a co-design activity has been planned, the goal is to understand whether stakeholders perceive that they have effectively contributed to the co-design of that tool, solution, methodology, etc.
Calculation formula	Likert scale: Not at all = 1 – 2 – 3 – 4 – 5 = Extremely Not at all: stakeholders believe that their participation has not contributed to the objective of the engagement activity. Slightly: stakeholders believe that their participation has contributed slightly to the objective of the engagement activity. Moderately: stakeholders believe that their participation has contributed moderately to the objective of the engagement activity. Very: stakeholders believe that their participation has very much contributed to the objective of the engagement activity. Extremely: stakeholders believe that their participation has not contributed extremely to the objective of the engagement activity.
Unit of measurement	Mean of results or percentage of respondents for each score
Collection interval	At the end of the participatory process or of single engagement activities
Data requirements	This KPI requires the compilation of a questionnaire to collect the data at the end of the engagement activities.

KPI.07. Viable solutions Dimension: value creation Hierarchical level: outcome	
Objective	The primary objective of this KPI is to quantitatively assess the number of solutions, initiatives or ideas that have been integrated into the design, development or adoption within the project.
Description, including justification	By tracking this KPI, it is possible to measure the tangible outcomes of engagement efforts. It allows determination of the number of viable solutions or ideas that have successfully transitioned from conceptualisation into implementation.
Calculation formula	Number of viable solutions proposed by stakeholders that have been successfully implemented into the design/creation or development of tools, solutions, initiatives, etc.
Unit of measurement	Number
Collection interval	At the end of the participatory process
Data requirements	The data needed for this KPI can be collected by the organisation responsible for organising the engagement activity.

KPI.08. Jobs created Dimension: value creation Hierarchical level: impact	
Objective	The primary aim of this indicator is to assess the extent to which participatory processes within a project have played a role in generating economic and social value, particularly in terms of job creation.
Description, including justification	This KPI measures the concrete impact resulting from participatory efforts, specifically in the context of job opportunities. It allows gauging of the extent to which the participatory process has been instrumental in fostering economic growth and social development by creating direct or indirect employment opportunities.
Calculation formula	Number of jobs created
Unit of measurement	Number
Collection interval	At the end of the participatory process or at the end of the project
Data requirements	These data can be gathered through an internal (at project level through the organisations involved) and/or external assessment (e.g. start-ups resulting from the activities carried out as part of the project).

KPI.09. Integration of stakeholders needs Dimension: value creation Hierarchical level: outcome	
Objective	The aim of this KPI is to assess the level of convergence between the solutions, tools, initiatives, etc., and the articulated needs of stakeholders.
Description, including justification	The goal of this KPI is to qualitatively assess the extent to which the solutions, tools, technologies, initiatives, etc., developed within a given project align with and effectively integrate the identified needs of stakeholders. This indicator provides valuable data that enable the determination of the extent to which the outcomes of the participatory process are responsive to the actual demands and requirements of the target audience.
Calculation formula	Eventually, it could be used as a Likert scale, where stakeholders are asked to give their opinion on whether the solution/tool/initiative has met their needs and requirements. Both approaches could also be used contemporarily as a mechanism for triangulating the results.
Unit of measurement	Mean of results or percentage of respondents for each score (on the Likert scale)
Collection interval	At the end of the participatory process and/or at the end of the project
Data requirements	These data can be gathered through an internal assessment or through a questionnaire.

KPI.10. Social acceptance Dimension: value creation Hierarchical level: outcome	
Objective	Beyond being a KPI, this represents a specialised analysis designed to determine the level of social acceptance for a particular tool, initiative or solution developed through a participatory process. Its purpose is to provide a deeper understanding of whether the participatory process has effectively contributed to fostering social acceptance of the tools, initiatives and solutions that have emerged from it.
Description, including justification	This analysis considers societal reception, aiming to uncover insights into how the community or target audience perceives and embraces the outcomes of the participatory process.
Calculation formula	Different social acceptance models can be adopted (e.g. technology acceptance model, integrated acceptance model, unified theory of acceptance and use of technology) and adapted to any specific project.
Unit of measurement	Not applicable
Collection interval	At the end of the project
Data requirements	These data can be gathered by a questionnaire with several variables or constructs that together form the social acceptance model. For instance, see KPI.09, which could be a potential variable for a social acceptance model.

KPI.11. Capacity building Dimension: participatory activities Hierarchical level: outcome	
Objective	The purpose of this KPI is to achieve a more comprehensive understanding of stakeholders' perceptions of the capacity-building potential acquired during the participatory process in which they have been engaged. This would be a vital tool in determining the depth of insight and expertise accumulated on a particular subject matter. In addition, measuring the extent to which stakeholders have assimilated knowledge related to the participatory process can aid in making informed decisions on engagement strategies.
Description, including justification	This KPI assesses stakeholders' perceptions of the knowledge acquired throughout the engagement activities. It serves as a valuable metric to determine the effectiveness of capacity-building efforts.
Calculation formula	Likert scale: Not at all = 1 – 2 – 3 – 4 – 5 = Extremely Not at all: stakeholders have not acquired any new knowledge regarding X or Y. Slightly: stakeholders have acquired a little new knowledge regarding X and Y. Moderately: stakeholders have acquired a moderate amount of new knowledge regarding X and Y. Good: stakeholders have acquired a good amount of knowledge regarding X and Y. Very good: Stakeholders have acquired a very good amount of knowledge regarding X and Y.
Unit of measurement	Mean average of results or percentage of respondents for each score.
Collection interval	This KPI is monitored for each engagement activity, and it can also be measured at the end of the entire engagement process.
Data requirements	This KPI requires the compilation of feedback forms (used at the end of each engagement activity) and/or a questionnaire to collect the data at the end of the entire process.

KPI.12. Informing policy Dimension: value creation Hierarchical level: impact	
Objective	The objective of this KPI is to evaluate the tangible outcome of the participatory process in terms of shaping policy guidelines, briefs and documents.
Description, including justification	This KPI aims to measure the impact of initiatives on informing policymakers developed within the participatory process
Calculation formula	Qualitative assessment of policy guidelines, briefs and documents that have informed policymakers and/or have been taken into account in drafting policy-related documents.
Unit of measurement	Not applicable
Collection interval	At the end of the project
Data requirements	These data need to be collected through a qualitative assessment.

