



**mosaic**

MOSAIC Toolkit for the  
impact assessment of  
co-creation  
contribution to  
missions

Deliverable No. 6.1

Douglas K. R. Robinson and Mélanie Marcel  
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**Mission-Oriented Swafs to Advance Innovation through Co-creation**

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## Executive Summary

Evaluation of a project's success and its impacts is highly desirable, to understand what works and what does not, and also to justify the investment of resources into the activity. Whilst there are many impact assessment approaches, it is widely recognised that genuine indications of impact from research and innovation materialise after 10-20 years. For mission-oriented research and innovation activities, such as the activities seeking to contribute to the European 100 Climate Neutral and Smart Cities by 2030 mission, waiting ten years until impacts can be traced and evaluated is too later to be useful for the "mission" itself. A recent trend in evaluation of research and innovation shifts away from being a pure *summative evaluation* (assessing an impact after it has emerged) to being more *formative* (shaping real-time decisions in through anticipation the co-creation outcomes and legacies, into the co-creation activity itself).

In this report we will outline two formative evaluation processes for mission-oriented co-creation. The first will focus on integrating anticipation of impact pathways stemming from co—creation in order to (a) reach consensus on the near-term and longer-term objectives of the co-creation exercise, (b) articulate stakeholder values through that process and (c) reach consensus about "success indicators" that can be used for future monitoring of the outcomes of co-creation exercises. The second formative evaluation approach focuses on enabling good practices in co-creation processes, providing a tool to enabling real-time learning with regards to doing co-creation.



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# 1. Introduction: why ex-post impact evaluation will be too late

## 1.1 The broad need for (reimagining) socio-economic impact assessment

Attempts to estimate socio-economic impacts from research are fraught with difficulties, because there is no linear-causal relation between research, innovation and impacts. Innovation activities are spread amongst many actors and occurs not as a single point source, but occurs at different stages of development of a new technological or social innovation. The impacts associated with the innovation process are distributed and will have further effects, shaping the ongoing innovation process and also will lead to second order impacts.

Impacts are heterogeneous, distributed across various contexts (research centers, fablabs, value chains, socio-technical systems and households), and more often than not it is difficult to disentangle the web of activities and attribute a specific impact to a single point source. This is a generally recognized issue, but still there is a demand for indicators of impact and an understanding of historical and future impact pathways to assess the impact on societal grand challenges (Kuhlmann and Rip 2015) and more specific and regional socio-economic challenges (Foray et al 2009).

This is the second main issue, the need of public agencies and administrators to have indicators of impact, so that decisions can be made on their basis, without having to go into the complexities of the actual developments. A further use is with respect to the need to assess current and potential return on investments by public agencies, philanthropic organisations and firms. So there is a challenge: how to develop indications which speak to these decision-making actors and their purposes, without giving up on the actual complexities.

Over the past 15 years, there have been numerous activities attempting to address this two-sided challenge of (i) acknowledging the complexity but (ii) finding comparable indications of impacts. Examples of approaches include public value mapping (Bozeman 2003), the payback framework (Donovan & Hanney 2011), and the ERIC and SIAMPI approach (van der Meulen 2010, Spaapen & Van Drooge 2011, 2015). Although no international methodological standard for assessing societal impact is in place, a number of public sector research organisations have been experimenting with (and reflecting on) broader socio-economic impact assessment approaches, for example the Consultative Group for International Agricultural Research or CGIAR (Walker et al. 2008), the Brazilian corporation of agricultural research EMBRAPA (2013), the Canadian Foundation for Innovation (Wallace and Hillier 2015) and the International Institute for Tropical Agriculture who have been comparing PRO impacts in sub-Saharan Africa (Feleke et al. 2015).

Amidst these approaches, the notion of impact pathways is gaining currency, particularly with regards to public research organisations (Joly et al. 2015, Gaunand et al. 2015) and to emerging innovation fields (Robinson and Rip 2013, OECD 2014). The definition of impact pathway in these activities, although different, speak to the idea that pathways can be understood as the way along which knowledge moves, or better: is taken up by people, and taken by them in a new direction; a non-linear way with sudden 'openings' and chance finding new areas of value. In this way, 'pathway' highlights the route that knowledge is being taken along by actors involved in research, engineering, innovation and market introduction. Impact pathways move across environments, regional (for example in the territory around a public research organisation), national/international and across different disciplines and sectors.

## 1.2 Impact pathways as an approach to tailor for MOSAIC?

For thinking about impacts generated from mission-oriented co-creation, the focus of the MOSAIC project, the notion of impact pathway is attractive. It acts as a usable metaphor for the future outcomes of the co-creation activity and promises ways of understanding the contributions made from the co-creation to a desired aim – the target mission. However, there is a fatal flaw in the majority of impact pathway approaches – they are usually mobilised after impacts have materialised with sufficient distance in time from the initial action or activity that is being assessed.

This is important for the context of the MOSAIC project and the five European Missions, particularly the focus mission of MOSAIC: 100 Climate Neutral and Smart Cities by 2030. The processual approaches described above require 10-20 years of data to be able to create an evaluation. This means two things for the MOSAIC project. One is that evaluations that will be done in 10-20 years will have little use in *supporting* the mission aim of achieving 100 climate neutral cities by 2030, even if it would provide useful insights in the longer term. Secondly, and most important, it means a new approach must be taken if any reflection or analysis of impact of co-creation activities will be usefully conducted during the timeframe of the MOSAIC project.

Therefore, the MOSAIC approach will focus on anticipatory impact assessment approach that shifts away from being a pure *summative evaluation* (assessing an impact after it has emerged) to being more *formative* (shaping real-time decisions in through anticipation the co-creation outcomes and legacies, into the co-creation activity itself).

Such an approach has the potential to allow for more *inclusive* and *fair* anticipatory impact assessment. It can be used as a way to inform co-design and co-creation activities and inscribe norms and values of the co-creation participants into the co-creation legacies by (a) clearly articulating a collective vision of the *future pathway-to-impact*, (b) collectively define criteria of success that city authorities (the local “owners” of the 100 climate neutral cities mission) can use when looking at the legacy of the co-creation outcomes and (c) to define a baseline monitoring approach post-co-creation exercise.

Moreover, a formative approach can be mobilised, not only for anticipating impacts, but for real-time assessment and tailoring of co-creation processes themselves – a key need for those organisations experimenting with organising co-creation activities whilst at the same time having to show the quality and utility of co-creation approaches. A formative approach to evaluating good co-creation processes is very desirable.

## 1.3 Scope of this report

In this report we will outline two formative evaluation processes for mission-oriented co-creation.

The first will focus on integrating anticipation of impact pathways stemming from co—creation in order to (a) reach consensus on the near-term and longer-term objectives of the co-creation exercise, (b) articulate stakeholder values through that process and (c) reach consensus about “success indicators” that can be used for future monitoring of the outcomes of co-creation exercises.

The second formative evaluation approach focuses on enabling good practices in co-creation processes, providing a tool to enabling real-time learning with regards to doing co-creation.

