Co-creation review: experiences of cocreation from Science with and for Society initiatives

Deliverable No. 2.1

Raphaël Stephens, Douglas K. R. Robinson
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Mission-Oriented Swafs to Advance Innovation through Co-creation

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Executive Summary

The SwafS journey (2014-2020), with a dedicated budget of 462 million, and nearly 2,000 proposals submitted to the programme, represents a key resource regarding on-the-ground experiences regarding Quadruple Helix interactions with a view to science and innovation. The MOSAIC project is centred on facilitating mission-oriented co-creation, and thus, the experiences gained from the SwafS programme, particularly on projects which have a component of co-creation, can be exploited and leveraged.

In addition, whilst there is a wealth of experience stemming from the SwafS activities, it is important to ensure that MOSAIC can draw upon the widest range of experiences. The review has therefore focused on identifying elements of co-creation in initiatives within and beyond SwafS projects, looking at Horizon 2020 in general as well as non EU-funded initiatives, with the aim of finding inspiring examples which could provide useful and applicable insights for the MOSAIC context.

In the following report, a reasoned selection of SwafS projects will be explored and potentially useful insights for the MOSAIC co-creation context will be presented. In addition, non-SwafS projects and activities from within Horizon2020 and external to Horizon2020 have been chosen to provide complementary insights. The analysis reveals a variety of co-creation processes, venues and rationales stemming from the 50 projects that have been reviewed. An extensive annex presenting small reports on each of the 50 activities provides deeper detail on each co-creation related experience. The report closes with a reflection on the gaps in co-creation knowledge with a view to targeting the MOSAIC co-creation approach to fill these gaps.

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Contributors	Allison Loconto (UNI EIFFEL), Evelyne Lhoste (UNI EIFFEL), Anna Pellizzone and Angela Simone (FGB), Maria Zolotonosa and Marzia Mazzonetto (SD), Mélanie Marcel (SoScience), Yoann Malinge (SoScience).
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4	SoScience	SoScience	X
5	ERRIN	ERRIN	☐

List of Abbreviations

Abbreviation	Long Form
EC	European Commission
RRI	Responsible Research and Innovation
SwafS	Science with and for Society

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1. Introduction

The MOSAIC project seeks to support the strengthening of Quadruple Helix ("QH") engagement in innovation ecosystems with a view to addressing complex grand societal challenges. This requires that the fourth helix – citizens and organisations from civil society – should be integrated into the very heart of innovation processes (Mazzucato 2019[1], Robinson et al. 2021[2]) alongside the three other helices – research, government and private sector actors. Whilst this is important for all innovation activities, it is especially important for innovations that are targeted towards transforming society – for example transforming European Cities for them to be Climate Neutral[3]. Attention has been pointed to the need to develop novel and responsible ways of innovating and co-creating to reinforce the links between science, innovation and society and connect science to the values and interests of European citizens (Mazzonetto and Simone 2018[4]).

With this in mind, the MOSAIC project focuses on "co-creation as open innovation" as a collaborative process to find solutions to achieve European Mission aims. This translates into the following definition of co-creation:

> *"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 central objective of MOSAIC is to integrate "Co-creation as Open Innovation" into the ongoing European Missions in general and the 100 Climate Neutral and Smart Cities by 2030 mission in particular. Therefore, MOSAIC will systematically explore co-creation processes in public-private initiatives, and resulting changes in the relationship between science and society. This objective will be achieved through an experience review of SwafS projects as well as initiatives outside the SwafS programme, leading to the identification of co-creation experiences relevant for mission-oriented co-creation as open innovation.

The MOSAIC experience review, presented in this report, is a "sense-making" exercise. It studies projects and initiatives that incorporate elements of co-creation processes, tools and practices between different helices of the QH. The review does not aim to point to the "best" co-creation elements from these different projects, rather, it is about making more explicit the facets of co-creation in order to provide insights for the MOSAIC co-creation approach (to be developed in the work packages of the project)..

Co-creation has been a recurrent approach in SwafS projects, sometimes labelled as co-construction or co-production, and intended to be applied in public engagement, policy deliberations and

[1] Mazzucato M. (2019) Governing missions in the European Union. 2019. Available from: https://ec.europa.eu/info/sites/info/files/research_and_innovation/contact/documents/ec_rtd_mazzucato-report-issue2_072019.pdf.

[2] Robinson, D. K. R., Simone, A., & Mazzonetto, M. (2021). RRI legacies: co-creation for responsible, equitable and fair innovation in Horizon Europe. Journal of Responsible Innovation, 8(2), 209-216.

[3] https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en

[4] Mazzonetto, M., & Simone, A. (2018). Introduction to "science, society and citizens: Suggestions (and hopes) on how to foster RRI in horizon Europe". Journal of Science Communication, 17(3), C01.

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participatory research agenda setting and, citizen science. Indeed, one of the SwafS call topics was specifically aimed at better understanding co-creation approaches and their outcomes. Therefore, SwafS promises to provide multiple insights into co-creation processes and practices. In this co-creation experience review, we shall select and explore a number of initiatives from the Horizon 2020 SwafS program, as well as activities from outside of SwafS.

In the remainder of the report, the co-creation sense-making exercise will be presented. Section 2 describes how fifty co-creation activities were selected. Section 3 provides a description of the method used for analysing the fifty co-creation examples. Section 4 provides a cross analysis of th fifty examples along three dimensions: (1) the processes and tools employed, (2) the sites and venues of co-creation and (3) the rationales of co-creation. The report concludes with Section 5 which reflects on what can be taken from the experience review. An appendix of 50 reports on each of the activities reviewed, providing further detail on the activities analysed as well as links to further information.

2. Selecting ~ 50 projects and activities for review

Below we shall present the method for the selection of 50 projects and activities for review. Section 2.1 shows the rationale for activities from SwafS projects that show some co-creation elements. Section 2.2 provides the rationale for selecting a limited number of other Horizon 2020 projects funded outside of SwafS. Section 2.3 provides details on non-EU-funded activities selected by MOSAIC partners.

2.1 The H2020 SwafS "co-creation and open innovation" landscape

In order to get an understanding of co-creation experiences in H2020-funded initiatives, with a particular focus on open innovation settings, a choice was made between available databases to search from: the RISIS EUPRO database[5] and CORDIS. While EUPRO is easier to extract data from and to manipulate with various software, it is not updated as often as CORDIS. Since the aim of the review work performed in MOSAIC is to understand the state-of-the-art of co-creation in SwafS, in order to address potential gaps, it was decided to use the CORDIS database.

To get an overall landscape view of co-creation in the SwafS programme, we chose to extract the textual data from the CORDIS database that described the objectives of each project. Each H2020 funded project listed in the CORDIS database has a brief summary of the overall objectives of the project, and our assumption was that if co-creation is a key component of the project, it would be visible in this text.

The Network Mapping of co-occurrent multi-terms from the SwafS objectives is structured around nine clusters, each characterised by one, or several, dominant theme(s). By looking at terms organised in clusters, it is possible to draw some interpretations as to the overall lexical structure of the discourse which emerges throughout the SwafS objectives. These interpretations are presented below: the dominant themes are presented with some of the multi-terms that illustrate them. The clusters have been labelled with a number 1 to 9. The main clusters (3, 5 and 8) are placed in the centre of the mapping: these clusters contain more co-occurrent terms and hold more overall weight and significance than the others. In addition, the spatial proximity between clusters reflects their thematic proximity relative to one another. Clusters 3, 5 and 8, as central clusters, find themselves naturally related to several of the smaller clusters, but relations may also exist between the smaller clusters.

Cluster 1 refers to ethics or ethics-related concepts (e.g., "research ethics", "ethical frameworks", "responsible innovation"), as well as global outreach to refugees or developing countries (e.g., "refugee researchers", "Middle-East", "South America").

Cluster 2 (one of the smallest clusters) refers to young people and science education issues (e.g., "young people for science", "educational platform", "science-related careers").

Cluster 3 (one of the large, central clusters) refers to gender equality issues (e.g., "gender imbalances", "female researchers", "reflexive gender equality policy").

Cluster 4 refers to integrity, conduct and ethics (e.g., "research misconduct", "research integrity", "embassy of good science"). Note that Cluster 4 is close to Cluster 1 and clearly related to it, via the concept of ethics.

[5] https://www.risis2.eu/risis-datasets/

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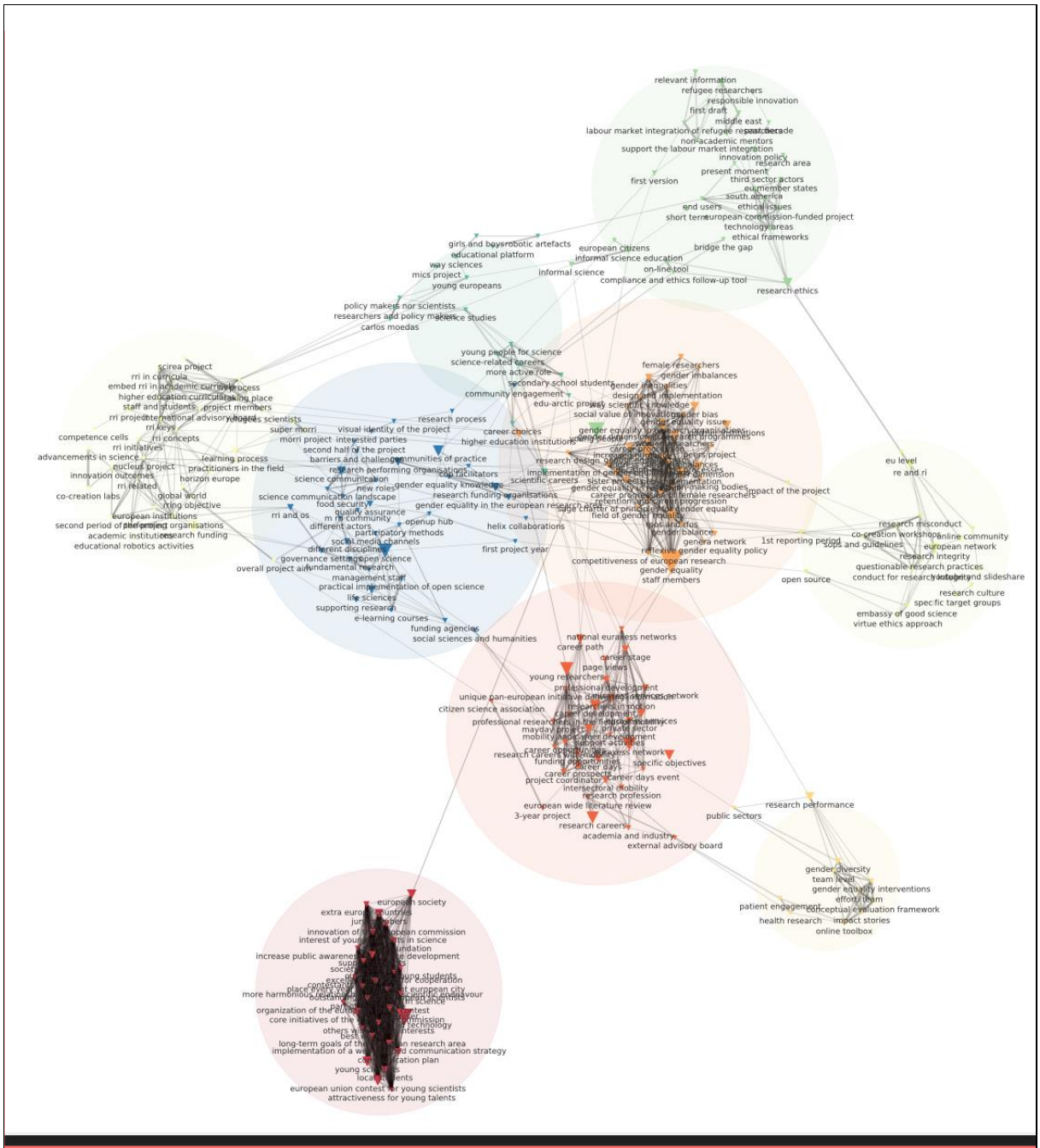

Figure 1: *Network Mapping of recurring multi-terms in SwafS objectives: multi-terms which often co-occur in the objectives texts for SwafS projects in the CORDIS database are arranged in clusters.*

Cluster 5 (one of the larger, central clusters) refers to careers in research (e.g., "research careers with mobility", "careers days", "professional development"). Note that Cluster 5 is relatively close to Cluster 2 which refers to the connected theme of young people and science education.

Cluster 6 (one of the smallest clusters) refers both to gender (e.g., "gender equality interventions") and to healthcare (e.g., "patient engagement", "health research"). This cluster is the least easy to interpret as it seems to be composed of two disconnected themes, but this is sometimes the case for clusters with very few multi-terms.

Cluster 7 refers to the overall objective of the European Research Area of raising public awareness and interest in science, in particular for European youth. Multi-terms that illustrate this multi-faceted theme relate to increased attractiveness of science for European youth (e.g., "interest of young students in science", "attractiveness for young talents"), raising public awareness (e.g., "European society", "increase public awareness of science development"), and processes needed to reach these goals such as improving communication (e.g., "implementation of a well-aimed communication strategy", "communication plan").

Cluster 8 (one of the larger, central clusters) refers to the challenges faced by European research, and some of the proposed methods to address these challenges. This multi-faceted theme articulates issues of evaluation (e.g., "MORRI", "Super MORRI", "quality assurance"), community and awareness (e.g., "science communication", "community landscape", "social media channels", "e-learning courses", "community of practice"), implementation of open science (e.g., "practical implementation of open science", "participatory methods", "openup hub").

Cluster 9 refers to Responsible Research and Innovation – RRI (e.g., "RRI in curricula", "RRI keys", "RRI initiatives", "RRI concepts").

Overall, the clusters enable us to interpret the overall corpora of SwafS objectives as being clearly structured around themes which are both discrete and interrelated. In particular, the conceptual links between the issues of science education, gender and careers in research are clearly related; as is the case between ethics, integrity and conduct, and RRI; and between all the improvements that are to be made in processes of communication, community building and public awareness raising (especially for young people through improved attractiveness of science), but also project quality and impact evaluation issues.

The numerous multi-terms present throughout the Network Mapping of clusters were useful to the authors during the SwafS selection process, but more generally also during the analysis of the selected projects themselves. Indeed, they provided a synthetic view, a "reservoir" of the core, recurring concepts that would be encountered throughout the projects. The authors were able to tap into this reservoir of concepts during the subsequent phases of (i) projects analysis and individual project report writing and (ii) analysis of the content of the 50 individual reports and write-up of Deliverable 2.1.

The 18 SwafS projects selected

Out of 212 SwafS projects listed in the CORDIS database (as of 1st February 2021), 83 of them mentioned either "co-creation" and/or "open innovation" as part of their objectives. Once these 83 projects were identified, we extracted all their meta-data from the CORDIS database and explored it using a digital lexicometrics software[6] which enabled us to draw a thematic map of co-occurring multi-

6 The software is part of the CorText Platform suite created and housed at Université Gustave Eiffel ("UGE") and part of the RISIS2 H2020 initiative. CorTexT.Manager is a particular kind of digital lab focused on the exploitation and analysis of heterogeneous textual data generated by new information technologies and communication. This tool is located within the CorTexT Platform, both a physical space and host of digital spaces comprised of tools, methodologies and skills to handle large textual corpora (Barbier and Cointet 2012). This online research facility supports research and experimental methodologies for the Humanities and Social Sciences that are conducted by sciences studies, media studies, as well as science and innovation policy studies. See: https://www.cortext.net/publications/.

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terms (of two terms or more, since one term is usually not enough to develop significance) from all the different objectives texts, organized around clusters of multi-terms that often appear together. An example of thematic map is presented below in Figure 1.

UNI EIFFEL lead authors of this report went through the objectives of the 83 selected SwafS projects, and determined a *ranking* based on, firstly, their announced commitment to the Quadruple Helix and, secondly, their relevance to city transformation. Both authors ranked each of the 83 projects separately, and the combined scores determined an overall ranking for the SwafS projects (in most cases, the individual rankings overlapped). This ranking was then shared with all MOSAIC partners in a virtual meeting. Project partners discussed the 83 SwafS projects and UNI EIFFEL's ranking and, based on their experience in co-design and co-creation and their familiarity with such projects, they shortlisted 18 of them on which to perform the review (described in Table 1 below).

The original aim of this step was to identify close to 50 SwafS projects with co-creation activities. However, following the process, only 18 illustrative projects were identified. The MOSAIC team therefore aimed to identify an additional 32 projects from beyond SwafS activities to be able to achieve a critical mass of co-creation experiences.

Table 1. 18 selected SwafS projects

BigPicnic Big Questions – engaging the public with Responsible Research and Innovation on Food Security
CIMULACT Citizen and Multi-Actor Consultation on Horizon 2020
COMPASS Evidence and opportunities for responsible innovation in SMEs
CREATIONS Developing an Engaging Science Classroom
D-NOSES Distributed Network for Odour Sensing, Empowerment and Sustainability
EU-Citizen.Science The Platform for Sharing, Initiating and Learning Citizen Science in Europe
FoTRRIS Fostering a Transition towards Responsible Research and Innovation Systems
FRANCIS Frugal Innovation by Citizens for Citizens
GRECO Fostering a Next Generation of European Photovoltaic Society through Open Science

LIV.IN

LIVING INNOVATION - Implementing RRI through co-creation of smart futures with industry and citizens

MULTI-ACT

A Collective Research Impact Framework and multi-variate models to foster the true engagement of actors and stakeholders in Health Research and Innovation

RiConfigure

Reconfiguring Research and Innovation Constellations

SCALINGS

Scaling up Co-creation: AVenues and Limits for Integrating Society in Science and Innovation

SeeRRI

Building Self-Sustaining Research and Innovation Ecosystems in Europe through Responsible Research and Innovation

SISCODE

Society in Innovation and Science through CODEsign

SMART-map

RoadMAPs to Societal Mobilisation for the Advancement of Responsible Industrial Technologies

TRANSFORM

Territories as Responsive and Accountable Networks of S3 through new Forms of Open and Responsible decision-Making

WeCount

Citizens Observing UrbaN Transport

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2.2 H2020 projects outside of SwafS

When searching on CORDIS for the term "co-creation" through all H2020-funded projects, we observed that over 5000 projects outside of SwafS included co-creation in the description of their objectives. Whilst it seemed useful to draw on the non-SwafS H2020 projects as a source for experiences on co-creation, the large amount of projects meant that some further refinement of the search strategy was needed. Therefore, we added further keywords to the search in an attempt to limit the selection of illustrative projects to those focusing on elements (such as citizen-involved innovation) that could be relevant to the Climate Neutral and Smart Cities mission, which is at the core of MOSAIC.

Our selection rationale for shortlisting projects was based on the following requirements:

- Their description contains the terms "co-creation" and "citizen" when searched on CORDIS
- They are focussed on city contexts
- They cover a range of different fields of application or sectors that find application in city contexts (four chosen themes: food, energy, transport, environment)
- They are at a stage of development where they can already provide examples, reflections, etc. through reports and a project website

The four themes mentioned in the third point were selected through a double filter on CORDIS: "Domain of application" (applies to all Framework Programmes) and the H2020-specific filter "Programme".

For each search, the first 200 results (or all results if less than 200) were screened to identify projects which cover all requirements: (i) they explicitly mention co-creation and (ii) they explicitly mention citizens in their CORDIS project objective. Below is the table of selected projects with the associated search terms and selection process.

Table 2: List of selected non-Swafs H2020 projects

Project	Rational for choice
Cities-4-People New approaches for community-driven sustainable mobility innovations at neighbourhood and urban district level	Using the terms "co-creation" AND "citizen" and the double filters Domain of Application: "Transport and Mobility" and Programme: "TRANSPORT", the transport theme search yielded 81 search results. From the screening, we chose: Cities-4-People; and CROWD4ROADS.
CLEVER Cities Co-designing Locally tailored Ecological solutions for Value added, socially inclusivE Regeneration in Cities	Using the terms "co-creation" AND "citizen" and the double filters Domain of Application: "Climate Change and Environment" and Programme: "ENVIRONMENT", the environment theme search yielded 84 search results. From the screening, we chose: CLEVER Cities; and RESYNTEX.
CROWD4ROADS CROWD sensing and ride sharing FOR ROAD Sustainability	Using the terms "co-creation" AND "citizen" and the double filters Domain of Application: "Transport and Mobility" and Programme: "TRANSPORT", the

	transport theme search yielded 81 search results. From the screening, we chose: Cities-4-People; and CROWD4ROADS.
ENABLE.EU Enabling the Energy Union through understanding the drivers of individual and collective energy choices in Europe	Using the terms "co-creation" AND "citizen" and the double filters Domain of Application: "Energy" and Programme: "ENERGY", the energy theme search yielded 189 search results. From the screening, we chose: IRIS, and ENABLE.EU.
FAIRCHAIN Innovative technological, organisational and social solutions for FAIRer dairy and fruit and vegetable value CHAINs	This project was brought to the attention of the main author during a conference in October 2021, when he met a researcher from one of the consortium's members (Fraunhofer Institute). Because the project is a Horizon 2020 (non-SwafS) project, because it develops co-creation activities in the area of food systems, and because the author had an opportunity to conduct an interview with the researcher, FAIRCHAIN was selected for the co-creation review.
FOODE Food Systems in European Cities	This project was brought to the attention of the main author when he conducted a search on urban agriculture initiatives that could incorporate co-creation activities. He found out that the Commune de Romainville – an object of his doctoral research on Alternative Food Networks (AFNs) – was involved in FOODE. Because it is a Horizon 2020 project, and because AFNs develop reconnections between food consumers and food producers that are akin to co-creation, FOODE was selected for the co-creation review.
FORCE Cities Cooperating for Circular Economy	Using the terms "co-creation" AND "citizen" and the double filters Domain of Application: "Food and Natural Resources" and Programme: "FOOD", the food theme search yielded 155 search results. From the screening, we chose: Ground Truth 2.0; and FORCE.
GoNano Governing Nanotechnologies through societal engagement	This project was brought to the attention of the main author by partner SD.
Ground Truth 2.0 Environmental knowledge discovery of human sensed data	Using the terms "co-creation" AND "citizen" and the double filters Domain of Application: "Food and Natural Resources" and Programme: "FOOD", the food theme search yielded 155 search results. From the screening, we chose: Ground Truth 2.0; and FORCE.

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IRIS Integrated and Replicable Solutions for Co-Creation in Sustainable Cities	Using the terms “co-creation” AND “citizen” and the double filters Domain of Application: “Energy” and Programme: “ENERGY”, the energy theme search yielded 189 search results. From the screening, we chose: IRIS, and ENABLE.EU.
OPENCARE Open Participatory Engagement in Collective Awareness for REdesign of Care Services	This project was brought to the attention of the main author by partner FGB.
POCITYF A Positive Energy CITY Transformation Framework	Using the terms “co-creation” AND “citizen” and the double filters Domain of Application: “Energy” and Programme: “ENERGY”, the energy theme search yields 189 search results. From the screening, we chose, among others, POCITYF.
Sharing Cities Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse projects	This project was brought to the attention of the main author by partner FGB.
RESYNTEX A new circular economy concept: from textile waste towards chemical and textile industries feedstock	Using the terms “co-creation” AND “citizen” and the double filters Domain of Application: “Climate Change and Environment” and Programme: “ENVIRONMENT”, the environment theme search yields 84 search results. From the screening, we chose: CLEVER Cities; and RESYNTEX.
REFLOW constRuctive mEtabolic processes For materiaL flOWs in urban and peri-urban environments across Europe	This project was brought to the attention of the main author by partner UNI EIFFEL.

2.3 Projects outside of Horizon 2020

Each MOSAIC partner has experience in conducting co-creation activities, and thus, the team was asked to identify projects outside of Horizon 2020 which they believed would provide interesting and complementary insights to those already selected. These were projects they had participated in, or had deep knowledge of, and where they could easily identify involved partners to invite to interviews. These projects may differ with H2020 ones in terms of size, leadership (grassroots or local authorities or both), dynamics or resources.

Table 3: List of selected non H2020 projects

Action Co-Creation

Action Co-Creation is a program funded by Innoviris (the public institute for R&D in Brussels) since 2015 and accompanies multi-actor research projects which aim to improve urban resilience.

AFAUP

The Association Française d'Agriculture Urbaine Professionnelle (AFAUP) was created in 2016 as a national network for French Urban Agriculture (UA) initiatives which seeks to federate, represent and build capacities among UA professionals.

Agrivair

Agrivair is a subsidiary of Nestlé Waters created in 1992 which aims at preserving the water sources of its mineral water brand Vittel by working with various local stakeholders to change farming practices in the area.

BeeOdiversity

BeeOdiversity is a Belgian social enterprise created in 2012 which aims to protect biodiversity while creating value from it, and more generally to improve environmental quality and human well-being.

BizArTech

BizArTech is a collaborative project which started in 2018 in the French city of Lyon and which aims at renewing reflections and developing new technological and artistic devices that can address the mediation issues raised by energy transitions (like raising awareness or changing practices).

Cerros de Bogota

Cerros de Bogotá Foundation, founded in 2009, seeks to build a civic and ecological culture in a tropical megacity of high mountain.

CoLAB

CoLAB is a collaborative program started in 2014 which connects different stakeholders in West Africa and enables them to co-construct and conduct innovative projects with societal impacts on a specific theme (food security in Burkina Faso, Côte d'Ivoire and Senegal; and maternal and child health in Mali and Niger).

Datathon Déchets

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Datathon Déchets is a program piloted by the collaborative innovation lab TUBÀ based in the French city of Lyon, which consisted in a two-day event in 2020 that gathered various actors to work together on the use of local waste data.

EATingCRAFT - EducAtion Towards the Creation of Alternative Food neTworks

This project was suggested to the main author by one of the co-authors of this report (Allison Loconto from UNI EIFFEL). The main author conducted his doctoral research on Alternative Food Networks. Because AFNs develop reconnections between food consumers and food producers that are akin to co-creation, EATingCRAFT was selected for the co-creation review.

Epidemium

Epidemium is an open and participatory research program dedicated to a better understanding of cancer through the use of Big Data, launched by the pharmaceutical group Roche and the community lab La Paillasse, which consisted in two six-month challenges (the Challenge4Cancer) from 2015 to 2017.

Grenoble CivicLab

The Grenoble CivicLab is an open challenge whose participants co-design and prototype projects which include a digital dimension and are of general interest for the citizens of the French agglomeration of Grenoble (three editions have been so far organized, in 2018, 2019 and 2021-2022).

Hackability@Barilla

The Hackability@Barilla Project took place in 2017-2018 and saw Hackability – a not for profit organisation born in 2016 in Turin which aims at fostering co-creation processes – collaborate with large Italian food conglomerate Barilla to find new food tools and packaging solutions for disabled and elderly people.

MIT Solve

MIT Solve is a marketplace for social impact innovation launched in 2015 at the initiative of the Massachusetts Institute of Technology (MIT), which issues new challenges yearly to address social, environmental and economic global problems, selects the most promising solutions and catalyses partnerships across its large community to scale their impact.

La Ruche qui dit Oui!

La Ruche Qui dit Oui! is a French company founded in 2010 which coordinates a centralized network of local food operations through a digital platform.

Suez / TAPAJ

SUEZ, a French utility company, and TAPAJ, a professional inclusion program, have collaborated since 2014 to provide work schemes adapted to young people in very precarious situations, meeting business and social needs at the same time.

TFOPP - The Future of Positive Packaging

The Future Of (TFO) is a multi-theme open innovation program designed by SoScience that aims to create new research and innovation collaborations with positive business and societal impact, involving a wide variety of actors such as private companies, research institutes, NGO/NPO, social

entrepreneurs, incubators and local authorities: The Future of Positive Packaging was conducted in 2020 to address the theme of plastic packaging issues.

TFOW - The Future of Waste

The Future Of (TFO) is a multi-theme open innovation program designed by SoScience that aims to create new research and innovation collaborations with positive business and societal impact, involving a wide variety of actors such as private companies, research institutes, NGO/NPO, social entrepreneurs, incubators and local authorities: The Future of Waste (TFOW) was conducted in 2018 to address the theme of waste management issues.

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3 Method for analysing the 50 projects

The heterogeneity of the selected projects and activities posed a particular challenge: how can one draw out insights from such diverse co-creation experiences? Moreover, the nature of the information on each co-creation project is very different: for example, whilst H2020 projects would have various deliverables that could be analysed, non-H2020 projects did not have the same kind of reporting requirements, although one could usually rely on substantial online material through their websites.

To handle this heterogeneity, we decided to identify a number of "Dimensions of Interest" to be able to analyse each project in a systematic and comparable way.

3.1 Drawing out the analytical Template for individual project reports

To be able to analyse each of the selected projects and initiatives, a template was designed for the analysis and writing of individual reports. Following this analytical template enabled each report writer to search for and provide information on the same three dimensions of interest when looking for co-creation in each project or activity.

These broad dimensions are:

- **Dimension 1: Participants and Motivations.** A key question for MOSAIC is, which stakeholders are involved in the co-creation activities? Participants include both those involved in the project as a whole (consortium members) and the multiplicity of stakeholders involved in one or several stage(s) of the project's multi-stakeholder co-creation activities. Motivations for engaging in co-creation activities of these different actors are also interesting to assess. The nature of Participants and the nature of their Motivations are interlinked, which is why they are placed within the same Dimension.
- **Dimension 2: Methods and Processes.** Key questions for MOSAIC are, how are stakeholders engaged and how do they interact in the co-creation activities? Particular types of Methods might be mobilized to achieve this, while Processes concern the overall ways in which co-creation activities unravel. Types of Methods and types of Processes are interlinked, which is why they are placed within the same Dimension.
- **Dimension 3: Outcomes and Impacts.** A key question for MOSAIC is, what are the effects of the co-creation activities on innovation? Outcomes include both general technological outputs and organizational changes stemming from the co-creation activities. Impacts relate to more specific and measurable outcomes with regard to desired sustainability goals (environmental, economic, social, institutional). Outcomes and Impacts are therefore also intertwined.

3.2 Results

See the appendix for individual project / activity reports.

4. Analysis

In this section we draw out insights from the 50 projects that can inform the MOSAIC co-creation approach. As you will see, some of the findings are steps or processes in co-creation activities and some findings reveal modes and methods to implement co-creation. The section is split into three broad sub-sections. The first broadly groups the insights concerning processes and tools that are relevant for co-creation. The second section describes the sites and venues of co-creation activities, mobilising the 50 projects to illustrate the characteristics of co-creation in each particular co-creation venue. The third and final section describes the underlying co-creation rationales visible across the 50 projects.

4.1 Processes and tools from the reviewed projects

Stakeholder mapping workshops

A key element in many of the co-creation activities reviewed are stakeholder mapping workshops. Considered as a necessary step to articulate and identify the variety of stakeholders that can contribute to innovation processes in a given field or context, this activity is also an essential element to ensure the identification of stakeholders who are not usually present in innovation settings, thus, facilitating inclusion.

The level of granularity of, and distinction between, stakeholder groups differs across the co-creation activities reviewed and thus, stakeholder mapping must be tailored to the different co-creation objectives. Evidence of stakeholder mapping is found in numerous projects, with different focuses depending on the context. SISCODE, for example, conducted stakeholder mapping to build co-creation labs with specific objectives, such as the Barcelona lab which focused on creating a “circular district” with regards to food waste reuse. In this case, stakeholder mapping included restaurant owners, citizens and municipal urban gardens, fablab designers and makers, innovators and city administration actors. As part of the SISCODE project self-assessment, SISCODE labs were also required to upload their stakeholder map both at the start and the end of their journey, enabling reflection on how the stakeholder composition actually evolved over time.

Another example can be seen in the MULTI-ACT project, which aimed to improve co-accountability in MSRIs (Multi-Stakeholder Research Initiatives) related to brain diseases. Here, the stakeholder mapping was conducted in order to build the landscape of, and identify gaps in, existing patient engagement initiatives (see Box 1 below).

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Box 1: MULTI-ACT

Identifying key stakeholders can be done through literature reviews, surveys, interviews, contacting specialised institutions, public consultations, etc.

Figure 2: *MULTI-ACT stakeholder mapping strategy for Multi-Stakeholder Research Initiatives on brain diseases. Source: MULTI-ACT website.*

SeeRRI, which seeks to guide the implementation of RRI in regional innovation policy, conducted stakeholder mapping in three very different R&I contexts (coastal issues, a plastics industry cluster and a zero-waste district). The SeeRRI guidelines for the stakeholder mapping across these diverse contexts were the same, yet the stakeholders identified naturally varied from one context to the other. In addition, some stakeholder helices were considered more important or prevalent in some contexts rather than others. For example, citizens were more prevalent in the zero-waste R&I setting, in which they are key players as members of the local population, than in the plastics industry cluster which seems to concern private sector interests above all. Thus, part of the stakeholder mapping exercise can also be the observation, articulation or ranking of the importance or prevalence of a stakeholder group in a given co-creation context.

In summary, stakeholder mapping is a foundational exercise for any project seeking to broaden innovation towards co-creation and/or citizen engagement. It should be adapted based on the different themes and geographical contexts in which co-creation approaches will be deployed. Stakeholder mapping can be used as a self-reflection and evaluation tool, monitoring which stakeholders are considered important in the co-creation activity over time. In addition, stakeholder mapping can include an assessment on the prevalence or importance of a stakeholder group – thus informing the co-creation organisers which stakeholder knowledge is especially important to include in the co-creation exercise.

Open challenges and competitions

Open challenges comprise a great range of approaches, particularly time-bound events, where teams compete for a prize. The scope of the open challenge may include the early stages of ideation up to and including the refining of a prototype. Open challenges can be designed to yield different types of outcomes: technological or non-technological prototypes, data analysis, new partnerships, etc. Whilst some challenges involve financial prizes, many include non-financial rewards and other benefits.

Challenges usually happen over several months, comprising several stages resulting in some projects being selected to move on to the next round.

One example of an open challenge is the MIT Solve initiative, which is a permanent structure with a permanent staff, issuing and mediating annual challenges with several selection stages, while providing assistance to candidates. Rewards include financial prizes for the selected projects (~9000 USD) and follows-up for several years (including assistance in finding new sources of financing and new collaborations). Typically, participants will be innovators, makers or students rather than lay citizens, and most participants will have already designed a prototype which they seek to refine through the challenge.

The Grenoble CivicLab (in its third edition so far), on the contrary, aims to integrate citizens at the very centre of its open challenges, which are typically hosted in Civic Labs (See Box 2). The challenges happen over several selection stages, with mentoring and modest financing for the selected projects (2000 EUR). In another example, the project Epidemium carried out two six-month challenges, called Challenge4Cancer, in which participants, including citizens, worked on cancer-related datasets obtained from governmental and inter-governmental sources and from internal private partner sources. The three winning teams shared a total prize of 9000 EUR.

Box 2: Grenoble CivicLab

Making fablabs/makerspaces available to city residents enables them to use tools and have access to expertise to work on innovations which can help address municipal issues.

Figure 3: *Openlab night in Grenoble CivicLab makerspace. Source: Grenoble CivicLab website.*

In summary, open challenges and competitions provide a means of triggering innovation activities from a variety of stakeholders (including citizens), providing them with financial rewards and other benefits (including in some cases such as MIT Solve, support for taking the innovation idea further). Co-creation is not necessarily at the heart of open challenges, but initiatives such as the Grenoble CivicLab can facilitate inclusive innovation through enrolling key actors – in this case, citizens.

Facilitating citizen data collection and analysis

Citizens can collect real-world data, either through direct observation or with dedicated technological devices. In other cases, citizens do not "collect" data per se but still "provide" data which they generate or can passively collect (e.g., their own energy consumption, collected by their energy supplier). Aside from data collection, citizens can also work collaboratively on datasets during workshops, which are sometimes called "datathons". In addition to being data collectors, citizens can also play a part in the

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analysis and interpretation of the data. The purposes and envisioned uses of citizen-generated data and analysis are varied: for example it can provide key information in the design and testing of new technological solutions as well as in shaping R&I policies.

In the D-NOSES project (Box 3), citizens collected odour-sensing data (using their noses as natural sensors, after being trained by odour experts to eliminate biases). In the WeCount project, citizens collected data using simple traffic-counting sensors that are placed on their windowsills. In both cases, the aim is to improve the policy uptake on the issue of odour nuisance and pollution, and traffic management, respectively. In both D-NOSES and WeCount, citizens are considered experts because the data collected is limited to their neighbourhood and its surroundings, which they have an intimate knowledge about, and because the data is collected to a high-level of detail which cannot be achieved by other means. In both cases, citizens are not only data collectors but are also active in the co-design of policy and data collection planning. In the GRECO project, citizens were proactive in providing data on their photovoltaic installations through the Generation Solar app, feeding into a photovoltaic performance and repair model, but, in this case, citizens are not involved directly in the co-design of the model: this particular task is performed by professional scientists. In all these projects, however, data collectors are called “citizen scientists” because they provide data that cannot otherwise be collected.

Box 3: D-NOSES

Petroleum refinery close to residential areas in Thessaloniki, Greece. Local neighbourhoods or city residents collect odour information under different conditions (season, time of day, wind, etc.).

Figure 4: *One of the D-NOSES odor pollution collection sites in Greece. Source: D-NOSES website.*

In another initiative, Datathon Déchets organized a two-day datathon event that brought together professional actors related to waste management to work on waste data. While in this case citizens were not involved in the process, all the participants had a direct interest in the data collection, being professionals from the waste sector, and this led to an efficient collaboration between them.

In summary, plugging data gaps through the enrolment of citizens has been seen as a proactive way of including citizens into developing societal solutions to key problems such as odour, pollution, traffic congestion etc. Citizens can play the role of passive producer of data, active gatherer of data and

analyser of data and the initiatives provided in the annex to this report give examples of all of these roles. A clear gap in the projects analysed in MOSAIC is a credible consideration of fair rewards for citizen data gathering and analysis. This need not be financial reward, but tied to concrete outcomes, and the nature of these outcomes would determine the nature and magnitude of the reward to citizen data collectors and analysts.

Prototyping

Prototyping involves the building of a concrete solution to a specific problem. Any initiative involving a prototyping process therefore must result in something which is implemented and put to test for possible future replication. Prototypes can take many forms and can include technological prototypes, such as specific devices, textual or online materials for diverse purposes (training, capacity building, communication, etc.), the provision of a new type of service, or urban design interventions.

Examples of technological prototypes can be found in the Hackability@Barilla initiative (see Box 4), which focused on designing new devices to facilitate food-related operations for physically disabled people (e.g., a fork designed specifically for people with Parkinson's disease). Another example, BizArTech, aimed at designing new artistic devices to help raise awareness on energy consumption (e.g., ventilator fans that give a sensory experience on how much energy is being consumed depending on different consumption scenarios). OpenCare focused on the design of new devices linked to personal care services (e.g., a device wearable by a physically disabled person which calls and sends coordinate to the caretaker in case of a fall).

Box 4: Hackability@Barilla

Surrounded by a team of co-designers, a man tests an eating device that is tailored to his physical impairments.

Figure 5: *An example of co-designed medical device from Hackability@Barilla. Source: Hackability Barilla website.*

Examples of *services prototyping* can be found in Cities-4-People, in which citizens develop prototypes within mobility labs, such as demand-responsive transit services that offer free trips to the supermarket in geographical areas that are considered food deserts, or the Grenoble CivicLab, where a mobile app provides itineraries for the best-lit streets for coming home safely at night.

The design of different *textual and online materials* can be found in SISCODE, developing a prototype high-school module on ICT and precision agriculture and an education module on mental health.

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CLEVER Cities is an example of *urban design interventions*, where Nature-Based Solutions are co-designed by citizens alongside municipality actors and landscape architects (e.g., noise mitigation living-wall along rail tracks) or in Cities-4-People (e.g., pedestrianisation of a traffic-ridden river embankment).

In summary, prototyping is a key step in any innovation process. It allows for the development, testing and tailoring of an emerging innovative solution to a specific need. Stakeholders can play multiple roles depending on their expertise: problem definers, designers, users/testers, disseminators/replicators – thus prototyping can be inclusive. Prototyping, more often than not, requires infrastructures, instruments and tools and therefore makerspaces, fablabs and living labs are key venues for prototyping (see next Section on Sites and Venues of co-creation).

Future visioning and scenario workshops

Tools and approaches from foresight can be mobilised to tap into the expectations, views and ideas of a variety of stakeholders to collaboratively imagine future worlds where socio-technical and economic situations may differ dramatically from the present. Motivations for such activities may differ. On one hand, such activities are very useful in making explicit the concerns and views of different stakeholders – and thus thinking about the future can be considered as a Trojan Horse for reflecting on the present. On the other hand, such initiatives may be initiated to develop desirable goals and to explore how to avoid undesirable futures.

Visioning processes often consider the medium to long term, typically (at least 20) to (no more than) 50 years. This decades-long perspective means that stakeholders focus less on immediate technical feasibility, political/institutional inertia or readiness of society, since all of these have the potential of evolving to astonishing degrees in such time frames (think of a citizen visioning today's internet use back in the 1980s). Because the desired projections are deliberately "out-of-the-box", the "expert-bias" is avoided, levelling the field to all stakeholders equally. Therefore, visioning can be very inclusive.

The CIMULACT project (Box 5), focused on participatory research agenda setting, with the aim of shaping the final work program of Horizon 2020 as well as national R&I programmes. Citizens and other Quadruple Helix stakeholders co-created research agendas, through several stages. Firstly, through 30 citizen visioning workshops, were citizens produced 179 "visions of desirable and sustainable futures" in the 30-40 year timeline. Subsequently, experts from other helices clustered these visions into 26 "underlying, crosscutting needs". Finally, 30 citizens, each representing one of the visioning workshops, met with the experts and consortium members to co-create 48 suggestions for "research program scenarios" which were then articulated into one-page research topics and presented to EU Commission program officials.

Box 5: CIMULACT

Figure 6: Citizen visioning workshop in Norway. Source: CIMULACT website.

In summary, visioning allows for "out-of-the-box" and unrestrained imaginative ideas to be developed by stakeholders relating to mid to long-term futures. They can be initiated to develop alternative ideas of the future that may be pursued, and can also act as a "Trojan Horse" helping to bring to light differences in worldviews amongst stakeholder groups, and their underlying norms and values. Often linked to agenda setting, because of its longer term perspective, visioning reduces the "expert-bias" and thus helps level-the-field for participation and the legitimacy of knowledge that comes from so-called "non-experts".