ANNEX 4. REFERENCES AND OTHER SOURCES CONSULTED FOR THE STUDY

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ANNEX 5. LIST OF INTERVIEWEES

Contact person	Organisation	Project	Project included in the final sample?
Aja Hazelhoff	Government of Seattle	One Seattle Engagement Hub	No
Alissa Ban'kovska	Synchro Space	Synchro Space	Yes
Arianne Acke	Public Waste Agency of Flanders	Repair	Yes
Blanca Deusdad Ayala	Universitat Rovira i Virgili	Socatel	Yes
Carla Pacheco	GEOTA	Coastwatch Portugal	Yes
Carrie Seltzer	iNaturalist	iNaturalist	Yes
Celia Santos; Matias Verderau	ISGlobal; Lichenis	Laboratorio de Salud Urbana	Yes
Christopher Kyba	Ruhr-Universität Bochum	Nachtlict	Yes
Domenico Schillaci	WePush	MUV	Yes
Dylan Bergen	Dutch Research Council	Living lab for restoration of rural biodiversity	Yes
Elke Franchois	Mobiel21	PING, Telraam (WeCount)	Yes
Ewa Kopczyńska	Jagiellonian University	Foodiverse	Yes
Firas Khatib	UMass Dartmouth	Foldit	Yes
Frances Fahy	NUI Galway	Energise	Yes
Francesco Orsini	Università di Bologna	FoodE	Yes
Gerd Lupp	Technische Universität München	Phusicos	Yes
Giuliana Gemini	Politecnico di Milano	Merezzate+	Yes
Gonzalo Gamboa	Universitat Autònoma de Barcelona	WaterMining	Yes
Halla Bjork	OsloMet	DigiGen	Yes
Holger Gerdes	Ecologic	BE-Rural	Yes
Ines Omann	ÖFSE Österreichische Forschungsstiftung für Internationale Entwicklung	Engage, Localised	Yes
Isabelle Cecile Anne Bonhoure	University of Barcelona	CoAct	Yes
Isabelle Sabadotto; Bernard Buron	VYV 3; Université de Tours	Usetechlab	Yes
Joan Condell	Ulster University	Sendoc	Yes
Julie Ridley	University of Central Lancashire	YouCount	Yes
Kasza-Romankiewicz Weronika	Municipality of Rzeszów	Urban Lab Rzeszów	Yes
Laura Wendling; Spela Zalokar	VTT; ENoLL	Unalab	Yes

Lihong Huang	OsloMet	Democit	Yes
Ling-Jyh Chen	Institute of Information Science, Academia Sinica	Airbox	Yes
Loris Servillo; Erica Mangione	Politecnico di Torino	Smartdest	Yes
Lorna Anguilano	Brunel University London	Using citizen science to develop solutions for healthy soils through phytomining	Yes
Lou Ackermann	Université Toulouse III	Living labs for a green transition through the integration and interconnection of complex heterogeneous networks	No
Marek Muiste	Estonian University of Life Sciences	PANEL 2050	Yes
Marie Louise Jørgensen	Danish Board of Technology	RRI-Leaders	Yes
Marion Real	Fab Lab Barcelona	Siscode	Yes
Marta Ducci	Vrije Universiteit Amsterdam	Co-design workshops for cultural landscape planning	No
Marzia Mazzonetto	Stickydot	Mosaic	Yes
Mathis Cacheux	TUBÀ	Datathon, Pass Trabool	Yes
Niko Lönn	Tampere University Hospital	Co-Created Health and Wellbeing (CoHeWe)	Yes
Nora Weinberger	Karlsruher Institut für Technologie	Teqfor1, Terrain	Yes
Paloma Nieri	Carnet Barcelona	Citython, Furnish	Yes
Pascale Frey-Klett	INRAE	Citique-Lorraine	Yes
Reiner Braun	Open science for open societies	Parkli	Yes
Róbert Bjarnason	Citizens Foundation	Better Reykjavík	Yes
Rosa Arias; Nora Salas	Science for Change	D-Noses/OdeurCollect, Transform	Yes
Rosina Malagrida	Irsicaixa	Living lab salud	Yes
Sascha Haselmayer	Ashoka	CityMart	Yes
Sevdalina Voynova	Sofia Development Association	InnoAir	Yes
Silvia Pezzoli	Politecnico di Milano	Circular Housing	Yes
Tiina Ruohonen	Municipality of Oslo	MOVE21	Yes
Tobias Reckling	University of Vienna	Digital Solutions for Societal Challenges – Hackathon	Yes
Virginia Vassilakou	Mentor in Culture	Adáma	Yes
Zoltán Kiss	Region of Budapest	Innovation Ecosystem for Smart Elderly Care	Yes

ANNEX 6. AGENDA AND LIST OF PARTICIPANTS IN THE EXPLORATORY WORKSHOP

	Agenda item and description
9:00–9:10	Workshop rules and expectations (led by the consultant)
09:10–9:30	**Tour de table – icebreaker** Each participant introduced themselves and shared their experience of knowledge valorisation and at least one engagement method and project example.
9:30–9:50	**Presentation of the preliminary findings from the analysis of cases** (by the consultants) The consultants presented some preliminary findings, referring to practical cases analysed in the repository. The presentation addressed the following questions: Which engagement methods have been used to achieve certain aims? Which ones proved to be more suitable? Which are the factors contributing to the success of certain methods/approaches? Which are the challenges/barriers encountered?
09:50–10:20	**Projects' findings discussion** (facilitated by consultants) The experts were asked to discuss the preliminary findings. The discussion addressed the following questions: Are the findings in line with your expectations / previous knowledge? Why do you think the presented drivers enabled the participatory process to reach its goals? What actions could have been taken to avoid the encountered barriers?
10:20–10:25	**Group formation** The experts were divided into **three groups according to the level of engagement** they should focus on. They were asked to examine **two or three engagement tools** that should be the most relevant for that level of engagement. Group A: Listening. Examples of tools: community mapping, public hearing Group B. Collaborate. Examples of tools: gaming techniques, hackathon, envisaging the future, fishbowl Group C. Empower. Examples of tools: living lab, user committee .
10:25–11:40	**Group activity – deep dive on selected engagement methods** (facilitated by the consultant) Each group was asked to prepare a poster focusing on the engagement tools used in a specific level of engagement. The poster had six quadrants: chosen tools, specific objectives that can be addressed with the tool, challenges, driving factors for success, output indicators and outcome indicators. The group members drew graphic elements or wrote keywords in each quadrant.
11:40–12:15	**Presentation of posters on engagement methods** – each group presented its poster. The contractors animated the discussion, encouraging comparisons among the outcomes of the different groups as well as with the findings of the analysis of cases previously presented.
12:15–12:45	Light lunch
12:45–13:50	**Recommendations for action points** (led by the consultant) Building on the two previous activities, the experts were asked to share with the other participants possible action points and recommendations. The experts discussed the proposed actions, which the contractors wrote down on posters.
13:50–14:00	Concluding remarks by the Commission and consultant.