## 2. Embedding values and formative evaluation through anticipating impact pathways

In this section we construct some “process principles” for a formative evaluation approach that could be applied in a MOSAIC co-creation context

### 2.1 Key requirements and process principles

#### Recalling MOSAIC co-creation design principles and overall RRI approach

From Deliverable 2.1, the working definition of MOSAIC co-creation was given as:

*“Co-creation as Open Innovation (Co-innovation) is ‘a form of collaborative innovation, which is initiated by one or more members of the Quadruple Helix (a company, citizens or citizen group, research organisation or public agency), and involves contributors or co-creators from the other “helices” but above all from civil society to co-produce tangible outcomes, such as technologies, services or new organisational structures’.”*

The definition implies a fair representation of the four helices of the quadruple helix in the co-creation activity. In the first publication stemming from MOSAIC (Robinson et al. 2021) a key challenge was pointed out for co-innovation contexts, where the final aim of the co-innovation activity is to reach the market with new products, services and processes for profit: how to ensure that citizens’ contributions in co-creation approaches can be properly recognized and rewarded?

In deliverable 3.2, ten MOSAIC co-creation design principles (Box 1) were developed based on (a) the findings of the co-creation activity review (D2.1), (b) the insights from the investigation into mission-oriented approaches and the five European missions (D3.1), (c) interviews with a number of city authorities aiming to engage in the 100 Climate Neutral and Smart Cities Mission and (d) a MOSAIC consortium workshop to develop these core principles.

#### Box 1. Ten MOSAIC Co-Creation Design Principles<sup>1</sup>

**Principle 1:** any MOSAIC co-creation approach requires that clearly articulated tangible mission outcomes are the objective of all MOSAIC supported co-creation activities.

**Principle 2:** any MOSAIC co-creation approach must be clear with regards to the scaling of outcomes of co-creation and the scaling of co-creation processes.

**Principle 3:** any MOSAIC co-creation approach must include an anticipatory element which (a) articulates the desired contribution of the co-creation outcome to the Cities Mission aim and (b) articulates the path towards these mission-related contributions.

**Principle 4:** any MOSAIC co-creation approach must include processes to build shared objectives and clearly articulate commitments of the co-creation participants for both the co-creation activity itself and the next steps in the journey towards impact.

<sup>1</sup> These ten principles are the outcome of a workshop held in Paris, 24 & 25th February 2022. A full description of the ten principles and how they were created is available in the MOSAIC Deliverable 3.2. Mission-context cross charting report.

**Principle 5:** any MOSAIC co-creation approach should endeavour to include representatives from each of the four helices of Government, Industry, Academia and Civil Society.

**Principle 6:** all MOSAIC co-creation activities must have a balanced representation of citizens and civil society organisations.

**Principle 7:** every MOSAIC co-creation activity must facilitate, support and build capacity, for the cities involved in the Cities Mission, to effectively identify and integrate QH actors.

**Principle 8:** every MOSAIC co-creation activity must incorporate a means to (a) make explicit the values of each stakeholder group involved in the co-creation activity and (b) inscribe these values in the strategic agenda and monitoring mechanisms that cities will mobilise to evaluate progress from the co-creation activity to Mission contribution.

**Principle 9:** all MOSAIC co-creation processes should always carefully plan ways of incentivising participatory and inclusive innovation, making sure that the co-developed solutions concretely benefit all actors involved in the process and their contributions are fairly recognised and rewarded.

**Principle 10:** MOSAIC will mobilise existing and appropriate tools and processes as part of its co-creation approach, and only develop new co-creation tools and processes where there is a clear gap.

Principle 1, 2, 3, 4, 8 and 9 are relevant for anticipating impact pathways. Along with these principles, the anticipatory impact pathway approach should place an emphasis on three further principles. These are briefly mentioned below.

### An emphasis on consensus and commitment on innovation directions

Mission oriented research and innovation has been positioned as a way of tackling specific societal challenges (Deliverable D3.1). Missions are supposed to be clearly articulated but they are a co-evolution of top-down interests and bottom-up activities. Moreover, when connecting a single innovation activity to a mission, the most practical way of dealing with it is to focus on contributions to the mission objective. Articulating what will be the specific contribution of the co-innovation to impacting positively the mission aim is key. For co-creation, a consensus not only on the co-creation solution but also on the eventual impacts is key (and will shape the design of the technology).

### An emphasis on co-evaluation

In her Mission Implementation report of 2019, Prof. Mariana Mazzucato emphasised that co-creation should be combined with citizen involved evaluation of innovations that would contribute to achieving mission aims. Whilst this can be pursued relatively easily in terms of the ex-post evaluation, for example citizen juries have been mobilised to assess various innovations and agenda (See Deliverable 3.1), formative evaluation with citizens is less clear. For MOSAIC, with its emphasis on fair and equitable co-creation, it is important to explore ways that all quadruple helix actors that participate in the co-creation exercise are also represented in, or participate in, co-evaluation of the co-creation process and its legacies.

### An emphasis on inscribing values into ongoing assessments

Formative evaluation focuses on informing ongoing innovation processes in real-time. Thus, there is an opportunity in co-evaluation to make explicit different stakeholder values and perspectives and mobilise them to reach a consensus on what is the “right” way of innovating, scaling and deploying solutions. Thus, a key principle for the anticipatory impact pathway approach is to include the articulation of values and perspectives in definition of evaluation criteria.

## 2.2 Building blocks of an approach to formative (co)evaluation in co-creation

A formative approach to evaluating potential impacts is a promising approach that could support the steering of innovation processes in a *desirable direction* through anticipation and feedback into ongoing design and development processes. What is a *desirable direction*? In the MOSAIC context, broadly speaking, the desirable aim is for 100 European cities to become climate neutral by 2030. The desirable direction is more problematic. What are the routes towards achieving the desirable aim? How do co-creation organisers, such as city authorities, break this broad aim down to the co-creation level of individual innovation activities?

One way, we suggest, is to: articulate the co-creation innovation goal/challenge + articulate the contribution it will make to the broader mission aim

In this way, the specific challenge is identified that is relevant to the overall mission aim – the connection and contribution of the co-creation to the mission aim is made clear.

A second element is to anticipate on the routes towards making the contribution to the mission aim. This requires a process of anticipation that bridges the output of the co-creation activity to the successful achievement of the mission contribution.

One way, we suggest, of addressing this is to include collective anticipation of the pathway from the co-creation activity to the desirable impact (the contribution to the mission aim, plus secondary impacts<sup>2</sup>).

Collective anticipation by the participants of the co-creation helps build consensus and reveal differences concerning the legacy of the co-creation activity and its pathway to achieving desirable impacts (a key process principle from section 2.1).

The process of collective anticipation also allows to elicit core values of the participating co-creators – for example, is there agreement between firms and the citizens involved in the co-creation activity concerning the scaling and diffusion of the envisaged innovation? This step is important because a fair and equitable quadruple helix co-creation, see the MOSAIC working definition of co-creation, would be supported if all participant of the co-creation exercise have a say regarding which criteria will be used to evaluate the outcomes and legacies of the co-creation exercise (see the co-evaluation process principle of section 2.1).

One way, we suggest, of ensuring a form of formative co-evaluation of co-creation impacts is to collectively identify criteria of successful roll-out and uptake of the innovation(s) stemming from the co-creation activity.

Bespoke criteria of success – criteria that are tightly linked to the innovation that is co-created and the context in which it will be deployed – are a means of undertaking *formative co-evaluation*. Such criteria can then be taken up by the co-creation activity organisers, in the case of MOSAIC these are the city authorities, to assess the outcomes and overall legacy of the co-creation activity.

We emphasise *formative co-evaluation* to distinguish from *summative co-evaluation* which is implied in the discussions of Prof. Mariana Mazzucato in her report “Implementing Missions” (Mazzucato 2019) where she rightly calls for inclusion of multiple stakeholders in the evaluation of the mission contributions of innovation activities. Formative co-evaluation, we argue, is a means of including

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<sup>2</sup> Whilst the aim of the co-creation is to contribute to climate neutral cities, there will be other impacts not directly tied to this aim, for example, building citizen capacity to innovate, building the capacity of city authorities to support and/or undertake robust and effective co-creation.

multiple stakeholders' norms and values and inscribing them into the whole innovation journey from conception to use - a key element of Responsible Research and Innovation (Robinson et al. 2021).