Governance dialogues and workshops

This broad umbrella term subsumes activities which seek to implement new practices in the governance of research and innovation. In doing so, the co-creation activities propose new tools for implementing and evaluating new governance principles in order to make R&I more "responsible" and more ethically aligned with societal values and concerns. This is particularly important in cutting-edge fields and where industries may foster potentially controversial and "risky" applications. Activities under the umbrella term of "governance dialogues and workshops", can take different forms, depending on which actor is at the heart of the governance improvement process. For example, "industrial dialogues" (which mainly involve change in the governance of companies), tools framework co-creation (which can apply to both companies and public institutions), or citizen-led workshops for more general issues (such as "food"). The focus of the governance change may therefore be more specific in some cases than in others.

Several projects seek to implement responsible principles into the governance of R&I. SMART-Map develops "Industrial Dialogues" as ways of identifying company motivations for embarking on such

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"responsibilisation" schemes, in the areas of precision medicine, synthetic biology and 3D printing in biomedicine. These are industry-led pathways that involve the co-design of "toolboxes" which are linked to how responsible principles and multi-stakeholder R&I processes can "add value" (e.g., in the co-production of new technical standards in 3-D printed protheses).

COMPASS seeks to make these responsible principles more accessible to small and medium enterprises (SMEs) and develops a Responsible Innovation Toolkit and sector-specific roadmaps that cover the lifecycle of a product, from the underlying company ethics and management practices to the prototyping, development and testing to the raising of public awareness about a technology up to the market launch and a follow-up of the product's impacts. SeeRRI develops a governance guidance framework for incorporating responsible innovation principles in regional innovation policies, in three very different contexts. In BigPicnic, botanical gardens are used as spaces of interaction between citizens and experts in the field of food, to develop and articulate governance improvement recommendations for the food sector in general.

Box 7: SMART-MAP

Industrial dialogue on precision medicine in Valencia, Spain.

Figure 6: *Industrial dialogue on precision medicine. Source: SMART-map website.*

In summary, governance dialogues and workshops cover a range of governance-improvement situations. They are particularly relevant and useful for controversial and contested technologies and often cover the entire lifecycle linked to a (potentially irresponsible) product reaching the market.

Ideation approaches

Ideation, like visioning, enables stakeholders to develop "out-of-the-box" and "wild" ideas with less constraints than in workshops designed to bring out immediate, concrete outcomes. Ideation seeks to develop actual ideas for the application of a particular technology, before the design and prototyping stages. Therefore, even at such early stages, an iterative process is necessary whereby various

stakeholders must assess the realistic quality of the ideas and give feedback to the “ideators” on their ideas.

GoNano seeks to align R&I outcomes in the field of nanotechnology with societal needs, values and concerns in the field of health, food and energy. This process consisted in citizen workshops that helped develop 92 new nanotechnology product suggestions, followed by stakeholder workshops with experts in the nanotechnology field, then an online citizen consultation to broaden the participation of citizens beyond the workshops, and finally a second stakeholder workshop to determine the actual feasibility of the product suggestions.

Box 6: GoNano

Caption: Citizen workshop on food applications of nanotechnology in the Czech Republic.

Caption: An illustration of the process of filtering and desalinizing ocean water into smaller lakes with "sweet" water from the food-focused citizen workshop.

Figure 7: Citizen ideation workshop and ideation example. Source: GoNano website.

In summary, ideation allows for “wild” ideas to be suggested, with a focus on specific applications and helps align research and innovation priorities with societal needs, values and concerns.

4.2 Sites and venues of co-creation processes

This section presents the reader with the following venue categories: V.1 Fablabs and living labs; V.2 Digital spaces for facilitating co-creative activities; V.3 Hybrid venues; and V.4 Urban food venues.

Fablabs and living labs

Physical spaces are a key venue for co-creation activities. Sometimes set up for short periods, sometimes anchored in a particular space for considerable time, physical spaces such as living labs and fablabs (Digital Fabrication Laboratory) provide spaces, infrastructures and resources for co-creation.

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For example, the Cities-4-People project set up Citizen Mobility Labs to involve local communities in all steps of mobility strategy developments in their city. The labs provided physical spaces where community members could come together with mobility experts, policy makers and other urban mobility stakeholders to "discuss new ideas, initiate new projects for their neighbourhoods or districts, and share outcomes in the forms of blueprints, codes, best practices". Each lab came up with three prototypes to transform urban mobility in their area. Similarly, the CLEVER Cities project set up CLEVER Action Labs involving Urban Innovation Partnerships that include citizens in the different stages of co-creation with a range of Nature-Based Solution stakeholders. These labs were conceived as testbeds where cities implement innovative co-creation processes and Nature Based Solutions.

The RESYNTEX initiative created several Citizen Labs as an interactive means for collecting behavioural information on textile recycling and disposal. Aside traditional surveying, these Citizen Labs allowed the study of participants (mostly citizens) as they interact with different textile items, to determine consumers' behaviours, attitudes and variable levels of acceptance related to textile collection and recycling. In the same way, the IRIS project set up local Innovation Hubs where citizen behaviour related to energy use was monitored. So called "game design interaction scenarios" and "participatory city modelling" sandbox games using Minecraft on real survey maps were used to help engage citizens in creative processes.

Another example is the Grenoble CivicLab where participants, over a 4 to 6 months period, develop ideas and are supported by a number of events and workshops to help improve and develop their ideas, and also to initiate collaboration with others (often creating innovation teams). The Grenoble CivicLab gatherings are places where emerging projects can showcase their activities, and access training opportunities on how to use tools for the manufacturing of their technical prototypes in a local fablab.

Digital spaces for facilitating co-creation activities

The COVID-19 pandemic crisis has reinforced the need for co-creation activities to be supported by and happen through online resources (tools, methodologies, demonstrations, training materials, games, etc.). These can be provided through online platforms which are also digital spaces for interaction between participants, such as for example publics interested in a common theme (e.g. citizen science), network organizations, or bringing together communities which are usually separated.

One of the consortium partners in the BigPicnic project, called WAAG, set up an open access visual representation of co-creation processes with over 70 tools and methods to support their facilitation. Their Co-creation Navigator provides a structure for aspiring facilitators to understand the co-creation process. This visual, interactive representation of the different stages of co-creation aims to help botanic garden professionals in redefining their role in society through co-creation, by connecting to local stakeholders and providing them with increased ownership of food security issues. Similarly, the core outcome of the CREATIONS project was a portal which could act as a repository for "Demonstrators" to show that students can, when equipped with the right tools, become researchers and be more motivated to pursue scientific careers. These Demonstrators are composed of a set of in-school and out-of-school activities rooted in scientific enquiry and creativity-based learning pedagogies. The portal therefore enabled teachers throughout Europe to share their creative science education ideas, joining the CREATIONS community and possibly creating sub-communities around their own Demonstrator(s). In a similar way, the EU-Citizen.Science platform set up an online repository that is becoming a central hub for sharing knowledge, tools and training and provide support to citizen science in Europe.

Digital venues are also used for general organization and communication between project participants. This can be the case when co-creation is programmed to happen online, but also when it must shift online due to unforeseen circumstances. While the TFOW and TFOPP initiatives were able to hold their meetings physically, other TFO (The Future Of…) initiatives (nine in total), due to the COVID-19 pandemic, had to be held online. Their success relied partially on the use of an online platform called Discord, which provided an environment that supported communication between participants by allowing them to freely circulate between different audio channels and discuss with the participants of their choice. Similarly, platforms such as Mural and Miro have been used to replace post-its, stickydots, flipchart and other tools typically used in face-to face meetings.

The CROWD4ROADS project, in bridging together two data-generating communities (car-sharing and road-sensing), creates a digital space in the form of an app where data collection on the state of local roads is enhanced by the combined effects of crowd-sensing technology and ride-sharing technology. There are relatively few interactions between citizens and other QH members (namely, municipalities in charge of road safety), so to engage citizens in this mostly online activity, incentive mechanisms such as gamified add-ons were incorporated into the app.

Hybrid venues (digital and physical)

Many projects showed that the combination of digital and physical co-creation activities can work very well. This is for instance typical of numerous citizen science projects, where results from a succession of in-person workshops could then be presented online to wider audiences to enlarge the number of participants in the co-creation process. The reverse also exists: starting with data collection through digital devices (e.g., sensors, mobile apps) and then bringing the data to a physical, workshop-type setting where multiple stakeholders co-interpret data and co-create solutions.

Datathons also correspond to this category: although the (usually large) digital databases are not collected by citizens, they allow for in-person interactions between multiple stakeholder types. Interactions may be structured (through the focus on and use of a common database) or free (with particularly rich variations on how data might be used depending on datathon team/group composition). Data may also be used to get a preliminary grasp on/of a subject or product before meeting experts or producers in person, which helps focus material interactions right away.

An example of this is visible in the CIMULACT project, which combined physical and online events as part of its aim to define a research agenda for Horizon 2020. Starting with visioning workshops held in different countries where a few dozen citizens produce several “visions” for future research priorities, the workshop outcomes are then used in a clustering workshop involving consortium members and experts, and in a third stage a two-day workshop that produces, from these results, 48 research program scenarios. These scenarios were then submitted both to an online consultation which engaged over 3,400 people, asking them to prioritize the scenarios and enrich them with additional arguments in their favour, and to face to face consultations in 30 countries, engaging citizens, experts, policymakers and other stakeholders in reviewing and enriching the scenarios. Likewise, in GoNano, workshop results follow a similar path: citizen vision workshop results are used in a series of broader stakeholder workshops where visions are articulated into further exploration, then ideation and finally prototyping, before being further used in online public consultations.

In some of the citizen science projects studied, such as D-NOSES, WeCount and GRECO, both digital and physical approaches of co-creation are used: citizens collect data where it is to be found, be it outdoors (D-NOSES odour pollution monitoring) or from their homes (WeCount traffic monitoring using a sensor placed on their windowsills; GRECO data sharing on domestic solar panel installations). In both these projects, their role, as citizen scientists, is also to analyse and interpret the data

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collaboratively with other QH stakeholders, processes usually done in workshops or datathons, or in the case of GRECO, with project members measuring solar radiation and attempting to repair defective modules from the solar panels.

Datathon Déchets organized a two-day event where multi-actor teams tackled challenges linked to local waste data. Participation was open to multiple publics such as students, waste professionals, designers, public authorities and civil society actors, working in multi-disciplinary teams, under the auspice of "Datactivist" (a cooperative enterprise working towards data opening and re-use). The teams were asked to question the data put at their disposal and to identify gaps. Because participants were selected carefully, all of them felt concerned and produced in-depth discussions. The COVID-19 pandemic affected the project in two ways: on the one hand, the programmed presentation of datathon results to the city council was cancelled due to restrictions, but on the other hand, the timing of the event only a few weeks after the end of the first lockdown was conducive to co-creation as people were pleased to once again meet in person and work in teams.

La Ruche qui dit Oui !, a network of local food distributions in urban settings organised around a technologically advanced e-commerce digital food platform, also illustrates well this type of digital-material combination. While the local food distributions are held in third-place venues (usually more attractive and original to citizens than supermarkets or an outdoors market street), much of the shopping is done through the online platform which centralizes all the commercial/transactional aspects (product descriptions, producer presentations, payments, etc.). This has the advantage, compared to most systems, that food consumers (or "prosumers", in the case of citizens linked to alternative food initiatives) are able to focus all their attention on discussing the food itself, rather than price or availability, with the food suppliers. The centralisation of very detailed and open-access information on each product and each food supplier in the network also provides an interface for learning about (local) food characteristics at any time or place, information that can then be re-verified or discussed with the suppliers present during the food distributions held in physical "third place" settings as varied as shops, cafés, cinemas, churches, etc..

Urban food Venues

Food is a particular area where venues of co-creation can assume very diverse forms. As shown in the AFAUP (the French national association for urban agriculture professionals), there is a multiplicity of initiatives geared towards reincorporating the food system within urban areas, such as eco-intensive farming, permaculture, rooftop farming, shared gardens, urban organic waste composting, local food chains, etc.. These examples are all potential venues for co-creation, since urban food initiatives are not aimed merely at (local) production, but also at making good use of their proximity to urban populations to reconnect actors directly involved in food (producers, caterers, retail municipal food authorities, etc.) with citizens and civil society groups. Alternative Food Networks and similar initiatives such as City/Region Food Systems (CRFS) promoted in FOODE or Community Supported Agriculture (CSA) and Participatory Guarantee Systems (PGS) which EATING CRAFT aims to bring together, all constitute circuits of reconnection between producers and urban food consumers, who are increasingly becoming "food prosumers" (Stephens and Barbier 2021).

4.3 The rationales behind co-creation activities

Exploring the sample of 50 co-creation projects provides us with rich and diverse accounts of co-creation rationales and characteristics. In this subsection, we inductively identify 11 rationales underpinning co-creation processes. Identifying these rationales, which are not necessarily mutually

exclusive, of our co-creation sample, allows the MOSAIC team to further articulate the range of co-creation approaches in a way that allows us to identify elements that will be useful for the MOSAIC co-creation approach (see Deliverable D3.2 and the upcoming work in WP4).

The co-creation rationales presented hereafter have themselves been co-created by the MOSAIC partners that participated in writing up the reports provided in the Annex (UNI EIFFEL; SoScience; FGB and Stickydot). Whilst the co-creation rationales are diverse, they assist us in the sense-making of the variety of co-creation activities studied and will act as a key resource in defining the rationale and characteristics of the MOSAIC co-creation approach (see Workpackages 3 and 4).

1. Filling data gaps and creating open data through citizen mobilisation

Co-creation and citizen engagement provide opportunities to gather and interrogate a variety of data that may not be accessible from traditional data gathering institutions. Filling gaps in data (e.g., environmental pollution, cancer epidemiology, energy consumption, traffic counting, road-sensing, etc.) may take several forms. In many situations, data does not yet exist, or exists at a level of precision which is insufficient (for instance, to address local issues for which there is no fine-grain local-level data), or is too costly to produce (especially at the local level). Thus, collecting data from citizens (and other stakeholders) can help address this gap, either through crowdsourcing – citizens are sometime mobilised in a passive way, they may be monitored e.g., behaviour, energy installation consumption, without participating further in the process – or through involving citizens in not only providing and collecting but also analysing and interpreting data.

In situations where there is existing data, it may not be open, may not be aggregated enough, or may be missing valuable inputs. In this first case, datathons and challenges can be organized to gather stakeholders so they can gather their data to work together. For example, Datathon Déchets was a two-day event that gathered various actors from the private sector (utilities companies linked to waste), public sector data services, computer science schools, and data-related companies, to work together on the use of data on local waste. All these actors were motivated by the issue of missing or unqualified data in their particular datasets or data services. The data thus obtained is used in a European project (DEAS) and the overall outcome is that entities coming from different helices could see the value in opening up their data and benefiting from others opening up their data, as well as working together during the event.

Similarly, Epidémium, for its Challenge4Cancer, set up an Epidemium Open Data Portal consisting in 21,000 datasets on cancer and cancer research from international or governmental organizations (e.g., WHO) that had already granted access, but also data that was opened up for the purpose of the challenge by Roche, a large pharmaceutical group (12 data sets concerning 8,000 patients), after a thorough anonymization process.

RESYNTEX set up a data aggregation that aims to ensure waste traceability and provide relevant data for economic and environmental assessment. It also aimed, through the setting up of Citizen Labs with interactive exercises with textile items, to collect information about participants' behaviour when it comes to disposing or recycling clothes and textiles.

GRECO developed, among other research products, an ageing model and repairing procedure for photovoltaic modules, for which there are very few installations older than 10 years (3%), despite a 25-year manufacturer warranty. Owners of photovoltaic modules provide highly valuable data on the energetic behaviour of older photovoltaic cells, which may be owned by citizens (e.g., rooftops, companies, or any other actor), particularly since the historical data is available through sales invoices by electrical companies when the installation is grid-connected. This data is analysed along with a measure of solar radiation by GRECO, who will also attempt repair of any defective module.

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In WeCount, the key are the traffic counting citizens (through the use of low-tech sensors on their windowsills). They take an active role in the production of data around mobility in their own neighbourhoods, at a particularly fine, street-level granularity. This data can then be used by local policy makers and the transport policy research community to build better transport systems (note that citizens are also involved in policy co-design, not just data gathering).

In D-NOSES, citizens gather data on perceived odours in their neighbourhood and city, with prior training by odour experts to help eliminate bias and better identify odours and their sources. The main aim is to put odour issues on policy agendas, as it is considered that it is inexistent as a policy issue. But the project also collects data from other linked data sources (e.g., operational data from emitting industries, weather and environmental data from public stations). The aim is to detect "correlation of observed data with daily operations at the emitting activities and the weather conditions". This should help better understand odour issues and identify situations for improvement in daily operations and practices.

REFLOW makes use of blockchain technologies to incentivise circular practices in local ecosystems and create data visualisation tools to enable continuous monitoring and optimization of "urban metabolic" processes and rapid intervention management. To this end it seeks to develop networks of sensors, urban computing and geolocation to capture data ensuring accuracy, integrity and interoperability of data infrastructures, and standardise data visualisation to make effective for communication, public consultation and experience exchange. The blockchain reinforces a decentralised open data platform that connects multiple nodes in the REFLOW network, accessible to citizens, specialists, policy leaders, and industry.

2. Improving participation in agenda setting

Participatory agenda setting has the double advantage of tapping into diverse sources of useful intelligence to shape agendas, plans and policies, as well as enhancing democracy through inclusivity. For example, CIMULACT focused on participatory research agenda setting and aimed to shape the final work program of H2020 by engaging citizens and other QH stakeholders in co-creation of research agendas based on societal visions, needs and demands. Starting with 30 citizen visioning workshops that produced 179 "visions of desirable and sustainable futures" for the following 30-40 years, from which consortium members supported by external experts met for a clustering workshop and extracted 26 underlying, crosscutting "needs". These consortium/expert "needs" were then reappropriated during another workshop by 30 citizens (one for each workshop) who along with consortium members and external experts, co-created 48 suggestions for research program scenarios based both on the 179 visions and the 26 identified societal needs. The selection process therefore follows an iterative pathway since citizens get to reinterpret the needs that were themselves interpretations of their visions. The 48 suggestions emerging from this process were then formulated into precise, one-paged research topics presented to EU Commission Program Officers and experts. Evaluation of CIMULACT shows overlap between many CIMULACT topics and H2020 (2018-2020) Work Program topics.

3. Prototyping and testing solutions

Co-creation can help develop tangible "products" which can take the form of technological prototypes or devices. Co-creation can also produce actionable knowledge through experimenting with solutions to local problems, educational programs or interventions in a particular area, for example, experiments with urban design or small-scale urban planning that can be later scaled up or replicated. What all

these prototypes and experimentations have in common is that they are designed to respond to insufficiently met needs, be it regarding urban transformations, the changing ecological behaviour and practices or improving social inclusion for disadvantaged groups.

In line with this, the outcomes from SISCODE, which aimed to stimulate co-creation in policy design, produced prototypes that ranged in nature depending on the lab in which they were created. These take diverse forms, ranging from new materials and programs, educational programs related to agriculture and mental health, an incubation program, an exhibition, and also some technological prototypes (e.g., a smart bracelet to help address cerebral palsy). Prototyping was also a way to better understand the problems tackled: there were several loops of experimenting/prototyping.

In BizArTech, a "three-day creative sprint" aimed to create new mediation devices, or prototypes, that would help to, through artistic renditions, raise awareness on energy consumption and change the practices in Lyon. These were: a sensory tool to familiarise people with eco-gestures, a collaborative game linked to the impact of collective actions on the environment, an immersive device to visualise energy production across a territory, and a device revealing energy consumption through a sensory experience with fans.

In Cities-4-People, citizens co-developed Citizen Mobility Labs which come up with Citizen Mobility Kits and, applying it, developed intervention prototypes to transform urban mobility in their area. Some of these are: a "Demand-Responsive Transport", "SuperTransit" service that offers trips to the supermarket for free in an area considered a food desert; a "Micro-Depot" for delivery trucks, that often block streets, to park in the outskirts and combine delivery with a bicycle delivery service; the "Pedestrianisation of the Danube River Embankment" which is currently traffic-ridden; and the "Provision of Wheelchair Scooters at the Central Square" to create wheelchair scooter attachment options.

CLEVER Cities sought to implement Nature-Based Solutions in three pilot cities to test their climate-mitigating and social benefits. It set up CLEVER Action Labs (CAL) that involve Urban Innovation Partnerships (UIP) that include citizens in different stages of co-creation with a wide range of stakeholders linked to Nature-Based Solutions, or "NBS" (e.g., landscape architects, municipalities). These took the form of, for instance: the design and promotion of innovative solutions for experimental and multifunctional green roofs and walls; the creation of a community garden and public green area co-designed and managed by local citizens on an abandoned and polluted green lot; mitigation of noise on a railroad that integrates planted soil and vertical "Living Walls"; or the setting up of CAL parallel to an existing urban regeneration plan, that involves a battery of NBS such as rain gardens, swales, reed bed filtration to improve the quality of a local lake, public events to encourage residents to better appreciate nature, greening "unusual spaces" such as walls, roofs, walkways etc.

IRIS sought to participate in the transition to decentralised energy and to develop smart solutions that integrate energy, mobility and ICT. IRIS developed a set of Integrated and Replicable Solutions for Co-Creation in Sustainable Cities ("IRIS Solutions" or "IS"), along different Transition Tracks, including a transversal one called "Citizen engagement and co-creation". It developed tangible interactive devices, such as "Game design interaction scenarios" with app-based interfacing and sensors such as smart lampposts, participatory city modelling contests linked to bus electrification using Minecraft, or Living Labs in which resident energy consumption behaviour is monitored constantly.

Hackability@Barilla, in aiming to develop new food tools and packaging solutions for elderly people and people with disabilities, developed six prototype solutions (e.g., a corkscrew that can be used with one hand; a fork designed for people with Parkinson's disease; braille-labelled products). These products emerged from an open call for collaboration to designers, makers, creative people and people with disabilities or specific needs. These prototypes used the competences of makers and designers in

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using digital fabrication processes like 3D printing as ways to create products that respond to unmet needs, with a view to higher social inclusion and scalability.

In addressing social and health care issues, OpenCare aims to prototype a "community driven approach" that draws on advances in collective intelligence, advances in digital fabrication and cheap-and-open hardware technology, and the rise within the global hacker community of a will to address care problems, all ultimately leading to a shift from top-down approaches to care to bottom-up approaches. The citizens involved in the prototyping activities were, among others, elderly people, parents of children with disabilities, and migrants. The prototyping process is hedged on access to maker capabilities, specific tools typical of makerspaces and fablabs (e.g., laser cutting, 3D printing), and open innovation and open data cultures. As an illustration, one prototype is a device that sends a call to caregivers with coordinates to help a person who accidentally fell down).

Prototyping can serve to demonstrate, in concrete product form, the usefulness of co-creation in aligning R&I outcomes with societal needs, values and concerns. In GoNano, 92 product suggestions were collected across the pilot studies, some of them considered too optimistic by nanotechnology experts, but others very concrete, pointing to incremental innovations in medicine (e.g., mobile diagnostic).

4. Building markets and reconfiguring value chains

In co-creation approaches focusing on producing tangible and impactful outcomes, addressing the value chains, industries or broad user behaviours is key. Co-creation can be leveraged to help pave the way for impactful innovations to embed in value chains and change society. In many cases, value chains may be considered unbalanced for some actors along the chain (e.g., farmers vs supermarkets), but may also lead to social and environmental imbalances, for instance when the nature of value chains makes quality goods inaccessible to many, or generates too much waste. For example, the goal of developing circular economies is inherently linked to objectives or value chain reconfiguration and these reconfigurations imply governance changes in whole sectors, but also at the level of cities or regions.

In FORCE, cities, enterprises, citizens and academia engaged in 16 participatory value chain based partnerships to create and develop eco-innovative solutions together. These partnerships lead to the development of 10 "viable end-markets" linked to material/waste streams in plastic waste, metals, bio-waste and wood waste. To this end FORCE develops a governance model for cities based on value chain based partnerships and a set of decision support tools using Big Data.

La Ruche qui dit Oui! is a network of local food distributions in urban settings (maximum 250 km from producer to consumer). Organized around a technologically advanced e-commerce digital food platform, articulated a range of new relations between producers, consumers, auto-entrepreneurs who manage one or two of the 1500 distribution points in the overall European-wide network, and free hosts for weekly distributions in third places which therefore costs nothing to the company ("no walls"). This type of digital-material, food prosumption innovation (Stephens and Barbier 2021) has the potential to seriously reconfigure the local food system, and possibly the food system as a whole; and build dense networks of knowledge exchange between food producers and consumers (or "prosumers"). However, this reconfiguration is also a form of "uberisation", since large amounts of food are distributed and coordinated by less than 200 employees, who only manage digital flows while it is independent, unsalaried autoentrepreneurs who manage the actual physical flows and logistical organisation of the food distributions. The value chain imbalance may therefore end up in favour of technology companies, much like with Uber, Airbnb and other such platforms in other sectors.

EATING CRAFT promotes Participatory Guarantee Systems (PGS) and Community Supported Agriculture (PGS), which are types of Alternative Food Network practices which offer ways of reducing intermediaries (even more so than with La Ruche qui dit Oui! which still has two intermediaries between producers and consumers, while both PGS and CSA only have one intermediary. They also offer, through PGS, ways to be independent from third-party certification while still valorising food products on marketplaces, particularly at the local level.

5. Implementing Responsible Research and Innovation (RRI)

Implementing Responsible Research and Innovation (RRI) into different industrial, private sector or policy settings requires multi-stakeholder interactions and an appreciation, and integration, of local context insights. Co-creation approaches are a useful way of tailoring and embedding RRI into local contexts and settings. In the co-creation sample analysed in this report, implementing RRI focused mainly on the academic (and in some cases the industry) helices of the Quadruple Helix.

RRI implementation, or further embedding, can take many forms, from the establishment of new practices, phasing of innovation, indicators, rules, codes of conduct, and so on. For example, SMART-Map's primary scope revolves around the co-production, co-design and co-creation of feasible tools and processes to introduce and test RRI in three cutting-edge technological industrial settings: precision medicine, synthetic biology and 3-D printing in biomedicine. A large part of the process involved "Industrial Dialogues" which serve to identify motivations for embarking on RRI and useful ways to do so in industry-led pathways through the co-design of a list of RRI toolboxes, which were mostly about the added value brought by using multi-stakeholder processes. For instance, this involved the co-production of recommendations for new technical standards for producing 3D-printed protheses.

In BigPicnic, citizens and other stakeholders engaged in food-security related workshops and exhibitions to publish a report that articulates public opinion and recommendations for RRI on food security, co-developing an RRI Toolkit in the process. Citizens are seen as core actors of RRI implementation.

COMPASS seeks to make RRI more accessible to SMEs. For this the project develops a Responsible Innovation Compass which consists in a Self-check Tool, a Responsible Innovation Toolkit (also called "Co-creation method booklet") and three interactive, ongoing and sector-specific Roadmaps. The Responsible innovation self-check tool involves SMEs in an exercise of identifying RRI aspects they could implement, following four dimensions called "Company management" (e.g., ethical conduct in stakeholder consultation and disclosure of conflicts of interest; data management practices in collecting and sharing; raising public awareness on the science behind their innovations; employee diversity, health, safety, and responsibility), "Idea generation & research" (principles sought in the initial stages of innovation such as prioritizing societal challenges, involving stakeholders and anticipating impacts), "Development & Testing" (activities in the development phases of innovation – production, testing, market entry, etc. – such as fair co-developing with stakeholders, implementing safeguards against unintended use of the company's innovations, and sustainable production and sourcing), and "Market & Impact" (which focusses on the final stages of innovation processes from launch to re-evaluation and managing negative effects with relation to societal challenges).

SeeRRI aims to create a general framework, the "SeeRRI framework", and roadmap, that regions can use for guidance when seeking to integrate RRI into regional innovation policy while integrating territorial actors from industry and business to academia, policymakers and the public. This framework is developed with stakeholders from these different arenas and its implementation is tested in three pilot territories: Catalonia (Spain), Lower Austria, and Nordland (Norway), with an aim to subsequently

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sharing lessons and proposing governance strategies for different regional contexts beyond the three pilot territories. Each territory is focussed on one specific R&I area: “Responsible management of coastal areas” (Nordland), “The contribution of the plastics industry to a CO2 neutral economy” (Lower Austria) and “Zero Waste” (Catalonia).

Through six living labs, LIV.IN provides physical spaces for exchange, experimentation and learning about co-creating innovations in a responsible way, involving major ICT industry corporations (e.g. Siemens, Telefonica Movil) on questions/issues such as “how can new digital services enhance daily life when growing older?”, the Internet of Things in daily life, “sleep tech” in smart homes and user concerns, etc. The first stage for these living labs involves mainly industry and lead user interactions during physical workshops, while the lab then goes “virtual” through a virtual community platform open to much wider publics (industry, academia, citizens). Audio-visual storytelling is an important part of the project in aiming to “convince” the private sector about the benefits and process of implementing RRI.

Through case studies in five social labs, RiConfigure provides a better understanding of what happens when the four main sectors of society (industry, academia, policy and civil society) collaborate during research and development (R&D) projects. They sought to facilitate the interaction and inclusion of all helixes into the innovation process through a report of lessons learned from experiences, policy brief and training sessions.

6. Building trust between potential co-innovators

Bringing different communities from the Quadruple Helix together is a major challenge. Institutionally, the different helices have been separate for many decades, and building trust, credibility and legitimacy between the four helices is a key challenge. Firstly, there is a general lack of understanding of what co-creation and similar types of processes actually are, leading to mistrust or at least misinterpretations from actors as diverse as public actors (e.g., no financing for community-based projects), private actors (e.g., who do not wish to “share” the outputs of the innovation with their competitors), research institutes (e.g., who may deem methodologies illegitimate and of poor quality). Secondly, there may be mistrust between different helices (e.g., researchers not trusting industry partners or citizen expertise, citizen seeking researcher and industry transparency and confidence). At a more micro-level, co-creation participants may have very different mindsets, which it is helpful to identify, and anticipate on, in order for co-creative interactions to be freed from unnecessary strife (albeit allowing for conflict in a productive way). In some cases, “ambassadors” from organisations that are traditionally opposed (or do not share the same “language” and culture) may be necessary intermediaries in facilitating co-creation and avoiding conflicts. It may also be useful that an independent third-party organises the co-creation process in order to build trust.

A general lack of understanding of co-creation and participatory processes in general, and a lack of perceived scientific legitimacy, can hamper projects. For example, Épidémium failed to access fundings traditionally granted to research projects through calls for proposals launched by public funding agencies because usual financing mechanisms do not recognise, and are not adapted to community-based projects and research methods. It is not only financing from public agencies, but also collaboration with the research world that proved problematic, due to a perceived lack of scientific legitimacy.

During the definition of the TFOPP scope for innovative and more sustainable packaging that would go beyond plastic recycling, the private partner Perrier was reticent to inviting competing companies (e.g., in bottled water) to meetings, and was more focused on start-ups. It took a certain time for some

members of Perrier's team to open up to the idea that positive packaging is not specific to them, and should benefit others, in spite of reducing their own competitive edge. In that sense, mentalities can change even in large groups, but this process takes time.

BIZARTECH gathered participants to prepare the ground for future collaboration. The project developed activities to help them learn how to work together, with tools to better manage conflicts or to better find their place in their group depending on their personalities. BigPicnic goes further in this sense as it develops a soft-skills tool that enables activity organisers to identify seven types of mindsets that can be relevant in several stages of the co-creation process: "critical" (e.g., question the ordinary), "fearless" (e.g., allow uncertainty), "hands-on" (e.g., create while doing), "sensitive" (e.g., get to know people and show empathy), "experimental" (e.g., try something new), "flexible" (e.g., allow others to change the direction), and "optimistic" (e.g., believe in a solution). This type of prior preparation on participant personalities/mindsets can help prevent or anticipate potential conflicts.

A key success in SUEZ-TAPAJ was to have ambassadors in each organisation who are determined to co-construct and implement solutions together, learning to familiarise themselves with the other's culture and building bridges between the two very different organisations (a multinational corporation and a third-sector social inclusion actor). This helped overcome "language" barriers and overcome stereotypes associated with the type of social innovation TAPAJ was developing.

FRANCIS innovators reported that they have experienced silos previously in their innovation processes, where different worlds won't connect (e.g., medical doctors or workers may be suspicious of industry innovations). The project hopes to build bridges and show that profitability and strong social benefit (especially quality and affordability, which are two important characteristics of frugal innovations) can be aligned.

Overcoming scepticism is also about reaching innovators that are not part of the typical hubs of innovation. For instance, MIT Solve had to change their view of innovation, and even their language (as in T1. Linguistic), in order to incorporate innovations based on traditional, ancestral technologies from Native American innovators so that Indigenous communities can participate in co-creation.

As Épidémium suggests, even in typical innovation hubs, mobilising a community around a project can turn out more time-consuming than expected. The project's coordinator had to spend several months and conduct 150 interventions in universities, open labs and research institutes to convince different actors to be part of the community that would work on even a rather global issue as the Challenge4Cancer.

In its Handbook for Citizen Involvement on Circular Economy, FORCE provides a framework for reaching the objectives of citizen involvement. Among others, this involves strategic planning of the scope, procedures and expected outputs of citizen involvement, which establishes trust among stakeholders and increases the effectiveness of the process; "inclusivity" which ensures a variety of perspectives through involvement of various affected citizens groups; "transparency" which means clearly disclosing information, rules, plans, processes and actions. These measures increase trust in authorities and the probability of environmental and social decisions' acceptance, and offers new perspectives to solutions proposed by the actors in charge of waste management, making them more suitable for addressing citizens' needs.

In GoNano, which aims to improve the responsiveness of R&I processes in three nanotechnology areas (health, energy, food) through co-creation processes involving all QH types, findings suggest that researchers in these areas are skeptical about the need to include wider societal considerations in their research and innovation. Therefore, to be more convincing to researchers, the co-creation process may need to focus more on the technological content itself, and practical usefulness of the suggestions for future nanotechnology applications, rather than more abstract ideas on conceptual foundations or

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methodological soundness. Following the same line of reasoning, to convince companies to include co-creation and stakeholder engagement in their innovation processes, compelling examples and focused propositions are needed that clearly demonstrate value added (e.g., will it save costs? will it enhance reputation? who will be involved?).

7. Tapping unheard voices and the broader ecosystem of expertise

Making use of the knowledge and insights from various communities allows for better, and more societally robust innovations. Tapping into the various reservoirs of knowledge is a key challenge – which stakeholders are relevant, what knowledge do they have and how can one make use of such insights?

Stakeholder mapping exercises help identify ecosystems that may include a much wider range of stakeholders and knowledge than may have been initially envisioned. This matters because broader ecosystems bring new viewpoints, allowing for systemic thinking, collective intelligence and holistic approaches. More concretely, large ecosystems also bring in new capacities and multiply synergies. Stakeholder mapping is key to getting actors involved who would not normally be involved in, or even have knowledge about, innovation projects. The scale of cities, in particular, is highly relevant in trying to rethink material flows within productive systems in order for them to relate better to the local environmental resources and their local populations and material fabric: cities, in addition, provide specific, multi-stakeholder third places for experimenting systemic changes. Third places are typically situated at the border of organisations and homes and characterised by their hybrid population (e.g., open labs, community centres and gardens, museums and libraries...).

In BigPicnic, the Policy Brief 5 “Using participatory approaches to raise unheard voices and broaden our perception of expertise”, recommends to “build new knowledge and create value, for all concerned, through open and inclusive research and public engagement processes”, to “involve the larger ‘eco-system’ (e.g. audiences, green organisations, researchers and industry)”, to “leave your site to get easier access to and build relationships with new audiences. Don’t expect they come to you”.

In Agrivair, the preservation of local water quality concerns not only Nestlé’s Vittel bottled water and local farmers and their pesticide use, but also the local public sector seeking to prevent an eventual closing of the water business to preserve local employment, the tourist sector, and agricultural institutions that have both local and national representation, and capacities to serves as useful intermediaries between Nestlé and the farmers.

In COLAB, the project invited key actors to an “ecosystem mapping workshop” to identify stakeholders with whom synergies could arise. This then led to several co-construction workshops based on “design thinking” and “collective intelligence”.

As The Future of Positive Packaging shows, there is a need to create a space for different stakeholders to be identified and included in order to implement systemic change. To this effect, the call for applications is formulated so as to ensure a diversity of actors: it places emphasis on the social and environmental issues around packaging rather than on a specific technology or strategy that would lock the program into an industrial perspective, in order to make NGOs, social entrepreneurs or researchers feel concerned and prone to collaborate.

With FoTRRIS, co-RRI must adopt a “complex systems perspective”, related to “constantly evolving, open systems that contain a multitude of elements” which interact in ways that are often “unpredictable, in the sense that they are non-linear and determined by feedback loops”, and which contain “nested systems” (economic, ecological, social…) that influence one another at multiple different scales. This entails the participation of all QH types, in particular that “Citizen and stakeholder

engagement for RRI requires the co-creation of relevant knowledge and solutions for complex problems, and not just involving citizens and stakeholders in the final phases of an R&I project with the aim of 'educating' them into acceptance of the outcomes".

BeeOdiversity introduces the idea of "natural partners" (in "Nature-Based Solutions") as a fifth helix, turning the Quadruple Helix into a "Quintuple Helix" that incorporates partners from the natural world. In the project, bees act as "data collectors" as they "naturally" report on the quality of the environment, which provides an alternative to using sensors or other technological devices to gather data.

As a whole, REFLOW illustrates well the need to think holistically and systemically, as it aims to develop circular and regenerative cities by enabling citizen involvement and systemic change to rethink the approach to material flows in cities. The project pilot leaders co-create, test and implement circular practices within their local context, fostering the transition towards regenerative and circular cities for specific activities (e.g., textile recycling, waste-to-heat recycling, agri-food, energy or overarching city processes (e.g., governance, regulation, public procurement).

8. Building Quadruple Helix cohesion by harnessing territories and local resources

"Territories" are key nucleating points for different actors to come together to find solutions. Citizens, civil society organisations and public authorities each have a keen interest in seeing things change for the better in their local context. Concepts such as well-being or environmental quality translate into practical situations at the local level and this "territorial anchorage" motivates local populations to contribute to the community by providing their expertise (either scientific, technic or experiential knowledge) to solve common problems.

Understanding local contexts and particularities is essential in defining the right scope for innovation projects, building trust on potentially controversial innovations, and understanding local barriers and dysfunctions. A particularly important area of innovation that is embedded in territories is the (local) food sector, which has boomed in the past decade. These food initiatives can potentially reconfigure or revitalise local economies as well as build more resilient cities, involving citizens alongside producers, public authorities, private sector initiatives and third sector actors that are mostly from the same territory.

In BeeOdiversity, public authorities engaged local actors to preserve their territory, its biodiversity, air quality, local endangered resources, and the well-being of the territory's citizens.

Grenoble CivicLab has shown how citizens can be interested in knowing more about issues that concern local data in their communities (as opposed to data elsewhere). The Project also aims to help them explore the resources of their territory (e.g., Fab Lab) and thus to show how these resources can be used in the general interest. They are asked to anticipate the future of the projects they set up for the open challenges so that these can become "Commons for the territory".

SeeRRI, in conducting RRI implementation in three territories with very different priorities and specificities (Austria, Norway and Spain), provides comparative insights, stating that what is feasible and appropriate in terms of citizen engagement remains dependent on territorial specificities and in particular on the different cultures for public debate and decision-making

MIT Solve consists in challenges linked to social impact innovation. The challenges are global, but the selection phase for the projects takes into account the proximity of teams with the issue they are trying to solve. The jury examines whether the teams have a close understanding of the specific needs of the underserved population they want to help and if they are not trying to impose preconceived technological innovations regardless of the local context.

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In meeting local actors of food security and maternity and infant care, COLAB were able to find out that there were a great number of NGOs operating in the health sector in Mali, but that they lacked coordination, coming in one after the other and conducting the same mission. Therefore, analysing local contexts helps delineate the scope of a program and assess whether collaborative approaches are relevant on the ground.

D-NOSES based their approach for odour sensing through citizen science on the idea of the "city commons", which is about working with the resources locally available in cities, connecting the right people to create new resources that are missing, and using technologies, tools and systems for the common good such as sensors (in a mix of old and new technology) and meshing these with wider resources and knowhow already in existence.

FoTRRIS formulates recommendations at the EU policy level to encourage the development of regional level innovation ecosystems with cities and regions as "drivers for finding successful solutions the new mission-based challenges". This links to the importance of carefully taking into account local contexts' particularities, especially when the fields investigated through co-RRI processes are highly contested.

Local food initiatives, such as AFAUP, FOODE and La Ruche qui dit Oui! are deeply engrained in their territories. The initiatives that belong to the third-sector national-level network for Urban Agriculture ("UA"), AFAUP, are very diverse, but most have in common that they seek to reconnect urban dwellers with food, food producers, and the spaces food is produced on – albeit adapted to the urban fabric (e.g., rooftop farming): one of its members, the Cité Maraîchère de Romainville, for instance, built a vertical market gardening greenhouse, promising to create jobs, including for local actors involved in food, as well as provide festive, scientific and educational events and healthy food for its local population. FOODE seeks to promote City/Region Food Systems ("CRFS") which bring together "all those actors, processes and relationships that are involved with the food chain (from where food is produced, to where it is processed and distributed) in a defined geographical region". La Ruche qui dit Oui! is a private sector initiative that sets up local food networks through a digital platform, whereby local food producers deliver distribution points in cities. The producers cannot be distant of more than 250 km and are encouraged to engage with their urban customers, creating a rural-urban knowledge and insight exchange dynamic at the scale of a reduced territory (region or neighbouring region).

Fablabs and makerspaces play a central role in REFLOW, as "catalysts for change in urban and peri-urban environments to be used for co-creation processes" that "enable, visualise and regulate 'four freedoms': free movement of materials, people, (technological knowledge) and commons in order to reduce materials consumption, maximise multifunctional use of (public) spaces/building and regenerative practices". This type of circular system in cities aims to foster the development of local manufacturing ecosystems and emerging business models.