List of experts

Name	Role
Francesco Molinari	Expert advising policymakers at EU, national and local levels on knowledge valorisation practices (e.g. living labs)
Gregor Cerinšek	Head of the Department for Applied Social Science Research at the Institute for Innovation and Development of the University of Ljubljana
Fernando Vilariño Freire	Former president of ENoLL. He coordinates the action-based working groups on the social impact of artificial intelligence
Effie Amanatidou	Senior research fellow at Manchester Institute of Innovation Research, University of Manchester
Sam Marchetti	Founder of ConsortiaCo, a collective of SMEs, social enterprises and local government development agencies
Masatoshi Shimosuka	Secretariat of the OECD Global Science Forum, Organisation for Economic Co-operation and Development
Chiara Fonio	Coordinator of and researcher in EU projects
Charlene Stagon	Senior innovation practitioner at the Young Foundation
Olga Glumac	Participatory design lead at Three o'clock
Annelies Duerinckx	Head of Scivil, the citizen science expertise centre in Flanders (Belgium)
David Chavez	Senior manager – in-house social and humanities consultant at Blue Synergy
Jason Chilvers	Professor of environment and society concerned with the changing relations between science, innovation and society
Dimitri Schuurman	Innovation expert in methodology and monitoring at Imec

List of participants from the contractor team

Name	Role
Laura Delponte	Partner and senior researcher at CSIL
Francesca Monaco	Senior researcher at CSIL
Eva Martinez	Senior social innovation manager
Raffaele Articolo	Junior researcher at CSIL

List of participants from the European Commission

Name	Role
Iphigenia Pottaki	Policy officer at the Directorate-General for Research and Innovation
Federica Baldan	Legal and policy officer
Eleni Bafera	Administrative support agent
Ugo Dino Fonda	Policy analyst at the Directorate-General for Research and Innovation

ANNEX 7. SUMMARY OF THE DISCUSSIONS AT THE EXPLORATORY WORKSHOP

Presentation of the preliminary findings from the analysis of cases

Francesca Monaco and Eva Martinez (contractors) provided an overview of the preliminary findings of the project, starting with the analysis of a sample of 24 projects.

- **Introduction and overview of cases analysed.** The contractors clarified that the findings were preliminary, as they had collected data for a sample of projects (24 out of 60). They explained that they will continue refining the methodological approach and tools as they progress with the data collection and analysis – and will consider the input gathered during the workshop. The contractors briefly presented some features of the engagement processes implemented in the sample of cases.

- **Findings on engagement processes.** The contractors clarified the focus of the study (i.e. value creation from R&I) and illustrated some drivers of success and risks or challenges observed. The drivers of success relate to the definition of a **strategy and of a systematic approach** (e.g. stakeholder mapping, KPIs) that span from a clear rationale to engage citizens to the choice of methods used to the way the input collected is used. Some aspects mentioned in this context were involving all stakeholders at the right stage, clearly identifying the target groups, including profiling of actors, having a high level of expertise on participatory methods, and ensuring that the entity responsible for implementing the innovation generated through the participative process is committed to the uptake of the innovation. The following elements were underlined as challenges: the time, effort and resources needed to engage citizens, the difficulty in reaching and engaging citizens (especially groups that are difficult to mobilise), and the difficulty in maintaining the momentum to ensure that citizens are involved throughout the process.

- **Findings by engagement method.** The contractors presented some preliminary findings on the drivers and challenges of three methods specifically: hackathons, citizen science and living labs.

- **Hackathons** are considered a good tool for developing ideas or small-scale solutions. They are suitable for bringing together actors with different perspectives and asking them to come up with ideas/solutions for a well-defined, limited challenge. The following elements were highlighted as drivers of success: involvement of different types of stakeholder, engagement and commitment of the entity responsible for implementing the innovation generated through the participative process, and existence of follow-up initiatives. The main barrier is the knowledge gap, since it can prevent all actors from freely expressing their ideas.

- **Living labs** entail user-centred, open innovation ecosystems based on a systematic user co-creation approach, integrating R&I processes in real-life communities and settings (ENoLL). In practice, however, the tools used, actors involved and objectives vary considerably from one to another, and sometimes there are different interpretations of the living lab concept. As for drivers of success, choosing a tailored set of tools and methods and relying on an engagement strategy that includes all stages (from inform to empower) was mentioned by participants.

- **Citizen science** is sometimes interpreted only as a data collection method; however, in some good practices, citizen science projects aim to empower citizens. They involve them not only in the data collection but also in the design of the research and the methods, and they provide communities with the knowledge and tools to continue the initiatives even after the project has ended. Key drivers of success are continuous communication and openness about sharing information and results and using novel approaches to engage citizens. The main risk concerns the uptake of the data collected and solutions/methods created. To this end, the actors that can extract value must be engaged in the process and must be committed to it (e.g. public authorities, companies)

The experts commented on the preliminary findings. The main topics discussed are reported below.

- **The concept of knowledge valorisation.** The experts explained that the knowledge valorisation concept is not known by most researchers, policymakers and civil society. One expert remarked that the focus of the study should be on whether citizen engagement could increase the impact of R&I investment in society compared with R&I projects not involving citizens in the process. On a methodological level, according to the same expert, consultants could explore in more depth the generation of the output and the uptake of R&I results and pay less attention to cases where participatory approaches are applied in the design phase. Other experts disagreed with this point, underlining that the concept of valorisation is strictly linked to the concept of change through research. The uptake of research results is linked to the extent to which people are willing to embrace change. In line with this view, it was suggested that the study could also investigate whether there is a shared understanding of how change happens by all the stakeholders involved in the projects.