With these building blocks, that stem from the process principles outlined in section 2.1, we can now look at concrete processual approaches doing formative anticipatory impact assessment of co-creation activities. Before we do that (section 2.4) we outline the approach that we will draw on to inform our approach.

## 2.3 Building from an existing tool and theory of change

### ASIRPA ex post: The impact pathway approach

Launched in 2010, and still being applied at the time of writing, the ASIRPA<sup>ex-post</sup> approach was developed for the evaluation of the socio-economic impacts of the French National Institute for Agricultural Research and Environment (INRAE). The impact pathway assessment approach was pioneered by INRAE focusing on unveiling the generation of impacts stemming from specific programmes of activities at INRAE (Joly et al. 2015, Matt et al. 2017). The approach seeks to unveil patterns of activities (the inputs, outputs and eventual impacts) so that one can identify value creation.

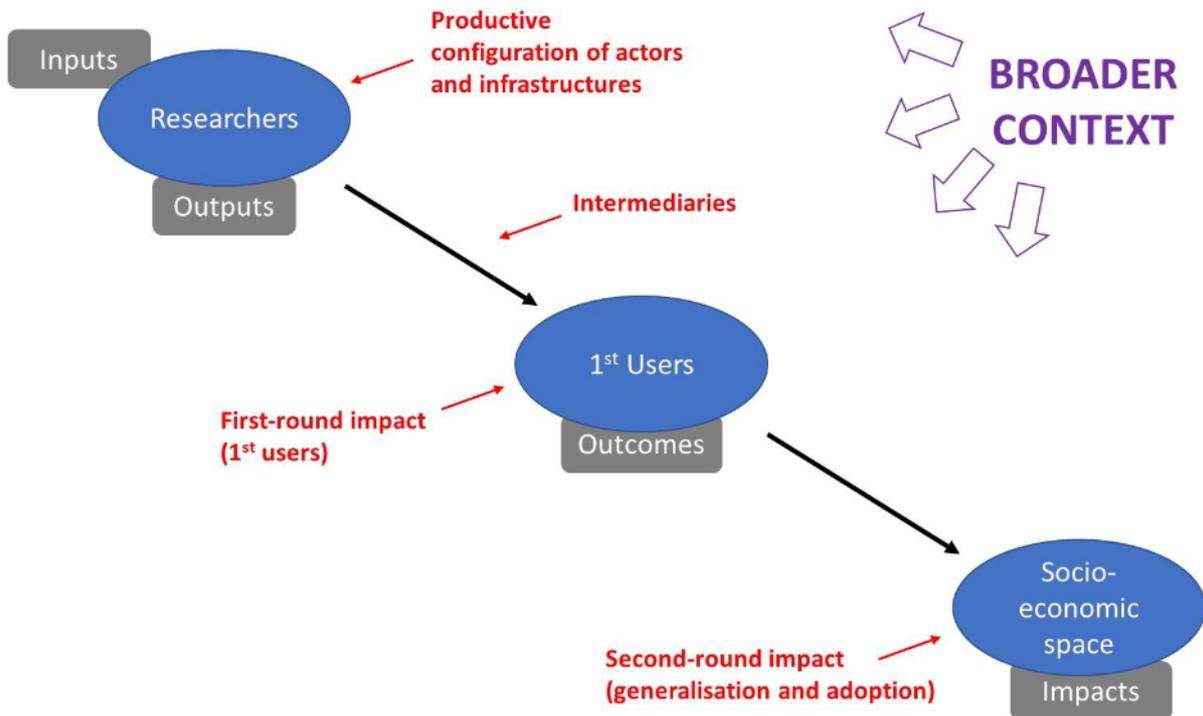


Figure 1: A simple schematic of impact pathway

The ASIRPA approach, shown in schematic above, is built on first identifying the productive configuration of actors that come together and transform inputs (finance, person power, infrastructures etc.) into outputs (knowledge, demonstrators, prototypes, patents, new techniques etc). These outputs are then transformed into impacts by intermediaries. Intermediaries could be

technology transfer offices, large or small firms the transform a prototype into first applications, it could be other intermediary organisations or brokers.<sup>3</sup>

The approach is built from for building blocks.

- **Block 1:** The **productive configuration** that represents all of those involved in a research or innovation activity.
- **Block 2: A historical chronology** that identifies the beginning and the end of the case, as well as the main events between the two (context of action in which the case is located and identification of the moments and forms of intervention). Figure 2 below shows the format of the chronology visualised for an example (Liming against forest decline – Nys et al. 2014). Key activities are plotted on a timeline allowing to give a representation of the contributing activities within the research programme.

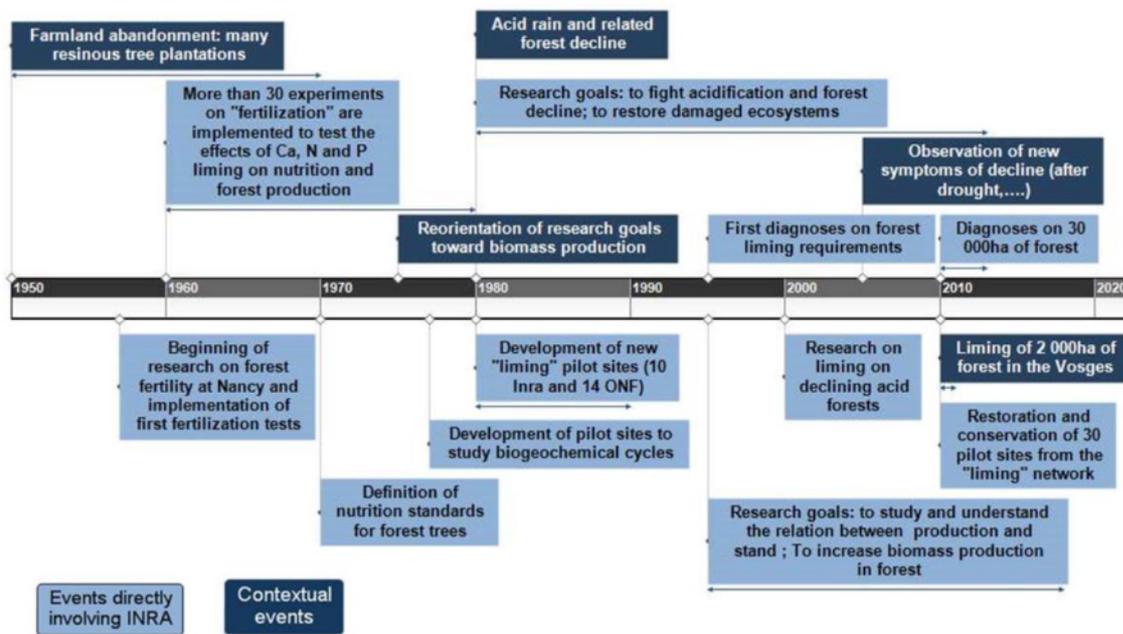


Figure 2: Chronology of INRAE activities on liming against forest decline

- **An impact pathway** that graphically represents the stages of impact generation. In general, the impact path describes the research work, the progression of knowledge outside the academic sphere, its transformation and its use by socio-economic actors. More specifically, the impact path distinguishes and describes the characteristics of the research (*inputs*), its primary products (*outputs*), the first level of impacts generated (first products on the market for example) and the second-level impacts corresponding to the generalization of first-level impacts (for example a new market) , as well as the intermediaries involved at each stage of the impact path. Below, in figure 3, is an example from the same case on lime treatment (Nys et al 2014). In Blue the inputs show the actors and activities involved in creating research outputs