9. Forging a common language to facilitate communication

Finding the right language when communicating about "change" or even "innovation" is essential to engaging the targeted stakeholders – especially important when focusing on the transformative changes that are necessary to achieve societal missions. Communication without a common language can provide major bottlenecks to initiatives. For example, for Action Co-creation, attracting private companies proved more difficult than universities, associations and local authorities due to the way the project first communicated on its scope, presenting "social innovation" as one of its three key pillars, which made social innovation too predominant for the private sector to feel concerned. The scope had to be reformulated, which shows the difficulty in finding a common goal to a highly diversified range of actors.

In Agrivair, it was difficult to tell farmers who had followed agricultural practices for decades that they had to change their ways. It is only through sustained discussions that took time and required to forge a common language that the project managed to convince them that it was in their interest to enter the partnership with Nestlé's bottled water business. Once a few farmers had done this and some first results were demonstrated, more farmers followed suit. Taking the time to develop a common language to convince even a small group of "leaders" can therefore have a "snowball" effect as these become advocates for change among their peers.

As BeeOdiversity shows, the process of getting farmers who use pesticides to make their practices more friendly to biodiversity and bees requires project initiators to institute genuine dialogues and to collectively determine solutions that take into account current practices and that will succeed in achieving gradual changes, rather than trying to impose unadapted radical measures that will hardly be accepted.

As The Future of Waste shows, partnering with a third-party facilitator is key to favour dialogue among all the stakeholders. While all participants to the program agreed to shift towards a circular and a bio-based economy, many challenges can complicate its implementation, including different interests, motivations and constraints, and a lack of collaboration culture and a common vision. Thus, it is not sufficient to only put stakeholders in touch: there is a need to facilitate discussions and collaborations, which requires time, adaptation, and trust.

As COLAB suggests, participants in Project activities may not fully recognise the value of collaboration at first, and consider other stakeholders as mere sources of additional funding and not realize they could capitalise on knowledge sharing. COLAB sets up frequent meetings that are not only online, but also in the form of structured workshops and space for informal meetings.

In SeeRRI, it is pointed out that to enable co-creation, science literacy and scientific education are key to making the language and tools of science available to everyone and better equip citizens with the knowledge and skills needed to participate in R&I debates.

Co-creation processes are also ways for actors in potentially controversial fields to gain public approval, as in GoNano with nanotechnology innovations and product development. This is however made difficult by the disconnection between abstract propositions or values from citizens (e.g., incorporating "sustainability", "respect for nature" or "transparency" in nanotechnology design) and deriving concrete design recommendations while the choice of a specific technology depends on whether it is necessary or not, the existence of other alternatives to address an everyday problem, and so on. Also, forging a common language needs to take into account power imbalances in co-creation workshops (e.g., industry and/or scientist representatives vs. civil society representatives). This also raises the question of the choice of stakeholders: which experts for what choices? Excluding industry representatives may impair their understanding of the issues raised by citizens along the translation process. Indeed, outcomes from citizen-only workshops have to be translated into brief statements for a wider online consultation, and again from online consultation results into concrete design requirements. GoNano suggests involving the same participants throughout all the steps of the co-creation process, helping them develop a "shared language", or "pidgin" that helps exchange the value of one's own contribution to a shared problem in a way that makes sense from the perspective of the other. Yet this process takes time and requires commitment.

10. Incentivising participatory and inclusive innovation

One key element for successful co-creation is to ensure the integration of civil society and other stakeholders. Since co-creation requires an investment of time, incentives for participation are key Incentives for civil society participation may include pure curiosity and enthusiasm for participating in

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developing novel ideas, particularly if these result in tangible outcomes that are perceived as useful. Some projects provide incentive through gamification: direct (cash or in-kind) rewards; support for participants' own ideas and projects; certificates or acknowledgements for work accomplished; or more novel ideas such as "knowledge currencies" that provide access to usually restricted information or infrastructure. Online tools can work particularly well to incentivise one-off, less involved participants.

In FRANCIS, which aims to leverage citizen science for the development of frugal innovation, it is expected that contributors will participate because they are naturally enthusiastic about new things, and want to have an impact on the future. They would therefore be motivated to see something they contributed to be brought to market by private companies, even if they receive little financial incentive. This question is studied in the project by behavioural scientists.

Épidémium, in setting up open challenges (Challenge4Cancer), seeking to include a broader range of participants, due to public health issues being rarely addressed by non professionals besides patients (concerned groups). Open challenges add a ludic, "game"-like aspect to the innovation process, and can be both competitive and collaborative when teams are encouraged to exchange with one another as well as working internally. The project challenges also provide incentives in the form of certificates and financial prizes (9,000 euros shared between the three winning teams).

Similarly, Grenoble CivicLab sets up an open challenge co-designed and prototyped by participants, with a digital dimension and positive societal impact for the Grenoble agglomeration. This challenge is open to everyone, but intended mainly for local citizens, since these have interest in their local communities, or may simply seek to reinforce their skills, or may actually already have an idea or project which they could further explore at the CivicLab, which acts thus as an incubator.

FOODE has also set up a challenge that involves multiple stakeholders (consumers, students, entrepreneurs, civil society organisations, etc.) in the co-design, co-creation and improvement of existing City/Region Food Systems ("CRFS") initiatives, and/or the integration of new sustainable food system projects in 12 cities. The co-design activities take the form of student challenges, hackathons and local challenges, surveys and interviews, co-design workshops, focus groups, among other methods.

FoTRRIS formulates policy recommendations that propose the award of certificates for implementing "co-RRI" successfully, through Transition Experiments held on particular themes (e.g., sustainable food, energy) in specific territories. But other quite specific measures are proposed, like the launch of academic journals that support co-RRI and grant particular visibility to territories and actors that engage in co-RRI. At the level of citizens, incentives could be formalized through the award of a "knowledge currency" that is complementary to the euro, in the form of vouchers that could be traded freely for other knowledge within the knowledge currency community, for instance enabling citizens to access knowledge infrastructure such as universities.

EU-Citizen.Science suggests the idea of "instant-gratification citizen science", leveraged on ingrained human motivations linked not just to personal interest but also to altruism, which could work particularly well for one-off participants that do not feel part of a particular innovation community, but who are interested and have time to participate punctually, in particular through online tools if they cannot be physically present. A further motivation for participants – whether one-off or more regular, is to credit them for their work (e.g., acknowledgements or mention of work accomplished).

CROWD4ROADS aims both to increase car occupancy rate and to engage drivers/passengers in road monitoring, by way of a CROWD4ROADS Platform built by exploiting synergies between two types of collective intelligence systems (or platforms): (i) the largest ride-sharing community worldwide, BlaBlaCar, and (ii) SmartRoadSense, a crowd-sensing system that uses car-mounted smartphone

accelerometers to estimate the roughness of the road surface. The project emphasises the importance of cooperation incentives, which motivate users to share services and resources (including their car, time, and effort, in addition to bandwidth, computational power, and storage space). While BlaBlaCar makes use of reputations mechanisms like many online platforms, SmartRoadSense collects no personalised data and must therefore harness other incentive strategies to boost adoption of its app, such as leveraging the much larger BlaBlaCar community may in part be sensitive about CROWD4ROADS/SmartRoadSense issues; virtual currencies called GeoCoins used to pay services provided by third-party entities; and a "gamification layer" to let users collect game rewards while driving.

Hackability@Barilla brings together a third-sector non-profit involved in fostering co-creation with one of the worlds largest food conglomerates, around the development of food tools and packaging solutions adapted to growing elderly populations and individuals with disabilities. The latter have obvious incentives to participate in the development and future scaling-up of solutions which they personally relate to, but they are also part of a team which will earn commercial rights for the co-created solutions. For Barilla, around 1 million could benefit from such solutions in Italy alone, so that their incentive is not just about "being good" but has a chance to increase the company's competitiveness.

Citizens' intrinsic motivations vary according to the field. Food security or mobility issues may be easier to apprehend for the general population than, for instance, nanotechnologies. This is what GoNano seems to suggest when it points out that nanotechnologies may only attract specific subsections of the population interested in technology and/or participatory processes, while overall citizens may have a relatively limited interest in nanotechnologies, which, despite continuing calls for public engagement, may simply not be considered to be among the most urgent societal problems of today.

11. Promoting and increasing citizen science

Citizens can find themselves at the heart of co-creation, from defining the problem to producing and disseminating knowledge to solve it. Their participation is necessary to define everyday problems and to collect data which would then be organized, analysed, interpreted, and used by others to formulate policy or plan actions. Citizen may also be involved in the latter, for example, in D-NOSES, a "citizen power approach" (Arnstein 1969) since it involves communities not only in monitoring and analysing their local environment but also leads them to define the problem, co-design methodologies and tools that enable them to act on the results of their data collection. In each main monitoring community citizens are trained by "odour experts" to eliminate bias and help them better distinguish odours and guarantee a certain standard sense of smell (only observations and data by validated citizens appear on the map which projects the results). Operational data obtained from the key emitting industries are then matched to observations and key processes and meteorological conditions responsible for nuisances are identified for remedial action involving public authorities, odour experts, citizens and emitting industries, in the form of co-designed ad hoc local solutions. A key challenge of D-NOSES is "to orchestrate the engagement of different stakeholders – citizens, CSOs and NGOs, industries, local and regional authorities, and odour experts, etc" and their "conflicting interests and goals" and a "bottom-up approach where affected communities take an active role in defining and monitoring the problem while engaging in dialogues with public authorities and emitting industries to co-design potential mitigation options and good practices to reduce the odour impact" (Balestrini et al 2018).

FRANCIS, hopes to combine research on citizen science with research on frugal innovation. This type of innovation consists, in a nutshell, in, low-tech, high quality products that cost a fraction of the usual price of comparable equipment, with a view to making essential equipment (e.g., maternity ward

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equipment) more accessible, which is particularly important in developing countries, but also highly applicable in developed countries, albeit with differences in priorities. Frugal innovation can therefore be seen as fertile ground for innovations coming from civil society, and their motivations to act as citizen scientists, though not yet clear, will be studied by behavioural scientists.

The overarching aim of WeCount is to provide capacity building for citizens in the area of traffic counting and evidence of their high relevance in co-designing traffic management and transport policies. Using low-tech sensors, they collect traffic counting data from their windowsills, but the project also aims to offer citizens the mechanisms to generate evidence and utilize tools to quantitatively determine their local transport mix; understand and challenge mobility behaviour; proactively lead local transport discourse; and participate in co-designing traffic policy.

GRECO's Generation Solar platform for citizen scientists is a mobile app which is presented as the first platform to create a unique solar energy community and promote data exchange between photovoltaic installation owners and scientists. It acts as a database of photovoltaic installations which incorporates input both from research scientists and citizen scientists. Its purposes include to enable data exchange between PV installation owners but also to allow data to be fed into scientific models to analyse energy efficiency.

The EU-Citizen.Science platform is to become a central hub for the knowledge sharing, coordination and action relating to European citizen science. Though not developing citizen science itself, the project curates resources for a platform that will be used by citizen scientists across Europe. The different categories or resources for the platform are: Tools, that are "any software or hardware to help perform a particular task or work in citizen science initiatives (e.g., water quality equipment, air quality sensors, etc.)"; Guidelines, that are "a set of rules and instructions that could be helpful in designing, implementing or evaluating citizen science" (e.g., written texts such as reports, deliverables, briefings, etc.)"; Training resources that are "some form of instructional material in relation to citizen science often related to 'how to do' citizen science", such as MOOCs, workshops, webinars, gamified training, quizzes, etc.; and Other Materials that include "Libraries", "Scientific publications", "Websites", "Reports", "Audio", "Visuals", etc.

5. Conclusions

The (expected) gap in SwafS

The SwafS journey (2014-2020), with a dedicated budget of 462 millions and nearly 2,000 submitted proposals (Tomasi et al., 2020), represents a relevant bulk of resources and on-the-ground experiences which can be valorised in MOSAIC if properly reviewed and contextualised. MOSAIC has been designed with the aim to address a visible and important gap in the SwafS knowledge base: the difficulty to engage in co-creation activities all parts of the Quadruple Helix at the same time, and in particular the scarce engagement of the private sector in Responsible Research and Innovation (RRI) interventions funded by the SwafS programme under Horizon 2020 (Robinson et al. 2021)[7]. The review presented in this deliverable was therefore performed assuming that it might be difficult to find within SwafS projects the full extent of co-creation experiences that are particularly fit for open innovation/EU Missions settings. The review has therefore focused on identifying elements of co-creation in initiatives within and beyond SwafS projects, looking at Horizon 2020 in general as well as non EU-funded initiatives, with the aim of finding inspiring examples which could be useful and applicable to the MOSAIC context. In this chapter we will reflect on which of the identified elements, out of all reviewed experiences, can be used in a MOSAIC-type co-creation process. This is not a critical assessment of Horizon 2020 nor of SwafS. Several SwafS projects implemented elements of co-creation in an environment which was still experimental, with a clear scope of testing and promoting methodological approaches and highlighting their added value, rather than addressing concrete challenges such as those which Missions Cities will have to face in the near future. Several elements emerging from the review can become parts of a mosaic of approaches to implement effective co-creation approaches in Missions' landscapes.

Co-creation in MOSAIC

EU Missions are at the core of MOSAIC. Collaborative efforts of all Quadruple Helix actors towards the identification and implementation of shared solutions addressing global challenges are key to achieving Missions' objectives. Engaging citizens "in a serious way" in all the phases of their unfolding is a priority (Mazzucato, 2019)[8]. This means involving citizens at all stages of the process, ranging from defining and selecting priorities that are not only scientifically and technologically relevant but also addressing societal needs, up to the implementation and grounding of shared solutions and the monitoring and evaluation of their efficacy. Each of these steps requires different approaches, expertise and methods to be used and adapted to the specific context in which the Quadruple Helix collaboration unfolds. For instance, citizen engagement approaches used for agenda setting experiences differ a lot from types of citizen engagement used in monitoring or prototyping.

MOSAIC's co-creation pilots will involve cities which are at key stages of their Climate Neutral and Smart Cities' Mission implementation, with Quadruple Helix actors working together to create innovative and possibly technology-based solutions to achieve climate-neutrality. The MOSAIC co-creation methodology also needs to be applicable to any type of Missions and their specific aims.

[7] Robinson, D. K. R., Simone, A., & Mazzonetto, M. (2021). RRI legacies: co-creation for responsible, equitable and fair innovation in Horizon Europe. Journal of Responsible Innovation, 8(2), 209-216.
[8] Mazzucato M. (2019) Governing missions in the European Union. 2019. Available from: https://ec.europa.eu/info/sites/info/files/research_and_innovation/contact/documents/ec_rtd_mazzucato-report-issue2_072019.pdf.

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MOSAIC partners have therefore developed what they envisage as the ideal type of co-creation which should take place in Mission contexts:

> *"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 key elements of the MOSAIC co-creation approach to address Mission challenges are:

- All the actors of the Quadruple Helix should be involved in co-developing new solutions;
- Citizens have a key-role in such a process and their role should be recognised, valued and fairly rewarded;
- The process is meant to produce a tangible outcome which is not a policy, a vision or a scenario: tangible outcomes are mostly technology-driven innovations;
- Researchers bring their scientific know-how to the process but private players (innovators) should also always be involved as they often drive, shape, nurture or deploy what emerges from the co-creation process;
- Co-creation processes should be facilitated by experienced professionals (enablers). Co-creation processes should be carefully planned and implemented to make sure all stakeholders' needs and concerns are accounted for;
- Innovation generated by co-creation would not exist without the co-creation: this is the contribution that all stakeholders bring to the process. Therefore, co-creation is an essential part of the innovation process.

Assessing elements of co-creation

When looking at the SwafS projects reviewed in this deliverable, they clearly show that MOSAIC's gaps assumptions are confirmed (lack of involvement of the full Quadruple Helix spectrum, lack of full-scale experiences in innovation settings and lack of tangible outcomes). Generally speaking, while most of the reviewed initiatives don't fulfil the list of requirements set by the MOSAIC co-creation definition, part of the co-creation elements which emerge from the review can be used to prepare for or to implement specific steps of a co-creation process.

Elements which are not co-creation but are fit for activities leading to the identification of challenges, stakeholders or priorities to be addressed through co-creation include:

- *Improving participation in agenda setting*, which are typically activities which do not lead to tangible innovation outcomes but contribute to identifying shared priorities, plans and policies;
- *Implementing RRI*: while RRI is a cross-cutting principle underlying almost all process and rationales identified, it does not represent an achievement in itself. Co-creation in Missions settings should be aligned with RRI principles, although it should focus on developing inclusive and concrete innovations;
- *Building trust between potential co-innovators* is needed in co-creation processes, but it should not be its unique aim and outcome. It is also typically a "by-product" of an effective co-creation process;

- *Forging a common language to facilitate communication* is also desirable in co-creation, to successfully engage various types of stakeholder and facilitate interactions, although it should not be its main aim and outcome.
- *Stakeholder engagement workshops* are key to identifying all relevant actors to be involved in the process, to foster inclusivity and to get a deeper understanding of the territory and its specificities.

Elements which can be capitalized in MOSAIC co-creation approaches, as they represent tools and rationales which can be part of co-creation processes include:

- *Prototyping and testing solutions* is, of all elements, the method that can most likely support the co-development of concrete (technological) solutions. Few examples have shown a full QH engagement in prototyping processes, which can be particularly challenging due to issues at stake (e.g. intellectual property, rewarding, profits distribution, etc.).
- *Building markets and reconfiguring value chains* is key to involving the private sector in Mission-oriented co-creation processes. In Missions, industries are seen as both funders of new advancements and actors contributing to the common good. These two roles are often in contradiction with one another and need to be carefully mediated.
- *Promoting and increasing citizen science*. Citizen science is one of the methods that can be used to support co-creation processes, although a key aspect (often lacking in some of the reviewed examples) is that all stakeholders involved should have an active role in and benefit from all steps of the process. Citizen science often contributes to *filling data gaps and creating open data through citizen mobilisation*, which can lead to a better, shared understanding of the challenges to address.
- *Building Quadruple Helix cohesion by harnessing territories and local resources* also represents an important step in co-creation. As shown by several examples in the review, local aspects of co-creation processes are key to its successful implementation, and preparatory activities can be beneficial to identifying common ground and managing stakeholders' expectations.
- *Tapping unheard voices and the broader ecosystem of expertise* is also a cross-cutting priority of all co-creation activities, which should be inclusive and recognise forms of collective intelligence which are often either unheard of, or unfairly exploited in innovation processes. Such processes should also 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.

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Appendix

Action Co-Creation

Action Co-Creation is a program funded by Innoviris (the public institute for R&D in Brussels) since 2015 and accompanying multi-actor research projects aiming to improve urban resilience.

Dimension 1: Motivations and Participants

Innoviris is a public institute which promotes and supports innovation through the funding of R&D projects based in Brussels. In response to the various crises that Brussels-Capitals Region is experiencing (e.g. population segmentation, limits of resources available, mobility, etc.), Innoviris launched the Action Co-Creation program in 2015 to address some of these issues through research projects that concretely explore new perspectives to improve the city's resilience and socio-environmental sustainability. Its second main objective is to promote and develop new research methodologies that go beyond the usual frame of universities or private R&D departments: all participants of Action Co-Creation become co-researchers of their projects - no matter if they are scientific experts or field-actors, as they are all in a position to produce knowledge. Innoviris thereby seeks to foster closer links between the Brussels population, the academic and public worlds and the private sector. Besides the fundings it provides, Innoviris is involved as well in the design of the program and in the monitoring of its projects.

A few projects are selected every year (up to 10), each co-creatively carried out by several actors (4-5 structures in average) that can come from any branch of the Quadruple Helix Model. Although many universities, associations and local authorities are interested in the program, it has been more difficult to attract many private companies. Indeed, at the creation of Action Co-Creation in 2015, its announced scope embraced three dimensions: social innovation, research in co-creation and urban resilience. The ‘social innovation’ aspect soon became predominant in people’s minds and did not make the private sector feel concerned enough, especially since companies were eligible to other programs financed by Innoviris - that in addition do not have the quite demanding co-creation dimension of this program. Innoviris had to reformulate the scope in consequence, thereby showing the difficulty to find a unique way to communicate and be attractive to an extremely diversified range of actors all together.

More specifically, the vision of co-creation that Innoviris chose to adopt imposes that the actors leading the research activities are the people directly concerned by the project: they must be the ones ‘facing the transformation risk’, i.e. those that the project will impact and ask to make experiments or changes in their practices. For instance, a project exploring new ways to improve the living conditions of people in precarious situations must include them as co-researchers rather than confine them to a role of passive beneficiaries. But those actors primarily affected can in many cases differ from the ones wanting to initiate the project and applying to Action Co-Creation. In the first phases of the program (detailed in Dimension 2), Innoviris therefore asked those later to carefully identify the changes that they would like to bring about on the ground and the corresponding stakeholders that they need to actively involve in their project. Convincing those stakeholders can thus be challenging. To do so, some intermediate structures (like associations or consulting firms) can provide bridges between project initiators and those that will need to operate the changes. Moreover, since participants must belong to a legal entity, these intermediate structures can also host individual citizens to include them in the projects.

The projects selected benefit from the help of the Centre for Support to Action Co-Creation (CACOC), specifically created for the program and providing actors with the necessary means (in particular in terms of methodology) to carry out their participatory projects. In 2018, it was established as a non-profit organization, Confluences, and it is now also participating in other co-creation initiatives in Brussels.

External actors can also be invited in the process to assist and assess the projects: they are technical experts specialized in the topics at hand, experts in co-creation, experts in resilience, regional actors, etc. A few local citizens can also be gathered to constitute a "popular jury" (see Dimension 2).

Dimension 2: Methods and Process

Overall process

Innoviris launches a call for applications each year to select new research projects, then supported on average during three years. Each edition of the program is made up of several phases between whom projects are assessed to see if they can continue benefiting from Innoviris' support and move on to the next step.

The setup phase. Project applicants must first submit a "project outline", which includes a funding request for this first phase. If the project is selected (the selection rate is on average 30%), it enters the 6-month setup phase during which the other actors that will join the project are identified and start to co-construct its objectives, the state of the art, the research questions, the project structure, the budget, etc.

The phasing-in stage. A "full proposal" of the project must then be submitted, it includes a funding application to complete the 18-month "phasing-in" stage. Around 50% of the projects are selected by the jury and Innoviris to enter this phase, where they finish mobilizing all the co-researchers and start to implement the co-creation process they previously designed.

The full operation phase. Project carriers apply for the renewal of their grant. While the projects not selected go through a 6-month closing phase, the others continue their research in co-creation for up to 30 months.

his process structure, which initially just consisted in a call for proposals, has undergone several major changes since 2015. The 6-month setup phase was added right from the second year, as applicants were clearly not familiar with the notion of research in co-creation as it is defined by the program and needed to refine their collaborative project before applying. This setup phase finally proved to be too short to build a final proposal already involving all the relevant actors. Some institutions were for instance not willing to integrate projects still in launching phases. Innoviris was likewise not prone to already grant three-year fundings to projects that appeared too vague (and tended to justify this haziness as if it was an intrinsic feature of any co-creation project). The 18-month phasing-in stage was thus added to the process, to further support projects in their early stages. This has called into question the usefulness of the first setup phase which remains too short (especially in view of the administrative delays that led projects to receive fundings nearly at its end) and could therefore disappear in the coming editions.

Confluences redesigned the selection process in 2018 to introduce a popular jury. Each year, they bring together a group of about ten Brussels citizens, coming from diverse backgrounds, to supplement the already-existing panel of professional experts to assess the projects applying to the phasing-in and full operation stages. This change stemmed from a need to include more citizens in the selection

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committee: the initial panel of experts tended to only challenge the academic profiles among the participating teams, which did not give much opportunity to other types of profiles to valorize their specific contributions. The popular jury thus brings a citizen perspective, by looking if the project makes sense for the local community for instance. As the members of this new jury initially lack knowledge about the program and its key themes, several sessions are conducted beforehand to inform them on the program's context and on their roles as a jury, and to reassure them about their legitimacy. While their commitment is underpinned by a willingness to engage in an innovative experiment gathering people striving to work for their city, it is also stimulated by a financial remuneration and the recognition of a symbolic status. As of today, all members of the complete jury (citizens and scientists) must find consensus on all the selection criteria, but the program is thinking about assigning only a reduced array of criteria to each kind of expertise (so that everyone is only asked to take a stance on its own field of expertise).

Monitoring and support

Besides its funding support, Innoviris also has a monitoring and evaluation role: its scientific advisors along with external experts (chosen based on the projects' specific content) assess their progress and research results, and discuss with project carriers during monitoring committees. Innoviris works with Confluences who attributes one member of its team to each project and who therefore have a more precise idea of their respective advancement. These referents collect the various needs, requests and obstacles that participants are reporting, in order to adapt its support to each project. Many workshops have been conducted at the Centre for Support to Action Co-Creation, like training sessions aiming to foster understanding of the principles underlying the co-creative approach in research and introducing project carriers to new methodologies and tools. They include some concrete exercises which focus on themes such as how to plan a participatory project, how to validate its results, how to determine its strengths and weaknesses or how to identify the habits and fears that could inhibit its progress. Practice groups on diverse topics were also organized so that project carriers can exchange their experiences and learn from them. By gathering participants across teams, these transversal meetings serve as well to reinforce ties among the projects and thus to create a community of practices around urban resilience.

This assistance from the Centre for Support to Action Co-Creation was put in place right from the beginning of the project and has been reinforced throughout the years. Innoviris was indeed aware that the vision of co-creation they chose - and which is not the unique one viable - was quite demanding, especially in terms of actors to involve as co-researchers. In lack of any support, only structures already familiar with the approach would have been selected while other promising projects left aside. Confluences used to only monitor the phasing-in and full operation stages but have recently started to operate in the setup phase. This stage turns out to be more delicate: Confluences has trouble explaining its position to participants who often regard it as an auxiliary instrument of Innoviris created to watch them. It is therefore essential for Confluences to build trust among the candidates in its role as a neutral third party.

Dimension 3: Outcomes and Impacts

Innoviris has been selecting new projects each year since 2015 and it renewed its call for applications in 2021. In total, 24 projects have benefited from the entire support program. While they all led to some specific experiments on the ground, they are primarily research projects which aim at producing and sharing new knowledge (largely made available online). The 6 projects of the first edition (2015-2018) which focused on sustainable and fair food systems also had the opportunity to present their results during the forum Co-Create organized in 2018. This forum consisted of two days of round tables

(with project carriers and external actors) to debate the results obtained and generate 11 propositions on future food systems in Brussels, that were then publicly presented and summed up in a publication. The goal of this forum was to share co-creation experiences, valorize research results and convey learnings and tools that could later be reused and improved by others. Besides, it is planned that surveys inquiring about what each project of Action Co-Creation has become will be conducted three years after the end of their support period. The survey of the first projects is thus expected for the end of 2021. While members of some projects decided to go their own way at the end of their research, others decided to launch their enterprise or to continue their collaborations through another program funded by Innoviris which is more oriented towards implementation.

Because of the atypical format chosen (which requires to include field-actors among the co-researchers), the project carriers are able to directly make use of the knowledge they acquire. While more standard research projects conducted in universities must go about the difficult task of transferring knowledge, Action Co-Creation projects do not face similar challenges, as co-researchers directly valorize their results on the ground. Their findings along with their collaborations with other stakeholders can also change their standpoints in their daily professional and private lives. For instance, by collaborating with public institutions with which they were first in conflict, some members of an environmental organization acquired a more global understanding of issues regarding water management, as they realized how complex and interdependent were the underlying mechanisms (e.g. linking dams and floods). In return, the institutions learnt to discuss with them as legitimate partners with expertise, rather than considering them as troublesome activists. These changes of mentalities are however more tacit, and therefore not so easy to be quantitatively assessed.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

A specificity of Action Co-Creation is its three-stage selection process, which really puts an emphasis on the setting-up of the projects. The key elements that will make the co-creation successful must be implemented right from the outset, when participants draw up the project structure. These elements are already visible in the expectation of each stakeholder or in the budget that reflects for instance how project carriers intend to involve citizens (e.g. relying on complete volunteering will make it difficult to ensure their strong commitment). It is thus all the more important to support projects in their early stages if the right collaborative momentum is to be launched.

Innoviris and Confluences also pay particular attention to the distinction between collaboration and participation. Many projects tend indeed to view the number of stakeholders as an indicator of whether the co-creation dimension has been well respected, while a reduced number of project carriers, who all feel strongly concerned and involved, can in fact be more valuable.

* * *

Sources:

Interview on July 19th 2021 of Xavier Hulhoven (Scientific advisor of Innoviris, Initiator and responsible for the program Co-Create)

Action Co-Creation website (https://www.cocreate.brussels/)

Confluences website (https://www.confluences.eu/action-co-create/)

Presentation of Action Co-Creation by Innoviris (https://innoviris.brussels/sites/default/files/documents/presentation_co-creation_2021.pdf)

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Full description of the program's steps by Innoviris (https://innoviris.brussels/sites/default/files/documents/etapes_et_suivi_dun_projet_co-creation.pdf)

AFAUP

Association Française d'Agriculture Urbaine Professionnelle (French Association for Professional Urban Agriculture)

Key findings:

- AFAUP network provides visibility and an entry-point for anyone interested in Urban Agriculture (UA) in France
- Urban Agriculture and alternative/short food chain/network initiatives at heart of many processes of technical, social, organizational innovation, that involve many hybrid forms
- AFAUP provides support to UA initiatives in "reaching market" (public, private call for projects) and following certain rules (summarized in a Charter) for sustainable growth of UA as a sector
- AFAUP builds institutional strength for regulatory representation of UA actors in all their diversity

Sources:

- W: Project website/platform
- W_AMP: *AMP* website
- W_CMR: *Cité Maraichère de Romainville* website
- W_CIT: *La Citrouille* website
- W_NOO: *Noocity* website
- W_PU: *Le Paysan Urbain* website
- W_PL: *Peas & Love* website
- W_VV: *Veni Verdi*
- W_VF: *V'Île Fertile*

The AFAUP Project

AFAUP, founded in 2016, is a non-profit national organization that aims to organize and regroup professionals from the field of Urban Agriculture ("UA") and to facilitate their interlinkages with actors from cities, the agricultural sector, and citizens. UA, as it mobilizes both social and technical innovations, is considered to help "reconnect citizens with the living", "create social linkage", "improve food quality and food autonomy in cities", "recycle waste, air and water", "revitalize the lives of deprived urban dwellers", and "increase real estate value". AFAUP considers UA in all its diversity, from grassroots associations to entrepreneurial ventures, from low-tech to high-tech solutions, and from forms of implementation that may be directly into soil or instead on rooftops or even parking lots (W). Currently, AFAUP counts 110 members, 600 production sites, 76 hectares of cultivated area, that involve a total of 575 employees.

Dimension One: Participants and Motivations

<u>Consortium breakdown</u>

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The consortium members are the following (see table below):

Name*	Type (EU taxonomy)	Description / role	Country
AFAUP (Association pour l'Agriculture Urbaine Professionnelle)	N/A	French Association for Professional Urban Agriculture : national network for 110 Urban Agriculture (UA) initiatives in France.	France
AMP (Aquaponic Management Project)	N/A	Private sector aquaponics involving citizens, municipalities and the private sector	France
Cité Maraichère de Romainville	N/A	Municipally-led vertical urban farm involving the Romainville municipality with private sector and citizens	France
La Citrouille	N/A	Private sector "ready-made" vegetable patches for citizens	France
Noocity	N/A	Private sector "ready-made" vegetable patches for citizens and companies, involving co-creation of vegetable patch with Noocity Growers	France
Le Paysan Urbain	N/A	Third-sector/private sector (mixed status "Entreprise Sociale et Solidaire") micro-farm involving citizens and workers through social programs (production and education)	France
Peas & Love	N/A	Private sector "distance" vegetable patch (cultivates patch for citizens in their region who can come and pick their produce)	France
Veni Verdi	N/A	Third-sector initiative that sets up micro-farms and rooftop UA on school grounds (production and education)	France
V'Île Fertile	N/A	Third-sector micro-farm (production and education)	France

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

* Aside from AFAUP itself, the following members listed only constitute some of the 110 members of the AFAUP network. They appear in the list because they are used below as illustrations for how Urban Agriculture initiatives contribute to co-creation and innovation between different spheres of the Quadruple Helix (see "Dimension Two: Methods and Processes").

Stakeholders from Project activities

AFAUP is adamant about who can be admitted as a member of the network, and who cannot. Those who can be admitted include "consultants, providers, farmers, animators, and actors aiming for social insertion through work, broader social linkage, pedagogical projects, or the conception of "edible landscapes". Conversely, those who cannot be admitted include (notably, but not only) "institutions, local authorities, urban planners and developers, and food distributors (e.g., supermarket chains) (W).

Dimension Two: Methods and Processes

AFAUP Charter

The Charter fixes certain rules that pertain to the specificities of agricultural projects when they are implemented in such particular physical/social contexts as urban or peri-urban areas. These Charter rules are destined to both UA actors (its members, therefore) and local/municipal authorities or building tenants or tenant organizations that provide the spaces where UA activities will be implemented following calls for UA projects ("ordering parties"). They help establish healthy practices that are geared towards "the long-term and the general interest" with regard to "contemporary agricultural, urban and societal issues" related to sustainable management of water, air and waste, the circular economy, economic sustainability, food security, reconnection with the living world, the creation of social linkages, professional insertion, and improved valorization of real-estate. The ordering parties are required to follow eleven points, that include, among others, to establish a "sustainable and collaborative sustainable development approach that responds to economic, social and environmental needs of present and future generations", "to favor an inclusive and multi-functional approach to agriculture", to "support circular economy and social insertion initiatives", to "maintain farms that still exist in peri-urban areas and develop linkages with them so that the UA projects are coherent with and integrated within their environment", and to "accompany the promotion and communication around the project and to sustain the operator in its relations with public authorities and local residents"; as well as several points that relate to technical and regulatory aspects (e.g., soil pollution, planning regulations, economic business model).

Stakeholder engagement: at the level of AFAUP

AFAUP has three core missions. Firstly, it aims to *Federate*, that is, "to welcome in an open way, without judgement, the entire spectrum of urban agriculture initiatives", in order to help develop "a multiplicity of solutions to urban issues". Secondly, it aims to *Communicate* about AU to citizens, city actors, agricultural sector actors, and other members of AFAUP. Thirdly, it aims to *Accompany* AU actors as they create new professions, new types of projects, new forms of organization that articulate associative (third-sector), agricultural and private spheres (for instance, 80% of AFAUP members aim for both food production and pedagogy/training). Through these different aspects, AFAUP members constitute hybrid entities with hybrid approaches that are not always easy to explain and to valorize with respect to the public sector and other large organizations. AFAUP classifies these UA initiatives/members following this hybrid logic, either as "Conceivers-Animators", "Producers-Animators", "Conceivers-Producers", "Providers-Consultants", or "Consultants-Conceivers". AFAUP provides its members with support during calls for tender that can affect the decisions made by these large organizations regarding whether to award a market/contract/financing, and ultimately the scaling-up and long-term viability of UA.

Stakeholder engagement: at the level of Urban Agriculture initiatives in themselves

This report can only scratch the surface of the sheer variety of ways in which UA initiatives (in general, but here we focus on those supported by AFAUP, since this is the entity being studied in this report) help bring together Quadruple Helix (QH) actors from all helices in collective processes and multi-stakeholder collaborations for innovations of many types (technical, social, institutional, economic) that have major impacts on multiple aspects of sustainability in cities. Among the 110 members

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supported by AFAUP, the following types of activities and innovations can be drawn out to provide a basic illustration of these innovation processes. These are in part drawn from previous study done on AFAUP and some of its members in this report's author's doctoral thesis (Stephens 2020). Each UA initiative has its own set of objectives, embedded values, organizational structure, network, etc., so the following illustrations only provide a basic image of the richness of interactions which stakeholders from the QH can have together around food.

AMP ("Aquaponic Management Project") develops aquaponics (symbiosis between aquaculture fish and hydroponic culture of vegetal matter) develops solutions at four levels: "domestic aquaponics" for ordinary citizens (aquarium and micro-greenhouses), "urban aquaponics" on rooftops and municipal land involving publics from gardens, parks, schools, retailers); "industrial aquaponics" on urban fallows both in France and in African countries specifically as a relay to industrial fishing (W_AMP). The *Cité Maraîchère de Romainville* builds a vertical market gardening greenhouse which will create jobs, including for local actors involved in food, as well as provide festive, scientific and educational events and healthy food for its population (W_CMR). *La Citrouille* provides read-made vegetable patches for citizens, which can be integrated on any outside surface and require no prior knowledge of plant rotations, varietal choice etc (W_CIT). *Noocity* provides a similar ready-made solution, but for residential apartment terraces and larger corporate building terraces, while providing a network of "Noocity Growers" who "co-construct with you the vegetable patch that is adapted to your needs and space" and come over monthly to share their knowledge and experience of growing (W_NOO). *Le Paysan Urbain* produces micro-sprouts on substrate soil on inner-city land, involving workers through social insertion and pro-bono citizen participation programs, and providing sensitization and pedagogy workshops to schoolchildren, local residents and employees from the private sector (W_PU). *Peas & Love* provides citizens with access to a vegetable patch lot in their region, which is cultivated for them and which they can visit to come and pick their own produce while interacting with the *Peas & Love* farmers, who also interact with them virtually to keep them informed about the evolution of their lot (W_PL). *Veni Verdi* (W_VV) develops vegetable lots on school grounds, involving schoolchildren, through values of "citizenship", "solidarity" and "creativity", in the establishment and running of micro-farms, vegetable lots on rooftops or plain earth, and demonstrators (W_VU). *V'Île Fertile* is an associative (third-sector) micro-farm that employs socially inserted workers and pro-bono citizen participation in the production of a wide variety of fruits and vegetables, with a strong emphasis on recuperating organic waste from local sources (e.g., horse manure from the neighboring republican guard stables), while also providing workshops for local schools and residents (W_VF).

These numerous examples, although there are so many more, provide a picture of the richness of interactions around food which are already well established between citizens and food actors from the private, public and third (associative) sectors, involved at all stages from materials sourcing to production, distribution and education, through methods and techniques that involve citizens in food in an increasingly innovative and diverse manner.

Dimension Three: Outcomes and Impacts

Benefits of membership with AFAUP

Through membership, UA professionals benefit from a range of advantages. Firstly, they appear in a UA Registry which is made available to entities seeking to develop UA projects (e.g., public authorities such as municipalities). Secondly, members have access to pre-negotiated contracts with providers (of materials, services, expertise, etc.). Thirdly, they are nationally represented with regard to legal and institutional aspects. Fourthly, they have access to a large network of other UA professionals, get

priority information on calls for projects and regulatory evolutions. Finally, the AFAUP website provides them with a broad online audience with regard to citizens (among others).

Benefits from the Urban Agriculture initiatives in themselves

Although the forms of UA initiatives, their objectives, values, the innovations they mobilize, and many other aspects, are multiple and diverse, the expected outcomes from these food initiatives operate along the lines of those that stem from *Alternative Food Networks,* or "AFN" (e.g., Stephens 2020, Stephens and Barbier 2020, Goodman et al 2012). These AFNs build localized and direct relationships between food producers and consumers, shedding light on "a wide variety of consumer engagements that include organic agriculture, participatory guarantee systems and community-supported agriculture" (Stephens and Barbier 2020), as a "response to the glaring and multifaceted contradictions of the unsustainable industrial food system and the exploitative trading relations embedded in the global supply chains that support its growth and (expanded) reproduction" (Goodman et al 2012). As these networks develop, they incorporate a growing wealth of consumers who develop, through localized reconnections with producers but also new virtual mediums thanks to ICT technologies, greater knowledge of food, making them more involved with the food they eat and therefore turning them into something that goes beyond simple consumers: rather, they are "food prosumers" involved in "food prosumption" (Stephens 2020; Stephens and Barbier 2020), facilitated by initiatives such as UA but also "Short Food Supply Chains" (Aubry and Kebir 2013), sometimes both at once: indeed, UA initiatives are usually embedded in localized short food supply chains and other types of alternative networks of food provisioning that reduce intermediations, usually to 0 or 1 intermediary, between producers and consumers. In consequence: (i) producer margins are increased and it becomes possible to produce a livelihood with a smaller production and, moreover, accomplishing this while remaining close to cities (making the difficult job of food producer more attractive, especially to younger generations)

(ii) food quality increases in nutrition, taste, environmental impact and ethics (e.g., animal rights)

(iii) ecological sustainability increases with reduced intermediations and food mileage (when transport mode is comparable), reduced waste and generally better production practices (especially since production, in UA, occurs close to dense residential areas as opposed to large vacant fields in rural areas)

(iv) social sustainability improves with the integration of socially inserted workers, pro-bono "coming together around" food, educational and wider pedagogical potential, reconnection with food and the living world, and healthcare, among many other social benefits

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Agrivair

Agrivair is a subsidiary of Nestlé Waters created in 1992 and aiming at preserving the water sources of Vittel - which supply its natural mineral water brand - by working with various local stakeholders to change farming practices in the area.

Dimension 1: Motivations and Participants

In the early 1980's, the replacement of the hay-based cattle ranching system by an intensive maize-based system had led to an increasing risk of nitrate contamination in the Vittel catchment. This environmental issue, along with a worrying use of pesticides, was raising concerns among the bottling industries of natural mineral water, especially since the quality of bottled water must comply with strict French legislation and sanitary requirements. Because no public incentives for farmers to change their agricultural practices were offered, Nestlé Waters, which had become the majority shareholder in the Vittel Company in 1987, decided to launch a program to collaborate directly with farmers present on the territory surrounding the water sources, which later led to the creation of Agrivair in 1992.

To design this program, the INRAE (the French National Institute for Agronomic Research) joined forces with Agrivair in 1989. The INRAE had indeed just created a research division about farming systems and Agrivair's project provided a good opportunity to apply it. They thus started a four-year multidisciplinary action-research program aiming at defining a more sustainable agricultural model for the region as well as incentives for farmers to adopt it.

Local farmers (largely dairy farmers) working in the 6,000 hectares Vittel catchment are the main partners of the co-creation process, as the program was launched specifically to change their practices. They were ultimately motivated by the incentives offered by Agrivair in return for their changes, although convincing them that they would benefit from engaging in the program was a major challenge, as it will be outlined in Dimension 2.