- **Empowering citizens.** Some experts put emphasis on including citizens in the design phase keeping in mind the commercialisation and sustainability of research initiatives. The potential of participatory practices in transforming the R&I landscape was emphasised, as these practices build confidence and skills in the individuals involved. It was remarked that setting the objectives of citizen engagement is crucial, differentiating between those initiatives that treat citizens only as users and those that empower them not only in the design of the solution but also in the delivery.

- **The role of the entity/entities responsible for implementing the innovation generated through the participative process.** It was underlined these actors could be single entities (businesses, public authorities, investment funds, etc.) but also the community itself. Differentiating between the knowledge producer and the valorisation actor risks excluding the possibility that the community has ownership of the research. Conversely, when the process owner is a collective actor, such as a group of citizens, they feel responsible for the research project and ensuring the uptake of the results. There are many cases in which citizens can play a bigger role to increase societal well-being. Existing practices such as mapping all the potential actors and involving citizens throughout the R&I process – from designing the R&I framework to the delivery – can improve the valorisation outcomes of research. Impact investment funds could also be relevant actors, because they have a strong incentive to think about how to valorise the knowledge generated; otherwise, they could face financial risks.

- **Ensuring diversity in target groups.** It was underlined that participatory research initiatives should enhance diversity and bring different people on board through a more participative framing of the research project. For example, in a project in Ljubljana on sustainable mobility, the best insights were provided by homeless people who are not

usually involved in such research. Framing the actions correctly and participatively is crucial for successful involvement that seeks diversity in the participants. One expert highlighted that participatory processes are exclusionary by design. There is often a belief that it is possible to include all relevant actors, but this is rarely achieved, and power dynamics inhibit participation. Given these difficulties, it is important to know how to tackle representativeness problems.

- **Being open to unexpected results.** It was observed that citizen engagement can lead to unexpected outcomes. For this reason, knowledge valorisation through citizen engagement is sometimes seen as a box-ticking activity that researchers try to avoid because it could lead to results that may not be in line with the initial assessment. Conversely, researchers should exploit unexpected outcomes, as they could be positive for the research.

- **Capacity building.** It was underlined that capacity-building initiatives and curricula aimed at developing valorisation competences are crucial to achieve the objective of systemic change. The starting point is to identify the expertise and skills that lead to knowledge valorisation and facilitate citizen engagement. The need to exploit existing practices such as digital innovation hubs was also remarked upon. It is important that the entity or entities responsible for implementing the innovation generated through the participative process places appropriate instruments in place to involve citizens and to test before investing.

- **Communication.** The experts agreed that engaging with citizens is a complex activity and communication is extremely important if they are to be successfully involved.

- **Suggestions for the study.** It was suggested that researchers should look for initiatives that are not funded by public authorities. Moreover, it was suggested going beyond the project report when investigating a potential project for the repository to understand its real effectiveness.

Group discussions according to the level of engagement

Participants were divided into three groups according to three degrees of engagement: listen, collaborate, empower.

Listening

This group was initially named Consult, but it changed its name to Listening, since the participants perceived that consultation implied a one-way interaction, limiting the results that could potentially be achieved through a proper process of engaging with citizens. Listening was considered relevant at different stages of an R&I process to develop solutions that matter for citizens. The table below summarises the main takeaways from the discussion.

Objectives Continuously reframe problems, be responsive to societal views or needs, make knowledge relevant to society and prioritise trust and ownership. By reframing problems, the focus is on adapting solutions based on changing circumstances. Responsiveness to societal views ensures that the knowledge generated addresses the concerns of the community. Trust and ownership foster collaboration and engagement among stakeholders.	**Methods** • Sociocracy: facilitates egalitarian deliberative conversations to ensure that everyone is part of the decision-making process. It is a consensus-building technique that is not based on majority voting. • Systemic constellation mapping: recreates specific environments with targeted stakeholders to gain insights into complex dynamics and observe their thoughts and interactions. • Social listening techniques: researchers use digital methods to analyse conversations on social media and other platforms, mapping relevant actors and capturing public sentiments. • Deliberative mapping: researchers actively engage with communities involved in social innovation, participating according to their rules and practices, to understand their perspectives and aspirations. • Peer review: researchers and citizens conducting research together as peers.
Drivers • Fostering inclusive and safe environments that promote public representation and involvement • Mapping participation to ensure inclusion • Using the arts and other creative instruments make people feel comfortable when sharing their needs and priorities • Ensuring transparency and accountability of the listeners/researchers • Ethical considerations are important in building trust	**Challenges** • Possible misuse of information collected by citizens for other purposes • The information collected is not valued equally, leading to some voices being marginalised or disregarded • Distrust in the process / leader of the action
KPIs/**outputs** • Diversity in the listening process • Time devoted to listening is at least equal to the time devoted to talking to participants	**KPIs/outcomes** • Behavioural change both in researchers (e.g. changing them or the methods of the research) and citizens (using new tools / changing their habits) • Increase in the number of social movements promoting collective actions

Collaboration

The team defined the concept of collaboration as a repeated series of interactions with the same actors, often in real time, creating a feedback cycle. The following table summarises the main takeaways from the discussion.