<sup>3</sup> For a recent review on innovation intermediaries see Kivimaa et al 2019. :

<https://www.sciencedirect.com/journal/research-policy/vol/48/issue/4>

(Green boxes). Outputs are not Impacts and thus need translation. Often such translations occur due to dedicated actors which the process calls intermediaries. Such Intermediaries (Dark Pink boxes) transform the research output into first round impacts (Yellow) which are identified via a vector of impact tool (see next tool). Broader and extended impacts are represented by orange boxes. Of course, such impact pathways do not occur in isolation, contextual factors may enable and constrain the impact pathways (Purple boxes). The Impact pathway Diagram is useful since it helps build a chain of contributions from research inputs to eventual impacts.

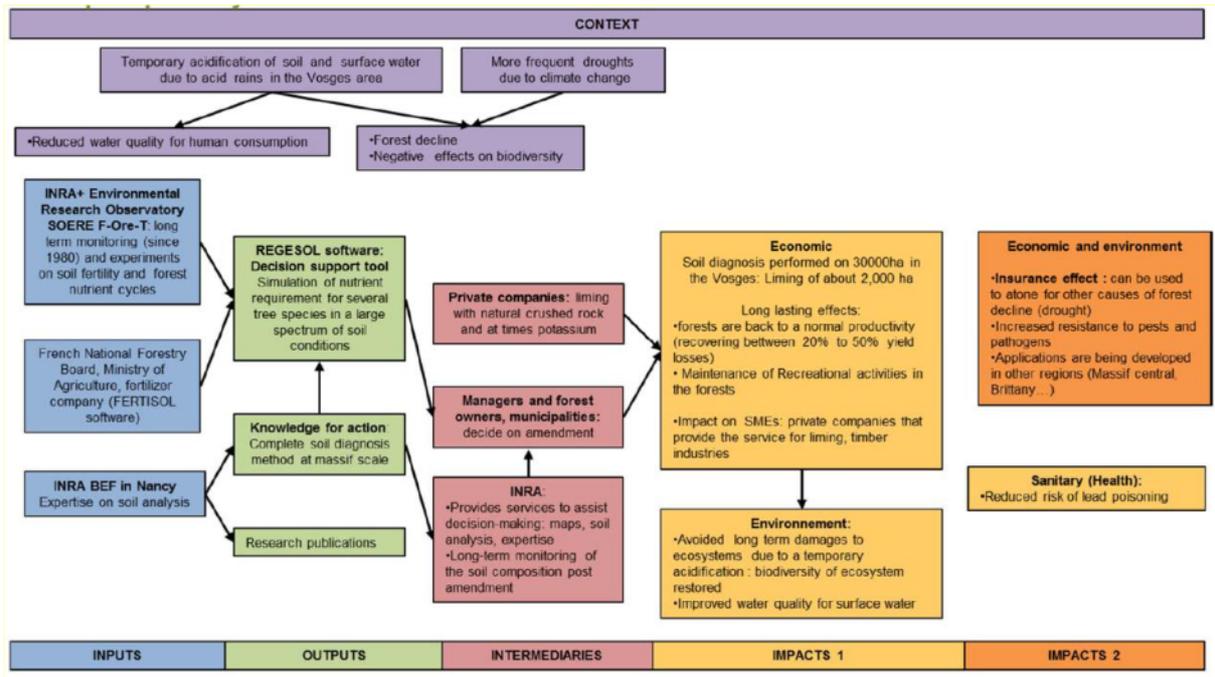


Figure 3: Lime treatment impact pathway

- **A table of impacts**, describes the impacts generated on five dimensions corresponding to the key impact dimensions. For the Impact Pathway approach, the following dimensions were considered important for the mission of INRAE: (1) economic, (2) environmental, (3) health, (4) social and territorial policies and (5). For each of these dimensions, the intensity of the impact is graduated on a scale ranging from 1 (very low impact) to 5 (very high impact). Table 1 below further elaborates on these five dimensions.

Type of impact	economic	Territorial-Social	environmental	political	Health
Targets (examples)	Markets	Farmers	Given	ministry	Animal
	Sectors	Social networks	waste	Community	man
	Firms/actors	Professionals	Ecosystems (species invasive, biodiversity)	Nature reserve, Park	Animal welfare
		Traditions	Ozone layer, gas effects	National	Public health
		Houses	Greenhouse, air, soil, water,	Public health	
		territory		Public interest	

		inheritance	Resources (energy, water...)		
<b>Terms</b>	rules	Working conditions	Changes in practice	Decision support tools	Nutrition
<b>of action</b>	New product	Regularity of income	balanced	National inventory	Vaccination
<b>(examples)</b>	Segmentation, organization	dialogue	Recycling, valuation use	Bargaining power	Traceability
	Business creation	Mediation	Restoration, decontamination	Public decisions	prevention safety
	Grants	Circuit court			
	Financial incentives	Localized label (AOC, AOP, IGP) fitting out			
<b>Descriptors</b>	competitiveness	Distribution (index of Gini)	ACV, IFT, CO2, Bilan C,	Quotes in debates	Mortality
<b>(examples)</b>	Jobs	Distribution of population	Consent to pay, Climate change, Sustainability fertility	public, changes in keywords	Morbidity
	Concentration indus	Maintenance of activities		New Regulations	Prevalence
	Value added	Landscape maintenance		New arguments	Toxicity
	New opportunities				Epidemic
	R&D				Obesity
<b>Measures</b>	Economic surplus		See scale	See scale	

*Table 1: Five dimensions of impact from the original impact pathway Approach (Joly et al. 2015)*

These four tools enable the description and analysis of the mechanisms that generate the impacts, i.e. the chains of "translation" operations that relate the worlds of research and innovation with the worlds of users.

### Tailoring the ASIRPA impact pathway approach and theory of change for MOSAIC co-creation

The ASIRPA ex post toolbox cannot be directly applied to the MOSAIC co-creation context: it is focused on analysis of historical data on research programmes and their legacies over 20-year timeframes. However, the approach has been applied to 60 different INRAE research programmes to understand impact generating mechanisms, revealing that the framing of impact pathways is robust and useful.

For the MOSAIC approach, which is anticipatory, elements of the ASIRPA ex post approach can be mobilized and tailored for the MOAIC context.

1. First, the "productive configuration" remains important and is represented by all of those stakeholders involved in the MOSAIC co-creation activity.
2. Second, the input, output, intermediary and impact classification is useful (although will require tailoring for anticipatory purposes).
3. Third, the underlying theory of change on impact generation will remain.

Regarding the third point, the nature of formative approaches means that the aim is not to evaluate, but to undergo collective anticipation to identify what is a desirable outcome of the innovation journey from co-creation to impact. For a robust approach, the understanding of how innovations journey from conception to their use in society is needed. In addition, an understanding of what is an impact and what are the impact generating mechanisms that are at play is also needed. A clear "theory of change" is needed and the ASIRPA ex-post approach I useful here. The ASIRPA approach brings

together two conceptual frameworks, the sociology of translation (Callon 2001) and the innovation journey through different phases of development (Garud, Tuertscher and Van De Ven, 2013; Van de Ven, 2017). Whilst the MOSAIC project is not aiming to delve into theory, it is important to be aware of the “inner workings” of an assessment approach.