Although only Agrivair, researchers and local farmers were really the ones at the core of the collaboration, the program operated in an ecosystem that included a much wider range of stakeholders, all the more so when the program's scope was enlarged to a 10,000 hectares area, to scale its impact. The local public sector had an interest in this program, as an eventual closing of the water business in the region would have deeply affected the local economy, especially by impacting employment. Local authorities participated in sharing the conclusion of the monitoring phase to farmers and presenting the possible actions to undertake in response, and they also promoted maintenance practices that avoided agrochemicals among a wider public (a golf course, the railroad company, green spaces managers…). Actors from the tourist sector, among which a health resort and a vacation club, shared Agrivair's motivations about the quality of water. Finally, entities embodying the agricultural profession like the Chamber of Agriculture, the FNSEA (the National farmers Federation) or the SAFER (a private institution created by the public sector to intervene in farmland markets) sometimes acted as an intermediary between farmers and Agrivair.

Dimension 2: Methods and Process

The program was based on an action-research approach: the idea was to apply scientific methods directly on the territory in partnership with local stakeholders. More precisely, the program consisted in several successive phases:

- Consultation of scientists that could find the causes of the increased nitrate rate that had been noticed: the territory was monitored, especially through *in-situ* measurement systems in agricultural parcels, to get an overview of the local farming systems. This multidisciplinary research was undertaken by approximately 40 actors (agronomists and soil scientists, but also sociologists and economists…). Farmers already participated in this stage: scientists collected data on the ground with them to respect and understand their agricultural practices.
- Data analysis and sharing of the results with the different stakeholders.
- Elaboration of the recommendations and measures to be taken in order to maintain local economic activities and Nestlé Waters' bottling activity. Agrivair continued to collaborate with farmers to devise the measures to be implemented on the ground while taking into account their needs and concerns.
- Implementation of these measures. This phase included a bargaining process, to adapt the specifications and counterparties (further detailed in Dimension 3) to each context.

Following the completion of all these stages, Agrivair realized that they needed to embrace a more global approach to tackle the issues raised by the rapid urbanisation of the Vittel area which also posed a threat on the groundwater quality. Including new stakeholders thus appeared as a necessity for Agrivair to really scale its impact. The geographical expansion of the program to other adjacent lands was accompanied by a widening of its scope, which was extended beyond the farming sector. New collaborations made it possible to improve the management of forests, golf courses and city parks - to name but a few.

The main challenge faced by Nestlé was to convince farmers as well as institutions representing the agricultural profession: many were at first reluctant to engage in a partnership with Neslté Waters whose legitimacy and ambition was not always well understood. It was indeed difficult for a bottling industry to call into question agricultural practices that had been followed for 30 years on the territory. The fact that these practices were largely responsible for its degradation was not an easy message to convey, nor to be heard by farmers. Through sustained discussions that took time and required to forge a common language, Agrivair finally managed to convince them by showing that the set of incentives established a genuine win-win situation and compensated them for the loss of yield caused by the transition from an intensive agricultural system to a more extensive and sustainable one. Once a few farmers accepted the partnership, the first results emerged and aroused the interest of others who decided to join as well, thereby creating a group dynamic. Although the innovative dimension of this transition - in particular in the 80's and 90's - was challenging, it also brought together farmers who were curious of this farming model that ran counter to what used to be done in these days.

However, even if Agrivair has succeeded in enrolling a substantial number of local farmers (see Dimension 3), some are still not involved in the program and the participation of others cannot be taken for granted once and for all, especially since new generations are taking over the farms. Consequently, the program requires a continuous monitoring - that is still ongoing today - of all the partners' engagement that can only be conceived in the long-term if the objectives are to be met.

Dimension 3: Outcomes and Impacts

The collaboration between farmers, researchers and Agrivair resulted in a close environmental analysis of the territory around the sources of Vittel, but also around Hépar's and Contrex's ones - supplying Nestlé's bottling industry as well. This field evaluation began at the beginning of the program, in response to the increased nitrate rates observed, but it has been continuously maintained since, with the help of precise indicators on the ground (about water quality, biodiversity…). It quantitatively

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assesses the impact of the measures implemented, which provides data on water quality to Agrivair but also on soils and crops to farmers.

The environmental benefits of the program mainly come from the changes in farming practices: among others, the specifications of the partnership ask farmers to give up agrochemicals, to stop maize cultivation for animal feed, to adopt extensive cattle ranching, to reduce carrying capacity to a maximum of one cattle head per hectare, to compost animal waste and to modernize farm buildings for optimal waste management and storing. In 2020, 37 farmers were partnering with Agrivair, leading to the preservation of 10,000 hectares of land. The program also resulted in plantings (12,000 trees), in the protection of rivers and in the maintenance of hedgerows (240 km) on farmers' lands, as they are very valuable for the environment but tended to be cut down before. All these changes did not only protect the water quality, but also regenerate soils and biodiversity.

As necessarily implied by the win-win approach adopted, revenues of farmers are maintained thanks to the financial and logistics contribution that they receive in return for the changes they undertake in their fields (in the form of a PES - Payment for Environmental Services). More precisely, they signed a 18 to 30 years contract with Agrivair by which their land was bought by Vittel and left in usufruct. They are also given additional farm lands to compensate for the reduced cattle capacity imposed and receive subsidies to reimburse their debts previously contracted, ensure them a guaranteed income during the transition phase, acquire new farm equipment and modernize buildings. Finally, Agrivair pays labourers to apply compost in farmers' fields every year and provides free technical advisory assistance for farm planning.

In a larger scope, the momentum and discussions generated by the program about environmental protection prompted other actors to respect the specifications, thus building a new model of sustainable management of the territory. Local authorities worked with a golf course in the area and with green space managers (e.g. operating on school grounds, parking lots or paths) and contributed to change their weeding practices. A partnership was also established with the SNCF (the national railroad company) so that they opt for thermal weeding instead of agrochemicals to maintain their railways. Agrivair also worked with the ONF (National Forestry Office) to protect 300 hectares of forests owned by Nestlé Waters.

The measures adopted by farmers and other local stakeholders who later joined the program have enabled Neslté Waters to meet its original objective of maintaining its bottling industry, which is also economically essential for the Vosges departement: Nestlé is indeed the second largest employer there, with more than 4,000 direct and indirect jobs generated. More broadly, the environmental protection of the territory benefits the local economic development, by preserving the activities of the tourism sector for instance.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

It is interesting to note how this collaboration between farmers, researchers and the bottling industry - and later with local authorities, golf courses, etc. - initially arose from a constraining legislation and from a lack of public initiatives to improve the environmental situation: because no treatment is allowed before bottling mineral water withdrawn from natural sources, there was no choice for Nestlé Waters but to get at the root causes of the nitrate problem and, to do so, to partner with local stakeholders in order to bring about changes on the ground.

As this need to change farming practices was only felt by Nestlé Waters at the beginning, convincing other actors to collaborate was far from an easy task: contrary to other multi-actor programs whose participants are voluntary (they chose to apply to a call for proposals for instance) and where the

difficulty lies more in maintaining a lasting momentum, farmers were not even willing to partner with Nestlé at first. To overcome this challenge and establish win-win relationships, Nestlé had to design a set of incentives: this required to work with farmers in order to closely understand their specific needs and the local context. Involving some of them at early stages of the program (namely in the field monitoring and the elaboration of the specifications) revealed all the more fruitful as those who contributed to those first phases were consequently more prone to adopt the measures.

* * *

Sources:

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Interview on June 22nd 2021 of Christophe Klotz (Director of Agrivair from April 2012 to May 2020)

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BeeOdiversity

BeeOdiversity is a Belgian social enterprise created in 2012, based in Brussels, which aims to protect biodiversity while creating value from it, and more generally to improve environmental quality and human well-being. It provides its consultancy and advisory services to companies and public authorities either at a global strategic level, or at an operational level by conducting projects on site with the help of its innovative nature-based tools. To implement its different solutions and scale its impact, BeeOdiversity chooses to adopt a co-creative approach which involves local stakeholders.

Dimension 1: Motivations and Participants

BeeOdiversity launched its activities in response to the current global collapse of biodiversity that is caused by human activities and that is dramatically impacting the entire ecosystem, including humans themselves. The significant losses that pollinating insect populations are suffering is a particularly pressing issue - among others - since they are indispensable to many plants' reproduction systems. In this context, BeeOdiversity was co-funded in 2012 by Bach Kim Nguyen who wanted to engage more concretely in environmental protection after completing his PhD in agronomy and bio-engineering on the factors impacting bee mortality. The company has expanded since, and fifteen people were employed in 2021: the multidisciplinary team includes agronomists, engineers, legal experts, business developers and consultants, who are necessarily involved in the co-creation process.

Bees and other pollinators are considered as full partners, as they are the key element of BeeOmonitoring, the scientific tool developed by BeeOdiversity to monitor the quality of the environment by analyzing data collected by bees (which bring back flower's pollen samples into the hives). There is no need to point out that their identification as a partner clearly falls outside the scope of the Quadruple Helix Model, which thereby poses the question of enlarging the model to include natural partners (as the Quintuple Helix model does). More generally, BeeOdiversity promotes the concept that nature should neither be reduced to a set of resources to exploit (and even over-exploit) nor to a source of costs or constraints, but considers on the contrary that biodiversity is a partner that can create value.

Besides pollinating insects, BeeOdiversity's clients also take part in the co-creation process. They are mainly private companies, some public authorities (recently more and more) and a few associations. They all want to collect data on the quality of their environment and eventually undertake appropriate actions involving actors present on the ground, but their precise motivations depend on their profiles, which can be classified in three categories:

- Public authorities seek to engage local actors in a transition in order to preserve their territory (its biodiversity, air quality…) and to ensure the well-being of citizens.
- Actors whose activities rely on local endangered resources (e.g. industries in the water or agri-food sector) want to monitor and protect them, which implies that they collaborate with local actors in order to bring about changes in their practices.
- Actors having a negative impact on the environment want to reduce it, or actors whose impact is perceived as negative while it is not always (e.g. in the real estate or recycling sectors) want to raise awareness on this fact. These motivations can be linked back to some CSR concerns.

Despite these differences, there is yet a recently growing common conviction that biodiversity has to be taken into account. Tackling its collapse, whose causes are grounded in complex ecosystems, requires more and more multi-actor approaches, as no single stakeholder seems in a position to resolve this multifactorial issue on its own.

Local farmers, beekeepers, non-profit organizations or citizens are also essential partners to work with for BeeOdiversity, in order to concretely elaborate and implement projects. Those members of civil society are moved by a willingness to actively take part in projects having a positive impact on the environment and from which they can also largely benefit (e.g. by preserving their health). They can be driven as well by a desire to know more about their territory. For instance, many farmers lack knowledge about their use of pesticides (e.g. about their impact on crops, soils and health) and are thereby keen to collect more data on their lands thanks to the monitoring conducted by BeeOdiversity with them, or can be prone to follow training on sustainable agricultural practices.

Dimension 2: Methods and Process

Although the methodology of BeeOdiversity depends on the clients and specific missions conducted, its overall structure can generally be divided into three phases. Local stakeholders (like farmers, public authorities, non-profit organizations, research institutes…) are engaged in the process, more and more from one stage to the next.

1. The monitoring phase: BeeOdiversity uses its tools to take stock of the local environmental situation (in terms of biodiversity, pollution...) and analyzes the processes already in place. Local farmers can for instance be solicited to better understand their practices, and beekeepers' participation is necessary if the situational analysis relies on BeeOmonitoring. The results, that are shared, can be enriched by environmental associations or institutes already working in the area. This phase remains ongoing during the projects, to assess the impact of the solutions implemented and provide feedback to the participants.
2. The simulation and recommendation phase: new strategies and measures are identified. The actions to undertake are discussed with clients but also with those local actors whose expertise is valuable to interpret the results of the first phase.
3. The implementation phase, to take action on the field (e.g. by reducing the use of the pesticides and pollutants previously identified, designing landscaping or therapeutic gardens, placing insect hotels or bee colonies, conducting tailor-made animations…). During this phase, training, collaborative workshops harnessing collective intelligence, conferences, forums and awareness-raising sessions are conducted with local actors. They can also actively take part in the concrete setting up of the solutions identified, through plantings for instance.

One of the challenges that BeeOdiversity often has to face resides in gaining the trust of local actors, in particular farmers. Seeing an unknown company coming to assess their practices and making recommendations to change them can lead to an understandable mistrust or resistance, since they can be worried about being stigmatized or asked to make too radical changes overnight after the field evaluation, or about not being let the opportunity to have their say in the process. Local populations as well as non-profit organizations can also be suspicious about private companies deciding to engage in environmental protection and wonder about their underlying motivations. While industries must keep on changing their perspectives (about CSR for instance), it is also necessary that civil society does not continue to systemically treat economic viability and socio-environmental impact as two irreconcilable opposites. To this end, BeeOdiversity relies on collaboration and transparency: listening to local partners, taking their needs and constraints into considerations to build win-win approaches, engaging them in co-creative activities, raising awareness and communicating have proven to be effective ways to limit opposition and even turn reluctance into positive involvement. Rather than imposing unadapted radical measures that will hardly be accepted, it is more efficient to institute genuine dialogues and collectively determine solutions that take into account current practices and that will succeed in achieving gradual changes.

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Another problem for BeeOdiversity lies in the justification of its scientific expertise: people accustomed to electronic sensors must often be convinced that biological solutions can also be reliable, even though they come with an inherent randomness. It is thus essential for BeeOdiversity to communicate about its nature-based solutions to foster a deeper understanding among participants, especially since they all have different backgrounds and fields of expertise. But once doubts are dispelled about the efficiency of the tools, the fact that they actively protect the environment reveals to have a unifying dimension: citizens can be more prone to collaborate on a natural solution based on bees' colonies than on a purely technological one.

Dimension 3: Outcomes and Impacts

The impacts of the projects conducted are firstly environmental: each year, BeeOdiversity monitors around 100 project sites, which amounts to more than 70,000 hectares in 10 different countries. Most of the changes in local practices (like in the use of pesticides) and a lot of new installations (like planting) are made possible by the collaboration with local actors. For instance, actions undertaken in partnership with beekeepers protect pollinating insect populations, but also bring positive environmental externalities, as they are essential to many plants: pollination stimulates the reproduction of plants and trees which enriches genetic diversity - thereby increasing plant resilience to diseases - and which leads to more carbon sequestration - thereby contributing to fight climate change. The involvement of local farmers also enables continuous field monitoring, which is indispensable to evaluate the solutions implemented. Finally, BeeOdiversity directly shows through its activities how nature can offer services and create value, which provides an additional reason to preserve it. Its actions of communication and awareness raising, destined to local stakeholders or to a wider public, advocate for environmental protection as well.

The projects' impacts are also social in several ways. Their benefits for local actors go beyond the general necessity for society to tackle the current environmental crisis. The missions conducted provide opportunities to gather people: although they are all coming from different backgrounds, they engage in unifying projects and learn to collaborate, which strengthens social links within local communities. The participation of citizens also empowers them: besides gaining knowledge during the training, they are actively involved in the solutions' elaboration and implementation on their territory. The measures themselves benefit their health and well-being. For instance, neurologists are solicited to design indoor and outdoor planting schemes in workplaces that have positive impacts on employees' health, capability to manage stress and efficiency at work. A collaboration with medical experts also revealed that the installation of gardens has a therapeutic impact on preventing neurological diseases (like Alzheimer's) or psychiatric diseases (like depression).

The projects conducted also create economic value for the clients and for the actors engaged in the collaboration. For example, industries' activities are maintained by reducing pollutants that were threatening water supply and foodstuffs, while beekeepers supplement their honey production with another source of income. BeeOdiversity can also seek services of local companies to carry out audits, which stimulates the local economy.

Finally, on an institutional point of view, having a better understanding of the environmental quality of a given area (levels of pesticides and pollutants, quantity and types of biodiversity, etc.) enables policy makers to devise appropriate measures towards improving biodiversity. To this mean, BeeOdiversity goes to the annual Week of Bees and Pollination hosted by the European Parliament, shares some of its results and raises awareness, thereby making valuable contributions to the elaboration of new regulations. Moreover, results shared to the press have led to some parliamentary questions and debates in the Brussels Region. The influence that projects can have on new policy raises the question of the implication of policy makers in the co-creation process: while they currently tend

to only receive its end results, would including them more upstream be more efficient to elaborate regulations that are more appropriate to the challenges faced on the ground?
The project initiated in 2015 in Knokke-Heist (a Belgian city that faced several environmental challenges) is particularly striking by its scale and range of stakeholders involved - which is progressively increasing as the project expands. The city, the farmers and more than 600 citizens have for instance participated in planting which led to a very successful development of wild bees. New processes were also implemented to reduce industrial pollutants by collaborating with the company in charge of the port. Training sessions were conducted, destined to local farmers and golf course operators to make their practices more sustainable and reduce their use of agrochemicals, but also destined to schools and tourists, in particular through educational circuits in the city. Finally, poor choices in urban planning had led to a lack of biodiversity but the actions undertaken succeeded in quadrupling the number of plant species in four years. The project was then extended to agricultural zones around the city and to local retirement houses with the creation of green therapeutic spaces.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

BeeOdiversity's services are inherently integrated in a win-win approach for all the stakeholders and ecosystems. Its clients receive the services they need to pursue their activities, while ensuring a positive social, environmental and economical impact. The inclusion of the local population in the projects benefits both to civil society and clients: companies wanting to preserve water supply are for instance keen to offer training on sustainable agriculture to change the practices of farmers who, in return, preserve their crops, soils and own health. Another example of this win-win approach are the plants that are integrated in the environment during landscaping projects: they are selected for their ability to improve the well-being of other animals (such as cattles, birds, wild bees) by increasing their survival, growth and reproduction rates, thereby benefiting both to animals and to the newly integrated plants and implicitly including them in a new helix - a 'natural partners' one. Consequently, cattles in agricultural grasslands produce better tasting milk with a higher nutritional quality (increased Omega-3 levels), which brings substantial value to the end-product of farmers or private companies. Finally, the BeeOmonitoring tool also manages to be interesting at the same time for clients, beekeepers and the environment: it is a cost-effective solution in comparison to other purely technological tools, but it also actively regenerates biodiversity while stimulating the activities of local beekeepers. BeeOdiversity makes sure to find a consensus and respect the interest of the local population if it is not aligned with the one of its clients: although the clients are the ones seeking the services of BeeOdiversity on a particular project, the co-creation process cannot be only at their service, other partners (including natural partners) must take advantage of the collaboration as well.

* * *

Sources:

- Interview on February 26th 2019 of Bach Kim Nguyen (Co-Founder of BeeOdiversity)
- Interview on June 25th 2021 of Michaël van Cutsem (Co-Founder of BeeOdiversity)
- BeeOdiversity website (https://beeodiversity.com/fr/)

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BigPicnic

Big Questions – engaging the public with Responsible Research and Innovation on Food Security

Key findings:

- Builds public understanding of food RRI through co-created outreach exhibitions engaging citizens held in botanic gardens throughout Europe
- Develops an RRI toolkit to engage QH stakeholders, with citizens at the centre, to co-create understanding of RRI on food security issues
- Formulates a set of seven Policy Briefs to the attention of policymakers based on the citizen engagements at the outreach exhibitions

Sources:

- W: CORDIS Project page or Project website
- D1.1 Stakeholder Engagement Strategy
- D5.2 Public views and recommendations for RRI on food security
- D2.1 Blueprint of toolkit for co-creation
- D5.1 Toolkit on co-creation processes
- D6.3 Final Festival Proceedings
- D8.2 Final External Evaluation Report
- CCN: Co-creation Navigator website

The BigPicnic Project

BigPicnic (May 2016 – April 2019) builds public understanding of food security issues that incorporates RRI. The Project consists in co-created outreach exhibitions that engage citizen audiences in science cafés held in botanic gardens and elsewhere, in order to capture public views on food security. The findings of these public engagements are consolidated into two key publications: a report articulating public opinion and recommendations for RRI on food security; and a co-creation toolkit. The overall aim of BigPicnic is to understand how people in multiple contexts and social groups interpret and propose solutions to food security issues, in order to further RRI for the future of food. To this aim, BigPicnic's objectives are to develop an RRI toolkit from best practice case studies; to increase engagement through outreach exhibitions and science cafés; to co-create novel mechanisms that facilitate interactions between the public, policy makers and researchers; to utilize findings from EU projects (INQUIRE, PLACES and VOICES); to build capacity for botanic gardens across Europe to deliver co-creation approaches to their audiences; to develop botanic gardens as centers that promote dialogue between public, researchers and policy makers; and to co-develop the tools for measuring the engagement of consortium members and co-creation teams with RRI and the benefits of the co-creation participatory approach.
Botanic gardens, involved as they are in food security research (seed banking, nutrigenomics) and used to connecting citizens to the plant world, play a central role in BigPicnic (W).

Dimension One: Participants and Motivations

<u>Consortium breakdown</u>
The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
BOTANIC GARDENS	O	UK

CONSERVATION INTERNATIONAL LBG (coordinator)		
UNIVERSITAET INNSBRUCK	HSEE	Austria
UNIVERSITY COLLEGE LONDON	HSEE	UK
AGENTSCHAP PLANTENTUIN MEISE	RO	Belgium
STICHTING WAAG SOCIETY	RO	Netherlands
COMUNE DI BERGAMO	PB	Italy
UNIVERSITEIT LEIDEN	HSEE	Netherlands
UNIWERSYTET WARSZAWSKI	HSEE	Poland
UNIVERSIDADE DE LISBOA	HSEE	Portugal
ELLINIKOS GEORGIKOS ORGANISMOS- DIMITRA	HSEE	Greece
SOFIA UNIVERSITY ST KLIMENT OHRIDSKI	HSEE	Bulgaria
AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	RO	Spain
UNIVERSIDAD DE ALCALA	HSEE	Spain
LANDESHAUPTSTADT HANNOVER	PB	Germany
FREIE UNIVERSITAET BERLIN	HSEE	Germany
WISSENSCHAFTSLADEN BONN EV	O	Germany
UNIVERSITETET I OSLO	HSEE	Norway
TOORO BOTANICAL GARDENS	O	Uganda
ROYAL BOTANIC GARDEN EDINBURGH	RO	UK

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

The audiences targeted by each Partner "vary from teenagers to senior citizens, parents of visiting schoolchildren to refugees and from students to local farmers, amongst others" – that is, "consumers ", the main target audience of BigPicnic. Other non-citizen (or non-consumer) targeted stakeholders include food or agriculture-related producers, stakeholders from food retail, the hospitality industry, food banks, seed banks, rural development networks, food movements (urban growing, education,

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justice, waste, etc.), government and policymakers (food safety, Ministry of Agriculture), media, research institutes in food technology, agriculture or environmental science – among many other types (D1.1).
The BigPicnic Final Festival comprised attendees from a wide range of audience types, predominantly from Botanic Gardens (43%), but also from academia, education, policy, industry, NGO, SME, media, other H2020 projects and uncategorized types (who represent a sizable 25% of attendees) (D6.3).

Dimension Two: Methods and Processes

Stakeholder engagement

BigPicnic's stakeholder engagement strategy starts with a stakeholder mapping and network analysis exercise between (Consortium) Partners, who exchange plans for engaging their target groups, their use of various co-creation methods, and strategies for reaching other regional/national/international institutions and policymaking bodies (D1.1). Engagement of stakeholders is accomplished through a mixture of direct engagement (getting advice through Food Security Advisory Groups), semi-direct engagement (Co-creation workshops, Outreach exhibitions, Science cafés), and indirect engagement (snowballing through digital online media and various events).

Difficulties in applying co-creation and engaging stakeholders

These are evoked in the Project's final external evaluation report (D8.2), and include: confusion as to process and methodology due to lack of step-by-step instructions; convincing people to participate in workshops or even accessing certain groups (e.g., refugees); overcoming skepticism from one group towards another (e.g., researcher with food industry actors); time-consumption of building trust; respecting participants' different "times" and making them coincide with those of other participants (e.g., researchers timeframes); open-mindedness (or lack thereof) of the different botanic gardens involved; etc.
Most botanic gardens reported difficulties in engaging policy makers, due to bureaucratic layering (especially higher levels of policymaking). In some cases, higher officials of the botanic gardens themselves did not always appear to be able or wish to participate. In other cases, citizens did not always seem comfortable in conversing with officials such as policymakers (D8.2).
Overall, though, the evaluation report suggests that BigPicnic's core objectives were achieved, including, in particular, "Objective 3- To co-create, with diverse audiences, accessible and novel mechanisms to facilitate interaction and bridge the gap between the public, policymakers and researchers", engaging a very wide range of stakeholders around food security issues.

Dimension Three: Outcomes and Impacts

Policy briefs

Seven policy briefs are drawn from the recommendations formulated by stakeholders throughout the Project activities (Outreach exhibitions and Science cafés). Out of this number, "four aim to support policy makers to shape future food policies and funding frameworks and two seek to support informal learning sites" (the seventh addresses exclusively issues for an Ugandan project Partner). These Policy briefs are linked to UN SDGs such as (among others) SDG#2 "Zero Hunger", SDG#3 "Good Health and Well-being" and SDG#12 "Responsible Consumption and Production". Policy briefs that involve policy makers include, as an illustration, Policy Brief 1, "The cultural heritage dimension of food should be embedded in food policy", which recommends, among others, that policy should "support the

acquisition of (traditional) food products and food processing skills as a means to enhance food sovereignty on familial, regional and national levels"; and Policy Brief 2, "Increase the resilience of citizens, especially vulnerable groups, to climate change and increase climate neutrality of food systems", that recommends, among others, to "reduce excessive food imports" and "support Civil Society Organisations (…) as well as local communities (…) to participate in decision making and the implementation of food security policies and programmes to address climate change". Policy briefs that directly explicate contributions from co-creation are Policy Brief 5, "Using participatory approaches to raise unheard voices and broaden our perception of expertise", recommends to "build new knowledge and create value, for all concerned, through open and inclusive research and public engagement processes", to "involve the larger 'eco-system' (e.g. audiences, green organisations, researchers and industry)", to "leave your site to get easier access to and build relationships with new audiences. Don't expect they come to you", to "focus on creating strong, lasting relationships with a deeper, more sophisticated engagement rather than on reaching more people", and to "open-up the research process and co-create across the organisation to build a knowledge base, foster ownership of a topic, gain support for projects and create leverage for the results". In this brief, BigPicnic specifies that "co-creation creates value on multiple levels, it does not necessarily lead to predictable results – freedom, creativity, flexibility and, above all, perseverance need to be part of the process" Policy Brief 6, "Organisations should embrace new approaches and draw on a broad spectrum of expertise as catalysts for change", recommends, among others, to "embed participatory research and development approaches such as co-creation", making use of botanic gardens as "an inclusive space, or hub, for dialogue around food security, encouraging and facilitating discussion across different stakeholders to inform policy and strengthen (or create) relationships between different societal actors". To this end, BigPicnic Partners established "Food Security Advisory Groups" made up of local experts from policy, industry, food production and civil society, who helped the botanic gardens involved co-create their food security goals in relevance with local needs and context (D5.2).

Toolkit on co-creation process

Consortium member WAAG hosts an online Co-creation Navigator as part of BigPicnic and other Horizon 2020 projects which WAAG is a part of, and which is maintained for future projects. Conceptually, BigPicnic co-creation connects "relevance" (by involving experts), "ownership" (citizens feeling part of something), "agency" (citizens having and making concrete choices) and "sustainability" (in design). To guide Partners, WAAG developed a co-creation workbook based on behavioral change, with a programme built around "movement" (people making informed behavioral changes in their lives), "enabling environments" (optimal circumstances to work together) and "co-creation" (with a five-stage process: foundation, context, community, workspace, and assessment). Three requirements are considered central to facilitating co-creation: the aforementioned "co-creative process", "tools and methods", and "soft skills: mindsets"

The five-stage co-creation "working structure" or process (first requirement) is not linear but rather "allows for reflection, iteration and revisiting previous stages". "Foundation" and "context" refer to the "internal structure of an organisation, and the skills of people facilitating the co-creation process". "Community" and "workspace" depict the type of community involvement and the co-creation activities. "Assessment" helps reflect on ambitions and efforts mobilized. BigPicnic stresses the iterative character of the process, particularly in the workspace stage.

The tools and methods mobilized during this working structure (second requirement) are available throughout multiple sources on the internet (e.g., Hyperisland Toolbox) but finding the right method/toolbox may be challenging. The Co-creation Navigator aims to act as a repository to "navigate through the forest of tools and methods".

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Soft-skills focused on mindsets (third requirement) identify seven types of mindsets that can be relevant in several stages of the co-creation process: “critical” (e.g., question the ordinary), fearless (e.g., allow uncertainty), “hands-on” (e.g., create while doing), “sensitive” (e.g., get to know people and show empathy), “experimental” (e.g., try something new), “flexible” (e.g., allow others to change the direction), and “optimistic” (e.g., believe in a solution).
To enact this toolkit, WAAG set up an open access visual representation of the co-creative process with over 70 tools and methods to support facilitation of co-creation, both newly developed and already in existence. All in all, the Co-creation Navigator (and the Co-creation toolkit it is based on) provides a structure for aspiring facilitators to understand the co-creative process (D5.1).
The tools and methods are highly diverse, ranging from a “Lego exercise” (so people come to understand what it means to work together), “2 minute design challenge” (solving a small problem) “empathy map” (better understanding audiences), “stakeholder mapping” (who are the allies in our movement?), “co-creation cards” (with specific guidelines), “enabling environment design” (which can be an exhibition, an app, an education programme, a website, etc.) (D2.1).

Botanic garden partners co-creation training

The Co-creation toolkit (and the associated Co-creation navigator) enables the training of the involved Botanic gardens to “gain a certain level of skill in co-creation skill” that will enable them to continue to work in new ways in the future, to make them more (future) proof” and “redefine their role in society”, and in particular to “connect to local stakeholders – through co-creation – not only to create awareness on the issue of food security, but also to create ownership with these stakeholders on this subject, to look at possible behaviour(s) in relation to food and food security issues and to ultimately influence behaviour of stakeholders” (D2.1).

Striking features

The BigPicnic co-creation Manifesto (D2.1) provides a synthesis of the Project’s definition/vision of co-creation, which states, for instance, that co-creation is “about people, not about users or customers”, who are “active agents, rather than beneficiaries”; that “it’s not about finding the right idea, it’s about finding a multitude of ideas”; and that “co-creation is open ended” and requires to “keep people involved after sessions have ended” and to “give feedback on the choices” made afterwards; and, at an earlier stage, to be clear on how participants’ efforts will be made visible.

BizArTech is a collaborative project which started in 2018 in the French city of Lyon and which aims at renewing reflections and developing new technological and artistic devices that can address the mediation issues raised by energy transition (like raising awareness or changing practices).

Dimension 1: Motivations and Participants

BizArTech is a program which emerged at the initiative of three structures based in Lyon: TUBÀ (a living lab dedicated to the development of smart city through collaborative projects), Erasme (a public open innovation lab) and Mirage Festival (a festival about digital cultures). They started from the observation that the artistic and industrial sectors could strongly enrich one another if they came to collaborate. They decided to launch a program accordingly and, after one year of discussions, chose to focus it on energy transition and scientific mediation, as they had identified that the arts were a key factor in raising environmental awareness. BizArTech (which stands for Business, Art and Technology) became the annual project of TUBÀ. It thus did not result from a specific client request and was financed by its membership contributions, European funding and complementary support from the Lyon metropole.

BizArTech participants, who were gathered in multidisciplinary teams, were employees from private companies that were members of TUBÀ and came from the energy sector (EDF, GRDF, Veolia, Enedis), public sector agents working in different departments of Lyon Metropole, associative actors, students in design and finally artists like photographs and composers who were paid for their services. The teams were thus mainly made up of professionals working in organizations partnering with TUBÀ, but were not open to the general public who would have brought very heterogeneous profiles (e.g. mixing genuine curiosity, networking interests and activist concerns). The motivations of the participants still covered a large spectrum though: some of the private actors had for instance been appointed by their companies to attend the program while others had internally insisted on coming. The teams were constituted beforehand by TUBÀ who already knew many of the participants' personalities: it enabled them to avoid tensions that could for instance have appeared between some of the artists and the private companies, and to favor some potential synergies.

Although they did not participate in the proper co-creation phase, many other citizens were interviewed by TUBÀ, Erasme and Mirage Festival in the early stages: their ideas, experiences and needs helped to refine BizArTech's scope and objective. The teams of participants also had the opportunity to discuss with local experts to gain a better understanding of the issues at stake or to benefit from the tools they had put at their disposal. Those experts also came from diverse backgrounds: YouFactory (an innovation and prototyping agency), ALEC (the local energy and climate agency), social psychologists from TUBÀ…

Dimension 2: Methods and Process

Exploration phase

The elaboration of BizArTech is the result of a first-time collaboration between TUBÀ, Erasme and Mirage Festival. After choosing to focus the program on energy transition, they met many public and private actors as well as the general public for several months in order to better delineate the scope of BizArTech. Their exchanges took the form of street interviews, surveys and discussions with their

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professional partners, and led to a closer identification of specific needs related to the mediation of energy transition. They were thus able to define more precisely the collaborative format that the program would take and decided to translate the identified needs into four challenges (about our knowledge of energy resources availability, our understanding of their paths, our financial consumption and the adaptation of our future lifestyles).

The program was launched at the SIDO 2019 (an Internet of Things show) where it was presented to already existing partners and to other potential ones. It was also an opportunity to ask participants what their representation of energy and data was. All the structures interested in participating in BizArTech (mainly energy industries and public local actors) were brought together one month later, so that they could meet and share their insights. They also discovered the result of the previous survey, about the way the general public perceive energy. A multidisciplinary approach was already initiated thanks to presentations given by TUBÀ on the digital arts and on the psychology of behavioural changes.

Imagination and conception phase

A “warming-up” workshop gathered the participants one month later to prepare the ground for future collaboration. They listed some existing initiatives in link with the four challenges that could be useful or inspirational, and then took part in activities developed by TUBÀ to help them learn how to work together. For instance, they discovered tools to better manage conflicts or to better find their place in the group depending on their personalities. The day was concluded by discussions about energy transition with a few external experts. Even if it seemed promising to gather all the stakeholders before the real co-design stage, this workshop revealed in fact not so relevant: presenting them the challenges again in depth (to which they had already been introduced before) created many expectations too early in the process. Some collaborative tools and data were already put at their disposal and although they were excited by the idea during the workshop, nobody found the time or motivation to use them afterwards.

The proper co-creative session was a “creative sprint” which took place four months later, in October 2019. This 3-day design sprint gathered 34 professionals, among which private industrial engineers, associative actors working in the energy sector, students and artists (presented in Dimension 1). They worked in four multidisciplinary teams to address each of the challenges previously defined. Besides combining complementary expertise, mixing different actors was also a way to confront - and therefore decompartmentalize - their respective professional perspectives. After an inspirational phase, they discovered the resources put at their disposal (e.g. designers and social psychologists from TUBÀ, datasets, technologies and tools provided by a prototyping agency) and finally created four prototypes. The different steps of the creative sprint were punctuated by informal and convivial breaks that were conducive for enriching talks between the participants and that proved essential for BizArTech success.

Dimension 3: Outcomes and Impacts

The goal of the 3-day creative sprint was to create new mediation devices that would raise awareness on energy consumption and change the practices of Lyon Metropole inhabitants. Four interactive devices were prototyped by the teams as a result, at the crossroads of works of art and technological tools:

"The energy piano", a sensory and ludic tool that raises awareness and familiarizes players to eco-gestures,
"From Love to Uranium", a collaborative game which put an emphasis on the impact of our individual and collective actions on the environment, economy and society,
"Energy Landscape", a dynamic immersive device to see at a glance and compare the different energy productions of the territory thanks to distorting filters,
"Tactile Energy", a device revealing local energy consumption through sensory experience based on fans, rather than usual diagrams.

The creative sprint was concluded by a presentation session of all the prototypes and was open to the general public. The time slot (a Friday late afternoon) was however not ideally chosen and not many co-workers of the participants coming from private companies were present. BizArTech's atypical approach aroused interest and the program was afterwards presented by the private and public partners during festivals (like at the SIDO 2020). They promoted both the innovative form of transdisciplinary collaboration that BizArTech had tested and a new use of energy data of the territory, put at the service of scientific mediation for the general public. One out of the four devices created has been taken over by Erasme, with the financial support of local public authorities and the local energy agency, and is now in a testing phase.

The three other prototypes have not been further developed, partially due the COVID-19 crisis which prevented the next steps to be implemented. Intellectual property was also a hindering factor. The pilot team tried to establish a regulatory and legal framework before the beginning of BizArTech to tackle issues raised by the use of data or the use of the works produced by the artists, but it was difficult to anticipate every aspect of the problem. The major parts of the projects (like the methods and lines of code) were in open source, as Creative Commons. Although this openness is usually considered as a positive feature to integrate, the pilot team understood its limitations: the projects belonged to everyone, but hence to no one in particular: nobody felt personally concerned enough to take over the project. Combined with the fact that BizArTech did not originate from a client request and that the four projects therefore did not have more fundings once they were prototyped, it could explain why only one of them was further continued.

However, as in many collaborative programs, the mere fact of bringing together a very diversified range of actors constitutes an enriching experience for them and can already be counted as a positive outcome by itself. Even though no formal survey was conducted, the participants expressed their satisfaction with the overall program. More specifically, they were pleased to work for three days with people whose jobs they barely knew before and that they would never have met otherwise. They also like the concrete form that their collaborations took (they designed and manufactured their prototypes themselves) and which can contrast with more prospective programs. Furthemore, while digital artists benefited from new tools to use in their art works, industrial employees had the opportunity to adopt a more artistic view on their technologies and to improve their skills or put them at the service of innovative projects. While this kind of collaborative program (like hackathons or sprints) had started to lose momentum at that time - since many had repeatedly been launched in the past years - the combination of technological and artistic dimensions in such an event renewed the genre and was met with great enthusiasm.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

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Although both organizational and participating stakeholders were very satisfied with BizArTech, the pilot team - with hindsight - is questioning the relevancy of combining so many challenging elements in a single program. Indeed, BizArtech encompassed an atypical transdisciplinary dimension (mixing arts and technological innovation), a desire to show how mediation could be used to change behaviors on energy consumption, and a new format of innovation combining collaborative and creative methodologies that had not been tested before. It was also the first partnership between TUBÀ, Erasme and Mirage Festival which were not used to working together. This new partnership constituted a challenge in itself, as their respective temporalities and methodologies could differ. Finally, BizArTech was the first large program that TUBÀ chose to conduct on its own initiative and not on a client's request. Embracing all these aspects at once was very demanding for the pilot team, and choosing to only focus on some of them could retrospectively have benefited the program.

* * *

Sources:

- Interview on July 23rd 2021 of Mathilde Colin (Senior Project Coordinator at TUBÀ)
- TUBÀ website page on BizArTech(https://www.tuba-lyon.com/projet/bizartech/)
- BizArTech website (https://www.bizartech.org/)
- Synthesis of the results of the conception phase published by TUBÀ (https://fr.calameo.com/books/004140164919bc1653b3d)

Cerros de Bogota

Fundacion Cerros de Bogota

Key findings:

- Citizen-centered project with multiple environmental impacts at border area between Bogota and protected area Cerros de Bogota mountain range.
- Creation of a Collaborative Restoration Lab to consolidate citizen actions.
- Strong involvement of school students from the areas bordering the Cerros de Bogota.
- Creation of a Socioecological Corridor consolidated by a Border Pact for improved governance of the links between the Cerros de Bogota protected area and the city.
- Creation of an Observatory of Landscape for bringing new visions to local urban planning.

Sources:

- W: Project website/platform

- I: Interview of Fundacion Cerros de Bogota founder Diana Wiesner Ceballos. Observatori del Paisatje (http://catpaisatge.net/esp/butlleti2/but_observador.php?idReg=1464&num=59&ed=octubre-diciembre%2018)

- A: Article in a scientific journal. Ceballos, D. W., Parada, A. P., Galindo O, M. C., Salamanca, D. A., & Moreno, D. S. (2019). Paisajes ciudadanos de Bogotá. El territorio percibido a través de la experiencia cotidiana. *Dearq*, (24), 68-77.

- N: iNaturalist platform: https://www.inaturalist.org/projects/reserva-natural-umbral-cultural-horizontes

The Cerros de Bogota project

Fundacion Cerros de Bogota ("FCB") is a non-profit organisation founded in 2009 which seeks to engage citizens in the preservation and promotion of life in the Eastern Mountain Range (Cerros Orientales) that borders the capital city of Bogota. FCB concentrates on supporting transformative processes involving citizens through three areas of action: (i) a Platform to make visible and bring together territorial processes; (ii) a Networking interface to encourage actions; (iii) an Advisory partner and think-tank that provides a socio-ecological vision for the territorial planning of the Bogota metropolitan area.

Dimension One: Participants and Motivations

Stakeholders from Project activities

Generally speaking, the Cerros de Bogota initiative is citizen-centric, and seeks to involve as many citizens as possible from Bogota, in particular inhabitants of areas which border the Cerros de Bogota mountain range. They are involved in on-site environmental participatory actions and Citizen Science

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using the iNaturalist mobile app, and are organized within the framework of a Collaborative Restoration Lab (see below in Dimension Two: Methods and Processes).

A more specific target within citizens are schoolchildren from the neighboring areas of the Cerros de Bogota. A Network of Secondary Schools in the Cerros de Bogota area was established to offer public and private school students (over 80 schools are involved). The Network has consolidated itself as a "space of integration and active collaboration between education institutions for the appropriation of the Cerros de Bogota". It offers tools for the articulation, strengthening and execution of Environmental School Projects and other pedagogical projects which aim to conservation, appropriation and sustainable use of the Cerros de Bogota and of the ecosystemic services they provide. The Network thus provides a role as facilitator for collaborative work between schools and institutions which have common interests and goals. In parallel, an annual painting contest (seven editions so far), "Somos Cerros", has involved thousands of students and dozens of institutions (1950 students from 26 editions in the seventh edition alone) in drawing and disseminating the message of conservation for the Cerros de Bogota territory, exposed in Bogota's Botanical Gardens Domo SEC (W).