Objectives Co-creation is a typical objective of collaboration. In particular, the group chose as its objective the co-creation of a social innovation in which the community is responsible for implementing the innovation generated through the participative process. An example is co-creation to introduce innovation in an organisation or a community (e.g. workplace, neighbourhood, municipality).	**Methods** The most suitable methods for this level of engagement are those building on design-thinking methodology. The methods identified could be used alone or in combination (for a stronger impact). • Graphic harvesting: the outputs of interactions (usually in small groups) are reported in a visual format. The final visual is composed of the outputs of all the interactions. • World Café: participants explore an issue by discussing it in small groups in an informal setting. • Fishbowl: participants are separated into an inner and outer circle. In the inner circle or fishbowl, participants have a discussion; participants in the outer circle listen to the discussion and take notes. • Fresk: collaborative games based on cards in which the participants draw a fresco that summarises their knowledge / point of view on an issue. It is used to raise awareness and eventually create behavioural change (e.g. Climate Fresk).
Drivers • Co-ownership is the key driver for collaboration. • Iterative nature of the process, where continuous learning and improvement are embraced. It aims to iterate and refine strategies based on feedback and evolving needs. • Maintaining trust, not only in the initial interaction but also throughout the process. Building and nurturing trust among stakeholders is essential for effective collaboration and long-term success. • Gaming and gamification are methods, but if used in combination with other methods (e.g. workshops) they can enhance engagement and lead to a more impactful experience. Likewise, the use of digital devices and technology can have positive impacts (but can also be counterproductive if misused). • Visualising the process and the outputs stimulates exchanges and strengthens the co-creation process.	**Challenges** • Time constraints, as engaging in inclusive and participatory processes requires sufficient time and resources • Balancing the need for thoroughness and inclusivity with practical considerations (e.g. restricted sample) • Communication and facilitation skills of the facilitators
KPIs/outputs • Number of scenarios developed in co-creation • Number of people engaged (attendance rate) • Active engagement and rate of retention • Diversity of the groups (attendance of priority groups)	**KPIs/outcomes** • General concept: gap between intended objectives and achieved outcomes (KPI to be defined depending on the context) • Scalability • Behavioural change in the participants • Commercial value (translating social value into monetary terms)

Empower

One of the key objectives of empowerment initiatives is to foster a sense of shared ownership, which ensures that the output of the valorisation initiatives belongs to the stakeholders involved. This objective requires the active involvement and engagement of individuals and communities in the decision-making process and implementation of solutions. By promoting shared ownership, these initiatives aim to empower stakeholders and increase their commitment to and responsibility for the outcomes. The discussions focused specifically on the living lab approach and methodology, as outlined in the following table.

Objectives	**Methods**
The objective of promoting and justifying high levels of citizen empowerment is to foster a sense of ownership among citizens, allowing them to actively participate in the decision-making process at all levels. This engagement not only ensures that citizens feel a genuine connection to the outcomes but also enables them to be valuable contributors throughout the entire process.	• Living lab sprint: this typically refers to a time-bound, intensive period of collaboration and experimentation within a living lab setting. During a living lab sprint, diverse participants (normally already functioning working groups participate) work together in a focused and time-limited manner to address specific challenges or goals. The sprint often involves rapid prototyping, iterative testing and feedback loops to quickly generate ideas, build prototypes and gather user insights. The goal is to accelerate the innovation process, gather valuable feedback and refine solutions within a short period of time. • Norm critical design: an approach to design that challenges and interrogates societal norms, biases and power structures. It aims to uncover and question the taken-for-granted assumptions and values that are embedded in our everyday objects, systems and interactions. The practice of norm critical design involves actively examining the social, cultural and political implications of design choices and seeking to address and disrupt inequalities and oppressive norms. Designers employing this approach strive to create awareness and stimulate critical thinking about existing norms and stereotypes, aiming for more inclusive, equitable and just outcomes. • Anthropology-led empowerment: a method/practice that the participants improvise during the discussion. This method embraces a community-centred approach, whereby the researcher actively engages with the community by immersing themselves in its activities and daily life. The researcher's presence and involvement in the community allows a deeper understanding of its experiences, challenges and aspirations. The practice aims to challenge societal norms, biases, and power structures by directly involving the community in the research process.

Drivers	Challenges
• Safe spaces: creating safe spaces is a crucial driver. These spaces provide an environment where individuals can freely express their ideas, concerns and perspectives without fear of judgement. Safe spaces ensure the sharing of diverse viewpoints, fostering trust and collaboration among stakeholders. • Capacity building: this involves personal development and improvement for both the individuals directly involved in the process and those who engage with them. • Shared governance: implementing a shared governance model is essential for building trust and ensuring the meaningful participation of stakeholders. By involving all relevant parties in decision-making processes and giving them a sense of ownership, shared governance fosters transparency, accountability and inclusivity. This driver empowers stakeholders and strengthens their commitment to the objectives of the initiative. • Identification of alpha users: identifying individuals who are highly interested in specific projects and willing to use the materials and assets provided by researchers and public authorities is a valuable driver. These individuals have the power to involve and mobilise the broader community, acting as advocates and influencers. Leveraging their enthusiasm and commitment can significantly contribute to the success and impact of initiatives. • Community building: if the community was already engaged prior to the initiative, there is a greater likelihood of continued interest and participation. However, in cases where initial engagement was limited, it is crucial to make a long-term commitment to sustain involvement and ensure lasting impact. • Managing expectations: properly managing expectations is critical to maintaining engagement and sustaining the involvement of stakeholders. Clear and transparent communication about the goals, processes and anticipated outcomes helps to align expectations and prevent potential misunderstandings or disillusionment. Managing expectations fosters a sense of trust and ensures that stakeholders have a realistic understanding of what can be achieved.	• Power dynamics: powerful people do not like bottom-up approaches because other people can emerge and challenge their power. • Demobilisation: this can be triggered by a lack of effective management of power dynamics and expectations, as well as a failure to establish a sense of shared governance. These factors can lead to disengagement and decreased participation among stakeholders. It is important to address these challenges to prevent demobilisation and maintain the momentum of the engagement effort. • Capacity to reach this level of engagement: empowering citizens is a complex and multifaceted task, and it is important to recognise the challenges and debates surrounding the attainment of this level of engagement within a research process. The concept of empowering citizens in research raises questions about power dynamics, inclusivity and the extent to which meaningful participation can be achieved. There are practical and philosophical debates regarding the feasibility and extent of citizen empowerment within a research process.

KPIs/outputs	KPIs/outcomes
As a fundamental premise, one of the key aspects identified during the discussion is the active involvement of citizens in the development of the measurement framework and KPIs if a level of empowerment is to be achieved. This approach recognises that citizens possess unique perspectives, experiences and knowledge that should inform the assessment of empowerment outcomes. **KPI outputs beyond the number of participants, etc., were not identified.**	• Behavioural change both in researchers (e.g. changing them or the methods of the research) and citizens (using new tools / changing their habits) • Number of decisions taken in which participants have been involved • Sense of belonging to the community • Perception of increased knowledge and skills/abilities

Discussions on action points and recommendations

The final discussion revolved around identifying actionable steps that could be suggested to practitioners (e.g. researchers, professionals designing and implementing participatory practices) and policymakers. Observations targeting both groups concerned the following points.