An analogy would be in the IT sector, for example web or mobile applications. The front-end of web applications are the visual interface a user sees on the mobile phone or computer screen, whereas the back-end is the algorithms and code that supports the application. In the MOSAIC impact pathway approach, the back-end is the theory of change taken from the ASIRPA ex post method, and the front end is the rather simplified engagement and visualisation tools that are built on this “back end” logic of how impacts are generated.

In 2022, 60 standardized case studies are accessible in open access on the ASIRPA website<sup>4</sup>. Each case describes the actor networks that are mobilized, the contribution of each actor to the generated impacts, the diversity of the impacts produced and the critical points. Standardization of a sufficient number of case studies allowed systematic codification of each case study variables that enabled transversal analysis and the building of a typology of impact pathways (Matt, et al., 2017) which provided important lessons on impact generating mechanisms.

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<sup>4</sup> <https://www6.inrae.fr/asirpa/Les-60-cas-etudes>

## 2.4 Steps in an adaptable approach to anticipating the impact pathway:

### Step 1: Defining the Challenge

The first step is the clear articulation of the challenge to be addressed by co-creation. This can be a collective activity or conducted by a co-creation owner. For the situation of MOSAIC, there is a clear co-creation owner: the city administration. From the co-creation review (Deliverable 2.1) it was observed that along with co-creation activity owners, a dedicated animator (or animation team) improves the co-creation process and allows for a freer, less directed, co-creation activity.<sup>5</sup>

Recalling that for city administrations, there will be multiple departments and units with a stake in the mission objective, it is important to clearly articulate the challenge that will be the focus of co-creation. This is important because the legacy of the co-creation activity will be dependant, in part, on the continuous monitoring by, and support of, the city administration of the further development and deployment of the co-created solution.

An agreed to challenge therefore underpins the commitment of the city to (a) the challenge that needs to be addressed and (b) supporting and steering the legacy of the co-creation activity.

An interactive workshop approach<sup>6</sup>, built on brainstorming, discussions, ranking and consensus is recommended for this step, allowing for multiple participants to share their views and framings of the challenge faced leading to agreement on the concrete “challenge statement” for the co-creation activity (the co-creation animator and participants). A suggested approach is given in section 2.5 describing a baseline “use scenario” for the MOSAIC project.

### Step 2: Articulating the contribution

Addressing the mission of climate neutral cities can involve innovation along many lines. In the 100 Climate Neutral and Smart Cities mission, areas of potential innovation focus include inner city mobility, energy efficiency as well as behavioural change by citizens. Within these broad areas there are specific and concrete innovative solutions, that could stem from co-creation. The aim of mission oriented programmes (Deliverable 3.1) is to inspire, guide and drive collective efforts to contribute to achieving the mission aim through a large range of innovation development and deployment. Thus, for any mission-oriented co-creation activity, it is important to clearly envision what is the specific contribution made to the mission aim by the co-created innovation.

This requires collective exploration of the changes that will come about if the outcome of co-creation was inserted into society. In field of foresight, the notion of “the future working world” is useful here, since it can be included in innovation visioning processes (an imaginative step in any co-creation activity) and positions all stakeholders thinking at the end of the innovation journey – what will change if the innovation is successful?

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<sup>5</sup> For example, a city authority may « own » the co-creation activity by initiating it and financing it, but delegation to a third-party co-creation animator or team reduces the dominance of the « owner » enhancing the design and development freedom of those involved in co-creation.

<sup>6</sup> One could imagine that this step could be done through interviews between a co-creation animator or animation team and various city representatives. However, whilst this may lead to a definition of a challenge, whether it is a shared vision of what the challenge is, is not clear, nor is the commitment across the city administration clear also. The latter point is important if the city administration is to support the co-creation legacy.

These changes are the “mission contribution”. Whether it is a reduction in energy consumption due to a co-created online platform, or increased use of public transport in inner city areas due to a co-created solution, the envisioned changes triggered by the co-creation innovation should be clearly articulated.

A visioning workshop approach with the co-creation participants is recommended. Mobilising the concept of envisioning the future-working-world of the city in 2030, what changes are envisioned linked to solutions to the “challenge statement” (see Step 1). Built on sketching of the future working world, listing of anticipated changes and discussion, this workshop (or workshop element) brings to light the key hopes, concerns and underlying values of the stakeholders involved in the co-creation activity. This allows a mutual understanding between co-creation participants of the rationales behind each stakeholder’s co-creation input and, potentially, a shared understanding of what the mission-contribution is. A suggested approach is given in section 2.5 describing a baseline “use scenario” for the MOSAIC project.

### Step 3: Identifying the key phases of getting there – defining a rough impact pathway

Whilst the ASIRPA ex post approach requires substantial evidence gathering and analysis by those involved in innovation and impact, the logic of input, output, intermediaries, and impact can be mobilised in a lean way and embedded in co-creation exercises (see figure 4 below)?

The motivation for this step is to identify the key processes needed to translate from the co-creation activity (the input in ASIRPA approach), the prototype or demonstrator (the Output of the ASIRPA approach) and the eventual envisioned changes and mission contribution (see Step 1 and Step 2 above).

This means a focus on the “Intermediaries step”. What is the impact pathway to from the prototype to the envisioned changes? The intermediary step includes the first-round testing of the solution, scaling up, changes in regulations (if necessary) etc. The intermediary step is essential if the legacy of the co-creation activity is to lead to impact. Articulating the intermediary step is essential for the co-creation activity “owners” to know what is necessary for translating a prototype into a working solution to contribute to the climate neutral city mission.

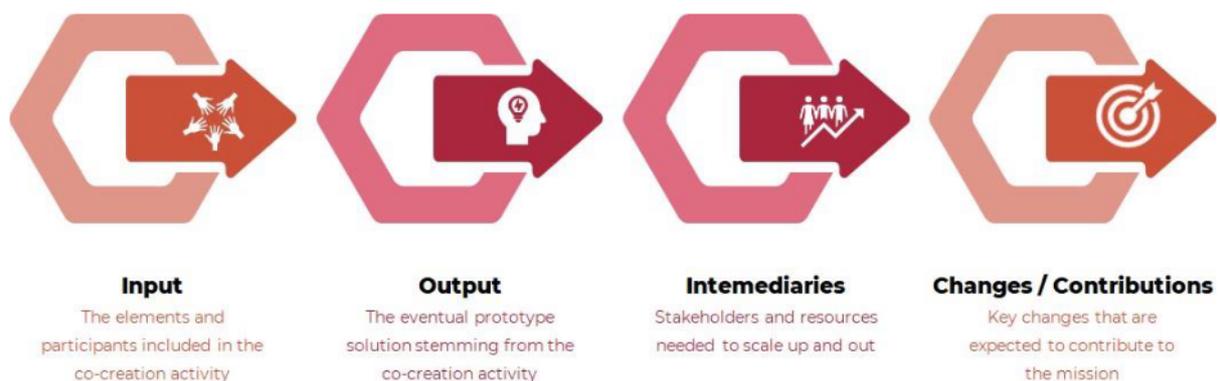


Figure 4: A simplified representation of the ASIRPA impact pathway for application in MOSAIC

An interactive workshop approach, structured on identifying key transformation steps of the prototype into a working solution in society, is recommended. The workshop should be built on discussions guided by key questions, for example, on scaling up and deployment of the solutions, and on the identification of key stakeholders for helping the innovation to achieve the desired impacts. A suggested approach is given in section 2.5 describing a baseline “use scenario” for the MOSAIC project.