Dimension Two: Methods and Processes

Strategies for engaging citizens

Three core strategies are devised to engage stakeholders around the common goals of Fundacion Cerros de Bogota.

(i) *Citizen agreements* which aim to incorporate sustainable management initiatives with environmental education, culture, boards and collaboration networks.

(ii) *Ecological strategy* which seeks to implement actions for conservation, preservation and sustainable uses in the framework of inclusive and participatory practices which bring consolidation and connectivity to the urban/hillside corridors.

(iii) *Spatial strategy* which pursues the consolidation of a continuous area, connected and articulated, that integrates a network of eco-routes and existing trails in a way that is permeable and accessible between the City of Bogota and the Cerros de Bogota reserve (I).

Observatorio del Paisaje (Observatory of Landscape)

The Fundacion Cerros de Bogota set up the *Observatorio de Paisaje* was set up as an interdisciplinary group aimed at promoting reflection on the contemporary forms of contemplating/perceiving the territory as well as methodologies which enable participatory knowledge building of Bogota's landscape and to incorporate this knowledge as entries in planning strategies (A).

Laboratorio de Restauracion Colaborativa (Collaborative Restoration Lab)

The *Reserva Umbral Cultural Horizontes* Collaborative Restoration Lab enables citizens to engage with the Cerros de Bogota preservation area in various ways:

(i) Environmental actions: beekeeping, composting, bird-nest building, acacia-tree restoration, sowing of 930 plants from 33 species native of the Cerros, urban farming, etc.

(ii) Citizen Science actions using the iNaturalist platform created by National Geographic and the California Academy of Sciences with over 200 participants and overs 1300 observations (N).

(iii) Catedra Cerros de Bogota: every Friday, free workshops and discussion sessions with invitees-experts aimed at "promoting critical thinking around regional biodiversity and landscape".

(iv) Annual artistic workshops for citizens (W).

Dimension Three: Outcomes and Impacts

Environmental impacts in the Reserva Umbral Cultural Horizontes

Multiple actions with diverse environmental impacts have been conducted and are ongoing in the 3 hectare area of the nature reserve (see above in "Dimension Two: Methods and Processes").

Socioecological Corridor and Border Pact for improved Cerros de Bogota governance

The *Socioecological Corridor* aims to provide a corridor for public use and integration of social and ecological processes in the frontier area between the City of Bogota and the Cerros Orientales forest reserve. It covers 57 kilometers and is consolidated through a Border Pact of the city geared towards planned regeneration involving biodiversity restoration as a strategy of social development and territorial appropriation by local communities. The creation of the Corridor and the Pact is also geared to implementing a new form of governance for the Cerros Orientales, that articulates citizen initiatives, security, productive activities and ecological, cultural and civic activities. Indeed, historically, the governance of the Cerros Orientales has been diluted between the transposition of competencies among different public entities, due to the national character of the Cerros Orientales forest reserve and the ongoing sprawl or urban population growth (I). To address these governance management issues, Fundacion Cerros de Bogota has proposed the design of a sole administrative and management entity with representation among the relevant public authorities and organizations from different spheres (private, mixed, citizen representation, etc.).

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CIMULACT

Citizens and Multi-Actor Consultation on Horizon 2020 (2015-2018)

Horizon 2020, H2020-ISSI-2014-2015: Call for integrating Society in Science and Innovation, Topic ISSI-2-2014: Citizens and multi-actor engagement for scenario building.

Sources
Website: CIMULACT website; CORDIS Project page; periodic reporting of the project: other project's materials

Dimension 1: Motivations and Participants
CIMULACT project is about **participatory research agenda setting.** It aimed to provide a unique contribution to the inputs shaping the final work programme for H2020 (FP8) and the development of the ninth framework programme (FP9) by engaging citizens and stakeholders in **co-creation of research agendas** based on real and validated societal visions, needs and demands. By establishing genuine dialogue between citizens, stakeholders, scientists, and policymakers visions and scenarios for the desirable futures, CIMULACT have developed and debated, and then transformed these outputs into recommendations and suggestions for EU research and innovation policies and topics. Consortium Partners The project was coordinated by the Danish Board of Technology and the Consortium was composed of 29 partners, covering all the European countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden. Stakeholder categories of national partners: research organisations, higher or secondary education establishments, private for profit, foundations, public bodies, etc. Participants in Project activities Key actors of the CIMULACT process were the citizens. However also policy-makers, key experts and other stakeholders were involved in the process.

Dimension 2: Methods and Process
The process was articulated in the following steps: **Citizens Visions**: As a starting point the consortium organized a **visioning workshop** in each participating European nation. In each workshop approximately **36 citizens**, selected to maximize diversity regarding several socio-demographic criteria, produced 179 visions of desirable and sustainable futures following a standardized method. These visions used a time horizon that was 30-40 years from the present (circa 2045-2055). **Societal Needs:** a group of CIMULACT **consortium members supported by external experts (challengers)** met in Paris for a **clustering workshop** and extracted 26 underlying, crosscutting, implicitly and explicitly mentioned needs within the citizens visions. **Research programme scenarios:** At a two-day workshop in Milan in April 2016, **consortium members, 30**

external experts and stakeholders as well as 30 citizens (one from each visioning workshop) co-created 48 suggestions for research programme scenarios on the basis of the 179 visions as well as the 26 identified societal needs.

Enriching research programme scenarios: In order to refine and enrich the 48 research programme scenarios and push them towards becoming actual research topics, two parallel activities were carried out: 1) an **online consultation** applying an **argumentative Delphi**, which engaged more than 3400 people, to prioritize the scenarios and enrich them with additional arguments; 2) **face to face consultations** in 30 countries, engaging **citizens, experts, policy-makers, and other stakeholders** to review and enrich the scenarios.

Drafting topics: **consortium core-partners** met for another two-day **workshop** (Paris, November 2016) to integrate the results of the online and the face-to-face consultations. The results of this aggregation and synthesis were 48 one-paged research topics with precise descriptions of challenge, scope and expected impact of the proposed EU research activities.

Refining topics with decision makers: to ensure applicability of the drafted topics to EU research programming, the consortium organized a final Pan-European Conference in Brussels to engage **European Commission Programme Officers and experts**. On that day, 75 participants reduced the 48 drafted research topics down to 46 by merging highly similar topics, and then selected and refined 23 final topics for presentation to policy makers.

Dimension 3. Outcomes and Impacts

During the project a number of intermediate results were gathered in key deliverables targeted to the needs of European and national research policy making. These deliverables included:

- 179 citizens' visions and
- 48 research programme scenarios
- 23 research topics

Another key outcome of the project was the development of:

- a methodological framework for participatory research agenda setting, including an Inspiration Catalogue for consulting different groups.

Beside these outcomes, two main impacts were analyzed in the Report on project impacts that can be found here:

1 Impacts on the European research agenda, particularly the use of the project outcomes in the process of designing the recent Work Programme of Horizon 2020 (H2020 WP 2018 – 2020) and a possible further utilization of its results in the formulation of the Framework Programme 9. The evaluation of the project impacts highlighted an overlap between 15 of the final 23 CIMULACT research topics and 22 topics from H2020 WP 2018 – 2020. It means that 65% of the CIMULACT research topics have been covered by the H2020 WP 2018 – 2020. Policy officers and policy experts interviewed within the project framework also proved that the project affected the H2020 WP 2018 – 2020 and that outcomes were also relevant for the preparation of FP9. Respondents also confirmed that the CIMULACT project proved to be a highly worthwhile and value-adding experience of public engagement, and the demand for projects with methodology like CIMULACT, based on co-creation and utilising views of citizens, would have remained high.

2 The impact on the partners of the project, including further uses of the methodology as well as co-creation and public engagement activities (e.g. proving to initially skeptical scientists that citizens are able to provide interesting, valuable, and plausible ideas about future and

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corresponding research needs).

A short selection of CIMULACT concrete achievements described in the CIMULACT deliverable 5.3:

- The reference to CIMULACT in the General introduction of the Horizon 2020 Work Programme 2018 – 2020 as an input to the H2020 WP 2018 – 2020 and as an example of FP project enabling direct interactions with citizens
- 15 of 23 research topics with thematic overlap in 22 topics of the H2020 WP 2018 – 2020
- The CIMULACT project affected the H2020 WP 2018 – 2020 and in some cases CIMULACT research topics led to a concrete WP 2018 – 2020 call or specific parts of the call (findings based on interviews with policy officers)
- The CIMULACT citizen-based topics had unique qualities as compared to expert foresight studies
- CIMULACT outcomes remained relevant for the preparation of Framework Programme 9
- CIMULACT developed 11 new or adjusted participatory methods (summarized in the Inspiration catalogue).

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy

The CIMULACT "Inspiration catalogue for consulting different groups" shortly debates the issue of rewards/incentives for participation and presented as a "controversial point"(p.197), whilst reimbursement (for transport and accommodation, if needed) are presented as a "to do".
Some inspirational incentives provided in the document are:

- Some money
- Gift cards
- Coupons/vouchers
- Small presents (such as books and chocolates, cinema tickets)
- Packs of organic products
- Tombola tickets
- You can go to restaurant with participants after the workshop and pay for all the guests

Other notes

The CIMULACT concept rested on a body of knowledge stemming from several traditions of thinking such as Responsible Research and Innovation (RRI), Participatory Technology Assessment, Theory of Negotiation, Foresight, Visualisation and Public Participation.

Cities-4-People

New approaches for community-driven sustainable mobility innovations at neighbourhood and urban district level

Key findings:

- People Oriented Transport and Mobility is put to practice in a framework to create new mobility solutions that put citizens at the core of co-creative processes
- Citizens co-develop Citizen Mobility Labs, Citizen Mobility Kits and intervention prototypes in five European cities
- Core Outcome Sets of criteria for impact assessment are co-created by citizens and mobility experts
- Citizen Mobility Labs make use of Co-Creation Navigator and Delphi Method

Sources:

- W: CORDIS Project page or Project website/platform
- D5.2: A Cities-4-People Toolkit of COS Methodology and Metrics
- CCProt.: Co-Creative Prototyping: Development of Practical Interventions and Prototypes in Cities-4-People

The Cities-4-People Project

This Project (June 2017 – November 2020) introduces a community-driven "People Oriented Transport and Mobility" ("POTM") framework to co-create new mobility solutions with EU citizens and city stakeholders, harnessing digital and social innovation. A selection of 15 concepts from these co-created solutions is put to test in five pilots in different EU urban settings (Budapest, Hamburg, Istanbul, Oxfordshire and Trikala), in the form of "citizen mobility communities" that bring together citizens as "active city stakeholders" alongside local municipalities, transport authorities and educational partners. Together they identify and transform mobility challenges into concepts for piloting and scaling up solutions within the Project timeframe. They set up Citizen Mobility Labs ("CML") that each create three prototypes for intervention in transport and mobility at the local level, develop Citizen Mobility Kits ("CMK") and make use of a previously developed Co-Creator Navigator ("CCN") platform. In addition, the Project introduces an open process to co-develop a Core Outcome Set of definitions, metrics, indicators and methods to guide POTM impact assessment that involves citizens. Impact assessment is conducted through this Core-Outcome Set ("COS") methodology.

Dimension One: Participants and Motivations

<u>Consortium breakdown</u>

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
COPENHAGEN BUSINESS SCHOOL (coordinator)	HSEE	Denmark
OXFORDSHIRE COUNTY COUNCIL	PB	UK
UNIVERSITY COLLEGE LONDON	HSEE	UK

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BUDAPEST FOVAROS ONKORMANYZATA	PB	Hungary
KTI KOZLEKEDESTUDOMANYI INTEZET NONPROFIT KFT	RO	Hungary
FREIE UND HANSESTADT HAMBURG	PB	Germany
HAFENCITY UNIVERSITAT HAMBURG	HSEE	Germany
ANAPTYXIAKI ETAIREIA DIMOU TRIKKAION ANAPTYXIAKI ANONYMI ETAIREIA OTA	O	Greece
Q-PLAN INTERNATIONAL ADVISORS PC	PFPE	Greece
USKUDAR BELEDIYESI	PB	Turkey
ISTANBUL UNIVERSITESI	HSEE	Turkey
WHITE RESEARCH SPRL	PFPE	Belgium
STICHTING WAAG SOCIETY	RO	Netherlands

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

Participants from the whole Quadruple Helix have been involved. This is particularly the case with citizens, who have been involved in every step of the co-creation process to build the Citizen Mobility Lab, Citizen Mobility Kit and the Core-Outcome Set (see Dimensions Two and Three) of 23 criteria for assessment. They work alongside public-sector bodies (also Project consortium participants) and science/research organizations, in interaction with experts in mobility.

Dimension Two: Methods and Processes

Stakeholder engagement

Citizen Mobility Kit

This kit, also called the "Citizen Co-Creation Navigator", guides the CMLs through the process of co-creation (note: this Navigator, developed by WAAG, is also used in other H2020 projects such as BIGPICNIC which is a SwafS part of the *Co-Creation Review* which this Project Review is part of). It articulates the different stages needed to set up the CMLs: "1. Foundation" (direction; position; team), "2. Context" (stakeholders, mapping, interviews, sensitize), "3. Community" (organizing, building, outreach), "4. Workspace" (smart citizens, including citizen sensing; sessions, including warm-ups, ideation, energizers, iteration, cool down); open labs, including DIY exploration; events, including

conferences and marathons), and “5. Wrap up” (reflection). All these methods are available in more detail on the Project website (W; CCProt.).

Core-Outcome Set methodology

The Core-Outcome Set (COS) uses the Delphi Method to enable participants to co-develop a set of evaluation indicators based on impacts they consider important. A panel of Delphi experts is set up from across all 5 pilot cities, around two categories: “Community of Users”, consisting of neighborhood residents, and “Community of Mobility Experts”. Each expert was responsible for identifying participants from their own Citizen Mobility Lab, with a view to garnering a broad and diverse set of opinions. The participants were invited to answer questionnaires, in two rounds, but also to respond to the summarized data of the collective Delphi panel, in a way “intended to harness and organize judgement through a process of controlled feedback. The Delphi is therefore an iterative multi-stage process designed to combine opinion into group consensus”. In the first round they were asked their views on impacts they deemed important if one or several of the seven mobility intervention strategies – which came out of the co-creation activities from the different CMLs) – were implemented in their area (out of: “promotion of action travel”; “traffic reduction strategies”; “affordable and quality travel options”; “inclusive mobility infrastructure”; “travel information provision and literacy”; “emission & noise control strategies”; “speed control strategies”. These views resulted in 23 aspects/impacts deemed important. In the second round participants were asked to rank these 23 impacts by level of importance and to add additional aspects they thought might be missing. Like in round one, results are translated and formatted and sent back to the Delphi panel for review (D5.2).

Dimension Three: Outcomes and Impacts

Citizen Mobility Labs

The CMLs set up in each city (Budapest, Hamburg, Istanbul, Oxfordshire and Trikala) use a “bottom-up approach, based on a community-based and participatory model so that local communities can be involved in all steps of mobility strategy developments of a city, from problem mapping to action planning and decision making” (W). The labs provide physical spaces where community members come together with mobility experts, policy makers and other urban mobility stakeholders to “discuss new ideas, initiate new projects for their neighborhoods or districts, and share outcomes in the forms of blueprints, codes, best practices”. The Project consortium partners facilitate the work of these communities in using “creative methods for collaboration and co-creation techniques or suggesting methods and tools for data collection, idea generation and prototyping”, offline and online, resulting in the building of a customized Citizen Mobility Kit.
The CMLs each come up with three prototypes to transform urban mobility in their area (Source: CCProt.). The Oxfordshire CML prototype interventions involve, as an example, a “Demand-Responsive Transport”, “SuperTransit” service that offers trips to the supermarket for free in an area considered a food desert. The Hamburg CML prototypes, among others, a “Micro-Depot” for delivery trucks, that often block streets, to park in the outskirts and combine delivery with a bicycle delivery service. The Budapest CML prototypes, among others, a “Pedestrianization of the Danube River Embankment” which is currently traffic-ridden. The Trikala CML prototypes the “Provision of Wheelchair Scooters at the Central Square” to create wheelchair scooter attachment options. For each of the fifteen prototypes, the CMLs make use of a method that comes out of the Citizen Mobility Kit.

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Toolkit of Core-Outcome Set Methodology and Metrics

The Core-Outcome Set (COS) establishes a “common baseline of outcomes (…) through a participatory process of co-definition and co-creation”. It comprises “an agreed minimum set of measures of how to evaluate the impact of transport and mobility based on what people value in their daily lives”. This means that alongside “traditional transport and mobility evaluation indicators, the development of an evaluation set of outcome measures (COS) will also be informed by what matters to people”. Examples of these are the 23 aspects brought out in the Delphi Method process (round one): these involve “safety” (e.g., physical safety concerns due to road traffic), “built environment experience” (e.g., sleep deprivation due to noise pollution), “travel experience” (e.g., more choice of transport and mobility options, cleanliness of public travel options); “individual agency” (e.g., more choice of destination options such as supermarkets or GP, to be kept informed on transport and mobility options, to participate in the process of decision making for transport and mobility); and financial impacts (D5.2).

CLEVER Cities

Co-designing Locally tailored Ecological solutions for Value added, socially inclusivE Regeneration in Cities

Key findings:

- Nature-Based Solutions (NBS) are implemented in three front-runner cities to test positive environmental and socioeconomic impacts
- CLEVER Action Labs (CAL) involve Urban Innovation Partnerships (UIP) that include citizens in different stages of co-creation with a wide range of NBS-linked stakeholders (e.g., landscape architects, municipalities)
- Outcomes are wide-ranging, from climate mitigation to social cohesion and improve well-being

Sources:
- W: CORDIS Project page or Project website/platform
- D1.1 Guiding Framework for CLEVER Cities Activities
- D2.2 Co-Creation Plan and Co-Design of Solutions in CALs
- D2.3 CAL specific co-implementation plan

The CLEVER Cities Project

The Project seeks to use Nature-Based Solutions ("NBS") to address urban challenges by setting up Urban Innovation Partnerships ("UIP") that support one or several CLEVER Action Labs ("CAL"). In these, Project partners work with local citizens in a process of co-creation that goes from design to implementation and monitoring, to create roadmaps, guidances on governance, and business and financial models for NBS. NBS involve the use of "natural features" (e.g., trees, plants, green spaces) in addressing urban challenges such as public health, social cohesion, security, and economic opportunities, particularly in deprived areas. CLEVER Cities therefore aims to improve knowledge of, contribute data to, and promote use in urban planning of NBS with a view to urban regeneration and transformation. The solutions developed in the Project are implemented and tested in three frontrunner cities (Hamburg, London and Milan) and replicated in other cities worldwide.

Dimension One: Participants and Motivations

<u>Consortium breakdown</u>

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
FREIE UND HANSESTADT HAMBURG (coordinator)	PB	Germany
GREATER LONDON AUTHORITY	PB	UK
COMUNE DI MILANO	PB	Italy
GRAD BEOGRAD	PB	Serbia

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DIMOS LARISEON	PB	Greece
AYUNTAMIENTO DE MADRID	PB	Spain
MALMO STAD	PB	Sweden
MUNICIPIUL SFANTU GHEORGHE	PB	Romania
FONDO AMBIENTAL	PB	Ecuador
SOCIETA COOPERATIVA SOCIALE ELIANTE ONLUS	O	Italy
FONDAZIONE POLITECNICO DI MILANO	RO	Italy
GROUNDWORK LONDON	O	UK
S T E G STADTERNEUERUNGS- UND STADTENTWICKLUNGSGESELLSCHAFT HAMBURG MBH	PFPE	Germany
WWF ITALIA	O	Italy
CENTRE FOR EXPERIMENTS IN URBAN STUDIES - CEUS Serbia	RO	Serbia
AGENTIA PENTRU PROTECTIA MEDIULUI COVASNA	PB	Romania
THE YOUNG FOUNDATION LBG	RO	UK
PEABODY TRUST	O	UK
RETE FERROVIARIA ITALIANA	PFPE	Italy
SOCIAL FINANCE LIMITED	O	UK
YEPEZSALMON YEPEZ SALMON ASOCIADOSSA	PFPE	Ecuador
GREEN4CITIES GMBH	PFPE	Austria
HAFENCITY UNIVERSITAT HAMBURG	HSEE	Germany
HAMBURGISCHES WELTWIRTSCHAFTSINSTITUT GEMEINNUTZIGE GMBH	RO	Germany
TECHNISCHE UNIVERSITAT HAMBURG	HSEE	Germany
ECOLOGIC INSTITUT gemeinnützige GmbH	RO	Germany
FUNDACION TECNALIA	RO	Spain

RESEARCH & INNOVATION		
UNIVERSITAETSKLINIKUM ESSEN	HSEE	Germany
EUROPEAN BUSINESS AND INNOVATION CENTRE NETWORK AISBL	O	Belgium
ICLEI EUROPEAN SECRETARIAT GMBH (ICLEI EUROPASEKRETARIAT GMBH)	O	Germany
ICLEI - LOCAL GOVERNMENTS FOR SUSTAINABILITY EV	O	Germany
AMBIENTE ITALIA SRL	PFPE	Italy
UMWELTBUNDESAMT GESELLSCHAFT MIT BESCHRANKTER HAFTUNG (UBA GMBH)	O	Austria
XI'AN JIAOTONG UNIVERSITY	HSEE	China

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

In the front-runner cities, several CALs are set up to implement NBS that are co-created with a range of stakeholders. Depending on the CAL and city, these involve, alongside Project consortium members and municipalities, “Professional Associations”, “Environmental NGOs and Citizens Associations”, “Business and companies Associations”, “Professional associations in gardening and NBS”, “Building owners and Building managers Associations”, “Travelers and residents” (Milan); residents, property owners, state officials, landscaping companies, a youth centre, an elderly home, school pupils, parents and teachers (Hamburg); “citizens” (e.g., residents, faith groups, community centers, etc.), “expertise” (e.g., landscape architects, gardeners), “authorities and associated partners” (e.g., borough, schools), and “London partners” (e.g., Peabody Trust in charge of an already existing urban renewal plan in the Project area, Greater London Authority…) (London).

Dimension Two: Methods and Processes

Stakeholder engagement

The CLEVER Cities Guidance on Co-creating nature-based solutions (in D1.1: Guiding Framework for CLEVER Cities Activities) provides “practical guidance on how to establish and run co-creation laboratories according to the CLEVER Cities method” based on Nature-Based Solutions (NBS) which are

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defined as “actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits”. The Co-creation Pathway Structure consists in different phases: 1. “Establishing the UIP” (through stakeholder mapping and engagement); 2. “Co-design” (collaborative design or urban regeneration interventions, including “novel smart technologies” to improve “involvement of citizens”); 3. Co-implementation (tangible interventions that “serve as a ‘test’ environment to make NBS marketable and sustainable”; 4. Co-monitoring (success/failure of the NBS implemented, assessed by the UIP, CALs and further residents); 5. Co-development (grow, test and develop the proposed solution).

CLEVER Action Labs: template

The CALs, linked to the broader concept of Urban Living Labs (“ULL”), are “test-beds where cities implement ~~at~~ the innovative co-creation processes and nature-based solutions, bringing together different socio-spatial relations” in an approach that “actively involves end-users and stakeholders”. They run the “co-creation pathway” in 16 Steps. Within the “Establishing the Urban Innovation Partnership” phase, the steps consist in: 1. “Identify CLEVER Cities project within the city local context”; 2. “Map and Engage Stakeholders”; 3. “Launch the Urban Innovation Partnership”; 4. “Design the platform according to the local context”. Within the “Co-design activities in the CLEVER Action Labs” phase, the steps consist in: 5. “Define the co-design kick-off and analyse the status quo”; 6. “Design the CAL space internally”; 7. “Launch the CAL at local level”; 8. “Co-Design the Nature-Based Solutions; 9. “Disseminate Co-design activities”; 10: “Co-design and test alternative design scenarios”. Within the “Co-implement Nature-Based Solutions” in PLACE, the steps consist in: 11. “Co-implement the joint project”; 12. “Verify the CAL co-implemented action in place”. Within the “Co-monitor and co-manage implemented NBS”, the steps consist in: 13. “Co-Monitor and Map the progress of implemented NBS”; 14. “Verification of Co-benefits of NBS”. Within the “Co-develop and replicate solutions” phase, the steps consist in: 15. Sustain the action; and 16. Co-develop the action. These 16 co-creation steps provide “a series of practical sheets, tools and templates that cities can follow and easily adapt to their needs and specific context”.

CLEVER Action Labs in practice: NBS in the three frontrunner cities (D2.2)

The Milan-based implementation sets up three CALs: “Green Roofs and Walls” (the design and promotion of innovative solutions for experimental and multifunctional green roofs and walls), “Giambellino” (creation of a community garden and public green area co-designed and managed by local citizens on an abandoned and polluted green lot), and “Station & Noise Barriers” (mitigation of noise on a railroad that integrates planted soil and vertical “Living Walls”). Depending on the CAL, project co-creation activities involve stakeholders in awareness-raising campaign design, pilot project design, workshops (e.g., on technical aspects, or on co-benefit design).
The Hamburg-based implementation sets up three CALs: “CLEVER Corridor” (NBS along a walking/cycling path traversing Hamburg, including urban gardening and redesigned green spaces), “Green Roofs & Façades” (along the Corridor area buildings), and “School Yards” (renewal of school yards including plants). Depending on the CAL (although here they are all connected to the Corridor), project co-creation activities involve stakeholders in co-designing garden projects, furniture design, a “cultural workshop” involving residents, the co-design of the green façade (e.g., professionals construct the façade and citizens select plants and educate about them), and school workshops.
The London-based implementation sets up three CALs in the Thameshead area that are parallel to an existing urban regeneration plan, and involve a battery of NBS such as rain gardens, swales, reed bed

filtration to improve the quality of a local lake, public events to encourage residents to better appreciate nature, greening “unusual spaces” such as walls, roofs, walkways etc.

Dimension Three: Outcomes and Impacts

Co-benefits and Nature-Based Solutions

NBS result in “multiple co-benefits for health, the economy, society and the environment”, and are potentially “more efficient and cost-effective solutions than most conventional approaches”, as well as providing inherent social, economic, and environmental benefits (e.g., clean water, green spaces for recreation, climate mitigation, etc.). The CLEVER Cities Framework defines key indicators based around four themes: “Human Health and well-being; Sustainable economic prosperity; Social cohesion and environmental justice; Citizen safety (D1.1).
These themes/indicators translate in specific/different ways for each front-runner city. In the Hamburg “Corridor” project, for instance, the schoolyard renewal CAL leads to outcomes such as “development of new skills”, “prevention of vandalism”, and “improved environmental education”, measured through indicators such as “gardening knowledge”, “increased interest in green job profiles” and “improved manual skills”. In the London Thameshead project, specific impacts are, among many others, “more commercial activity”, “improved cohesion”, “improved water resource/use”, “increased acceptance of decisions & responsibility for maintenance of the NBS”. In Milan, the outcomes are, for example, “increased awareness raising and knowledge about green roofs and walls”, “environmental (and) social (and) economic benefits deriving from green walls”, energy efficiency, etc.

Mission-Oriented Swafs to Advance Innovation through Co-creation
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CoLAB is a collaborative program which connects different stakeholders in West Africa and enables them to co-construct and conduct innovative projects with societal impact on a specific theme. A first edition began in 2017 and focused during 3 years on food security in Burkina Faso, Côte d'Ivoire and Senegal, while a second two-year edition, started in 2020, dealt with maternal and child health in Mali and Niger.

Dimension 1: Motivations and Participants

CoLAB was launched at the initiative of the French Ministry of Foreign Affairs which appealed to three organizations to this end: the IRD (which coordinates it), Makesense Africa, and Bond'innov. The IRD is the French National Research Institute for Sustainable Development, partnering with countries mainly in the Mediterranean and intertropical zone. It participates in the program by mobilizing the research sector, through its own researchers and its wide network of institutes. CoLAB puts them in contact with local actors who can concretely make use of their research by developing new products or services, or gives an opportunity to local project carriers to fulfill their research needs. Makesense is a French non-profit association which designs multi-actor programs engaging citizens, entrepreneurs or organizations and supports projects that contribute to a more sustainable and inclusive world. It has been present in Africa since 2014. Bond'innov is an incubator for social entrepreneurs in France and in developing countries in Africa. Although Makesense and Bond'innov work together to manage the program, Makesense focuses more on the emergence phase of the projects while Bond'innov is in charge of their monitoring.

The actors directly developing the projects in co-creation come from various structures: NGO/NPO, startups, private companies, research institutes and universities. Members of civil society (regrouped in consortium or organizations) often seek complementary actors, either to integrate them in already-existing projects or to join theirs. Private companies are looking for innovative ideas and for local actors with which they can partner to develop their product on the ground. However, a lot of participants applying to CoLAB are attracted by the network which the program can give them access to, but do not always fully grasp its more profound co-creative dimension (that goes beyond networking) at the beginning.

The program is also run by local ambassadors who are selected after a call for applications. Those ambassadors are eager to help their community through CoLAB while developing management skills. They receive training and can directly apply their learning on the ground with the help of the organizational team. By giving them the means to replicate the program themselves and to train other ambassadors in turn, the goal is to foster other collaborative initiatives, engage a long-term broader dynamic around the program and scale its impact.

Dimension 2: Methods and Process

The co-creative process of CoLAB is divided into several successive phases:

The emergence phase aims at building an ecosystem of actors that can collectively generate ideas of projects to tackle the issue at stake (food security or maternal and child health). CoLAB invites some key actors to an "ecosystem mapping" workshop during which they identify other stakeholders with whom eventual synergies could arise. Several co-construction workshops based on design thinking, collective intelligence or creativity are then organized with this broader ecosystem (which is still open to everyone). CoLAB requires the projects that it will support to be carried by at least three complementary structures. Participants start to gather either around a common subject (like eating local) or around project carriers who have pitched their idea. Although CoLAB can suggest synergies, the participants have to constitute their group themselves, as a voluntary approach is essential to ensure the success of future collaborations. Promising project carriers are then selected during a call for interests to be further supported. They imagine their solutions together and lay the foundations of their projects (e.g. by producing deliverables that define the role of each partner). Training sessions are also conducted to provide them with the necessary tools (like retroplanning) to structure their collaboration in view of the call for proposals. Other training that depends on the edition's topic or the territory can also be added.

A call for proposals is launched each year to select the projects to be incubated. It is not only addressed to the projects that emerged during the previous phase, other projects can apply as long as they are multi-actor and related to the issue at stake.

Support of the multi-actor projects: five projects are selected per country after the call for applications and benefit from a six-month follow-up program along with financial support. Its content depends on the specific needs of the projects but often takes the form of workshops or training (e.g. on economic and legal structuring, impact measurement, project monitoring). An additional four-month acceleration phase was added for the second edition of CoLAB, to further scale the impact of some of the projects.

One of the first obstacles encountered during the emergence phase comes from the fact that participants do not fully recognize the value of collaboration at first. Many see other partners as potential sources of additional funding but do not always realize that they could capitalise as well on knowledge sharing. CoLAB adopts a pedagogical approach to change their standpoints on the matter: they highlight the benefits of co-creation by helping participants to identify their needs (other than financial) and show how they could collaborate with other stakeholders to fulfill them.

Another hindrance is the eventual distrust or suspicion between actors who initially do not know each other. Frequent meetings (that cannot be only online) are precious to let them get to know each other and build mutual confidence. Although structured workshops are at the core of project management, informal meetings are valuable as well. For instance, one of the projects - that was already well underway but decided not to participate in a serie of meetings organized by CoLAB - chose not to apply to the call for proposals because its different members deemed that they did not achieved to develop a co-construstruction dynamic that included everyone: they were all linked to a central project carrier but did not know each other apart from that.

Furthermore, it is also essential to acknowledge vigilance points and regularly communicate on them before they have the chance to become prominent problems. Participants are given the opportunity to identify each other's interests and express their concerns about the collaboration, in a clear and transparent manner, in order to defuse some frustrations or misunderstanding. To this mean,

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Bond'innov conducts a serious game (called Diapason) with each project during the support phase. Co-establishing a business model also serves to anticipate issues that could arise from the distribution of profits.

In some instances, the motivations of private companies and the way they are perceived by other partners can sometimes bring about conflicting situations too. Those other partners - especially when the project is still in the emergence phase - can be concerned about losing their autonomy or being absorbed by larger structures that are interested in joining them. One of the projects refused to team up with a big company, even though their collaboration could have proved fruitful. To cope with such situations, CoLAB decided among others to reinforce its support on intellectual property issues.

Dimension 3: Outcomes and Impacts

The first edition of CoLAB, which focused on food security in Burkina Faso, Côte d'Ivoire and Senegal, resulted in the monitoring of 15 projects. The second edition about maternal and child health in Mali and Niger supported 10 projects, among which 5 benefited from the new acceleration phase. Bond'innov has initiated a study to assess their impact - which often embeds environmental, social and economic aspects at the same time - and found that more than 8,000 people had been impacted by CoLAB. 40% of the projects generated 33 direct jobs and 50 indirects. CoLAB favored the emergence of new projects but also enabled others to grow in scope: one project developed by researchers in Senegal managed to expand nationally and then to Benin and Burkina Faso by meeting new actors through CoLAB's network.

Besides these 25 projects, CoLAB's methodology itself is a valuable outcome of the program, especially since it was designed to be replicable in other countries with the help of the ambassadors trained (more than 120 in total). Two editions have so far been launched, but a third is already planned. The organizational team has continuously sought to improve the program, based on their own experience and the feedback of participants. With the aim of giving projects a better chance to continue after CoLAB's support and of increasing their impact, a selection criterion of financial sustainability was added to the projects' evaluation following the call for proposals. An additional acceleration phase also came to supplement the standard six-month monitoring phase that often stopped at a prototype stage of development. Makesense and Bond'innov have learned how to better harmonize the different phases for which they are responsible, which makes it easier to forge stronger transversal links across project carriers who can share experience.

Apart from the creation and improvement of the methodology, the program has also achieved to gather local actors working on a common topic, thereby building bridges between them and stimulating a collaborative momentum. For instance, some participants, who were neighbours but yet did not know each other, met during the program and found synergies they could exploit. They finally formed a consortium and applied to another call for proposals (one of the AFD, the French Agency for Development - which thereby gives a glimpse of the difficulty to assess the exact impact of CoLAB). Furthermore, the training sessions conducted (e.g. about project management) strengthen the community's skills, which gives participants the means to turn their desire to meet new actors into concrete collaborative projects and which empowers them as citizens.

An instance of projects which involves actors coming from the civil society, the private sector and the research world is BioManioc. Conducted in Burkina Faso, the project aims at producing cassava to turn

it into flour and export it to Canada. By developing an organic farming which makes use of solar energy, BioManioc prevents food insecurity, creates jobs for women in rural zones and gives access to education and health to families thanks to the revenues generated. It involves various actors: Buud Nooma (the association responsible for deploying the project in Notatinga where women are employed to produce and transform the cassava), Vergers d'Afrique (a Canadian association which provides technical and financial support), the INERA (the National Institute of Environment and Agricultural Research in Burkina Faso, conducting research on cassava production and transformation), Lulubelle & Co (a Canadian company buying, distributing and selling the cassava flour) and the CPASF (a non-profit organization of accountants). The complementary of all these partners enables the project to meet social, economical and environmental challenges at the same time.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

The continuous improvement of CoLAB's methodology is one of its noteworthy features: its current form is the result of a three-year first edition and a two-year second one, conducted in 5 different countries in total. Although only a very few projects created the first year managed to go their own way after the support phase, the changes made to the process from the second year resulted in a much larger share of collaborations continuing afterwards. A relatively long time frame also proved useful to adapt to each local context and gather a strong community from which synergies can emerge around the issue at hand.

Even if the co-creation process really starts with the emergence phase detailed in Dimension 2, it is yet interesting to explain how CoLAB has chosen the theme of each edition. While the first one resulted from a study about food security that had been conducted by Makesense before they knew they would develop CoLAB, the second was identified after a preliminary field study. They analyzed the health system in Mali and Niger and met local actors to understand their challenges and relationships. They found out for instance that a very wide number of NGO were operating in the health sector in Mali, but that they deeply lacked coordination: they could come on the same territory, one after the other, to conduct the exact same mission. This field study thus revealed a great need to connect such actors, especially on the pressing issue of maternal and child health. Analyzing local contexts to better delineate the scope of the program and to assess if a collaborative approach would be relevant on the ground was an indispensable pre-condition for CoLAB's success.

* * *

Sources:

- Interview on July 6th 2021 of Djamila Oumouri (CoLAB project manager)
- CoLAB website (https://colab-innovation.org/)
- CoLAB 2nd edition website (https://colab-innovation-sme.org/)

COMPASS

Evidence and opportunities for responsible innovation in SMEs

Key findings:

- Develops a Responsible Innovation Compass to help SMEs from biomedicine, nanotechnology, cybersecurity sectors integrate RRI

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- RI Compass includes three sector-specific roadmaps, training materials and good practice case-studies of successfully launched products incorporating RRI
- Methods to engage stakeholders in RRI co-creation include a Responsible Innovation Self-Check Tool and a Co-creation Method Kit

Sources:
- Website: CORDIS Project page, Website (Self-check tool Question set), Website (Co-creation toolkit)
- Five existing RRI case-study reports, for instance: "The development of new rehabilitation devices for use in the community setting – the Rehab Angel"; and "On my Own… at Work. A framework and an app".
- D5.1 Stakeholder and Multiplier Engagement Strategy. January 2017.
- D4.4 User feedback and implementation report on Responsible Innovation Roadmaps. April 2019
- Responsible Innovation Toolkit (also called "Co-creation method booklet")
- Responsible Innovation Compass Self-check Tool Question set

The COMPASS Project

COMPASS (May 2016 – April 2019) seeks to make RRI more accessible to SMEs. For this the Project develops a Responsible Innovation Compass which consists in a Self-check Tool, a Responsible Innovation Toolkit (also called "Co-creation method booklet") and three interactive, ongoing and sector-specific Roadmaps. These Roadmaps concern three different fields, with sector-specific RRI implementation aims: biomedicine (aim: more responsibility in the healthcare technology and services sector), nanotechnology (aim: to mitigate risk and safety issues in innovation), cybersecurity (aim: to shape ethical approaches to innovation). The Responsible Innovation Compass as a whole also comprises Training materials and Good practice case-studies of existing successful initiatives that successfully implemented RRI through co-creation processes in these three sectors.

Dimension One: Actors and Configurations

<u>Consortium participants</u>

The Project's consortium members are listed in the table below:

Name	Type (EU taxonomy)	Country
WIRTSCHAFTSUNIVERSITAT WIEN (coordinator)	HSEE	Austria
DE MONTFORT UNIVERSITY	HSEE	UK
UCLAN CYPRUS LIMITED	HSEE	Cyprus
FUNDACION BANCARIA CAIXA D'ESTALVIS	O	Spain
EUROPEAN BUSINESS AND INNOVATION CENTRE NETWORK AISBL - EBN	O	Belgium

STICHTING B LAB EUROPE	O	Netherlands
STRATEGIC DESIGN SCENARIOS SPRL Belgium	PFPE	Belgium

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). O = Other.

Stakeholders in Project activities

COMPASS involves participants from all four of the QH (Quadruple Helix) helices, but focusses on SMEs (private sector). Three fields of innovation are studied, biomedicine, nanotechnology, cybersecurity, in Spain, the UK and Belgium. Two types of actors are differentiated: Stakeholders and Supporting organizations. Stakeholders, which are drawn from a triple-helix of private sector, but also citizen and research helices, are directly involved in the project activities, albeit not all in the same stages and with the same importance (the private sector SMEs are involved in most stages since they are the key focus of the Project). Supporting organizations, also called "multipliers", which include "networks, professional associations, government organizations, chambers of commerce, clusters, incubators, accelerators, innovation parks, investors, and all sorts of organizations that provide SMEs with information and training, networking, and funding opportunities" (D5.1), are not directly involved in project activities, but play key roles in the dissemination of the Project's outcomes. Two of these multipliers are COMPASS consortium partners (EBN and B Lab). Policy makers (mostly European-level) are involved in the Project's Final Conference, where CSOs (the citizen side of the QH) are invited to participate.

Stakeholder engagement strategy

The engagement strategy, particularly targeted at SMEs, aims to communicate the benefits of responsible innovation and incentives which must be "tangible and will provide answers to key challenges that SMEs usually encounter, such as business and funding opportunities, network opportunities, visibility opportunities or added value" (D5.1). Motivations for involving SMEs articulate around "Business and funding opportunities" (e.g., wider market opportunities by providing solutions to societal challenges), "Networking opportunities" (e.g., belonging to a community and being part of a movement), "Visibility and recognition opportunities" (e.g., reputation: becoming leaders/experts in their area) and "Added value" (e.g., novelty: awareness of global panorama, context and current trends).

To exemplify the benefits for SMEs, COMPASS also determined and studied five existing SME innovations which are already on the market and linked to the three areas (biomedicine, nanotechnology and cybersecurity), in order to exemplify the importance of RRI for SMEs in general (Source: Five existing RRI case-study reports). For instance, the *Rehab Angel* case-study shows shows how involved stakeholders from a triple-helix of public (UK National Health Service), research (academia) and private industry sectors, jointly co-developed a new lower-limb rehabilitation device. In another one of the five case-studies, *On my own… at work* involved people with Down Syndrome in the development of an app aiming to make them more independent from tutors in the accommodation and food services industry.

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Dimension Two: Methods and Processes

The engaged stakeholders are involved in "face-to-face activities" such as interviews, RI Labs and, in later stages, the pilot applications of the tools developed, as well as "digital platforms". Two core tools were designed: the first one involves SMEs in a self-reflection exercise on RRI that brings to light current or future practices that, for some, involve some degree of participation from other stakeholders in their innovation processes, and more generally require more reflexive internal processes (at SME level) in accounting for responsible innovation. The second method consists in a staged exercise that involves a triple-helix of SMEs, citizens, and research, that shows that citizens are involved in an intermediate stage of co-creation between two stages directed at SMEs, while research is involved in the last stage (roadmaps testing). Also, the five case-studies showed some elements on how interactions between stakeholders from different helices were seminal to generating innovative outcomes.