- **A new perspective for framing knowledge valorisation.** Knowledge valorisation should be considered an integral part of the R&I process; it should not be considered only as the last step to reach the outmost individuals that can bring value to the research process. Practitioners from all stakeholder groups (researchers, public authorities, businesses, etc.) should acknowledge that any preceding steps are also part of the valorisation pathway.

- **Skills development.** All stakeholder groups could benefit from the development of guidelines for valorisation through citizen engagement. The guidelines should detail in a practical way how certain engagement methods could be used, how they should be implemented, what are the drivers and barriers, etc. [(27)]. At the same time, capacity building based only on best practices can have a negative effect on valorisation activities, because people tend to stick with the methodology, learning a niche of typical cases that do not represent the reality. There are other learning processes, such as learning by doing or constructing networks of best practices and common problems, that can serve as crucial activities for capacity building.

- **Ethical considerations.** Participants clearly stated that valorisation processes should not have negative impacts on participants.

The following points were emphasised specifically for practitioners.

- Develop a clear strategy for both the participatory process and the integration of its outputs into the overall strategy for the uptake of results. Although engagement strategies are widely employed by practitioners in the field, it is equally crucial to establish a clear strategy for effectively integrating the outcomes of these engagement strategies into the

[(27)] An example is the European Commission 2022 publication *Valorising Research through Citizens' Engagement – How to run hackathons with citizens*.

uptake of research results. In addition to implementing common and specific engagement practices, it is essential to focus on developing a comprehensive approach that ensures the integration of engagement outcomes into the utilisation of research findings. By doing so, practitioners can maximise the impact of their efforts and effectively bridge the gap between engagement activities and the successful uptake of results.

- Focus on the expected change and not on the methods. It is crucial that practitioners set clear objectives in terms of the societal change they want to achieve. Emphasising the sustainability of actions in making changes should be prioritised with respect to seeking specific methods to address particular issues.

- Establish safe and open environments. The space where the engagement happens should be as power neutral as possible. At the same time, the practitioners are in charge of creating a safe and open environment, where all actors feel at ease sharing their opinions and collaborating. To facilitate the creation of a collaborative environment, the co-creation process could be anticipated by a preparatory phase in which each actor (researcher, citizen, other stakeholder) acknowledges the interests and needs of the others, and all the actors involved achieve a shared understanding of the objectives. Likewise, citizen engagement should not be only about including citizens in the research but also about broadening the perspective and experiences of researchers to embrace that of citizens (including by experiencing their real-life environment).

- Be open to unexpected results. it is crucial that practitioners, and in particular researchers, broaden their perspective beyond the desired outcomes and acknowledge the potential of unanticipated paths of transformation. Participatory practices may often lead to unexpected results, and the researchers/innovators should be open to this possibility.

- Integrate a risk assessment into the engagement strategy. Consideration of possible limitations in terms of time and resources should be tackled from the outset and integrated into risk assessments. However, the risk assessment should not limit the flexibility to make necessary adjustments as the process progresses.

- Increase knowledge of and capacity building on participatory practices. Practitioners (especially researchers) should consider that there are specific skills and competences that need to be mastered to design and manage participatory processes (e.g. how to customise the methods according to the target group).

The recommended actions for policymakers were as follows.

- **Implement comprehensive support for knowledge valorisation.** Knowledge valorisation should become an integral part of R&I. To this end, instead of funding sporadic, ad hoc initiatives, public institutions should put in place continuous and institutionalised support for knowledge valorisation, including both funding support and soft support. In this way, a focus on citizen engagement could be integrated into existing EU research programmes, for example as part of the transition from the European Research Council to the European Innovation Council.

- **Integrate the societal impact of knowledge valorisation into the R&I framework.** Since knowledge valorisation can be linked to two types of impacts, i.e. technological/economic and societal, the conceptual framework for R&I should always consider both the TRL and the SRL.

- **Exploit instruments that address power dynamics.** To address the challenges faced by the public sector in embracing unexpected outcomes from participatory practices, public servants could be actively involved in regulatory sandboxes or similar tools. These spaces serve as interactive environments where experimentation, sharing and validation of ideas can take place, ultimately dismantling hierarchical structures in an acceptable manner. By using these instruments, both policymakers and other stakeholders can feel secure, fostering a sense of safety and encouraging participation. These tools aim to reduce hierarchy and facilitate a more open and collaborative relationships among all the parties involved.

- **Implement capacity-building programmes for public administrators.** Capacity building can help develop a strong expertise in co-creation inside public administrations. These experts should not limit their expertise to informing and consulting citizens but should extend it to co-creation practices.

- **Extend innovation hubs to citizen engagement initiatives.** Policymakers could promote the development of instruments that take inspiration from existing experiences in the business world such as digital innovation hubs. These policy hubs could steer citizen science, living labs and other kinds of participatory initiative.

ANNEX 8. AGENDA AND LIST OF PARTICIPANTS IN THE VALIDATION WORKSHOP

	Agenda item and description
10:00–10:10	Welcoming speech by the consultant, tour de table and presentation of the agenda
10:10–10:15	Introduction by the European Commission
10:15–10:30	**Session 1. Setting the scene** The consultants provided an overview of: the study's objectives, the methodology for data collection and analysis, the sample of cases
10:30–10:40	**Q & A on the methodology**
10:40–11:25	**Session 2. Creating economic value** Presentation of best practice(s) (20 min) by the consultants or speaker Presentation of the study findings (including drivers/barriers) by the consultants and discussion with the experts moderated by the consultants (20 min) Wrap-up (5 min) by the consultants
11:25–11.35	**Coffee break**
11:35–12:20	**Session 3. Creating value for society** Presentation of best practice(s) (20 min) by the consultants or speaker Presentation of the study findings (including drivers/barriers) by the consultants and discussion with the experts moderated by the consultants (20 min) Wrap-up (5 min) by the consultants
12:20–13:15	**Session 4. Informing policymakers** Presentation of best practice(s) (20 min) by the consultants or speaker Presentation of the study findings (including drivers/barriers) by the consultants and discussion with the experts moderated by the consultants (20 min) Wrap-up (5 min) by the consultants
13:15–13:45	Light lunch
13:45–14:15	**Session 5. Framework for evaluating participatory processes in value creation** Presentation of the study findings (10 min) by the consultants Discussion with the experts (20 min) moderated by the consultants
14:15–15:15	**Session 6. Lessons learned on value creation through citizen engagement and action points** Presentation of the lessons learned and recommendations formulated in the study (15 min) Discussion with the experts moderated by the consultants (45 min)
15:15–15:30	**Wrap-up and concluding remarks** (moderated by the consultants)