#### Step 4: Defining indicators of successful co-creation legacies

The final step in the process is to translate the impact pathway from Steps 1 – 3 into collectively agreed to criteria of success. Each and every co-creation activity is different, different types of objectives, different types of innovation solutions and different design and development contexts. It is therefore impossible to define robust general criteria of success relating to the legacy of co-creation activities.<sup>7</sup> To enable mission-oriented co-creation “owners”, in the MOSAIC case this is the cities, to monitor and intervene in the legacy of the co-creation activities, it is important not only to have an impact pathway to inform on the envisioned pathway after co-creation, but to also have some criteria of successful progress beyond the co-creation activity itself.

As argued in workpackage 3, and also described earlier in this section with regards to co-evaluation, it is also important that all stakeholders that are involved in co-creation have a say in what is a successful co-creation legacy. A solution is to co-create simple criteria of success for the legacy of the co-creation activity.

An interactive workshop approach, mobilising the impact pathway developed in Step 3, is recommended to identify three or four key criteria that any carrier of the co-created innovation (for example a firm) should consider when further developing and deploying the outcome of the co-creation activity. In this way, formative co-evaluation is catalysed – all participants have a say in what is a success and these values are inscribed in the innovation journey from prototype to deployment to impact. A suggested approach is given in section 2.5 describing a baseline “use scenario” for the MOSAIC project.

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<sup>7</sup> However, it is possible to define indicators of good co-creation process (see section 3).

## 2.5 Implementing the approach as part of MOSAIC co-creation: a use scenario

Embedding experimentation in the co-creation activities that are being initiated in the 100 Climate Neutral and Smart Cities Mission means that some accommodation to existing and evolving circumstances is required. At the time of writing, the MOSAIC co-creation approach and its first-round experimentations have still not fully stabilised.

Knowing that the anticipatory impact pathway approach will have to co-evolve with the MOSAIC methodology and its application, we flesh out a baseline use scenario of embedding formative co-evaluation of impact pathways into the MOSAIC co-creation method (work package 4). This use scenario is lean in terms of time but allows for the minimum necessary to fulfil the ambition of anticipating impact pathways and defining criteria of success.

### The (draft) co-creation approach in brief

The draft co-creation approach is divided into three phases:

- **Phase 1:** Preparation and setting of the scene (September-December 2022)
- **Phase 2:** Forming teams and defining collaborative projects (January - February 2023)
- **Phase 3:** Ideation and prototyping (March-August 2023)

In the remainder of this section, we outline how Steps 1 – 4 of the anticipatory impact pathway tool is to be integrated into these three phases.

### Integration of Step 1 into the MOSAIC co-creation approach

Phase 1 in the MOSAIC co-creation methodology focuses on, but is not limited to, (a) selecting the challenge for co-creation together with city authority representatives – based on the priorities of their “Climate City Contracts” (see Deliverable 3.1), and (b) get a deeper understanding of the context around the chosen challenge (key stakeholders, previous interactions between the city and stakeholders, etc.).

Defining the challenge is based on brainstorm and group discussion of city representatives over a one-hour interactive discussion. The collective articulation of the envisaged challenge is further explored through a number of questions:

- What is the key social problem/need to be addressed and why is it important? What social/cultural factors shape this problem?
- Who is it a problem for?
- What evidence is there that this is a significant problem?
- Can the problem be framed in a different way?

The outcome of this is a “challenge statement” which represents the consensus on what is the need that co-creation solutions can solve. Articulating the “challenge statement” means that the city authority representatives define a clear commitment to the co-creation process and outcomes, which can be made clear to all co-creation participants at the outset.

### Integration of Step 2 into the MOSAIC co-creation approach

A key element of Phase 2 of the MOSAIC methodology is “The Gathering”, two four-hour workshops which together form the first meeting of the different stakeholders that will participate in the co-creation activity. It is the first big gathering of all selected co-creation participants and the organising team and is the moment when the co-creation teams are formed and the co-creation work is launched.

Phase 2 includes the following activities:

- a) All formed teams go through a facilitated process to kick-off their work on the selection and identification of their idea
- b) The groups then work on their own milestones and deliver a draft idea (vision) by the end of February
- c) Based on that vision the Selection Committee selects 3 teams to be actively supported in the co-creation process

Step 2 of the anticipating the impact pathway (articulating the mission contribution) is integrated into Phase 2 a) and b). For phase a) as part of the facilitated idea identification workshop, once there is a selection of a core idea, each team will be asked to articulate what changes to the city will come about if their idea becomes a reality.

For phase 2 b) each team will work on their idea (vision) and include an anticipation of the changes that will come about if their idea is successful. This will be the envisioned contribution to the “challenge” identified by the cities in Phase 1, and in turn is a contribution to the 100 Climate Neutral and Smart Cities by 2030 mission.

### Integration of Steps 3 and 4 into the MOSAIC co-creation approach

Phase 3 of the MOSAIC co-creation methodology focuses on generating ideas and prototypes for to address the challenge provided by the city authority representatives. It is divided into three stages:

- a) Ideation (March-April 2023).
- b) Idea selection (April 2023)
- c) Prototyping (May-August 2023)

The integrating of Steps 3 and 4 of the anticipating impact pathway approach will be in Phase 3 c) (Prototyping). During this period, the core idea of the co-creation is decided and development of the prototype will focus on key design requirements for utility and scaling robustness (the ability to be scaled up and applied).

During this Phase 3 c), the co-creation groups will be challenges to create a first-round prototype, and then a further refined prototype focusing on crucial elements that will be key in its success or failure.

Step 3 of the anticipatory impact pathway approach contributes to this through looking at the necessary intermediary steps from prototype to final application in the real world. Therefore a one hour workshop session, focusing on the “intermediary” stage in the impact pathway will be conducted, where the co-creation team members will identify key elements and stakeholders are necessary for translating

Step 4 is an additional 30-minute working session where the key elements and stakeholders are rated by importance, and the top three are selected to form the baseline for three criteria of success. Steps 3 and 4 will be supported by a workshop animator to facilitate the brainstorm, ranking and success criteria definition.

### 3. Evaluating good co-creation process

#### 3.1 Why developing a tool to evaluate the quality of co-creation processes?

Principles and guidelines regarding co-creation processes have been largely discussed in recent years<sup>8</sup>. Even if they can influence how processes are being implemented, none were developed to that intent. They have been discussed at a theoretical level, as concepts, not as frameworks to be implemented on the ground. To contribute to fill that gap, the evaluation tools we aim to provide are supposed to be used in real-time in order to steer the activities and implement changes during the implementation if needed.

As such, they should reinforce the responsiveness of those implementing co-creation activities.

These evaluation tools should:

- give to the organisers of co-creation activities not just principles to adopt, but actual steering tools to help them navigate and facilitate the interactions between all stakeholders along the process;
- facilitate the production of tangible results that can be shared and function as a base for improvement;
- generate data for future research on the causality between the quality of the process and its impacts.

Our hypothesis is that following "good practices" of co-creation (such as diversity etc.) will result in more impactful results (i.e. generate value and positive outcomes to all stakeholders regarding the topic addressed). However, to our knowledge, such research was never conducted as there are no tools allowing to measure the quality of a co-creation process.

#### 3.2 What to evaluate in the co-creation processes?

The following indicators are core elements of every co-creation processes, as diverse as their approaches might be. Therefore, they have to be rigorously assessed.