The Responsible Innovation self-check tool

The first method, the *Responsible innovation self-check tool*, involves SMEs in an exercise of identifying RRI aspects they could implement, following four dimensions called "Company management" (e.g., ethical conduct in stakeholder consultation and disclosure of conflicts of interest; data management practices in collecting and sharing; raising public awareness on the science behind their innovations; employee diversity, health, safety, and responsibility), "Idea generation & research" (principles sought in the initial stages of innovation such as prioritising societal challenges, involving stakeholders and anticipating impacts), "Development & Testing" (activities in the development phases of innovation – production, testing, market entry, etc. – such as fair co-developing with stakeholders, implementing safeguards against unintended use of the company's innovations, and sustainable production and sourcing), and "Market & Impact" (which focusses on the final stages of innovation processes from launch to re-evaluation and managing negative effects with relation to societal challenges) (Source: Responsible Innovation Compass Self-check Tool Question set).

The Co-creation method kit

The second method, the *Co-creation method kit*, articulates RRI following the priorities defined by the EU (ethics, gender, public engagement, open access and science education). This tool develops an "RI-Labs choreography" with the following sequence of stages: firstly, initial discussions that ask "why take part in RI-Labs"; secondly, an online forum that asks "are your processes responsible"; thirdly, a forward-looking workshop that consists in a "foresight exercise on the future of your sector"; fourthly, a vision exploration webinar that involves CSOs; fifthly, a backcasting roadmaps workshop that helps "build your action plan"; and finally, a testing webinar where one can "test the roadmap tool" that involves researchers (Source: Responsible Innovation Toolkit). This tool involves a triple-helix process with a focus on private-sector SMEs that are involved in all stages of the Co-creation method kit, CSOs that explore visions built by SMEs in a foresight exercise, and researchers in the final stage where roadmaps are tested.

SME user feedback on the RI Roadmaps

SMEs in each of the three fields of innovation (biomedicine, nanotechnology, cybersecurity) are engaged in user feedbacks on the Responsible Innovation Roadmaps to check whether each sectorial RI Roadmap seems relevant to the participating SMEs' business and innovation strategies (D4.4). This phase allows COMPASS to validate the methodologies employed to design the co-creation method kit and the RI Roadmaps. Questions asked regard, for example, clarity of the Roadmap, how the Roadmap co-creation process helped the SME understand RRI, or whether the SME has already implemented or hopes to implement a particular Roadmap tool.

Dimension Three: Outcomes and Impacts

Responsible Innovation Compass

The core output of COMPASS is the Responsible Innovation Compass, an interactive online platform that deploys RRI visions and roadmaps for three fields of innovation (biomedicine, nanotechnology, cybersecurity). The online Self-check Tool for SMEs provides guidance for these on how to implement RRI practices.

COMPASS studies "how companies assess where they are along the path towards responsible innovation and what methods are useful" in doing so, and provides, as a consolidated output from the different SME studies, "commercially relevant roadmaps and methods for navigation and incentives for SMEs" to incorporate responsible innovation. The result is the Responsible Innovation Compass which deploys RRI visions, roadmaps, training materials and guides that are tailored to SME needs in the three fields (biomedicine, nanotechnology, cybersecurity).

While not an output directly from the project itself, the five case-studies on existing, commercially available products that incorporate RRI and are the result of Quadruple Helix (or at least Triple Helix) co-creation processes, enable COMPASS to show other SMEs how specific industry outcomes can be successfully obtained through multiple stakeholder co-creation. For instance, the *Rehab Angel* is now commercially available and is being used in many rehabilitation centres and sports clubs in a variety of knee-related injuries; and the *On my own… at work* app provides a new tool for people with intellectual disabilities, vocational education and training providers, disability organisations, and the accommodation and catering services industry.

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CREATIONS

Developing an Engaging Science Classroom

Key findings:

- Develops STEAM approaches that involve science education with art-based science learning methods
- Sets up 107 Demonstrators throughout Europe that act as vectors for innovative, art-based science learning approaches created by teachers through a Community Portal
- Articulates guidelines/framework for Demonstrators through a Pedagogical Framework and a guide for Learning Environments that helps students/teachers better understand innovative pedagogies

Sources:

- W: CORDIS Project page or Project website (online Platform)
- D3.2 CREATIONS Demonstrators
- D4.3 Guidelines and Support Materials
- D5.1 Implementation Plan
- D7.9 Effective Ways of Introducing Schools in Scientific Research
- CREATIONS Honeycomb diagram
- CREATIONS Wheel diagram

The CREATIONS Project

CREATIONS (October 2015 – November 2018) seeks to demonstrate innovative approaches that involve teachers and students in scientific research that are based on art, and supports policy development by (a) building communities between researchers, teachers and students through educational activities both formal (e.g, field trips) and informal (e.g., games), (b) the integration of science education within infrastructures for monitored-for-impact innovative activities, and (c) development of a roadmap that includes guidelines for the design and implementation of such innovative activities with an aim to improving scientific research outreach and science education policy.

CREATIONS sets up a community Portal on Open Discovery Space that "aims to enrich the existing education approaches by blending artistic creativity with the inquiry based science education model" by providing creative practices and tools adapted to the different needs of educators. CREATIONS establishes a pan-European network of students, teachers, researchers and artists and formulates a pedagogical framework based on RRI and that integrates culture and arts in innovative teaching practice. This pedagogical framework is based on the design and implementation of 100 CREATIONS Demonstrators (involving several thousand teachers and over 30 000 students across over 40 countries).

The Project' core aim and achievement is thus to lead to a better understanding of the links between creativity and science motivation and learning and more generally to further the STEAM (Science, Technology, Engineering, the Arts and Math) movement/approach that aims at "arts integration into science teaching and learning as a catalyst for developing creative skills that are necessary to thrive in an innovation economy" (D5.1). The Project's core objectives include (i) to develop a pedagogical framework based on creative learning for science education, and (ii) to create virtual learning communities of teachers, students, artists and researchers.

Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
UNIVERSITAT BAYREUTH (coordinator)	HSEE	Germany
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH	RO	Switzerland
THE UNIVERSITY OF EXETER	HSEE	UK
ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON	HSEE	Greece
ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE	HSEE	Greece
HOGSKULEN PA VESTLANDET	HSEE	Norway
INSTITUTE OF ACCELERATING SYSTEMS AND APPLICATIONS	HSEE	Greece
UNITED KINGDOM RESEARCH AND INNOVATION	RO	UK
HELSINGIN YLIOPISTO	HSEE	Finland
HOCHSCHULE RHEIN-WAAL-HSRW RHINE-WAAL UNIVERSITY OF APPLIED SCIENCES	HSEE	Germany
THE UNIVERSITY OF BIRMINGHAM	HSEE	UK
UNIVERSITA TA MALTA	HSEE	Malta
CENTAR ZA PROMOCIJU NAUKE	PB	Serbia
THE BIG VAN THEORY	O	Spain
KUNGLIGA TEKNISKA HOEGSKOLAN	HSEE	Sweden
EUROPEAN PHYSICAL SOCIETY ASSOCIATION	O	France

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

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Stakeholders from Project activities

CREATIONS seeks to create digital communities structured around Demonstrators (projects) which are presented through a repository in the online Portal. At the centre of these Demonstrators lie students and their teachers, who engage with researchers and artists via the science learning through arts/creation approach developed throughout the Project (D4.3). The ultimate aim of these activities is to develop effective links and synergies between schools and large research infrastructures to help spark students' interest in science and scientific careers (D5.1).

Dimension Two: Methods and Processes

Stakeholder engagement

The implementation of the educational activities involves a range of methods/strategies that include training seminars for teachers, workshops for students, science contests, access to a collection of open educational resources and research centers, and creating learning communities and networks of teachers, students, researchers, artists, and other stakeholders to involve them in collaborative learning activities (using European networks of science teachers already in existence such as SCIENTIX or Open Discovery Space). These implementation activities are done both at the national and international level. Activities include, among many others but here as an illustration: "Learning Science through Theatre" (involving teachers, students, researchers, directors/musicians/actors); "Global Science Opera" (digital interactions between scientists, art institutions, schools, universities and educational projects producing and performing educational operas in each of the CREATIONS Project countries); "May Month of Mathematics – M3" (consisting in interactive exhibits, children workshops, debates, using, for example, mathematical cartoons or building geometrical objects out of everyday items); but also some non-art related activities, such as "Virtual Visits" (involving students, teachers, scientists, but also policy makers and science education and outreach specialists) linked to particle physics through a tour of CERN facilities and exchanging with CERN scientists.

CREATIONS Portal and the Demonstrators

A Demonstrator is a set of in-school and out-of-school activities that are rooted in scientific inquiry but also creativity-based learning pedagogical principles. It consists in "a summative set of important information including description, methodology, guidelines and assessment of a school project which integrates three basic aspects: Effective Educational Activities based on Creativity-enriched Inquiry Based Approaches (school-based); Educational Activities that promote school – research centre collaboration; Effective Educators Preparation and Professional Development Programs". A Demonstrator shows new ways of interacting with scientific content and presents a project, its implementation, its outcomes and some recommendations for further applications in training policies and practices. The Portal therefore enables teachers to share their creative science education ideas, and join the overall CREATIONS community and, within this broad community, to create sub-communities around their Demonstrators. Teachers not only integrate innovative educational practices from other teachers (using their Demonstrators) but therefore also develop their own. Through three core Portal functions, "Search" (for a Demonstrator in the Portal resources), "Share" (the user ideas through a Demonstrator sub-community), and "Create" (an event linked to a

Demonstrator), CREATIONS aims to produce a "circle of creativity" for science education practitioners that can expand beyond the Project's objective and timeline (D4.3).

Dimension Three: Outcomes and Impacts

CREATIONS Framework for the Design of Art and Science Activities in Schools

On the basis of a total of 107 CREATIONS Demonstrators (and their 107 sub-communities) and following an implementation phase involving teachers and students across Europe, the Project constitutes "guidelines and recommendations on how scientific work can be used to provide an engaging educational experience through the exploration of "real science" using art as a vehicle of motivation" (D7.9). The proposed Framework provides a reference for helping schools and research groups articulate learning outcomes as they develop programs, activities and events linked to introducing science and art in seeking to engage students' creativity. There are two main areas of action for the CREATIONS Framework.

Firstly, the *CREATIONS Pedagogical Framework* consists in a visual graph that is structured around several concepts/aspects which are collectively geared to enabling both students and teachers to engage in "journeys of becoming" that are embedded within an ethical awareness of the impact of the co-creative actions of their group. Firstly, the Pedagogical Framework emphasizes/articulates "possibility thinking" (e.g., being able to ask "what if" questions such as "what if I/we choose to explore this scientific question rather than that one?"); the "4Ps" of "pluralities" (opportunities for students and teachers to experiment with different places, activities, personal identities), "possibilities" (transitioning from "what is" questions to "what might be", open possibility questions), "participation" (opportunities for students and teachers to make themselves visible on their own terms) and "playfulness" (opportunities for students and teachers to learn, create and self-create in emotionally rich learning environments); and Wise Humanising Creativity (WHS) and Living Dialogical Spaces (LDS) that articulate methods of "participation, emancipation, working bottom-up, debate and difference, openness to action" through the Demonstrators that promote dialogue between people, disciplines, creativity, identity and ideas, also allowing for conflict and irreconcilable difference (D7.9);

Secondly, The *CREATIONS Learning Environments* guide provides recommendations for the development of the learning environments that act as hubs for the educational and outreach activities of the Demonstrators. The guide also helps to identify different learning environments' abilities to support the requirements formulated in the Pedagogical Framework. It also sets the context/conditions for the implementation of the Demonstrators (e.g., school-based or school-research center collaboration; digital or physical simulations) and the usages made of the Demonstrators by different stakeholders (students, teachers, policy makers and other types).

CREATIONS Portal

The overall outcome of the CREATION Portal and its Demonstrators is to show that students can, when equipped with specific tools and applications, become researchers and lead their own scientific quest as "performers of knowledge", and in the process increase their motivations to follow scientific careers. Alongside the Demonstrators, scientific site visits and physical and online interactions with researchers enable both students and teachers to better understand their research and work lives. Science teachers develop innovative practices in their science classroom, and are empowered to change their practices, introduce contemporary scientific issues in their lessons, and propose and

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initiate science education changes at the level of their school. The resources created by teachers through the Demonstrators have thus populated the CREATIONS Communities through the CREATIONS Portal).

CROWD4ROADS

CROWD sensing and ride sharing FOR ROAD Sustainability

Key findings:

- Project integrates two crowd-share platforms together, bridging smart-sensing and car-pooling
- Stakeholders include citizens actively concerned with road issues, municipalities and the BlaBlaCar ride-sharing community
- Gamification is a core method of stakeholder engagement and bridging of the two platforms and their distinct communities
- Incentive and reward mechanisms are emphasized
- Outcomes are improved, cheaper and more transparent monitoring and intervention for local roads, closer ties between concerned citizens and municipalities, and greater uptake of ride-sharing

Sources:

- W: CORDIS Project page or Project website/platform
- D2.1: Socio-economic Analysis and Sustainability Threat
- D2.2: Representative Scenarios and Use Cases
- D3.1: Carpooling and Crowd-sensing Integration Plan
- D3.3: Gamification and reward strategies and features

The CROWD4ROADS Project

This project's aims both to increase car occupancy rate and to engage drivers/passengers in road monitoring, by way of a CROWD4ROADS Platform built by exploiting synergies between two types of collective intelligence systems (or platforms): (i) the largest ride-sharing community worldwide, BlaBlaCar, and (ii) SmartRoadSense, a crowd-sensing system that uses car-mounted smartphone accelerometers to estimate the roughness of the road surface. CROWD4ROADS builds a framework that stems from the analysis of socio-economic and sustainability threats linked both to ride-sharing, crowd-sensing and road transport issues in general (D2.1), and in this process the Project identifies a certain number of "use-cases" for the collaboration between the BlaBlaCar and SmartRoadSense platforms: a "joint data sharing model" (based on customer data sharing agreement); an "open, consumer oriented application to incentivise customers to reduce their road use by providing them with data on their travel behaviour"; a "next generation ride-sharing application" in the form of an "extension to the current BlaBlaCar application using SmartRoadSense technology"; "place based road sensing applications for municipalities to measure maintenance or reduce insurance premiums)"; "Road Sensing and Ride Sharing 'Serious Game'" (D2.1).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 101006382 - H2020-SwafS-2018-2020 / H2020-SwafS-2020-1

Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
Universita' degli Studi di Urbino Carlo Bo (coordinator)	HSEE	Italy
REGIONE MARCHE	PB	Italy
*COMUTO**	PFPE	France
COVENTRY UNIVERSITY	HSEE	UK
FUNDATIA SATEAN	O	Romania
BUCKINGHAMSHIRE ADVANTAGE	O	UK
REGIONE ABRUZZO	PB	Italy
COMUTO ITALIA SRL	PFPE	Italy

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.
* Participation ended

Stakeholders from Project activities

CROWD4ROADS identifies three core Target Groups for involvement, which they have studied extensively in their socio-economic report (D2.1). Firstly, “Citizens willing to improve the conditions of the roads they travel on”. Motivations for this group stem from regular observed (polled) dissatisfaction with the state of their local roads. Their attitude is linked to a “sense of civic duty or by a willingness to coöperate with local authorities”. However, they may “not be particularly motivated by the idea of taking up and participating in a ride-sharing practice”, so “extrinsic incentives are likely to have the greatest influence on their behaviour” such as “financial rewards, money-off vouchers and local reward schemes”, which should be “developed into the gamification platform in order to maximise pull and appeal of the ride-sharing platform to this group” (D2.2). Secondly, “Members of the BlaBlaCar community”. Motivations for this group link to “the impact that roads and travel creates on the environment and the local eco-systems” and the “ideals that surround sustainable travel behavior”, and, regarding SmartRoadSense they are “likely to have some concerns surrounding road quality and therefore may show some interest in using road-sensing technologies in their travel habits”. Thirdly, “Municipality personnel adopting SmartRoadSense as a road monitoring technology”. These are a large audience that include political, administrative and technical personnel and evolve within “specificities of the local contexts”, although they all face the same European-wide problem of dwindling public expenditure in road maintenance. One should also note that the publics for each platform are quite different in that they entail different objectives and uses of data: for instance,

SmartRoadSense anonymizes users, whereas, on the contrary, BlaBlaCar's model is built on the trust generated by users and materialized in their profiles (D2.1).

Dimension Two: Methods and Processes

Stakeholder engagement

Each of the three Target Groups enters CROWD4ROADS through a different path. When the "Citizens willing to improve the conditions of the roads they travel on" go to their local municipalities to report road issues, information/adverts present a game connected to road-sensing technologies (purpose, benefits) along with a link to sign up, via the municipal website, on a separate webpage that houses the downloads for the game, road-sensing app and links to BlaBlaCar. The "Members of the BlaBlaCar community" are reached through adverts for the game system hosted on BlaBlaCar, along with incentives to join the game and download the road-sensing technologies. "Municipality personnel adopting SmartRoadSense as a road monitoring technology" can use this sensing technology while traveling (personal or work related trips), including ride-shared trips with BlaBlaCar. The data gathered from all these groups is transferred to cloud storage and fed back to the municipality to inform on the quality of the roads, and also to determine player rewards that are fed back into the game system (D2.2).

Incentives and rewards

The Project emphasizes the importance of cooperation incentives, which "motivate users to share services and resources (including their car, time, and effort, in addition to bandwidth, computational power, and storage space)" (D3.1). While BlaBlaCar makes use of reputations mechanisms like many online platforms, SmartRoadSense collects no personalized data and must therefore harness other incentive strategies to boost adoption of its app, such as leveraging the much larger BlaBlaCar community, which may in part be sensitive about CROWD4ROADS/SmartRoadSense issues; virtual currencies called GeoCoins used to pay services provided by third-party entities; and a "gamification layer" to let users collect game rewards while driving (with user-app direct interactions outside of driving time for security reasons), which includes a multiplayer mode connecting different users further empowered by using "algorithms to perform onboard corrections and evaluations" and enact the "great potential of having data describing the same context from different instances of the SmartRoadSense app", especially since this enables the app to identify users traveling in the same (BlaBla)car and therefore collect statistics on the carpooling phenomena (D3.1).

Dimension Three: Outcomes and Impacts

Impacts from engaging the three Target Groups

By engaging the "Citizens willing to improve the conditions of the roads they travel on" group, the Project expects "less personal vehicle use, especially for routine, day to day travel", and money saved on travel expenditures" (ride-sharing); helping them "feel as if they are contributing to something greater, and in turn, there should be less focus on direct complaints to the municipalities and more focus on aiding the council by identifying troubled spots"; also "raising awareness of additional eco-efficient services within this group could help the promotion and development of a healthier approach

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to travel behaviors". In the process, CROWD4ROADS can also evaluate how engagement and motivation strategies (e.g., gamification platform) have performed. More generally, by "re-conditioning the behavior of this user group to instead become monitors of the roads and report back on its overall condition, a personal sense of responsibility, pride and camaraderie with the local council can be fostered (…) with less emphasis on general complaints"; and, naturally, the Project "expects general road maintenance programmes to improve, a reduction to vehicle damage and operational costs, improved safety and a reduction in local road accidents and an improvement on journey times" (D2.2).

The "Members of the BlaBlaCar community" group, sensitive to reduction of road travel impact, will positively impact the environment further by reducing the overall cost associated to road monitoring; by being encouraged to reach out to additional non-rideshare users through additional reward systems (e.g., gamification approaches); and, naturally, their engagement will provide municipalities with "greater access to daily feedback concerning the quality of the roads, leading to savings in maintenance costs" (D2.2).

The "Municipality personnel adopting SmartRoadSense as a road monitoring technology" group will benefit from road sensing "open data on how and where to operate, and a transparent way for the public to witness the efficiency and the priorities of the municipality", which will also "reduce the cost municipalities need to spend on 'contractors' which in turn will reduce their insurance premiums (as the data will enable municipalities to deliver a better programme of planned maintenance". Also, reducing costs paid by municipalities against insurance claims linked to damage caused to vehicles because of poor roads enables to save funds that can be "reinvested into helping communities that have previously struggled accessing transport solutions", "supporting new models of Public Transport for Disadvantaged/Low Wage Communities; Social Care Transport and or Home to School Transport, translating efficiency in road maintenance into widespread public utility and satisfaction" (D2.2).

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Datathon Déchets

Datathon Déchets - that translates as Datathon Waste - is a program piloted by the collaborative innovation lab TUBÀ based in the French city of Lyon. It consisted of a two-day event gathering various actors who worked together on the use of local waste data.

Dimension 1: Motivations and Participants

In 2019, TUBÀ applied to the European INTERREG program DEAS (Data Economy Alps Strategy to stimulate participation competitiveness and new business in Alpine Space) with a focus on its environmental dimension. Following its selection and a one-year exploration phase with its European and territorial partners, TUBÀ decided to specifically question the role that data about waste could play to improve the attractiveness and sustainability of the city, and in particular at the neighborhood level. The program was thus financed by European fundings (as well as by TUBÀ's partners support) and had to result in a pilot project, that TUBÀ chose to arrive at by organizing a datathon.

In order to gather all the relevant stakeholders, they realized a benchmark of the local actors working on open data or waste, with the aim of bringing together different types of backgrounds for the datathon. They solicited the private companies that were already members of TUBÀ, namely GRDF (a large gas distributor), Enedis (a private company in charge of managing the electricity network), Veolia (a French transnational company providing services in water, waste and energy management) and the SNCF (the national railway company). These companies took care internally of choosing the employees that would participate in the datathon: the profiles selected - often high level - proved to be extremely relevant with respect to the scope of the program. This can be explained by the strong relationship that those firms have developed with TUBÀ over the years, whose collaborative methods they have tested and trust. Other private companies working in the waste or data sectors came to supplement them, like Vizity or Ecovalim. TUBÀ also relied on its network to involve associative actors as well as public actors that came from the data service and the waste service of Lyon Metropole and from SPL Part-Dieu (a public company in charge of the urban planning of the Part-Dieu district). They also invited students in computer science at Epitech (a private computer science graduate school), in geography and cartography or in applied mathematics at Lyon universities. Finally, TUBÀ disseminated a call for interest online to complete its own sourcing of participants.

In sum, those who took part in the co-creation were employees from private companies, public actors of Lyon, local associations and students, who were all mixed together during the datathon in three different teams (of about ten members each). While the private groups members of TUBÀ financially contributed to the datathon, the participation of other smaller structures was free. Many of the stakeholders were often keen to engage in the project: they had already been confronted with some of the issues at stake (like missing or unqualified data) in their activities, the value of the program was therefore quite obvious for them. Some public actors could however be a bit reluctant at first, as they had been working in their services for years and could understandably not see what could come out of a two-day event. Additionally, it was far more difficult to convince some actors from the SSE (Social and Solidarity Economy) world who did not feel concerned by the program. By means of sustained discussions, TUBÀ had to overcome their prejudices about data and show how using local open data could benefit them.

Dimension 2: Methods and Process

The kick-off of the INTERREG project in February 2020 was followed by a five-month exploration phase, during which all European partners conducted a survey about open data on their territory to identify the needs, levers for change and opportunities. A local kick-off gathered about ten potential stakeholders in June 2020 and was then followed by a seven-month phase to refine the program scope. TUBÀ finally settled for a datahon, as this format seemed like an adequate way to combine a collaborative approach (which is TUBÀ's expertise), a precise issue (waste) and specific means (the use of open data). Such a multi-actor event was not radically new by its format but, contrary to more standard hackathons that are only destined to students and are initiated by a single private company, the Datathon Déchets mixed several private groups on the participant's side, as well as public and associative actors. TUBÀ appealed to the services of Datactivist (a cooperative enterprise working towards data opening and reuse) that helped them define the format. They also interviewed their partners, to understand what data they had at their disposal and which one was missing. The pilot team formed three teams thanks to the benchmark of actors (listed in Dimension 1) it had realized, and gathered all the necessary resources to address the three challenges identified: biowaste management in the Part Dieu district, voluntary waste drop-off centers and electronic waste in companies.

The datathon itself consisted of a two-day event, where each team tackled one of the three challenges. The aim was to question the data put at their disposal (and in particular to identify the gaps in the existing coverage) and to start imagining a service that could be developed to exploit them. The day was divided in different phases (definition of the scope, inspiration, appropriation of data, formatting, uses, restitution) to accompany the participants in their work. The collaborations were multidisciplinary, as each team brought together data experts, designers, developers and waste professionals. The participants who had been carefully selected felt all concerned by their challenges, which enabled them to go into in-depth productive discussions. No large event was organized after the datathon to share its result to the general public (due to the COVID-19 crisis), only a small session at the end of the two days had been planned to present the results to the vice-president of the city council and have its valuable feedback.

On a pragmatic point of view, the fact that the event took place in person a few weeks after the end of the first lockdown in France was a conducive condition for co-creation: people were pleased to meet each other directly and to work in teams. Because the potential of each group naturally relied on its constitution, the careful balance between the diverse profiles was essential to generate enriching discussions and results. For instance, due to a last-minute cancellation, one of the teams ended up with far more students than professional experts and hence did not succeed in deepening their reflection as much as others. Moreover, TUBÀ had decided to let participants check their mobile phones during the event if their work required them to do so. This small detail was received very positively by the participants: the fact that they could leave discussions for a few minutes if needed was reassuring for them and it would have been unproductive to ask all the high profiles that TUBÀ had managed to gather to put aside their professional responsibilities for two full days. This choice avoided frustration and was not misused by participants.

Dimension 3: Outcomes and Impacts

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A survey was sent to the participants ten days after the datathon to understand how the program had benefited them and to gather their feedback, which turned out to be very positive. Many of them indicated that they met people that were of professional interest for them, that they discovered new tools or acquired knowledge by discussing with others (like on biomethanization), or that they were pleased to deepen some topics they were already concerned with internally. It is worth mentioning that the SSE actors that TUBÀ had trouble persuading to come fully acknowledged the relevancy of their participation afterwards, as they had understood how data could bring about useful changes to their activities

Apart from this positive feedback, some small changes in mentalities and in practices occurred. The data, waste and digital innovation public services of Lyon realized that they needed in the future to collaborate far more than what they used to do before the event. The Datathon Déchets was also an opportunity for some participants to meet TUBÀ for the first time, discover its collaborative methodologies and eventually draw on them - e.g. one participant specifically asked if he could reuse a facilitating tool for a workshop he had to organize later. Finally, the program was the first collaboration between TUBÀ and the students from the GeoNum master (studying geography with a digital perspective) of Lyon University. They decided to continue this partnership in the long term, in particular through a new project soon to be developed.

As far as the work produced during the datahon is concerned, each of the three teams examined the sets of existing data related to their challenge and, from that, developed ideas to improve their use. For instance, the team focusing on waste drop-off containers saw that data on their position were not aggregated at all and that finding a way to compile them could prove useful to develop other new services (like a map displaying them). A new project that will take over this idea is thus being further developed. It is still under discussion what the suggestions of the two other teams will become.

More broadly, the ideas generated during the datathon will be reused in the context of the European project DEAS: a working group will constitute itself on September 2021 to draw upon the results and develop one or several pilot projects in Lyon, that will take the form of new devices or services improving local waste management and that will be shared and integrated in the DEAS platform. The fact that the Datathon Déchets is part of a larger European project is very beneficial in terms of outcome: it prevents the organizational team from simply ending the program after the event and from considering it as a satisfying realization sufficient in itself, given the positive feedback of all the participants. The pilot team is compelled to share the datathon results with all its partners and to turn them into a pilot project. This broader constraining framework can thus be valuable to keep up the dynamic created by short events like the Datathon Déchets and to help them scale their impact

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

In comparison with BizArTech (another program developed by TUBÀ and taken as a case study), the Datathon Déchets was easier to organize: TUBÀ was the only structure that designed and piloted it, whereas BizArTech was created in collaboration with two others. The approach chosen was also less atypical and closer to the collaborative methods that TUBÀ is already familiar with.

However, with hindsight, TUBÀ is wondering whether a single challenge would not have been sufficient (as for BizArTech): focusing on three challenges increased the complexity of the overall program

whereas concentrating all efforts on one would have been easier to manage. Moreover, TUBÀ is also reflecting on its position as an organizer. They chose to remain neutral and not to intervene too much in the discussions during the datathon to let the participants go their own way. However, given the very lengthy exploratory phase they went through and which gave them precise insights on the issues at hand, they would not have been illegitimate to provide more specific instructions and goals to each team, which could have benefited the program. Orienting them more in their discussions could indeed have saved time, but it also raises the question of how not to encroach on the co-creation approach if the participants are being imposed a fully predetermined direction rather than choosing one themselves.

* * *

Sources:

4 Interview on July 23rd of Mathilde Colin (Senior Project Coordinator at TUBÀ)
5 TUBÀ website page on the Datathon Déchets (https://www.tuba-lyon.com/projet/datathon-dechets/)

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D-NOSES

Distributed Network for Odour Sensing, Empowerment and Sustainability

Key findings:

- Citizens collect data on odour issues in their communities with the AppOdourCollect
- Citizens are previously trained by Project consortium experts to build capacity in odour sensing
- Other QH groups are targeted at specific events (industry, policy) to sensitize to odour issues
- Aims to encourage other QH odour issue stakeholders to provide data on platform alongside citizen data
- Overall aim is to reduce odour nuisance at communities level

Sources

- Deliverable 7.3: D-NOSES Events 1. April 2019
- Deliverable 4.1: Map of Odour issues and priorities. Multilevel engagement plan for stakeholders and communities. - December 2018.
- Bristol Approach website.
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- Arias R., Capelli L., Diaz Jimenez C., 2018, A new methodology based on citizen science to improve environmental odour management, Chemical Engineering Transactions, 68, 7-12 DOI: 10.3303/CET1868002

The D-NOSES Project: citizen-led mapping of odour issues

D-NOSES (April 2018 – September 2021) seeks to address odour issues by directly involving citizens in the supply of crowdsourced, openly accessible data through an online platform, AppOdourCollect, which is part of the setup of an International Odour Observatory. D-NOSES aims to introduce odour pollution in policy agendas at a global scale, as currently this issue seems to be lacking. This policy introduction is realized through a Green Paper and a Strategic Roadmap for Governance in Odour Pollution. D-NOSES also aims to build capacity in local communities (including advocacy actions), increase transparency on odour issues and promote collaboration between QH stakeholders who have links to odour issues. The geographical scope of the project, mostly European, includes nine countries with different sociocultural, institutional, economic and industrial contexts, comprising in total 450 communities from ten different countries (Spain, Italy, UK, Germany, Greece, Bulgaria, Chile, and Portugal). From these, eleven pilot communities are selected, one for each country (two for Portugal) for local case-studies which will test and validate the methodology developed in the Project. In D-NOSES, citizens interact with QH actors from all helices: CSOs (Community Supported Organizations), NGOs, local public authorities, odour emitting industries and academia.

Dimension One: Actors and Motivations

<u>Consortium participants</u>

The Consortium partners are listed in the table below.

Name	Type (EU taxonomy)	Country
FUNDACION IBERCIVIS (coordinator)	RO	Spain
IDEAS 3493 SL	PFPE	Spain
MAPPING FOR CHANGE CIC	RO	UK
VEREIN DER EUROPAEISCHEN BURGERWISSENSCHAFTEN - ECSA E.V.	RO	Germany
MEDITERRANEAN INFORMATION OFFICE FOR ENVIRONMENT, CULTURE AND SUSTAINABLE DEVELOPMENT ASSOCIATION	O	Greece
INTERNATIONAL SOLID WASTE ASSOCIATION	O	Austria
ASOCIACION MEDIOAMBIENTAL INTERNACIONAL DE GESTORES DEL OLOR	O	Spain
POLITECNICO DI MILANO	HSEE	Italy
UNIVERSITAET KASSEL	HSEE	Germany
APEA - ASSOCIACAO PORTUGUESA DE ENGENHARIA DO AMBIENTEENVIROMETRICS TECHNIKOI SYMVOULOI ETAIREIA PERIORISMENIS EFTHYNIS	O	Portugal
ENVIROMETRICS TECHNIKOI SYMVOULOI ETAIREIA PERIORISMENIS EFTHYNIS	PFPE	Greece
ECOTEC INGENIERIA LIMITADA	PFPE	Chile
MUNICIPIO DE SAO JOAO DA MADEIRA	PB	Portugal
STOLICHNA OBSHTINA	PB	Bulgaria
SERVICO INTERMUNICIPALIZADO DE GESTAO DE RESIDUOS DO GRANDE PORTO	PB	Portugal

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

Four audiences that reflect QH stakeholders were targeted at specific events (D7.3). Public audiences were important to generate enough volunteers and data to make odour maps in the actual pilots, but

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also to provide the odour observatory with data from all over the world. Industry representatives were targeted at exhibits where they usually congregate and presented with the core argument that this method would provide a low cost alternative to environmental odour monitoring. Scientific audiences that constitute the odour experts community were mobilized to spread the message of citizen science and promote the acceptance and use of these kind of methods. Policy audiences were also targeted at specific events (e.g., 22nd Meeting of the Working Group of the Parties to the Aarhus Convention).

Dimension Two: Methods and Processes

Engagement model

D-NOSES develops an engagement model in six phases (D4.1). Phase 1 "Frame the problem" maps out stakeholders to gain understanding of context and problems through ethnographic methods (e.g., interviews) with local stakeholders, and also to investigate how technology and data can help tackle the issue. Phase 2 "Pilot design" leads stakeholders to co-define a common research question and co-design a data collection strategy and the data gathering tools. Training sessions are also carried out to develop the skills needed by the citizens to use the tools needed for data gathering. Phase 3 "Data collection", using AppOdourCollect, must sustain participants' engagements for a full year to cover all four seasons and therefore all weather conditions. To keep them engaged over this year-long duration, measures involve: creating a group of community champions, organising events to broaden participant groups (e.g., data jams, co-creation workshops, training sessions) and data analysis sessions to allow participants to explore preliminary results (Balestrini et al 2018). In Phase 4 "Data analysis", participants from the eleven pilot communities analyse the data collected with help from odour experts within the D-NOSES consortium, but also with insights from other "pilot participants who can help interpret the results, adding value with their situated knowledge and experience". In Phase 5 "Action", odour mitigation actions based on results are co-designed by QH stakeholders, while in Phase 6 "Outcomes" participants are "invited to reflect on lessons learnt during the pilot (see "Dimension Three Outcomes and Impacts" for more detail on Phases 5 and 6).

AppOdourCollect

The AppOdourCollect is D-NOSES main tool. Through it, citizens citizens collaboratively report and map odour observations in their communities. This tool, which was not created for D-Noses but for another EU Framework Programme project, MyGEOSS, is integrated with other already existing tools, Commmunity Maps and PrOlar. AppOdourCollect enables citizens to report odour issues and their place, type of odour (drawn from a preselected odour type or freely described), odour intensity, level of annoyance, weather conditions, origin (if known), duration, and any additional comment. These data are generated from (and for) 450 communities, but only the data from eleven of these communities will be used in the context of the eleven pilot case-studies.

Engagement model methodologies

D-NOSES uses an engagement methodology which improves on two methodologies already used by Consortium partners Ideas and Mapping for Change. Firstly, the Bristol Approach (IFC) helps local communities co-design and implement citizen science interventions related to their living areas (here, odour pollution), and ensures sustained engagement from citizens prepared to give time and energy to address issues in their community (Arias et al, 2018). This approach is based on the idea of the "city commons" and asks (i) "how can we work together to use what's already in our cities and connect the

right people to create new resources that will address what's missing?" and (ii) "how can we ensure that technologies, tools and systems work for the common good", "using a range of sensors – usually a mix of new and old technology – and meshing it with the wider resources and knowhow that already exists" in a community (Source: Bristol Approach website)?. Its six-step framework involves identification (of the key issue), framing (exploring how to harness the power of technology and data to address the issue), design (creating tools needed for data gathering or further understanding), deployment (testing the tools in real-world environments), orchestration (sharing the tools and data with others) and outcome (evaluating whether the goals have been achieved). The second methodology (MfC) is guided by Principle 10 of the 1992 Rio Declaration, which states that "environmental issues are best handled with participation of all concerned citizens (…). At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes (…). Effective access to judicial and administrative proceedings (…) shall be provided". Therefore, the first step of this methodology is the "Introduction to existing public information", after which the second step is "Discussion & initial priorities setting", the third step is "Citizen Science & data gathering" alongside "General perception mapping", followed by "Digitalisation, visualisation and discussion", leading to a "Website and online map" that will then iteratively feed back into step two (Discussion & initial priorities setting). This "Extreme Citizen Science approach" involves communities not only in monitoring and analysing their local environment but also leads them to "define the problem, co-design methodologies and tools that enable them to own, share, and act on their results" (Arias et al 2018).

In each of the eleven communities selected (from the 450 initial communities), citizens are trained by "odour experts" to eliminate bias and help them better distinguish odours and guarantee a certain standard sense of smell (only observations and data by validated citizens appear on the map). Operational data obtained from the key emitting industries are matched to observations and key processes and meteorological conditions responsible for nuisances are identified for remedial action involving public authorities, odour experts, citizens and emitting industries, in the form of co-designed ad hoc local solutions. Indeed, a key challenge of D-NOSES is "to orchestrate the engagement of different stakeholders – citizens, CSO's and NGO's, industries, local & regional authorities, and odour experts, etc" and their "conflicting interests and goals" and a "bottom-up approach where affected communities take an active role in defining and monitoring the problem while engaging in dialogues with public authorities and emitting industries to co-design potential mitigation options and good practices to reduce the odour impact" (Balestrini et al 2018).

Dimension Three: Outcomes and Impacts

Expected outcomes are not only citizens' generated data for perceived odours but also data sharing by other stakeholders (e.g., operational data from emitting industries, weather and environmental data from public stations). The aim is to detect "correlation of observed data with daily operations at the emitting activities and the weather conditions". This should help better understanding of odour issues and identification of situations for improvement in daily operations and practices. The Phase 4 "Action" step of the Engagement methodology understands that "large corrective measures are difficult to implement in the short term, such as actions that may require investments from the odour emitting industries", that are "out of the scope of D-NOSES". This is "conveniently explained to all engaged stakeholders from the start of the pilots in order to avoid raising false expectations". However, shorter term co-design actions to improve local air quality can be implemented at this stage,

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as well as providing information for new local regulations to control odour pollution in the medium-term (Balestrini et al 2018). Participants are also “invited to reflect on lessons learnt during the pilot and how it can be translated into policy recommendations” and odour regulations at different levels, as well as on the tools and data that will remain available to the community and can be used in future projects, following the idea of a “data commons”. These take the form of a feedback survey, society-policy dialogues, scientific guidelines and policy recommendations, and scientific and non-scientific publications.

EATingCRAFT

EducAtion Towards the Creation of Alternative Food neTworks

Key findings:

- Develops guidelines for Participatory Guarantee Systems integration into Community Supported Agriculture initiatives
- PGS and CSA have similar broad objectives with differing but highly complementary approaches to help small farms build alternatives to third-party certification
- Policymakers are encouraged to support PGS through regulation but also non-regulatory measures
- Shortening of food relations between producers and consumers provide exemplar of knowledge and capacities co-building with "daily/weekly basis" co-creation potential as food shopping is a universal and constant need

Sources:

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- POLICY: *Policy Brief: How Governments and support Participatory Guarantee Systems (PGS)*

The EATING CRAFT Project

This Project (October 2017 – December 2019) seeks to design a training program to increase skills of people interested in building Alternative Food Networks ("AFN"). Its core aim is to develop a Participatory Guarantee System ("PGS") training program focused on how to adopt/adapt PGS in Community Supported Agriculture ("CSA") initiatives. Bridging PGS and CSA is coherent because both share the same overall objectives of improving livelihoods for organic producers and increased access to quality, safe and nutritious food for consumers. Both "enhance transparency and shared decision-making processes prioritizing a solidarity approach where the responsibilities for implementing sustainable agriculture practices are shared by the community". While in Europe, only third-party certified products are allowed to be labeled "organic", European producers certified through PGS can rely on their tight connections with their consumers, and PGS initiatives are spreading as a "complementary tool for certification particularly suitable for those groups of producers and consumers pursuing more meaningful relationships between production and consumption". EATingCRAFT researches the synergies between PGS and CSA systems, exploring how PGS contribute to ensuring quality and improved practices in CSA, while also looking at how CSA approaches can inspire PGS in building a robust solidarity economy and cultivate relationships between producers and consumers. The training program articulates four modules, which were tested in the Czech Republic, Hungary and Greece, and a toolkit accessible online. Also, the Project was an opportunity to create a network of European PGS initiatives for shared learning and experiences (W).

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Dimension One: Participants and Motivations

EATingCRAFT Consortium members

The Project's Consortium of partners is composed of international networks (IFOAM Organics International; URGENCI – The International Network for Community Supported Agriculture); two well established national-level networks, one for PGS (Nature et Progrès), another for CSA (Mouvement Inter-régional des AMAP); and three national networks linked to organic production and consumption in each of the Project implementation countries (TVE in Hungary, PRO-BIO LIGA in the Czech Republic and AGROECOPOLIS in Greece).

Name	**Type**	**Description / role in EATingCRAFT**	**Country**
IFOAM Organics International (*coordinator*)	Association (third-sector)	Organic agriculture international network	Germany
Nature & Progrès	Association (third-sector)	PGS national network	France
Tudatos Vásárlók Egyesülete - TVE	Association (third-sector)	Association of Conscious Consumers – national network	Hungary
Mouvement Inter-Régional des AMAP	Association (third-sector)	CSA national network	France
PRO-BIO LIGA	Association (third-sector)	Organic agriculture national network	Czech Republic
AGROECOPOLIS	Association (third-sector)	Organic agriculture national network	Greece
URGENCI – The International Network for Community Supported Agriculture	Association (third-sector)	CSA international network	

Stakeholder motivations for participating in PGS

Motivating factors to participate in PGS are multiple. In the generic sense, they are considered to provide (i) recognition in local markets without the costs and constraints usually associated to third-party certification, which are often geared towards anonymous and long supply chains; (ii) they reduce bureaucracy in the organic guarantee process; (iii) they promote equity and fairness throughout the production chain; (iv) they promote consumer access to organic products; (v) they support the transformation of current food systems by building alternative food networks, especially at the local level; (vi) they contribute to enhancing food sovereignty by creating ownerships of production standards and certification among PGS members; (vii) they pursue a continuous improvement of practices enhanced by knowledge exchange; (viii) they foster community values and support the

potential for community development through organic agriculture and participatory governance (GUIDE).
Motivations may also be context-specific. The PGS Guidelines are built by EATingCRAFT by the study and participation of five already established PGS initiatives: Ecovida (Brazil), OFNZ (New Zealand), CNG (USA), PGS in Vietnam, PGS in India, and Nature & Progrès (France – one of the Consortium partners). For instance, for Ecovida (Brazil), motivations are rooted in "promoting social justice for the rural poor by providing them with access to markets and an alternative to large-scale commercial agriculture and factory farming". For another, OFNZ (New Zealand), the impetus is to forego the high costs of third-party certification. In the case of CNG (USA), PGS arose as a response to the US Department of Agriculture's move to regulate use of the word "organic". To avoid falling in the same category as many other so-called "organic" operators, strongly committed organic producers felt they needed to seek and alternative system for market recognition. In the case of Nature & Progrès, they implemented the PGS in the 1980s *before* organic agriculture was regulated in France and Europe (which ironically excludes them from the right to use the term "organic" – therefore many farmers using this PGS must also get third-party certified (GUIDE).