List of experts

Name	Role
Pitidis Evangelos	Assistant professor at the Institute for Global Sustainable Development of the University of Warwick
Minna Kuivalainen	Behavioural scientist at Smart Innovation Norway involved in designing and implementing different stakeholder engagement models and tools in Horizon 2020 / Horizon Europe projects
Elisa Bacchetti	Deputy operations officer at SocialFare, a centre for social innovation
Sam Marchetti	Founder of ConsortiaCo, a collective of SMEs, social enterprises and local government development agencies
Alissa Ban'kovska	Founder and Chief Executive Officer (CEO) at Synchro Space, startup-in-residence lead at TechUkraine and acceleration lead at the Ukrainian Startup Fund
Marzia Mazzonetto	CEO at Stickydot, a consultancy company focused on supporting multi-stakeholder engagement in responsible R&I processes

List of speakers presenting the best practices

Name	Role
Lorna Anguilano	Senior research fellow, Quality Manager of the Experimental Techniques Centre and Assistant Director of the Wolfson Centre for Sustainable Materials Development and Processing, Brunel University
Paloma Nieri Romero	Urban planning project manager, Carnet
Marzia Mazzonetto	Founder and CEO at Stickydot
Rosa Arias	CEO and founder at Science for Change
Marek Muiste	Expert at Hea Uus Linn OÜ

List of participants from the contractor team

Name	Role
Laura Delponte	Partner and senior researcher at CSIL
Francesca Monaco	Senior researcher at CSIL
Eva Martinez	Senior social innovation manager
Chiara Fonio	Senior social innovation manager

List of participants from the European Commission

Name	Role
Iphigenia Pottaki	Policy officer at the Directorate-General for Research and Innovation
Federica Baldan	Legal and policy officer
Eleni Bafera	Administrative support agent
Ugo Dino Fonda	Policy analyst at the Directorate-General for Research and Innovation

ANNEX 9. SUMMARY OF THE DISCUSSIONS AT THE VALIDATION WORKSHOP

Session 1. Introduction and setting the scene

The European Commission opened the workshop by clarifying the concept of knowledge valorisation, explaining the relevance of the study in the policy context and the links with the code of practice that had been developed with the community of practice in the previous months. After that, the project leader provided a brief overview of the study's objectives, the methodology used for data collection and analysis, the sample of cases analysed and the methodological challenges.

The presentation of the findings comprised three thematic sessions: the first focusing on economic value creation, the second on the creation of value for society and the third on informing policymakers. Each session was structured as follows:

- presentation of two best practices from the repository, explaining the participatory process and highlighting the results achieved;
- presentation of the findings from the horizontal analysis;
- discussion with the experts.

Session 2. Creating economic value

The following cases were presented.

Title	Case summary
Circular Housing Funding source: EIT Climate Knowledge and Innovation Community	The Circular Housing project aimed to define and validate circular and regenerative economy experiments for a large number of households, identifying a sustainable, replicable and less carbon-intensive business model that is able to be scaled up rapidly (an innovative service for tenants that includes the renting of all household appliances and furniture).
Using citizen science to develop solutions for healthy soils through phytomining Funding source: Brunel University London	This citizen science project mapped soil contaminants in the United Kingdom and empowered citizens to regenerate their soil. The research resulted in the development of extraction and synthesis processes that recover metals from contaminated soil and other substrates, converting them into high-value nanoparticles for use in manufacturing. The project delivered a citizen tool for soil regeneration and spawned a spin-off company to implement the solution.

The experts commented on the cases and on the findings. The main topics discussed are reported below.

- **Engaging citizens always involves uncertainty in the potential outcomes.** Starting with the example of phytomining, where citizen engagement initially started as data collection but evolved into active participation, the experts highlighted the importance of being flexible in adapting the R&I process to maximise the benefits of the participatory approach. Nonetheless, having a well-defined initial plan for citizen engagement from the outset increases the project's chances of success.

- **Participatory projects have the potential to enhance participants' knowledge and skills**. When considering the effects of R&I processes involving citizens, the impact on participants in terms of knowledge, skills and awareness should be monitored. These effects contribute to value creation from a societal as well as an economic perspective.

- **Creating social value is closely intertwined with economic value creation.** In the two cases discussed, there are links between the creation of economic value and the creation of value for society, including through behavioural change. For example, the farming and phytomining sectors have brought benefits to the community, and young individuals participating in these projects could have used these opportunities to thrive, increasing their environmental awareness and social involvement.

- **Diversifying the competences of the team carrying out the project is important for successful participatory practices.** There should be an optimal balance between engagement skills and technical skills relevant to the project.

- In some cases, economic benefits derive from the **public procurement** of the solution (social procurement). In this case, it is important to involve public authorities from the beginning of the process, as they often operate within rigid programmes, and they may not readily embrace innovation and new approaches.

Session 3. Creating value for society

Title	Case summary
Furnish Funding source: EIT Urban Mobility	The project aimed to develop furniture for urban areas with a participatory approach. It had three editions: the first focused on furniture that could be used to make social interactions possible while keeping distancing during the COVID-19 emergency, the second focused on areas around schools and the third on areas for children.
Mosaic Funding source: Horizon 2020	The project aimed to develop effective instruments applicable to co-creation approaches in quadruple helix open innovation pathways to support cities when implementing Horizon Europe missions. Two pilot projects in the cities of Gothenburg (Sweden) and Milan (Italy) have been conducted. The project in Gothenburg focused on co-creating innovative solutions to improve urban mobility, while the project in Milan was centred around the air quality problem.

The experts commented on the cases and on the findings. The main topics discussed are reported below.

- For the Mosaic project, it was observed that leveraging societal knowledge is part of the value added by engaging citizens. Unlike other open innovation processes that target citizens individually as users, this participatory process created value by bringing in the societal perspective in addition to the individual perspective. In the case of Mosaic, the proposed solutions were not breakthrough innovations, but the citizens' input made the R&I actors and public authorities understand **how to make the solutions acceptable and ensure societal uptake**.