Indicator	Description	Content
1.Capacity to influence the process	A good co-creation process is enabling all participants not only to contribute on the topic, by expressing and sharing their vision and experience, but also to have room to challenge and modify the process.	This can reflect in the capacity for all participants to be able: <ul style="list-style-type: none"> <li>• to choose the topic of the co-creation</li> </ul>

<sup>8</sup> Ruoslathi, H.(2020). Complexity in project co-creation of knowledge for innovation. Journal of Innovation & Knowledge, 5(4), 228-235.

Stier, J., Smit, S.E. (2021). Co-creation as an innovative setting to improve the uptake of scientific knowledge: overcoming obstacles, understanding considerations and applying enablers to improve scientific impact in society. Journal of Innovation and Entrepreneurship, 10(35).

		<ul style="list-style-type: none"> <li>● to participate in the design of the sessions / activities</li> <li>● to participate in the choice of participants</li> <li>● to steer the activities during the process</li> <li>● to express themselves fairly</li> <li>● to react and and engage dialogue on sticking points</li> <li>● to provide alternatives or different options</li> </ul> <p>to influence the results according to their respective interests</p>
<p>2.Diversity of stakeholders along the quadruple-helix</p>	<p>The consortium gathered for a co-creation process must be diverse and as balanced as possible (Kupper, J. F. H., Klaassen, P., Rijnen, M. C. J. A., Vermeulen, S., &amp; Broerse, J. E. W., 2015<sup>9</sup>), made up of representatives from each category of the quadruple helix (public sector / civil society / industry / academic research).</p> <p>A co-creation process is inherently based on the diversity of stakeholders involved in the creation process. It is the primary requirement for a valid co-creation process (Robinson et al. 2021<sup>10</sup>). Although it may seem obvious or taken for granted, it is not always respected, even if it was the original intent.</p> <p>As co-creation processes involving the QH are still rare and not anchored into cities' practices, gathering such diverse</p>	<p>More granularity in diversity is possible by detailing each category of the QH into subcategories:</p> <ul style="list-style-type: none"> <li>● Public sector: local, regional, national, intergovernmental;</li> <li>● Civil society: NGOs, non-profit organisations, citizens, social entrepreneurs;</li> <li>● Industry: startups, SMEs, industrial companies;</li> <li>● Academic research: natural sciences, social sciences and humanities.</li> </ul> <p>These subcategories are examples. Other subcategories or typologies of subcategories can be created, as long as</p>

<sup>9</sup> Kupper, J. F. H., Klaassen, P., Rijnen, M. C. J. A., Vermeulen, S., & Broerse, J. E. W. (2015). *Report on the quality criteria of Good Practice Standards in RRI*. Athena Institute VU. [http://www.rri-tools.eu/documents/10182/18424/D1.3\\_QualityCriteriaGoodPracticeStandards.pdf/f7a1d707-5e54-48cb-949b-053dc7c6f36f](http://www.rri-tools.eu/documents/10182/18424/D1.3_QualityCriteriaGoodPracticeStandards.pdf/f7a1d707-5e54-48cb-949b-053dc7c6f36f)

<sup>10</sup> Robinson, D. K. R., Simone, A., & Mazzone, M. (2021). RRI legacies: co-creation for responsible, equitable and fair innovation in Horizon Europe. *Journal of Responsible Innovation*, 8(2), 209-216.

	<p>consortia may not be seen as an easy task on the field. The cause may be the lack of connections within networks, or a difficulty to engage with and convince specific stakeholders to be part of the process.</p> <p>This is why the diversity of stakeholders has to be monitored to ensure that this characteristic is respected, despite the possible difficulties to achieve such diversity.</p>	<p>it remains within the four primary categories of the QH.</p>
<p>3.Co-benefits</p>	<p>The co-creation process has to deliver co-benefits. Co-benefits have two meanings:</p> <ul style="list-style-type: none"> <li>• collective benefits for the consortium, through the results and impacts of the co-creation process</li> <li>• a sum of individual benefits, through the gains the co-creation process provides to each participant of the consortium.</li> </ul>	<p>These benefits can be reflected in the:</p> <ul style="list-style-type: none"> <li>• level of satisfaction of the participants on their contribution in the process and the gains according to their organisation's interests</li> <li>• quality of time spent in the co-creation activity: one of the criticisms often made by citizens that consider they did not benefit from a co-creation activity is that they lost their time. Indeed, time is very precious and is a good indicator of the actual rewards one is gaining from a specific activity. This is why a participant considering his active presence during the activity was "time well spent" is adding positive points to the co-benefits indicator</li> <li>• fair / equal treatment of all participants' concerns and interests</li> </ul>
<p>4.Capacity to align stakeholders</p>	<p>Gathering a diversity of stakeholders is one primary step for co-creation processes. However, to ensure a good co-creation process, it is essential to be</p>	<p>Aligning stakeholders in a co-creation process is reflected in the capacity to enable all participants:</p>

	<p>able to align them. Again, as these co-creation processes are still emerging among practitioners, it is not easy to align very diverse stakeholders with different interests, perspectives, or vocabularies. Being aligned can also cover different meanings depending on one's perception.</p>	<ul style="list-style-type: none"> <li>• to better understand the concerns of other stakeholders, especially the ones from different categories among the QH</li> <li>• to include other stakeholders' point of view to inform their perspective on the topic</li> </ul> <p>and provide :</p> <ul style="list-style-type: none"> <li>• a process to help/guide participants address a divergence of interests and potential conflicts/hurdles</li> </ul>
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These four indicators are linked to the eleven Rationales behind co-creation activities, a set co-created by the MOSAIC Partners to theorise what seems recurrent in terms of motivations, challenges, and practices across the fifty co-creation projects reports studied.

Indicator	How it connect to the Rationales behind co-creation activities
<p>1.Capacity to influence the process / governance</p>	<p><b>Rationale 2. Improving participation in agenda setting</b></p> <p>The capacity for stakeholders to influence the process/governance is key to truly attract and onboard them into the co-creation process.</p> <p>Stakeholders should also have room not only to influence the process but also to put new topics/challenges on the agenda, including “wild” propositions to make sure not to leave any blind spots on the topic addressed.</p>
<p>2.Diversity of stakeholders along the quadruple-helix</p>	<p><b>Rationale 7. Tapping unheard voices and the broader ecosystem of expertise</b></p> <p>Gathering a diversity of stakeholders along the QH implies taking into account an ecosystem perspective on the topic or challenge addressed. The more diverse are the stakeholders, the more numerous and different are the points of view and experiences allowing for systemic thinking and potential synergies.</p> <p>Diversity along the QH can also be achieved by identifying and onboarding hybrid stakeholders, i.e. having a foot in “several helices” of the QH. Not only these stakeholders can bring a double perspective as part of two helices (e.g. a social enterprise that is both in the private sector and the</p>