Stakeholder motivations for participating in CSA

CSA is defined as "a direct partnership based on the human relationship between people and one or several producer(s), whereby the risks, responsibilities and rewards of farming are shared, through a long-term, binding agreement" (SYNER). Usually (and as is the case with AMAP in France, for instance), a group of consumers pay an upfront amount (typically 6-12 months) in exchange for a predefined share of the harvest (e.g., a weekly food basket based on the harvest's own timing, with a view to guaranteeing high freshness and quality standards). Often, farmers are locally situated (e.g., 160 km maximum, or "100 miles") and have organic and environmentally qualitative practices, although not all producers have third-party certification due to costs and other factors. In the CSA system, consumers commit (by advancing treasury and accepting a certain limited choice of produce compared to going to the supermarket or ordering on online food platforms, even local ones like *La Ruche qui dit Oui)*, and, thus developing a "relationship based on trust with the farmers and often even assist in the planning and marketing of the produce, CSAs work well where there is proximity between the farmers and consumers and when both parties are able to commit their time, resources and efforts to support one another" (SYNER).

Motivations to integrate PGS and CSA

CSA can use PGS as a tool to address certain needs they face, which are of three categories: (i) Category 1 – challenges face in the relationship / partnership between farmers and consumers (e.g., miscommunication and the failure to share knowledge, lack of exchange of best practices and mutual assistance, the need for a minimal number of model farmers from which to learn); (ii) Category 2 – challenges faced during the lifecycle of the consumer group (e.g., insufficient size and stability, lack of ownership, functionality of the collective); Category 3 – challenges faced by CSA farmers during the lifecycle of a farm (as faced by the entire agricultural world, which CSA aim to provide more solidarity with, but with the consequence that producing for a CSA is a highly demanding and multifaceted job). Core motivations for applying PGS to CSA are therefore (i) "to multiply CSA groups whilst preserving the meaning of the CSA concept (i.e. with respect to the founding principles of CSA", (ii) "to improve upon group relations (between farmers and consumers). In general, a lack of communication can lead to serious consequences"; (iii) "to offer an alternative to the current organic certification system. This echoes the need to develop a diagnostic tool that is adapted to the specific context of the CSA partnership"; (iv) "to implement a methodology that enhances transparency, the participation of all

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the actors involved, and a horizontal organisational structure, which allows for exchange and mutual knowledge". PGS and CSA both align in their overall aim to support small-scale organic farmers, their common solidarity approach in which both risks and responsibilities are shared between producers and consumers, or, in other words, communities that are built on "trust" and "transparency" with an active and collaborative participation of producers and consumers. Both systems share an emphasis on short supply relationships (less or even no intermediaries) and social and environmental criteria in production, distribution, consumption and waste management practices (SYNER).

Dimension Two: Methods and Processes

The toolkit developed (in part) by EATingCRAFT consists in the following four modules, which are targeted in particular at CSA audiences, but also audiences that may be related to CSA development (e.g., policy, NGOs). Firstly, the *PGS Guidelines*: *How to develop and manage Participatory Guarantee Systems for Organic Agriculture* module (and booklet) constitutes the core methodological document of EATingCRAFT, through which the Project Partners demonstrate to their audiences the benefits and detailed features of PGS. Secondly, the (iv) *Synergies between Community-Supported Agriculture (CSA) and Participatory Guarantee Systems (PGS)* provides CSA audiences with a background on why CSA in particular face certain problems which could be addressed by PGS. The third module is the *Template Checklist for Peer Reviews for Crop Production*, which acts as the template for the information that needs to be filled out by the PGS stakeholders when evaluating the (CSA) farm's practices according to the PGS system put in place (TEMPLATE). A Master Presentation, finally, introduces stakeholders to key background information on PGS and an overview of these four training modules.
As well as these three other modules that are part of EATingCRAFT, IFOAM (the project coordinator) had also published (prior to the Project) a policy brief which is mobilized as a fourth module, *Policy Brief: How Governments and support Participatory Guarantee Systems (PGS)*. This document "targets policy makers and advocates that wish to support PGS not only through recognition in their national organic regulatory systems, but also through different forms of support aiming at promoting rather than regulating" (W; POLICY).

<u>PGS Guidelines: key framework and implementation methods</u>

At heart, the key elements of PGS are (note: with focus on the capital-letter terms) a "SHARED VISION", "TRUST", "HORIZONTALITY", "TRANSPARENCY", "PARTICIPATION" and a "LEARNING PROCESS". Its features articulate "GRASSROOTS Organization" with "PRINCIPLES & VALUES that enhance livelihoods" (Food Security, Well-being, Farmers' Rights and Gender Equality), with a common framework agreed through "Farmers' PLEDGES". This agreement involves "NORMS conceived by all the stakeholders" and "DOCUMENTED management systems & procedures" with "Clear, pre-defined CONSEQUENCES for non-compliance". These features are "Suitable for SMALLHOLDER AGRICULTURE", and also include "Mechanisms to SUPPORT Farmers" (e.g., facilitation of market access, information and technical support) and "Seals of labels as evidence of ORGANIC STATUS" (GUIDE).
The process of building and implementing a PGS is participatory and may include a broad range of stakeholders (e.g., producers, consumers, NGOs, traders, religious institutions, governments, etc.) who start of by creating the "shared vision".
The process itself is in seven steps: (i) Situation analysis (e.g., stakeholders' capacities, market demand, major bottlenecks), (ii) Stakeholders share the vision, (iii) Agree and then document how the PGS will work (e.g., management system, compliance pledge etc.), (iv) Build awareness for standards and make pledge, (v) Map farm and record farm details, (vi) Internal monitoring/peer review, and (vii) Certification approval.

A PGS is structured around an "Organizational Arrangement" that must include: a "Peer Review Group" (which carries out annual farm visits for each member farm and consists of farmers and other stakeholders such as consumers, NGO staff, etc.), a "Certification Committee" (that reviews the peer review reports), "Administrative Staff" and a "National Council" (in larger initiatives).

Dimension Three: Outcomes and Impacts

Starting from a 2014 publication by IFOAM on Participatory Guarantee Systems ("PGS") Guidelines, EATingCRAFT, funded through the Erasmus+ EU program, builds a revised version of these PGS Guidelines, alongside another program (Organic Markets for Development – OM4D, funded by the Dutch Ministry of Foreign Affairs). The concept of Participatory Guarantee Systems dates back to 2004 and the International Alternative Certification Workshop in Brazil that was sponsored by IFOAM and MAELA, the Latin America Agro-Ecology Movement.
The official definition of PGS adopted then states: "Participatory Guarantee Systems (PGS) are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange" (GUIDE). In that sense, they differ from third-party certifications (e.g., EU Organic Agriculture certification), because they require direct participation of farmers, consumers and other stakeholders in the verification process. This approach lowers certification costs because they mainly require voluntary time involvement and reduce paperwork, making them more accessible to small operations. They also empower and give more responsibility to both producers and consumers, thus building knowledge and capacities, and shorten market distance between them. PGS approaches also recognize the diversity of approaches to organic agriculture and food production. Therefore, the PGS Guidelines developed by EATingCRAFT and OM4D aims not to prescribe a single approach, but to "describe key elements and features of PGS initiatives, provide ideas on different implementation steps, and explain how this form of guarantee system has been developed and applied in different settings around the world, drawing from established and well-documented as well as recently developed PGS initiatives".
Through its core documents – in particular the PGS Guidelines, EATingCRAFT provides both advocacy for PGS in general, and justifications for integrating them specifically to CSA through the identification of certain shortcomings / issues with CSA systems. On a general level, all Quadruple Helix (QH) stakeholder types are involved in such systems, from farmers (private business entities, usually of smallholder size) to citizen-consumers – who could be called "food prosumers" (Stephens and Barbier 2020) in that they participate actively in developing knowledge of, and capacity to evaluate, agricultural production), NGOs, national and international networks of farmers and consumers, but also policy audiences through advocacy of both regulatory and non-regulatory (promotional) initiatives.

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Enable.EU

Objectives of the project

The Energy Union Framework Strategy laid out on 25 February 2015 has embraced a citizens-oriented energy transition based on a low-carbon transformation of the energy system. The success of the energy transition pillar in the Energy Union will hinge upon the social acceptability of the necessary reforms and on the public engagement in conceptualizing, planning, and implementing low carbon energy transitions.

The ENABLE.EU project aims to define the key determinants of individual and collective energy choices in three key consumption areas - transportation, heating & cooling, and electricity – and in the shift to prosumption (users-led initiatives of decentralised energy production and trade). The project will also investigate the interrelations between individual and collective energy choices and their impact on regulatory, technological and investment decisions. The analysis will be based on national household and business surveys in 11 countries, as well as research-area-based comparative case studies. ENABLE.EU aims to also strengthen the knowledge base for energy transition patterns by analysing existing public participation mechanisms, energy cultures, social mobilisation, scientists' engagement with citizens. Gender issues and concerns regarding energy vulnerability and affluence will be given particular attention. The project will also develop participatory-driven scenarios for the development of energy choices until 2050 by including the findings from the comparative sociological research in the E3ME model created by Cambridge Econometrics and used extensively by DG Energy. The findings from the modelling exercise will feed into the formulation of strategic and policy recommendations for overcoming the gaps in the social acceptability of the energy transition and the Energy Union plan. Results will be disseminated to relevant national and EU-level actors as well as to the general public.

Why did RS select the project?

The premise of this project is that the EU energy transition hinges upon both social acceptability of the envisaged (sustainable) transition reforms, and on public engagement in conceptualizing, planning and implementing these transitions. It looks at three energy consumption areas: transportation, heating & cooling, and electricity. In this project, "prosumption" is deifned, in the context of energy, as "users-led initiatives of decentralised energy production and trade". Its methodology captures data on national household (citizen) and business. It also studies "public participation mechanisms, energy cultures, social mobilisations, scientists' engagement with citizens. It aims to inform policy with recommendations to overcome gaps on energy transition social acceptability. Therefore, it mobilizes all QH stakeholder types, also mobilizes prosumption for enriching our co-creation conceptualization, and is highly citizen-driven.

Websites

https://cordis.europa.eu/project/id/727524
http://www.enable-eu.com

Dimension 1: Motivations and Participants
Guiding Questions:
6 *What is the composition of those organising and taking part in the co-creation activities?*[9]

9 For SwafS and other H2020 projects, it is also useful to study the composition of consortium

What are the announced reasons for the different Quadruple-Helix individuals and groups to come together in co-creation? **7** *Can we see a difference in the motivation of each corner of the Quadruple-Helix?* **8** *What is the composition of those organising and taking part in the co-creation activities?*[10] **9** *Is there a clear rationale behind the choice of participants?*
The project consortium is composed of 10 academics and for profit organisations, and 3 non-profit organisations : ● The Centre for Global Studies "Strategy XXI" (Ukrainian: Центр глобалістики «Стратегія XXI») is a non-governmental, non-profit civil society organisation, which consolidates on a voluntary basis citizen to satisfy and protect their joint research, social and economic interests. ● Institut Jacques Delors, notre Europe. think tank européen fondé par Jacques Delors en 1996 ● ISINNOVA, the Institute of Studies for the Integration of Systems, is an independent research institute that supports international, national and local public bodies, as well as private organisations, as they pursue sustainable visions and policies. The project is coordinated by ISINNOVA ISINNOVA ideates and runs cross-discipline and cross-sector research and innovation projects that bring together public authorities, industries, research institutions and civil society. Co-creating long-term visions for sustainability and advising on the development of coherent systemic (or strategic) plans, ISINNOVA delivers concrete solutions in response to complex challenges. There is a clear rationale behind the choice of participants. The added value of each participant group (e.g. Quadruple-Helix groups) is described. The goal is to change energy behaviour by empowering consumers and citizens to make freer and better-informed energy choices. They will also explore the business entreprises drives for energy decisions to help policy recommendations.

Dimension 2: Methods and Process
Guiding Questions: **10** *Which particular tools, methods, communication devices or settings are mobilised in the project?* **11** *Was the process of co-creation (a) stage-gate or (b) iterative?*[11] **12** *Outline the key steps or elements in the co-creation process.* **13** *Which particular challenges were observed (e.g., resources in time or funding, legitimacy, flexibility between participants...)? Does the project face challenges in successfully implementing co-creation? Were these challenges subsequently overcome in the co-creation activity?* **14** Which process elements are particularly striking and successful in the project?
The participatory foresight aims at taking stock of the research led in the project so far to devise possible trends in attitudes and lifestyles towards sustainable energy practices, and to explicit policies that can enable the energy transition in Europe over the next decades. Project partners conducted household surveys, randomised controlled trials, interviews, participatory foresight exercises and econometric modelling to increase understanding of what factors drive energy

members, which are involved in running the overall project.

10 For SwafS and other H2020 projects, it is also useful to study the composition of consortium members, which are involved in running the overall project.

11 Stage-gate means that there is a period of action reaching a milestone, and then there is a next phase of the exercise. Iterative means that the process goes through one cycle, and then reiterated, with learning and feedback loops.

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decisions. Results showed that choices mostly relate to economic, demographic, cultural and governance aspects.
- Conducting online survey of business enterprises in eleven project countries and analysis of the collected data.
- Survey for households. It regrouped: a household sub-survey, 3 case study surveys on low carbon mobility, prosumers and heating/cooling. Data were analysed to provide a better understanding of households' behaviours and evidence on the main factors (socioeconomic, informational, environmental, behavioral, preferences) affecting them. Statistical and an econometric analysis were performed.
- Conducting three governance workshops, engaging stakeholders in discussing and verifying research findings and the respective policy recommendations.
- Organisation of three Transition Workshops (with more than 160 participants, experts and citizens).
- The findings of the evaluation process (of ....) were reviewed by selected stakeholders and their feedback was used for the formulation of the policy recommendations.

Dimension 3. Outcomes and Impacts

Guiding Questions:

15 *What outcomes have been announced and/or demonstrated by the co-creation initiators and participants? More specifically, have any technologies, services or new organizational structures been produced by the co-creation activity?*

16 *Have the co-creation processes and/or outcomes led to any desirable impacts and if so, in which areas (e.g., environmental, economic, institutional…)? Were specific indicators developed/used to develop the project's impacts?*

17 *Have any changes in roles and practices of the participating Quadruple-Helix representatives been observed? Has there been institutional change?*

18 Are new forms of partnerships or relationships visible in the co-creation initiative or as an outcome of the co-creation activities?

Outcomes

- increased understanding of the underlying factors that drive consumer choices and of the effective solutions and tools that increase their participation in the energy system. By understanding what drives their energy choices, policymakers can make targeted decisions and encourage consumers to make more sustainable choices.
- Identified key hindering and supporting factors of national energy policies
- identified best practices of participatory methods (Contributions of citizens and energy experts in workshops).
- Contributions of citizens and energy experts in these workshops were the basis for the formulation of policy recommendations for policy-makers at local, national and EU level.
- Contributions to existing models and tools to better represent the drivers of energy-related household decisions.
- recommendations for governance of the energy transition, industry, energy efficiency, mobility and prosuming were disseminated to energy stakeholders.
- Comprehensive literature review serving as a background for the subsequent activities within ENABLE.EU.
- Design, Implementation, data gathering and analysis of Randomized Controlled Trials in four countries (SR, BG, UK and DE).

- Examination of household adoption of energy efficiency measures funded by government policy support using logistic regression models. Further statistical matching and panel econometric estimations were conducted to examine the extent to which these measures have reduced energy consumption (UK).
- Review of the literature on changes in industrial CO2 emissions due to energy-related behaviour of firms and the influence of energy costs and prices. Completion of the STATA code and pre-processing of the dataset for the analysis of plant/firm-level data (Germany).
- Analysis on the influence of energy price movement on firm level environmental and economic performance using a novel econometric technique (France).
- Conducting online survey of business enterprises in eleven project countries and analysis of the collected data.
- Survey for households. It regrouped: a household sub-survey, 3 case study surveys on low carbon mobility, prosumers and heating/cooling. Data were analysed to provide a better understanding of households' behaviours and evidence on the main factors (socioeconomic, informational, environmental, behavioral, preferences) affecting them. Statistical and an econometric analysis were performed.
- Review of literature on governance barriers for the social acceptability of energy transition technologies and policies as a preparatory step for the subsequent analysis.
- Elaboration of methodology and implementation of comparative case studies on governance barriers to energy transition in nine project's countries (BG, FR, DE, HU, NO, PL, RS, UK, UA).
- Analysis of non-technical bottlenecks and challenges in the implementation of the EU SET-Plan.
- Conducting three governance workshops, engaging stakeholders in discussing and verifying research findings and the respective policy recommendations.
- Organisation of three Transition Workshops (with more than 160 participants, experts and citizens).
- Contributions to existing models and tools to better represent the drivers of energy-related household decisions.
- Creation of a modelling framework for Enable.EU soft-linking 7 different models operated by Cambridge Econometrics and REKK.
- Design and implementation of a set of modelling scenarios, informed by outputs from the other WPs
- Publication of 2 scientific papers (including Engaging men and women in energy production in Norway and the United Kingdom: The significance of social practices and gender relations Author(s): Karina Standal, Marta Talevi, Hege Westskog Published in: Energy Research & Social Science, Issue 60, 2020, Page(s) 101338, ISSN 2214-6296
- Dissemination of findings and recommendations to different stakeholders through reports, workshops, newsletters, social media….

Expected impacts :

- changes in industrial CO2 emissions due to energy-related behaviour
- household adoption of energy efficiency measures
- The further advancement of the energy transition and ultimately the success and completion of the Energy Union.
- The completion of the Energy Union's research and innovation pillar and the continued implementation of the Strategic Energy Technology (SET) Plan and especially the Action Plan based on the Integrated Roadmap.
- The project assessed the implementation of the SET-Plan in the project countries, using desk research, email-based surveys and findings from field research (WP5). The activity identified the non-technical challenges (bottlenecks) in the governance of the EU SET-Plan implementation of national and EU level. The assessment is based on four group of indicators that could be seen as

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potential sources of non-technical bottlenecks: technical performance, economic performance, environmental performance and social performance.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy
Some inspirations: ● *Each co-creation project will have specific roles for each type of participant, however, who decides on the roles and what form they take is a key issue. Are tensions observed in the co-creation initiative? Do "actors" follow their "scripts"?*[12] ● *Are details provided of changing worldviews?*[13] ● *Do all representatives of the Quadruple-Helix get fairly rewarded for participating in the co-creation activity? Can we see differences in the nature of these "rewards" for different types of co-creation participant? Specifically, how are citizens rewarded (financially or otherwise) for contributing to the co-creation activity?*
The participatory process resulted in discussions with stakeholders to verify research findings and the respective policy recommendations. No concrete outcome or impact. It mainly provided data on consumers and on business entreprises drivers for energy decisions.

12 Organisers of co-creation processes may normatively prescribe the roles of the various members of the Quadruple-Helix, which may close down certain pathways of co-creation. One can think, for example, of "smart" ideologies which may reduce creativity by inscribing citizens as predetermined data collectors rather than insight providers. By "prescribed" we mean that the roles of certain actors within the co-creation activity are decided upon and incorporated into the co-creation process by another actor. For example, in the SwafS co-creation project *WeCount*, we can see that the system of traffic monitoring is co-created between small firms, public authorities and citizens, but the role of the citizen is prescribed to be "citizens as data gatherers" using technology that has been previously developed by private initiatives. In this sense, citizens follow a "script" that is embedded in the project. For those interested in the theory behind "scripts" see Madeleine Akrich "The de-scription of technical objects." (1992): 205-224.

13 Whilst being beyond the scope of the co-creation review, how participants in co-creation activities may change their worldview and then enact in their day-to-day life is of key interest. For example, a member of a firm may participate in a co-creation activity, and not only gain knowledge about the innovation focus, but may also change their view on their own practices (institutional change). SoScience provided an example of this in a "Future Of" activity in Packaging innovation.

Epidemium

Epidemium is an open and participatory research program dedicated to a better understanding of cancer through the use of Big Data and launched by the pharmaceutical group Roche and the community lab La Paillasse. It comprised two six-month challenges (the Challenge4Cancer), which respectively took place from November 2015 to May 2016 and from June 2017 to December 2017.

Dimension 1: Motivations and Participants

Roche France is a subsidiary of the pharmaceutical group Roche, a leading private company in the health sector and one of the world's largest investors in R&D. Roche started from the observation that open big data could provide a highly valuable source of knowledge for medical research but was yet largely untapped in the health sector. Also prone to explore unusual methods and tools to stimulate innovation, Roche chose to launch a new research program which focused on the epidemiology of cancer - the second cause of death in the world whose incidence (probability of occurrence in a specified period of time) is expected to increase by 70% in the next two decades. Its involvement in Epidemium went beyond the full funding it provided (through a 250k€ annual budget), it also mobilized more than 50 employees to monitor and evaluate the projects and to open some of its dataset to the community. One member from the Roche innovation department was also part of Epidemium coordination team.
Roche co-founded the program with La Paillasse, a community lab based in Paris which is used to develop multi-actor programs in open transdisciplinary ecosystems. It provided the innovative working methods and the technical, legal and ethical expertise that were necessary to turn Epidemium into a collaborative and open project.
As Epidemium was launched and implemented, its community progressively expanded: it encompassed all those who contributed to the program at some stage. During the first Challenge4Cancer, it was composed of 678 members of whom 459 were active. Apart from a coordination team (3 part-time employees and a PhD student volunteer), two committees were formed: an independent ethics committee (10 people) in charge of defining an ethical framework for the use of data in the Challenge, and a scientific committee (13 people) in charge of ensuring the scientific quality of the community's productions. There were 331 participants registered for the first Challenge, with diverse international profils like statisticians, epidemiologists, mathematicians, oncologists, economists, biologists, physicians, developers, experts in data mining and data visualization. 54% belonged to the sector of data science, 28% of computer science and 18% of health. The Challenge was open to everyone as no degree was required, and 27% of the participants were students. As the program moved forward, 75 of the participants registered teamed up to form 15 pluridisciplinary groups. The remaining participants stayed in the ecosystem, by attending conferences, participating in discussions and eventually helping the competing teams. Epidemium's added-value lied in this complementary of professional and disciplinary backgrounds: while actors in the health sector knew the state of cancer research, the major issues to address and the patients' needs, data and computer science actors had useful expertise in data processing, analysis, visualization and interpretation. Participants - who were volunteers eager to participate in a collaborative experience - saw in the program an opportunity to explore new topics while strengthening some of their skills which they could concretely put at the service of a common cause through their project.
Some partners also provided their technical support, like Hypercube (a data mining software), Dataiku (a data analysis and visualization software) and Teralab (a platform providing services in big

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data destined to collaborative research projects). For the second edition of the Challenge, Amazon France also granted a 5,000$ credit for the use of its calculation tools to analyze data faster. Finally, Epidemium benefited from the help of a few other partners (public research institutes like the Curie Institute, think-tank like Club Jade, non-profit organizations like Wikimedia) which provided their expertise, communicated around the program (which thereby gained legitimacy), hosted events and enlarged the community.

Dimension 2: Methods and Process

The Challenge4Cancer

Because public health issues are rarely addressed by people who are not professionally engaged in the sector, developing Epidemium in the form of open challenges was an effective way to be more inclusive in terms of participants, in addition to adding a ludic aspect. Furthermore, since participants worked together inside their team - which were all in competition for the prizes awarded at the end - while those teams also discussed with each other and with some external experts, the challenges were both collaborative and competitive, thereby bringing out the best in the emerging community. The two seasons each focused on 3 or 4 large thematics of cancer epidemiology, but did not set any precise goals, thus letting participants free to choose the specific forms and topics of their project. Epidemium had to give to participants the necessary data and technical tools that would make a proper running of the projects possible. To this end, 21,000 open datasets were accessible to the community that could browse them on the Epidemium Open Data Portal, a platform designed for the occasion using the open source software CKAN. These datasets came from data to which international or governmental organizations (WHO, the World Bank, ILO, Etalab..) had already granted access. Although much information was lost in the anonymization process, Roche also opened some of its datasets for the first Challenge (12 datasets about 8,000 patients) and added a few others for the second one. To work on these datasets, data analysis and visualization tools were provided, along with server clusters. Finally, participants benefited from the help of numerous experts that were part of Epidemium community. The two committees also supported the teams in their projects, while ensuring compliance with the rules of the challenge.

Assembling and animating the community

Mobilizing a community and keeping it active was of key importance for Epidemium: beyond implementing the challenges, the program also aimed at creating an ecosystem at the crossroads of medical research and data science, where each actor could exchange knowledge, ressources and working methods. To do so, the coordination team had to take into account the relatively long time scale of each challenge (six months) and the heterogeneous and changing levels of engagement of the participants who were all volunteers.
Information was disseminated through several online platforms. A website was used to present the program, the community and the projects and also took care of the registrations to the challenges. A wiki (a web app) centralized all the relevant information in a very flexible way, by displaying useful links, news, tools, complete descriptions of the projects, etc. Social networks and newsletters kept informed the community but also a broader public which gave more visibility to Epidemium. In addition, other tools enabled discussions within the community, such as Slack (a platform of instant communication), RocketChat (its open source equivalent) and a questions-answers platform (about methodology, ressources or specific health/big data issues). As those online platforms were not

sufficient to constitute a living community, numerous in-person events were also organized, mainly in La Paillasse's premises. Their formats depended on the public and the objectives targeted: conferences given by experts and open to everyone, small meetings where participants could start to team up, technical workshops (like model prototyping days), Call4Debate to facilitate exchanges with outside experts and create synergies inside the community, milestone events (launch evenings, halfway point, closing night)... Although much of the work done during these in-person gatherings could have been performed online, they were essential to foster the motivation and cohesion of the community as well as to ensure its growth. A substantial part of the budget was accordingly devoted to these events that had been identified as key success factors.

Obstacles encountered

Epidemium's co-creative approach had to face several impediments. First, mobilizing a community around the project turned out to be more time-consuming than expected: during three months, Olivier de Fresnoye (co-coordinator of the project) realized more than 150 interventions in universities, third places (like FabLab or hackerspace) and research institutes to convince different actors to become the first members of the Epidemium community.
Secondly, Epidemium needed to diversify its financing sources, as it fully depended on Roche whose engagement had to be renewed after each season. Moreover, as the project grew in scope and complexity, additional funds were becoming necessary to expand the coordination team. But Epidemium failed to access the fundings traditionally granted to research projects through calls for proposals launched by public fundings agencies: usual financing mechanisms are indeed not adapted for community-based projects whose new research methods still lack understanding or recognition. Finally, this lack of understanding of new research models also raised an issue of scientific legitimacy. Convincing actors belonging to a more traditional research world proved to be difficult and this essential change in mentalities was further slowed by burdensome administrative processes. This hindered the development of Epidemium's ecosystem: some important partnerships were for instance concluded only in late phases of Epidemium, when the challenge was soon coming to an end. To this respect, the scientific and ethics committee, whose members were recognized experts in their field, helped to confer legitimacy to the program.

Dimension 3: Outcomes and Impacts

The goal of Epidemium was to increase the volume of knowledge on cancer by means of a combination of data science and cancer epidemiology. It also sought to create a database and tools for data analysis and interpretation destined to cancer research, develop solutions for health professionals (in particular visualization tools), provide more answers to patients and to actions supporting prevention and cancer awareness. The first Challenge4Cancer resulted in the submission of 15 projects, among which 8 were selected to be finalists. The jury awarded special distinctions to them ("best impact for patients' health" or "best inclusive and collaborative work" for instance), as well as certificates and financial prizes (in total, 9,000€ for the first three winning projects). For the first edition, the first prize was awarded to Baseline, a project which modeled the incidence and mortality rate of different types of cancer from a large number of factors (infectious agents, behavioral, environmental, etc.). OpenCancer won the second edition by developing a tool to help cancer prevention thanks to predictive models and designing a platform to gather and visualize related data. A third edition is expected to start in 2021, but its format will differ from the past ones due to the COVID-19 crisis.
The coordination team along with various actors involved in Epidemium, especially members of the two committees, wrote a White Paper (a detailed annual report with several articles) after the first

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season in order to take stock of the program, identify future improvements to make and share the next steps of Epidemium. The program in itself served to explore and promote open and collaborative research methods that are still lacking understanding or recognition, even though their transdisciplinary dimension has a considerable potential in terms of impact.

Dimension 4: Other striking characteristics, insights and experiences that are noteworthy

Epidemium differed from traditional challenges, especially by the association of four core values which guided its elaboration and implementation:

19 Openness: Epidemium was open to everyone (no degree was required), it used open-source tools and open datasets, the projects' achievements and Epidemium's methodology were made accessible to the public (through the wiki, the White Papers…), thus adopting an open science approach.

20 Collaboration: participants with complementary skills teamed up at the beginning of the programs, worked within their teams, but also with the rest of the community (including with the other competing teams). The online collaborative tools used were carefully chosen to favor co-creation, while in-person events strengthened the community cohesion.

21 Transdisciplinarity: the program aimed to exploit the potential of big data put at the service of cancer epidemiology, but profils even more diverse (designers, economists…) composed the community and were mixed in the teams.

22 Independence: the two committees provided outside views that were autonomous from Roche and La Paillasse.

But this pioneering dimension of Epidemium came with its share of obstacles, as its atypical format could impede its access to other fundings than those from Roche, its scientific credibility, its capacity to mobilize experts who are used to more standard research practices.

* * *

Sources:

- Interview on July 18th 2017 of Olivier de Fresnoye (Co-Coordinator of Epidemium)
- Epidemium White Paper, 2017 (https://www.roche.fr/content/dam/rochexx/roche-fr/roche_france/fr_FR/doc/Epidemium-LivreBlanc.pdf)

EU-Citizen.Science

The Platform for Sharing, Initiating and Learning Citizen Science in Europe

Key findings:

- Sets up a Platform that centralizes European Citizen Science initiatives
- Formulates a set of 27 recommendations for engagement of multiple stakeholders from QH around Citizen Science
- Participatory processes between direct and indirect Platform end-users from all sides of QH help establish criteria for "good quality" Citizen Science resources

Sources:

- W: CORDIS Project page or Project website (online Platform)
- D2.1 Stakeholders, Network & Community Mapping Report
- D2.2 Engagement and community-building plan
- D2.3 Platform Functionality Requirements & Specification Report
- D3.1 Framework Report Describing Criteria and Rationale for Sharing and Selecting State of the art Citizen Science Resources
- D4.1 Guidelines and Recommendations Based on a Range of Best Practices for Achieving Societal and Policy-Maker Engagement
- D4.2 Report on Policy Maker Engagement and Awareness-Raising
- D7.1 Evaluation & Impact Framework

The EU-CITIZEN.SCIENCE Project

EU-Citizen.Science (January 2019-December 2021), also called "The Platform for Sharing, Initiating and Learning Citizen Science in Europe", seeks to build a platform and mutual learning space to coordinate and support the fragmented European citizen science (CS) environment by advancing social innovation and new business models. EU-Citizen.Science pursues three core interconnected activities: (i) coordination and leveraging of currently fragmented European citizen science actions; (ii) engagement of Quadruple Helix (QH) actors, and (iii) creation of a mutual learning space and a set of comprehensive co-designed training modules for target audiences for the mainstreaming of citizen science. The EU-Citizen.Science Platform thus curates tools, best practices and scientific outcomes of citizen science to the attention of stakeholders as diverse as citizens, media actors, scientific institutions, politicians and donor organizations. The Project is structured around (notably): the building of the Platform (WP2); the development of the criteria framework for the citizen science resources repository (WP3); the development of a model for awareness, empowerment and engagement in citizen science; evaluation and impact assessment (WP7) (W).

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Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
MUSEUM FUR NATURKUNDE - LEIBNIZ-INSTITUT FUR EVOLUTIONS- UND BIODIVERSITATSFORSCHUNG AN DER HUMBOLDT-UNIVERSITAT ZU BERLIN (coordinator)	RO	Germany
VEREIN DER EUROPAEISCHEN BURGERWISSENSCHAFTEN - ECSA E.V.	RO	Germany
INTERNATIONALES INSTITUT FUER ANGEWANDTE SYSTEMANALYSE	RO	Austria
CONSERVATION EDUCATION AND RESEARCH TRUST	RO	UK
ZENTRUM FUR SOZIALE INNOVATION GMBH	RO	Austria
UNIVERSITY COLLEGE LONDON	HSEE	UK
ASSOCIATION EUROPEENNE DES EXPOSITIONS SCIENTIFIQUES TECHNIQUES ET INDUSTRIELLES	O	Belgium
THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD, OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	HSEE	Ireland
VETENSKAP & ALLMANHET, VA	O	Sweden
NATURAL HISTORY	PB	UK

MUSEUM		
UNIVERSITEIT LEIDEN	HSEE	Netherlands
MYKOLO ROMERIO UNIVERSITETAS	HSEE	Lithuania
MUNICIPIO DE FIGUEIRA DE CASTELO RODRIGO	PB	Portugal
MINISTERIO DE ECONOMIA, INDUSTRIA Y COMPETITIVIDAD	PB	Spain

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

This Consortium itself "reflects a wide variety of stakeholder groups ranging from universities, NGOs, local authorities, CSOs, SMEs and natural history museums (D2.1).

Stakeholders from Project activities

Distinction is made between "Stakeholders" (actors who have a direct stake in the success and impact of the Platform), "Users" (those who will use the Platform) and "Target Audiences" (those groups EU-Citizen.Science seeks to engage with, including those who are not involved in CS in any way and might not even be familiar with the term). The stakeholder groups that are to be directly involved in using the Platform ("Users") are "Academia", "The Public", "NGOs and CSOs", "Industry and SMEs", "Policy Makers & Funders", "Educators" and "The Press & Media". Among these groups, distinction is made between "Producers of CS" (Scientist Practitioners, DIY/Citizen Practitioners, CSO/NGO Practitioners, Educator Practitioners) and "Consumers of CS" (Decision Makers, Policy Makers, Funding Bodies, The Press & Media). Note that the actual CS projects registered on the Platform contain a much wider range of stakeholders (since these are highly specific to their respective goals, domains of enquiry and locations) which are naturally not presented here (D2.1, D2.3). The Project keeps a Stakeholder Register (D2.1) ventilated around the following categories: Internal Stakeholders (sub-categories: Consortium Partner; Linked Third Party; EC Project Officer; Advisory Board); Academia (sub-categories: Universities; Research Institutions; Museums; Science Shops); Educators (Primary Education; Secondary Education; Museums; NGO/CSO education and learning staff); The Public (sub-categories: Local communities; Activist groups; Youth Associations; Hobbyists; etc.); NGOs & CSOs (sub-categories: Citizen Science Associations & Networks; Museum Associations; Science Communications Associations; FabLab Network; Maker Communities; European Children Universities; etc.). Within the Target Audience category, the "Primary Target Audience" consists in "Consortium project partners, third-party partners, our immediate network of 'Science of Citizen Science' professionals, and those undertaking similar initiatives to support citizen science in their home countries". The "Secondary Target Audience" consists in "those communities who will actively use the platform (…) and will take part in the community forums", consisting in "a broader community of 'Science of Citizen Science professionals', Citizen science Practitioners (scientists, DIY, CSOs and NGOs, educators), Citizen science Consumers (science journalists, policymakers, funding bodies), and Future potential citizen scientists (who are still not aware of citizen science) (D2.2)

Dimension Two: Methods and Processes

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Stakeholder engagement

The engagement of CS "Producers" in co-creating the Platform takes the form of interviews conducted among each of the following groups: Scientist Practitioners; DIY / Citizen Practitioners; CSOs / NGOs Practitioners; Educator Practitioners. These aim to "achieving a better understanding of each community's needs, expectations and expertise they would be willing to provide to the platform". The engagement of CS "Consumers" starts once the beta version of the Platform is launched (Summer 2020) and takes the form of interviews conducted among each of the following groups: Decision Makers, The Press / Media; Policy Makers; Funding Bodies, aiming to understand each of their needs, expectations and expertise they could provide the Platform with (D2.2).
EU-Citizen.Science formulates twenty-seven recommendations for the engagement of different stakeholders, all exemplified with one short case-study, aimed to improving engagement in CS, which include, in particular: project design (e.g., contributory where participants are engaged mainly through data collection, or co-created where project managers engage participants in most aspects of the project or activity); tailored and systematic approaches such as frameworks, protocols and activity summaries (particularly relevant to engaging policymakers with limited time or limited recognition of the relevant of CS to current policy issues); highlighting the benefits of CS (e.g., for policymakers, communities directly informed and involved in issues may provide more legislative support); identifying and respecting the uniqueness of communities (to sustain engagement that local communities identify as pressing to them and which they can act synergistically upon alongside policymakers); consider instant-gratification citizen science (leveraging on ingrained human motivations linked to personal interest but also to altruism, including for one-off participations that do not require citizens to feel they are part of a wider community, while still contributing, particularly through digital tools); using state-of-the-art technology and online tools (efficient for data collection, awareness raising, games, etc.); offering training and learning opportunities (both through formalized activities such as data collection, and informal learning mechanisms and interactions); providing participants with recognition for their work (e.g., acknowledgments or mentioning work accomplished); educational outreach and school visits (a largely untapped resource for generating interest in CS projects); aligning projects with emerging or ongoing policy debate (if well-timed, this can attract politicians' attention) among other recommendations (D4.1; D4.2).

Curating CS resources for the Platform

Participatory meetings were held to develop criteria for incorporating CS resources on the Platform. These criteria were not aimed at judging the quality of the CS projects in themselves, but in assessing their quality as CS resources for the Platform. The meetings resulted in a set of criteria which "varied from accessibility, readability, applicability, replicability and content", resulting in the proposition that "Good-quality citizen science resources are resources that are easy to access implement and adapt; well structured; clearly described; written with a clear language and ideally have an impact (e.g., on science, policy or society, etc.)"; and therefore useful to the citizen science community and beyond" (D3.1). Based on the needs expressed by both Primary and Secondary Target Groups, different categories or resources for the Platform were identified: Tools, that are "any software or hardware to help perform a particular task or work in citizen science initiatives (e.g., water quality equipment, air quality sensors, etc.)"; Guidelines, that are "a set of rules and instructions that could be helpful in designing, implementing or evaluating citizen science" (e.g., written texts such as reports, deliverables, briefings, etc."; Training resources that are "some form of instructional material in relation to citizen science often related to 'how to do' citizen science", such as MOOCs, workshops, webinars, gamified training, quizzes, etc.; and Other Materials that include "Libraries", "Scientific publications", "Websites", "Reports", "Audio", "Visuals", etc. (D3.1).

Dimension Three: Outcomes and Impacts

EU-Citizen.Science Platform

The Project's core output is the online Platform, which is to become a central hub for the knowledge sharing, coordination and action relating to European citizen science. As such it includes a "mutual learning hub" where resources are shared (e.g., "Do It Yourself Biotechnology (DIYBio) for open, inclusive, responsible Biotechnology" – a policy brief from DITO, another H2020 EU project); a "projects & networks hub" to help practitioners find each other (e.g., "Svinnkollen (The Food Waste Experiment)" linking AI to food waste via a mobile app in Sweden); training modules for capacity building (e.g., "Citizen Science Typologies", "The Librarian's Guide to Citizen Science"), a list of organizations (e.g., ZSI Centre for Social Innovation, Vienna); and an events page (e.g., conferences linked to citizen science) (D2.3; W).

Indicator Framework

As part of an Indicator Framework to determine its success, the Project defines three types of outcomes: (short-term) actual "outputs"; "intermediate outcomes"; and "longer-term outcomes". The output indicators consist in measurable preconditions to reaching intermediate and long-term outcomes (e.g., number of participants and perceived usability of the Platform, number of training modules and perceived usefulness of the modules, etc.). Intermediate outcome indicators consider the participants' benefits in learning or increasing interest (knowledge and awareness of CS in the general public, scientists, policymakers, formal or informal education, etc.). Longer-term outcomes consider actual engagement/uptake of CS within scientific institutions, by citizens, policy and decision making, or within education institutions, as well as a higher social diversity, geographic coverage or diversity in types of entity, depending on which stakeholder group is concerned); these also include sustainability for the Platform itself and evidence of increased financing for citizen science in general (D7.1).

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FAIRCHAIN

Innovative technological, organisational and social solutions for FAIRer dairy, fruit and vegetable value CHAINs

Key findings:

- Seeks to bridge the gap between long, and short, food value and provisioning chains by studying six initiatives seeking to build “intermediate value chains”
- Initiatives in case-studies involve technological, organisational and social innovations, sometimes mixing these three types of innovation together
- Question can be asked about which helix small farmers, often marginalised, belong to: citizen/civil, or private, or hybrid between different helices?

Sources

- W: Website: FAIRCHAIN Project page or website

- I: Interview with Tanja Kaufmann, PhD candidate working on the project for the Fraunhofer Institute

The FAIRCHAIN Project: building intermediate food value and provisioning chains

FAIRCHAIN (November 2020 – October 2024) seeks to “address the shortcomings of long and short food value chains while capitalising on their advantages”, developing intermediate food value chains. These incorporate “characteristics of both short value chains (relocation and proximity between operators; shared social values and search for social cohesion, higher quality products) and long value chains (presence of several intermediaries; larger production volumes; improved logistics and distribution). The Project hopes, among other things, to “empower small actors” to “increase range and volume of products, develop adapted technologies, valorise co-products, build knowledge, diversify” and to “inspire large actors” to “reduce the number of intermediaries, enhance traceability/transparency, reduce chemical input, reduce packaging, relocalise, diversify”.