- Also for the Mosaic project, the **importance of involving a commercial actor** that would be able to participate in public procurement processes and apply the innovation after the project had ended was underlined. This choice increases the chances of successful knowledge valorisation.

- The **absence of incentives** for project participants was addressed as a common issue. As a possible strategy to mitigate this, an expert suggested consulting potential participants to understand their interests and motivations and formulate the research questions with their interests in mind. One of the primary drivers for communities is the potential to develop specialised solutions for societal problems. This often requires high levels of participant involvement, particularly in the utilisation of public spaces. People can be motivated to take an active role in maintaining and monitoring the project's outcomes, even if this responsibility primarily falls on public administrations.

- Sometimes the difficulty in engaging citizens is due to a **lack of trust**. For this reason, the experts suggested that the projects should integrate a process to build trust from the beginning. At the same time, participatory activities can be highly beneficial for municipalities seeking to build trust with their citizens. In cases where trust is lacking, an effective strategy is to expand the participatory process beyond data collection, demonstrating a commitment to transparency and collaboration.

- Ensuring representation and **inclusiveness** in projects concerning public spaces is challenging. Communities are heterogeneous, and targeting becomes vital to keep the process manageable. Striking a balance between representativeness and the efficiency of the process is essential, as involving more people can make finding solutions more challenging. Leveraging already existing communities is a good way to go and helps to address the participation deficit.

- In projects that have an effect on society / people's lifestyles, it is important to **prevent negative reactions** and making the community part of the solution.

Session 4. Informing policymakers

Title	Case summary
D-Noses/OdeurCollect Funding source: Horizon 2020	D-Noses aimed to kickstart a collaborative journey to tackle the problem of odour at a global scale by developing coordinated local case studies in 10 European and non-European countries. An engagement plan covering the global, national and local levels was defined to engage stakeholders and communities, collect evidence and propose local solutions. The project informed the opinion of the European Committee of the Regions on the EU action plan 'Towards zero pollution for air, water and soil'.
PANEL 2050 Funding source: Horizon 2020	The aim of the PANEL 2050 project was to create durable and replicable sustainable energy networks at local level in central and eastern European countries, where relevant stakeholders collaborate in the creation of energy visions, strategies and action plans for the transition to low-carbon communities in 2050. As a result of the project, municipalities in the countries involved started developing local plans for the energy transition.

The experts commented on the cases and on the findings. The main topics discussed are reported below.

- One crucial aspect to consider is that **public authorities often operate within rigid programmes**, and they may not readily embrace innovation and new approaches. Why and how these projects can be beneficial might not be immediately evident to them. Hence, it becomes essential to involve them right from the start, aiming to convey the significance of innovative approaches. This can be a challenging task, but it is one that we must undertake. Municipalities vary in their readiness to accept and understanding of innovation, and many may not be fully prepared for it.

- It was observed that often it is difficult to convince public authorities to take action based on citizen science data because of a **lack of trust in the method and in the quality of the data**. To address this challenge, D-Noses developed, together with the Spanish authorities, a technical standard that specifies the methodology to be used. The standard is a milestone in fostering trust in citizen science methodology.

Session 5. Evaluation framework

- Measuring the success and effects of citizen engagement, particularly when KPIs are quantitative, presents challenges. **Qualitative indicators are more appropriate for this type of process** – for example, they allow monitoring of not only how many people were involved but also who was involved and how has their opinion/perception/acceptance changed. Nonetheless, in many cases funding entities require the monitoring of quantitative indicators. The monitoring activities are then undermined by the disconnect between the KPIs adopted and the nature of participatory practices.

- While the project outputs are well monitored, since this is done when the project ends and resources are generally allocated for that, impacts and value creation often occur over a longer time horizon. This is rarely captured by the project monitoring system unless the project is subject to an *ex post* assessment.

- One expert suggested adopting a theory of change methodology to assess outputs, outcomes and impacts as well as to identify contextual factors operating since the project's outset. By doing so, the process can be focused on its impacts since the very beginning, and the theory of change methodology can be adapted throughout the process to reflect unexpected changes. For this reason, it would be important to ensure the possibility of adjusting the evaluation framework as the project evolves. This is not always possible in EU-funded projects. Designing appropriate evaluation frameworks that capture societal and economic values requires **skills** that are not always present in R&I project teams, as they pertain to the social science field.

- An expert suggested **involving the community** that is the target of the participatory practice in defining the evaluation framework. In this way, the participants can contribute to the setting of targets for what can be considered success. This approach is also expected to create a sense of ownership among participants.

- **Skills transfer** is a significant aspect of participatory processes. For this reason, tracking the learning process should be integrated into the measurement framework.

Session 6. Lessons learned on value creation through citizen engagement and action points

- For the public actor, develop **incentives** for knowledge valorisation such as social procurement and green procurement.

- Increase awareness of participatory approaches by **using replicators** and **showcasing successful practices**.

- Be aware of **policy alignment** across the EU. Enable public authorities at national, regional and local levels to understand the knowledge valorisation principles and translate them into local contexts.

- Broaden the idea of participatory approaches by **including social enterprises**, as it can lead to a multiplier effect. Businesses, driven by both profit and societal value creation, can steer their way to a win–win approach.

- As an action point for R&I actors, it was suggested focusing on **value creation from the process itself** (creating trust, building relationships, transferring skills).

- To achieve knowledge valorisation it should be clear from the project outset what is expected of the various actors during the project and also after the project (e.g. in terms of follow-up steps). This point should be included in the **engagement and valorisation strategy**.

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This report provides an analysis of citizen engagement for knowledge valorisation practices, drawing on 60 selected case studies from 37 countries, across the EU and internationally. The report describes the benefits of participatory processes and explores key elements for successful valorisation of knowledge and research results with the engagement of citizens. Based on the evidence, it provides possible action points for research and innovation actors for effective participatory practices for knowledge valorisation. The analysis highlights a gap in employing a clearly defined measurement framework to assess the efficacy of participatory processes in value creation, and provides an evaluation framework including key performance indicators that can serve as a tool for researchers and practitioners.

Studies and reports

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