	<p>society helices) but also a third and unique perspective resulting in its position in the interstices of these two helices.</p> <p><b>Rationale 5. Implementing Responsible Research and Innovation (RRI)</b></p> <p>Gathering a diversity of stakeholders along the QH allowing for multi-stakeholder interactions is a prerequisite to implement a Responsible Research and Innovation (“RRI”). Co-creation with a diversity of stakeholders is what differentiates RRI from traditional research and innovation processes that often takes place between the research helix and private helix only.</p>
3.Co-benefits	<p><b>Rationale 10. Incentivising participatory and inclusive innovation</b></p> <p>Measuring collective benefits for the consortium, through the results and impacts of the co-creation process, as well as individual benefits for each stakeholder, through the gains the co-creation process provides to each participant is key to ensure sufficient motivational levers in participating to the co-creation activities and process.</p> <p><b>Rationale 3. Prototyping and testing solutions</b></p> <p>Among these benefits can be tangible “products” that can take the form of technological prototypes or devices, but also programs and educational or sensitising materials, experiments and solutions, or interventions in a particular area, taking the form of urban design or small-scale urban planning or what one could call “micro-policy”.</p>
4.Capacity to align stakeholders	<p><b>Rationale 9. Forging a common language to facilitate communication</b></p> <p>This is a key requirement to be able to align stakeholders all along the co-creation process, from the start when engaging the targeted stakeholders in the co-creation process; during all activities aiming to engage interactions and collaborations; and at the end when communicating on the results.</p> <p><b>Rationale 6. Building trust between potential co-innovators</b></p> <p>Aligning stakeholders also implies being able to manage any hurdles during the co-creation activities: lack of understanding, different mindset, conflicts of interests, traditional mistrust between different helices (e.g., researchers not trusting industry partners, or citizen expertise which falls out of their comfort zone).</p>

The four remaining Rationales (1. Filling data gaps and creating open data through citizen mobilisation; 4. Building markets and reconfiguring value chains; 8. Building Quadruple Helix cohesion by harnessing territories and local resources; 11. Promoting and increasing citizen science) are not included in our

indicators.

We decided to not include Rationale 8 due to the difficulty to assess them easily. As we mentioned earlier, evaluating co-creation processes has to be easy and not time-consuming for cities, which requires that indicators should not be over-engineered, hard to understand or hard to measure and data should be either already accessible or easy to collect. Measuring the reality of this rationale during and after a co-creation process would require complicated tools integrating a geographical aspect and hard to access information.

Rationales 1, 4 and 11 are linked to specific goals: developing open data and citizen science, redefining value chains. Their specific focus is not necessarily linked to the processes in themselves but to results that might not be part of the cities' priorities for the Mission. Thus we decided to not focus our indicators on them.

### 3.3 How to evaluate the co-creation processes?

Evaluating co-creation processes has to be easy and not time-consuming for cities, which requires that:

- indicators should not be over-engineered, hard to understand or hard to measure;
- data should be either already accessible or easy to collect;
- the tool should be easy to use;
- results should be easy to read and understand.

Following these requirements, three easy-to-use formats have been developed:

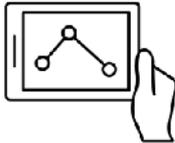
- a data visualisation (pie chart) to quickly grasp the diversity of the gathered participants, fed by easy-to-collect data (number of participants in each category of the QH);
- a satisfaction questionnaire shared to the participants of the co-creation activities, at the end of the co-creation process to collect their feedback;
- a self-evaluation questionnaire for the cities' steering team that can be used at the start, during and after the co-creation process to help them plan, adjust and evaluate their actions.

Indicator	Measuring Tools
1.Capacity to influence the process / governance	 A self-evaluation questionnaire for the cities
2.Diversity of stakeholders along the QH	 A data visualisation (pie chart)
3.Co-benefits	 A satisfaction questionnaire shared to the participants
4.Capacity to align stakeholders	

	A satisfaction questionnaire shared to the participants
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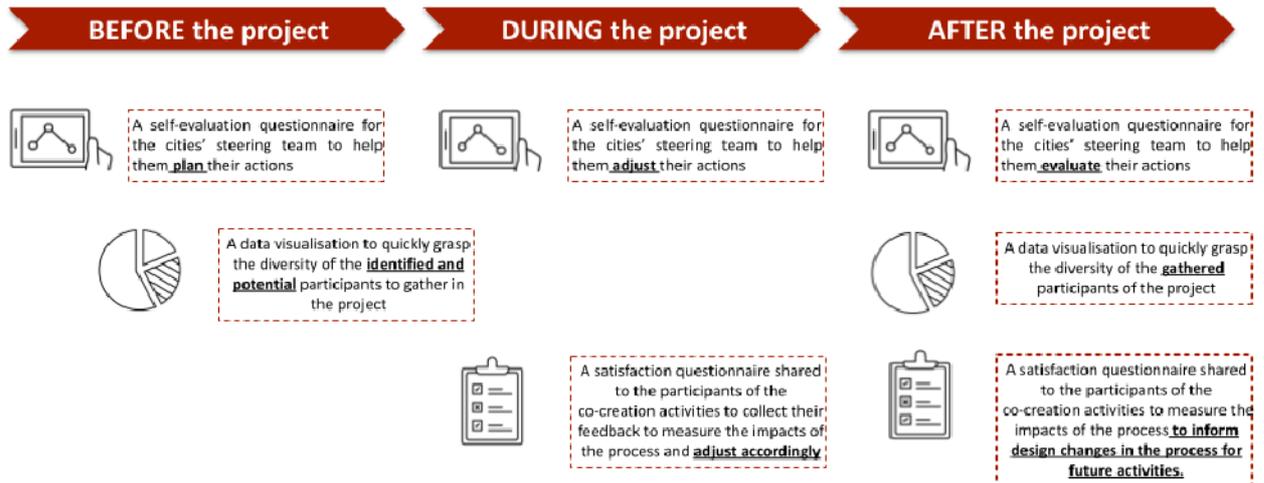
### 3.4 How to use the tools? A “use scenario”

The tools are built to help organisers of co-creation activities ensure that they implement a qualitative process. It must be reminded that these tools should be used all along the process. This is not an evaluation tool but rather a steering tool. Cities should not wait until the end of the process to implement these tools, on the contrary.

When to use a tool?	Which tool to use?	Objectives	Data needed
Day 1 and all along the process	<p>A self-evaluation questionnaire for the cities’ steering team</p> 	<ul style="list-style-type: none"> <li>- to anticipate how to frame the governance, content, and animation of the process, according to cocreation principles, and therefore put the cities in a cocreation-focused state of mind from the very beginning of the project</li> <li>- to self-assess regularly for improvements</li> </ul>	This is a self-assessment tool, no data collection is needed.
During the selection process of participants	<p>A data visualisation (pie chart) to quickly grasp the diversity of the consortium, fed by easy-to-collect data (number of participants in each category of the quadruple helix)</p> 	<ul style="list-style-type: none"> <li>- to quickly grasp the diversity of the identified and potential participants the cities would like to include as participants in order to adjust their selection if it lacks diversity.</li> </ul>	Data needed is the number of participants in your activity for each type of stakeholders.



## USE SCENARIO IN TIMELINE FORMAT



## 4. Conclusion

We have presented two approaches that can be adapted to the varying situations and contexts of mission-oriented co-creation. This is possible because we have focused on *processual principles and associated approaches* rather than a fixed tool kit. For each co-creation activity, levels of resources (related to person power, finances, timelines, etc.) will determine what is possible to do in any given co-creation activity.

The two approaches allow for tailoring to different contexts, and with different levels of resources. Indeed, at the time of writing, the co-creation method of MOSAIC has not been fully defined due to its tailoring and embedding in the ongoing activities of the European Commission's 100 Climate Neutral and Smart Cities Mission – thus, a requirement for the activity presented in this deliverable, was to allow for tailoring and application during the MOSAIC project.

The scope of this report is not to define what is the best *fixed* approach to assessing impact and quality of co-creation processes, but to provide principles and associated approaches to do so. In this way, co-creation activity owners can plug their own tools into the overall process outlined here.



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