More specifically, FAIRCHAIN’s core objective is to “enable small and mid-size farmers and food producers to scale up and expand production of nutrition food through competitive intermediate value chains at the local and regional levels”. To achieve this, the Project seeks to “test, pilot and demonstrate technological, organisational, social innovations that have the potential to facilitate the aforementioned objective, delivering a set of proven innovations”; to “develop business models associated to these innovations and carry out environmental, economic and social impact assessement; and to formulate recommendations and produce tools and guidance documents to ensure uptake and replicability of value chains developed within FAIRCHAIN” (W).

Six case studies in six different countries are carried out, that all seek to represent small and mid-sized actors from the fruit, vegetable or dairy sectors facing an unsatisfactory situation: (i) Co-product valorisation and generation of additional added value for SMEs and regional stakeholders (Switzerland); Production of innovative dairy drinks based on co-products of cheese manufacturing (France); Developing wild berry business to boost local economy and social cohesion (Sweden); Innovative packaging machine for small and mid-sized actors (Belgium); Traceability and reliable information sharing in local dairy production (Greece); and Food innovation incubator (Austria).

These cases all constitute examples of recently developed technological, organisational and social innovations geared towards expanding the production of affordable nutritious food, with particular attention paid to post-harvest steps, namely processing and retail sectors, since "the power imbalances created in market relationships are mainly attributed to the increasing concentration in the processing and retail sectors in conventional food supply chains" (W).

Dimension One: Actors and Configurations

Consortium breakdown

The consortium members are the following (see table below):

Name	**Type (EU taxonomy)**	**Country**
INSTITUT NATIONAL DE RECHERCHE POUR L'AGRICULTURE, L'ALIMENTATION ET L'ENVIRONNEMENT – INRAE (coordinator)	RO	France
RISE RESEARCH INSTITUTES OF SWEDEN AB	RO	Sweden
FH JOANNEUM GESELLSCHAFT MBH	HSEE	Austria
UNIVERSITEIT GENT	HSEE	Belgium
FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER	RO	Germany

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ANGEWANDTEN FORSCHUNG E.V.		
ASSOCIATION DE COORDINATION TECHNIQUE POUR L'INDUSTRIE AGROALIMENTAIRE	O	France
PACK4FOOD	O	Belgium
CONFEDERAZIONE GENERALE DELL AGRICOLTURA ITALIANA	O	Italy
PETREL	PFPE	France
SCALDOPACK	PFPE	Belgium
SOFIES SA	PFPE	Switzerland
SYNELIXIS LYSEIS PLIROFORIKIS AUTOMATISMOU & TILEPIKOINONION ANONIMI ETAIRIA	PFPE	Greece
BIOFRUITS SA	PFPE	Switzerland
COGITERRE	PFPE	Switzerland
LABORATOIRES STANDA	PFPE	France
STYMFALIA ANONYMOS EMPORIKI VIOMICHANIKI ETAIRIA	PFPE	Greece
VEREIN ISEKI-FOOD EUROPAISCHE GESELLSCHAFT FUR DIE INTEGRATION DER LEBENSMITTELWISSINSCHAFT UND -TECHNOLGIE IN DIE LEBENSMITTELVERSORG	O	Austria

UNGSKETTE		
FONDS DE DOTATION POUR L ENGAGEMENT CITOYEN MAKE.ORG FOUNDATION	O	France
SODIAAL INTERNATIONNAL SOCIETE DE DIFFUSION INTERNATIONALE AGROALIMENTAIRE	PFPE	France
GREENYARD PREPARED BELGIUM	PFPE	Belgium
INSTITUT AGRICOLE DE L'ETAT DE FRIBOURG	PB	Switzerland
SVERIGES LANTBRUKSUNIVERSITET	HSEE	Sweden

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

Stakeholders, generally food-related, depend on the case, and may be involved in innovations that are technological, organisational or social. In Switzerland, a cooperative of approximately 200 apple farmers came up with the idea for valorising apple production co-products, first thinking of a biodigester to valorise the co-products, but finally deciding to valorise them in the form of vinegar production (I). In Greece, through an organisational innovation, citizens are involved in a project to build a blockchain for feta: they have to say which informations they wish to see when, in the future, they flash the QR code on a feta packaging. In Sweden, in a current context where berry pickers from Thailand are being paid by volume and exploited in poor working conditions, a social innovation is to establish a local berry picking mobile app that can involve citizens (e.g., retired people), with a view to collecting statistics on berry picking (low-tech). In Belgium, a technological innovation involves the building of a machine to make aseptic conserves, built by Kent University researchers. This also mobilises organisational innovations to co-create the business model around this machine must it be incorporated in a cooperative? Is the machine to be leased, shared, mobile? Should it be brand-labeled? Etc.). In Austria, a social innovation builds a “food incubator” programme that is co-created in a pilot production facility and food lab involving producers who can describe their ideas and develop

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their products hands-on, exchange knowledge and network through “open food” events, also helping small producers innovate (I).

Farmers: private sector helix or citizen /civil helix?

An interesting point is which helix out of the QH farmers should be considered to belong to. While they cannot be considered citizens or civil society organisations, they cannot be considered entirely private sector actors because they are marginalised (I). Indeed, farmers suffer to varying degrees of marginalisation in different respects: geographic (distance from cities and infrastructures), social (disconnection from urban and social life, hard and inflexible working conditions), economic (climate vulnerability, downward pressures on prices from retailers, market price volatility), health issues due to pesticide-use, among others.

Community Supported Agriculture (“CSA”) groups, where citizens support farmers contractually, could have constituted a more clearly defined fourth helix of citizens and civil society organisations, but they were not involved in any of the cases (I).

Dimension Two: Methods and Processes

Co-creation workshops

The project is ongoing so more co-creation activities are expected. At the time of writing, at least one co-creation workshop has been held for most of the case studies.

In Switzerland, 30 participants discussed about how to generate new value propositions for SMEs and other regional food chain actors through improved valorisation of co-products. The main topics addressed are co-product valorisation in the fruit and vegetable sector to develop alternative cleaning agents or crop protection products, increasing added value for fruits sales, reduced ecological footprint and improving cooperation between farmers and processors (W).

In France, more than 30 participants representing milk, fruit and vegetable producers, processors, distributors, consumers and other stakeholders from eastern France discussed the opportunities and difficulties in using whey (a major co-product of small and medium-size cheese factories) with a view to developing new fermented drinks based on whey with zero-waste distribution (W).

In Greece, participants representing consumers, dairy production and processing, retail and ICT involving blockchain, smart agriculture, IT experts and solution designers discussed goal definition linked to consumer demand for more food transparency and challenges in using blockchain technology, including its potentially high costs (W).

In Sweden participants representing the wild berry companies, the public sector and universities came together to better understand wild berry production issues and set up goals for the development of the value chain (W).

In Austria, following a goal-defining meeting with regional stakeholders, a workshop was organised to prepare the launch of an incubator program bringing together fruit and vegetable sector stakeholders

from the Austrian province of Styria, the start of a series of moderated implementation workshops (W).

The goal defining workshops therefore were held between a diversity of food actors, often covering all the QH: some of which, but not all, involved citizens, as detailed above. These led to stakeholder mapping exercises which deliberately involved only the food actors, without the intervention of research partners in the process (however, Fraunhofer Institute, among others, were in charge of reviewing the stakeholder mapping). An “any stakeholder” approach helped to free the stakeholder identification process, making it less normative. A goal definition “mirrorboard” had to be transferred online due to the COVID-19 pandemic.

Dimension Three: Outcomes and Impacts

The project is ongoing so its core outcomes cannot yet be fully measured. However, some outcomes of co-creation have begun to emerge. For instance, the cooperation around the apple co-product to vinegar production project (Switzerland) enabled the farmers to develop new relations with one another, developing a “networked value chain” (I). Also, the technologically-minded participants (e.g., engineers developing technological prototypes) have started to overcome some of their reticences regarding citizen involvement. Some “train the trainer in co-creation” exercises helped show them what co-creation can bring and how to best conduct it: for instance, accepting that while co-creative processes take time, they also help find application scenarios for products, getting these closer to the market and possibly even helping accelerate the Technological Readiness Level (TRL) of their prototypes (I).

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FOODE

Food Systems in European Cities

Key findings:

- City/Region Food Systems (CRFS) help reconnect citizens with multiple other stakeholders in food provisioning
- FoodE identifies 16 CRFS to be improved through co-design initiatives including all types of stakeholders and in particular citizens, including children
- Building a database of CRFS helps understand these and helps them cross-pollinate and network throughout Europe

Sources:

- W: CORDIS Project page or Project website/platform
- D 3.1: Catalogue of networking and cross-pollination initiatives
- D 3.9: Report on KidScience Initiatives
- D 4.1: Launch of an open challenge for the design of innovative CRFS solutions
- D 7.5: Stakeholder mapping

The FoodE Project

This Project (February 2020 – January 2024) focusses on "City/Region Food Systems" ("CRFS"), which bring together "all those actors, processes and relationships that are involved with the food chain (from where food is produced, to where it is processed and distributed) in a defined geographical region" (W). This holistic "systems approach" integrates a great number of different actors, from food professionals to communities. FoodE promotes the growth of *citizen-led* CRFS by collecting knowledge on local initiatives across Europe, co-developing new tools to drive CRFS, and defining an operational assessment methodology of CRFS. The tools are co-designed with academia, citizens, and food system start-ups, and aim both to aggregate the most sustainable models of CRFS, and to enable the co-creation of innovative pilot experiences, applying mechanisms from Citizen Science and RRI. FoodE hopes to achieve the following steps: "define an operational methodology for the assessment of CRFS; promote cross-pollination between European CRFS; contribute to increase access to affordable, safe and nutritious food; create a tool mobilising CRFS stakeholders in sustainability assessment; upscale the output to other EU cities" (W).

Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (coordinator)	HSEE	Italy
INSTITUT NATIONAL DES SCIENCES ET INDUSTRIES	HSEE	France

DU VIVANT ET DE L'ENVIRONNEMENT - AGROPARISTECH		
COMMUNE DE ROMAINVILLE	PB	France
FACHHOCHSCHULE SUDWESTFALEN	HSEE	Germany
ILS - INSTITUT FUR LANDES- UND STADTENTWICKLUNGSFORSCHUNG gGMBH	RO	Germany
FLYTECH SRL	PFPE	Italy
NOLDE ERWIN	Germany	Germany
COMUNE DI BOLOGNA	Italy	Italy
Comune di Napoli	Italy	Italy
UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II	Italy	Italy
HAGUE CORPORATE AFFAIRS BV	Netherlands	Netherlands
GEMEENTE LANSINGERLAND	PB	Netherlands
STICHTING WAGENINGEN RESEARCH	RO	Netherlands
POLAR PERMACULTURE SOLUTIONS AS	PFPE	Norway
TASEN MICROGREENS AS	PFPE	Norway
ASOCIATIA MAI BINE	O	Romania
*ARCTUR RACUNALNISKI INZENIRING DOO **	PFPE	Slovenia
DRUSTVO URBANI CEBELAR	O	Slovenia
AJUNTAMENT DE SABADELL	PB	Spain
ORGANIZACION DE PRODUCTORES DE TUNIDOS Y PESCA FRESCA DE LA ISTA DE TENERIFE	O	Spain
UNIVERSIDAD DE LA LAGUNA	HSEE	Spain
UNIVERSIDAD AUTONOMA DE BARCELONA	HSEE	Spain
STICHTING METABOLIC INSTITUTE	O	Netherlands
NABOLAGSHAGER AS	PFPE	Norway

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Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

The Consortium members comprise universities, research institutes, SMEs, NGOs, and city councils from different EU countries. They collaborate with citizens within their respective localities in ways that "involve and stimulate active participation and promote knowledge exchange between European CRFS, involving public decision makers, companies, consumers, and other citizens". This collaboration relates to a core aim of the Project which is to "build and nourish healthy, active and sustainable relationships between food chain actors, thanks to the definition and implementation of networking opportunities and tools" (D3.1).
The Consortium members also conduct a stakeholder mapping (D 7.5) of over 200 food-related actors, which are organized in a varied categorization of CRFS, but also local decision-makers, local media outlets, educational institutions. Any of these may be involved in any one or several of the production side of in-city food (e.g., urban agriculture, agroecological consortium), production and distribution (e.g., Community Supported Agriculture or "CSA"), food waste reduction, community building, etc. The objective of this mapping is to contact and encourage these stakeholders to participate in MyLocalFoodE related events, to subscribe to FoodE's press releases, help conduct surveys on CRFS-related issues in their area, and engage with one another as part of a network via social media (D7.5).

Dimension Two: Methods and Processes

Stakeholder engagement: overview

The Project's activities revolve around a broad form of classification and methodology to monitor, assess, and develop City/Region Food Systems ("CRFS"). This broad aim involves – among others – the following activities: building a database of existing CRFS and developing a methodological framework for assessing these existing CRFS and their social, environmental and economic characteristics; creating an online app for their review and monitoring; launching a school initiative throughout Europe leading to a book on CRFS by and for schoolchildren; holding an open challenge for the design of innovative CRFS pilot projects; implementing and scaling-up 15 CRFS pilot projects in 12 EU cities; classifying innovative business models in CRFS; creating a CRFS eco-label; preparing a European guidebook and develop an app to help EU citizens identify, monitor and assess CRFS initiatives.

16 pilot projects that engage citizens, schools, policy-makers and entrepreneurs/food producers

These pilot CRFS are identified, through the FoodE Project, by citizen-led communities that were asked to identify success stories and bridge these for knowledge exchange at EU level. These CRFS are highly diverse: Aquaponic educational farm (Amsterdam); Urban beekeeping for rehabilitation and social inclusion (Ljubljana); Indoor Vertical Farm for growing Food, Competences and Innovation (Bologna); Circular economy restaurant (Svalbard Island near the Arctic, Norway); Educational hydroponic garden prototype (Oslo); Educational rooftop farm for school pupils (Oslo); Plant factory for demonstrational purposes (Bleiswijk, Netherlands); Plant factory for social inclusion (Oslo); Restaurant with local products (Iasi, Romania); Food hub for education, leisure and urban farming innovation (Bologna);

Sustainable small scale fishery in school canteens (Tenerife); Urban agricultural park for participatory agricultural test spaces (Sabadell, Spain); Urban agricultural park with farmers and fishery market (Naples); Urban farm with hydroponic greenhouse and greywater pilot plant (Berlin); Urban farming at SALUS Space (Bologna); Vertical farm, educational gardens, sustainable and social food, market gardening and mushrooms production, circular innovation and short food chain (Romainville, France).

These 16 projects in themselves all rely on extensive forms of collaboration between all helices of the Quadruple Helix (QH), including citizens, schools, food producers (growers, processors), municipalities, research institutes and universities, and multiple forms of expertise (e.g., on aquaponics or irrigation). On a general level, FoodE focusses on four core stakeholder categories (note: also see Dimension One): (i) Citizens, (ii) Schools, (iii) Policy makers and researchers, and (iv) Entrepreneurs and food producers. For the first type, regarding citizen involvement, FoodE states that it is "full of opportunities for active input from different segments of the population", through pilot-projects that "pioneer citizen-involvement in creating sustainable solutions to food challenges" through "events, surveys, activities, and more to gain as much input as possible" (W). Secondly, school activities are the focus of several projects, because "dissemination of information to schools is a strategic tool for the engagement of youth in main aspects of environmental, social and economic sustainability of innovative city food systems in Europe". The school activities have pupils investigate food-related issues as varied as climate change, social exclusion and innovative local food systems. Through the MyLocalFoodE initiative, pupils attend open science events linked to food, "presenting sustainable concepts and developing innovative pioneering strategies" in front of researchers and food system actors. With these interactions with key players in food, school students play active roles in redefining food issues and priorities, as they turn into "food prosumers" (W; Stephens and Barbier, 2021). Thirdly, at the policy level, "bottom-up strategies and innovative projects are being developed to influence the food system" (e.g., "food policy councils"), which in turn influence "real-estate owners, investors, planners and public administrations" to implement the ideas developed from the bottom up. As such, FoodE can help disseminate best practices (as evidenced through the 16 pilot projects) across countries. Researchers, furthermore, help disseminate knowledge in general (including best practices, but not limited to these) about these initiatives, making data available in the process. Fourthly, multiple stakeholders from the food domain are directly involved in FoodE, such as food-related entrepreneurs, farmers, processors and distributors. They are asked, in particular, to fill in a questionnaire to help build the European database of CRFS, and on this basis, build the pilot CRFS from the Project. In parallel, food producers are engaged in building a mobile app ("FoodE App") to help users be aware of and cross-evaluate existing CRFS. This category of stakeholders also participates in events (e.g., MyLocalFoodE) and workshops involving entrepreneurs with citizens employed in CRFS. These stages result, finally, in the classification of CRFS business models which will help identify typologies and business opportunities for this broad spectrum of CRFS. In summary, the "constant monitoring and exchange between research, business initiatives, public authorities and the civil society" enables the creation of a "citizen-based CRFS sustainability eco-label" (which could arguably be seen as a form of "marketable product").

Focus on citizen engagement: examples from some projects

The FoodE project states that it is "centered around the concept of community-designed food systems" (W). Multiple instances of citizen engagement (alongside other types of QH stakeholders as stated above) are indeed provided throughout the projects, albeit with differences in focus from one project to the other. For citizens, for instance, the Aquaponic education farm conducts workshops "allowing citizens to design, build, and manage their own small-scale aquaponics units". Another example, with Urban beekeeping for rehabilitation and social inclusion, shows how to "rehabilitate and empower

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underprivileged groups of society (it is aimed at imprisoned persons)". On Svalbard Island, the Circular economy restaurant involves "co-design with citizens (of) socially inclusive activities associated with food production, enabling to create partnerships with local stakeholders towards the implementation of an innovative model that follows circular economy principles". Certain projects are specifically geared towards certain publics/sectors, such as education (e.g., Educational hydroponic garden prototype, Educational rooftop farm for school pupils, and Sustainable small scale fishery in school canteens), social inclusion for unemployed people or refugees (e.g., Plant factory for social inclusion). Following principles of reconnection between producers and consumers in local food systems which have been documented in much food literature (e.g., Stephens and Barbier, 2021), citizens participate alongside food producers in knowledge exchange and co-creation, for instance through active participation through "experimental tests on traditional local varieties grown in organic production systems (Urban agricultural park for participatory agricultural test spaces). Some projects are particularly ambitious, with a multiplicity of objectives from awareness raising for different publics, development of vocational training related to urban agriculture and food in general, promotion of social inclusion, educational and cultural spaces, etc. (Cité Maraichère de Romainville). There is a wealth of examples of citizen involvement in co-creating innovative food practices and futures throughout these 16 CRFS pilot initiatives: representing them extensively unfortunately falls quite short of the scope of this report.

The "FoodE Challenge": selection of innovative ideas for the design of CRFS solutions

Besides the multiple forms of co-creation witnessed throughout the already existing 16 pilot CRFS in 12 different European cities, the Project itself sets up a "FoodE Challenge" that involves multiple stakeholders (consumers, students, entrepreneurs, civil society, etc.) in the co-design, co-creation and improvement of these existing initiatives, and/or the integration of new sustainable food system projects in each of these 12 cities. The co-design activities take the form of student challenges, hackathons and local challenges, surveys and interviews, co-design workshops, focus groups and other methods (D4.1).

KidScience

One of the work packages focusses specifically on the role of children in developing interest and understanding of broad food issues via the study and co-design of CFRS-related activities. KidScience activities include three subtasks. Firstly, "Awareness creation in schools" conducts events and activities in 18 schools with a total of 5000 students, presenting them with environmental, social and economic sustainability aspects of innovative CRFS in Europe. These take different forms (e.g., workshops, visits, extra-curricular) and tackle many subjects (climate change, unfair food access, food waste, food production, gardening, etc.). Secondly, students participate in the MyLocalFoodE events, by attending open-science events with researchers and food system managers, and presenting sustainable CRFS concepts and developing innovative strategies for implementing innovative food systems in their regions (e.g., through school competitions, hackathons etc.). Thirdly, school pupils are involved in editing dissemination documents on the sustainability assessment of European CRFS to be published in the form of an e-book (about 10-15 articles) in the international journal *Frontiers for young minds* (D 3.9). This editing and review process aims to foster critical thinking in students with regard to CRFS sustainability and innovation (e.g., urban agroecology, farming multifunctionality, food safety...) and to understand editorial processes better.

Survey of cross-pollination initiatives in Europe

One of the aims of FoodE is to understand how different CRFS and CRFS stakeholders are networked and coordinated, and to improve the networking potential of CRFS networking and collaborations. To achieve this the Project partners conduct a survey of cross-pollination" initiatives (e.g., food fairs that involve actors/stakeholders linked to CRFS), that identifies a total of 85 initiatives that relate to CRFS across Europe. This survey shows that there is involvement from different stakeholder categories across the Quadruple Helix: producers, consumers, public authorities (e.g., municipalities), private firms, NGOs, associations (e.g., citizen, refugees), and education and research institutions. The types of stakeholder involved varies on the type and size of the initiative: for instance, some of the initiatives identified are large international events with actors from the conventional, "Big Ag" food sector (e.g., the SIAL in Paris), while others are much smaller initiatives that are more civil society led (e.g., la Fête de la Transition led by the movement *Villes en Transition*). This mixed nature of CRFS-related initiatives is not that surprising, because in the past few years, conventional and alternative food actors have become more imbricated, as evidenced in large food fairs like the *Salon de l'Agriculture* (Stephens 2020). The survey provides a permanent database that can be used by CRFS to develop networks, directly from the database or through the initiatives that are registered on the database when they take place (e.g., professional food fairs).

Dimension Three: Outcomes and Impacts

The FoodE Challenge activities help raise awareness on multiple food-related issues while offering citizens and other stakeholders "hands-on experiences", networking and mutual learning possibilities. The actual outputs depend on the activity type, but include "project proposals, small-scale prototypes/tools, reports produced from focus group discussions, workshops, survey/interview results, among others. Moreover, the pilot CRFS initiatives are improved, participatory monitoring of these is introduced, and general scaling-up of the initiatives may increase access to affordable quality food throughout European cities (D4.1). Also, children are particularly well included as co-designers through the KidScience work package, and have their own specific outputs (ebook). More generally, improving CRFS initiatives is paramount to multi stakeholder involvement in innovation due to the universal importance and relevance of food in people's lives: this means that citizens of any age, culture, ability or location may be interested and have something to contribute to these type of food alternatives that, highly localized as they are, contribute to shifting the food production/consumption paradigm and regime towards producer-consumer reconnection and geographic but also socio-economic and institutional relocalization.

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FORCE

Cities Cooperating For Circular Economy

Key findings:

- Value Chain Based Partnerships conceptualize multi-stakeholder interactions between all Quadruple Helix actors engaged in Circular Economy waste reduction processes
- Four cities (Copenhagen, Hamburg, Lisbon, Genoa) are each involved as lead in one waste sector (plastics, metals, bio-waste, wood) and secondary participants in the other waste sectors
- Core outputs are a Handbook on Value Chain Based Partnerships, and a Handbook for Citizen Involvement on Circular Economy

Sources:

- W: CORDIS Project page or Project website/platform
- HB-VCBP: Handbook for Value Chain Based Partnerships – A practical guide for cities to promote resource efficiency and circular economy policy implementation
- HB-CICE: Handbook for Citizen Involvement on Circular Economy

The FORCE Project

This Project (September 2016 – February 2021) seeks to engage cities, enterprises, citizens and academia in 16 "participatory value chain based partnerships to create and develop eco-innovative solutions together". These partnerships lead to the development of 10 "viable end-markets" linked to material/waste streams in plastic waste, metals, bio-waste and wood waste. To this end FORCE develops a governance model for cities based on value chain based partnerships and a set of decision support tools using Big Data. The solutions are demonstrated across four European cities and relate to four materials: flexible plastics (recycling and upgrade of 5000 tonnes of plastic from enterprises and households); metals (citizens and SMEs that repair damaged electric and electronic devices are mobilized to reclaim up to 3600 tonnes of Waste Electric and Electronic Equipment, "WEEE"); wood waste (12000 tonnes of wood waste are collected from urban and mountain areas, 8-10000 tonnes of brushwood that are to be used for compost production, and 14-16000 tonnes are processed into wood particles); and bio-waste (7000 tonnes of municipal waste, 3000 tonnes from restaurants and hotels, and 4000 tonnes from households). The 16 partnerships articulate around one of the four cities establishing a "lead partnership" for one material/waste stream (Copenhagen for plastics, Hamburg for metals, Lisbon for organic waste and Genoa for wood), while each of the three other cities establishes a "local partnership" for each of the other streams.

Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
KOBENHAVNS KOMMUNE (coordinator)	PB	Denmark
FREIE UND HANSESTADT HAMBURG	PB	Germany
CAMARA MUNICIPAL DE LISBOA	PB	Portugal
CAMARA MUNICIPAL DE LISBOA	PB	Italy
AAGE VESTERGAARD LARSEN A/S	PFPE	Denmark
TEKNOLOGISK INSTITUT	RO	Denmark
LETBAEK PLAST AS	PFPE	Denmark
DANSK ROTATIONS PLASTIC APS	PFPE	Denmark
STADTREINIGUNG HAMBURG AOR	PB	Germany
HAFENCITY UNIVERSITAT HAMBURG	HSEE	Germany
HOCHSCHULE FUR ANGEWANDTE WISSENSCHAFTEN HAMBURG	HSEE	Germany
CONSIST ITU ENVIRONMENTAL SOFTWARE GMBH	PFPE	Germany
AURUBIS AG	PFPE	Germany
VALORSUL - VALORIZACAO E TRATAMENTO DE RESIDUOS SOLIDOS DAS REGIOES DE LISSBOA E DO OESTE S.A.	PFPE	Portugal
DARIACORDAR ASSOCIACAO PARA A RECUPERACAO DE DESPERDICIO	O	Portugal
Quercus - Associação nacional de Conservação da natureza	O	Portugal

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ASSOCIACAO DA HOTELARIA RESTAURACAO E SIMILARES DE PORTUGAL	O	Portugal
AZIENDA MULTISERVIZI E D'IGIENE URBANA GENOVA S.P.A.	PFPE	Italy
ECOLEGNO GENOVA SRL	PFPE	Italy
TECNOLOGIE INNOVATIVE PER IL CONTROLLO AMBIENTALE E LO SVILUPPO SOSTENIBILE SOCIETA CONSORTILE A RESPONSABILITA LIMITATA	RO	Italy
ACTIVE CELLS SRL	PFPE	Italy
ADDAPTCREATIVE LDA	PFPE	Portugal

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Stakeholders from Project activities

The stakeholders involve the entire Quadruple Helix. Municipalities and local authorities are central to project activities in that they are in charge of engaging their citizens at local levels, and setting up top-down processes of stakeholder mapping and coordinating interactions between citizens and the different private enterprises that relate to different sectors of waste management (plastics, metals, bio-waste, wood). The detail on stakeholders and their interactions/engagements is provided below.

Dimension Two: Methods and Processes

Stakeholder engagement

The City of Copenhagen (lead city on plastics) establishes several collection schemes for household flexible plastics, with a view to processing these into a marketable resource using innovative applications. In doing so the City collaborates alongside private enterprises linked to plastics (who are also Project consortium members). The three other cities are involved in plastic films collection (Hamburg), building art with plastic waste to raise awareness (Lisbon), or building a start-up that experiments with the production of plastic items (Genoa).
The City of Hamburg sets up a web portal, CYCEL, to help people decide whether to repair, sell (re-use) or recycle their electric/electronic equipment ("EEE"). Specific EEE-focussed second-hand shops with attached repair units are established, with the participation of private enterprises linked to metals or recycling (and part of the Project consortium). The three other cities are involved in the development of a local, neighborhood level infrastructure for collection and repair of EEE (Copenhagen), the set-up

of repair shops located in municipal facilities/markets or streets with important pedestrian flow (Lisbon), and the set-up of repair cafés to teach people how to repair common EEE appliances (Genoa). The City of Lisbon sets up an online "network of stakeholders from the food value chain (donors, redistributors and beneficiaries)" organized through an app that integrates food waste prevention and bio-waste source separation activities, along with related door-to-door and digital campaigns (W). The three other cities engage in a neighborhood-level bio-waste sorting technology development (Copenhagen), investigating measures from the housing industry (lessors, tenants and owners) that increase citizen participation in separating bio-waste (Hamburg) and the promotion of food waste prevention alongside environmental and consumer associations (Genoa).

Stakeholder motivations

FORCE recognizes differences in motivations between the different sectors involved in the multi-stakeholder partnerships. Firstly, for local authorities and municipal companies, these are identified as "the commitment to reach ambitious climate change policy goals and waste management targets through the abilities of non-state stakeholders". Secondly, for private stakeholders, the main drivers, aside financial benefits, were to "engage in cooperation with the local authorities and other non-state stakeholders" with a view to increasing "visibility and networking reasons in the local and broader 'sustainability arena', acquisition of new knowledge on circularity practices" and "sometimes also seeking for the support of the public authorities to overcome legislative burdens that hinder business models" (HB-VCBP). For citizens, motivations/enablers range from the provision of practical tips to help them improve their behavior regarding waste, providing convenient and accessible waste infrastructure to improve participation rates, or providing incentives such as discounts on waste tax or in shops (HB-CICE).

Dimension Three: Outcomes and Impacts

Handbook for Value Chain Based Partnership ("VCBP")

This Handbook is based on the concept of VCBP, and summarizes the methodological pathway to apply the transferable governance model to cities, the VCBP Process Model. This includes five stages: (1) initiation, (2) identification and engagement of stakeholders, (3) establishment of partnerships, (4) design and planning of initiatives, and (5) implementation. The Handbook mainly addresses local authorities and policy makers. The "initiation" phase is a top-down process initiated by local authorities, while "identification and engagement of stakeholders" is both a top-down process realized by local authorities and an integrated top-down and bottom-up process. The "establishment of partnerships" phase consists in the clustering of stakeholders and a bottom-up process forming multiple partnerships. The "design and planning of initiatives" and "implementation" phases involve integrated top-down and bottom-up process for the design and planning, and subsequently the realization, of measures (HB-VCBP). The VCBPs are the "cornerstone of the FORCE project", and are "an overarching partnership which is developed following the value chain generic framework, which seeks to cover all stages of the value chain from "Design/Manufacturing" to "Retail", "Consumption", "Waste collection", "2nd hand stores, repair shops, etc.", "Waste separation" and "Waste reprocessing"; with the involvement of "Policy-makers", "Industry associations", "Environmental associations" and "Research institutions" (HB-VCBP). In applying VCBPs to the four targeted streams, "leakage of plastic and strategic metals in the FORCE project was minimized through activities to prevent waste generation (reuse), to prolong the life of products (repair), to reuse spare parts

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(remanufacture) and through recycling and recovery of waste materials"; while at the same time, bio-waste (organic and wood) reduction involved activities to prevent waste generation (e.g., donation of food surplus; repair, remanufacture and reuse of furniture), use as raw material in biochemical processes, recycling in agriculture or recovery in energy production (HB-VCBP).

Handbook for Citizen Involvement on Circular Economy

This Handbook provides a framework for reaching the objectives of citizen involvement, around five criteria. Firstly, "strategic planning" provides a clear outline on the scope, procedures and expected outputs of citizen involvement. This establishes trust among stakeholders and increases the effectiveness of the process through scope definition, stakeholder mapping, the choice of suitable implementation tools, impact monitoring of citizen involvement, etc. Secondly, "inclusivity" ensures a variety of perspectives through involvement of various affected citizens groups. This increases trust in authorities the probability of environmental and social decisions' acceptance, and "offers new perspectives to solutions proposed by the actors in charge of waste management, making them more suitable for addressing citizens' needs". Thirdly, "transparency" which means clearly disclosing information, rules, plans, processes and actions, in order to "increase the citizens' trust in the system and authorities" (HB-CICE). Fourthly, "continuity" refers to the timeframe for the implementation of tools and strategies (e.g., providing information over a longer period of time fosters behavior change; regular exchange to build trust and strengthen relationships between the city/waste management company and other stakeholders). Fifthly, "resources dedicated" refers to the allocation of appropriate resources to citizen involvement activities, for instance to involve skilled people (e.g., topic experts) or experts in participative processes and tools (HB-CICE).

FoTRRIS

Fostering a Transition towards Responsible Research and Innovation Systems

Key findings

- Focusses on governance practices for RRI policies in innovations systems based on a set of six Transition Experiments hosted on a Co-RRI Platform
- Designs an RRI Cookbook to guide policymakers in fostering innovative governance models for RRI in three European territories
- Formulates recommendations at EU-level and context-specific (country) levels for increasing systemic thinking and fostering co-RRI in R&I

Sources:
- Website: FoTRRIS Project website or CORDIS Project page
- D2.2 Co-RRI web based platform
- D3.1 Report on co-RRI concepts
- D4.3 Policy Recommendation for co-RRI
- Cookbook: How to co-create RRI projects

The FoTRRIS Project

FoTRRIS (October 2015-2018) aims to introduce new governance practices to foster RRI policies and methods in research and innovation systems. This aim is materialized by the design, testing and validation of a Co-RRI web platform, a tool designed to support the FoTRRIS process for creating collaborative RRI projects. To validate the FoTRRIS process and its methodologies, FoTRRIS performs a series of Transition Experiments that use the Co-RRI platform. These experiments are conducted in five EU member states, are evaluated and lead to policy recommendations. Six transition experiments (TE) are carried out in five countries: sustainable food systems (Austria), circular economy regarding waste from housing construction and electric/electronic equipment (Belgium), a transitions town community aiming to co-design sustainable local economic development for a garden city neighbourhood (Hungary), a co-designed LivingLab for supporting renewable energy development in a region (Italy), a TE focused on refugees and another focused on women with disabilities (Spain) (D3.1).

Dimension One: Actors and Configurations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (coordinator)	RO	Belgium
LGI CONSULTING	PFPE	France
ESSRG KFT	PFPE	Hungary
UNIVERSIDAD COMPLUTENSE DE	HSEE	Spain

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MADRID		
CESIE	O	Italy
EUROPEAN REGIONS RESEARCH AND INNOVATION NETWORK ASBL	O	Belgium
INTERDISZIPLINARES FORSCHUNGSZENTRUM FUR TECHNIK, ARBEIT UND KULTUR	RO	Austria

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders in Project activities

The different stakeholders are organized around six Competence Cells, one for each Transition Experiment. These Competence Cells consist in "an organisational unit, either new, or part of an existing organisation, which ultimate mission is to foster this transition", where stakeholders are ideally "at the junction of science, policy, the business sector and civil society, and form a network" (Website). A FoTRRIS Cookbook defines who can be part of a Competence Cell, including "experts on co-RRI to facilitate the transition experiment", "directly involved knowledge actors familiar with the theme of the transition experiment", "knowledge actors indirectly involved" who understand local community context, "experts in project development", and uses the niche actor / regime actor taxonomy and conceptualization, specifying that both regime and niche actor types must be represented in the different TE (Source: Cookbook: How to co-create RRI projects).

Dimension Two: Methods & Processes

The FoTRRIS Co-RRI approach principles

The Co-RRI approach is based on underlying values of "ecological sustainability, acknowledgment of different forms of knowing and social inclusion". In attempting to solve wicked problems linked to the SDGs, co-RRI must adopt a "complex systems perspective", which are "constantly evolving, open systems that contain a multitude of elements" which interact in ways that are often "unpredictable, in the sense that they are non-linear and determined by feedback loops", and which contain "nested systems" (economic, ecological, social…) that influence one another at multiple different scales (D4.3). These "Normative assumptions" entail the participation of all QH types, in particular that "Citizen and stakeholder engagement for RRI requires the co-creation of relevant knowledge and solutions for complex problems, and not just involving citizens and stakeholders in the final phases of an R&I project with the aim of 'educating' them into acceptance of the outcomes".
The co-RRI processes require "transparency" (granting access to information about the process as well as intermediate results of ongoing activities), "accessibility" (of data and information in general), and, as a result of transparency and accessibility, "reflexivity" (iterative action within a "continuously developing network of actors that channel in new problems on a regular basis". Yet these processes are also hedged on sufficient "inclusiveness" (be it through open participation or more curated invitational methods) in ways that carefully take into account local contexts' particularities, especially when the fields investigated by the co-RRI processes are highly contested.

Co-RRI platform and FoTRRIS Cookbook based on the MISC approach

The Co-RRI platform enables Transition Experiment stakeholders to create different "pads" that correspond to different stages of the TE. These stages are based on the MISC approach (Mapping Innovations on a Sustainability Curve), developed by Anne Snick, which provides a "conceptualisation of sustainability and a guidance in carrying out a process of systems mapping, visioning, and action design based on collaboration and consensus-seeking of the multiple actors involved" (D3.1). The stakeholders interact through a workshop and record the workshop outputs on the different platform project pads (D2.2). The FoTRRIS "Cookbook" details five different stages of RRI co-creation based on the MISC: Step 1 "starter" (goal setting), Step 2 "soup" (system mapping), Step 3 "main dish" (visioning), Step 4 "dessert" (project concept design), Step 5 "liqueur" (outreach).

Dimension Three: Outcomes and Impacts

Policy recommendations: commonalities

FoTRRIS formulates policy recommendations for each Transition Experiment (D4.3). Although these recommendations are very much context-specific, FoTRRIS does identify two common points of interest which were formulated across the different TE contexts and countries. Firstly, Capacity building is necessary to address the major lock-in of "lack of systemic thinking" which should be addressed by "behavioural change and the development of skills that enable actors to co-create and think systemically". Secondly, Support/funding for transdisciplinary and co-creation R&I articulates (i) long-term agenda setting (e.g., long-term master plans such as the Flanders 2050 strategy), (ii) institutionalization (such as embedding Competence Cells in organizational structures), (iii) making transdisciplinary research and co-creation tracks part of the selection criteria for publicly funded projects, (iv) acknowledgment (such as labels or special titles for institutions), and (v) motivation schemes for individuals which could act as incentives.

TE specific recommendations (some illustrations)

As an illustration of the context specific recommendations that are different for each TE, the Austrian TE context involves the following. Firstly, "Institutional and financial support for reflections on the relevance of co-created Responsible Research and Innovation (co-RRI)", that could help finance, for example, "personnel costs, financial compensations for participating non-R&I actors, other costs necessary for e.g. the implementation of multi-actor workshops". Secondly, "Providing appropriate organisational space for the implementation of co-RRI". Thirdly, the "Creation of visibility, acknowledgment, and rewards for co-RRI", that could entail, for example, the launching of academic journals that are open to publishing co-RRI-related work and therefore increase the visibility of non-mainstream R&I approaches. Fourthly, "Education, training and capacity building to co-create research and innovation", whereby higher education curricula could integrate at least one obligatory course on co-RRI in order to build a generation that is not deadlocked into mainstream R&I approaches. As another example, for the Belgium TE context, one recommendation is to support R&I through a "knowledge currency" that is complementary to the euro, that could take the form of knowledge vouchers that could be traded freely for other knowledge within the knowledge currency community, for instance enabling citizens to access knowledge infrastructure such as universities.

EU-level policy recommendations (some illustrations)

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Recommendations are also formulated at the EU policy level. For instance, the “Make resilient societies and sustainable development the ultimate goals of the long-term European strategy, to be implemented by the new Research and Innovation Framework programme as a financial instrument” recommendation encourages the development of regional level innovation ecosystems with cities and regions as “drivers for finding successful solutions to the new mission-based challenges”. The “Foster co-created Responsible Research and Innovation (co-RRI)” in EU FP initiatives could, for instance, make engagement of societal stakeholders mandatory in EU FP calls, or set up dedicated units that support research for societal engagement in knowledge institutions. The “Invest in capacity building of current societal actors & researchers and in education (…) to co-create…” recommendation involves, for instance, the orienting of European programmes like Erasmus+ and Marie Curie Actions towards more co-creation transdisciplinary research, and making co-RRI a mandatory part of higher education and PhD curricula (D4.3).

FRANCIS

Frugal Innovation by Citizens for Citizens

FRANCIS project will leverage citizen science for the development of frugal innovations (FIs) that bring about affordable high-quality solutions. The project will do so by running two open innovation challenges that bridge geographical distances and social backgrounds for the development of FIs with citizens from developed, developing and emerging countries. Specific attention will be given to the inclusion of marginalised groups such as the elderly, large families and people with a minimalistic lifestyle, all of which are often neglected by the economy and society.

Sources:

- Cordis
- https://www.francis-project.eu/
- Interview with coordinator Liza Wohlfart, Fraunhofer IAO

Consortium composition:

FRAUNHOFER	Research Organisations	Germany
AGORIZE SAS	Private for-profit entities	France
BEHAVIOURAL INSIGHTS LTD	Private for-profit entities	UK
BSH EV ALETLERI SANAYI VE TICARET ANONIM SIRKETI	Private for-profit entities	Turkey
HELIOZ GMBH	Private for-profit entities	Austria
INNOFRUGAL RY	Other	Finland
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY	Research Organisations	Finland

Dimension 1: Motivations and Participants
Besides citizens, the project involves scientists and industry in the innovation process. The scope of the first challenge will be the culinary world and home care. This challenge is targeting the following groups: troubled families, people with a minimalistic lifestyle and elderly people living alone. The second challenge is focused on solar disinfection. Target groups are minimalistic consumers, low-/middle-income households in (semi-)rural areas, people in refugee camps and micro-entrepreneurs. The target countries of the two challenges span from Turkey and Germany to India, Egypt, Bangladesh and Uganda. NGOs and different associations working with these target groups will be involved in discussions beforehand, there will be round tables of representatives of these groups. When challenges start,

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members of the consortium will work with these organisations to reach the citizens. Scientists (part of the consortium) will run the workshops to help people develop their ideas further. Also, students will be involved, ensuring that every team has a student buddy who helps them.

The topic of the project is frugal innovation, it aims to make innovations that are very simple and still of high quality. Therefore, the target groups that were picked potentially have an interest in these innovations, they have also been neglected so far in the innovation process. FRANCIS is doing round tables with industry, associations, and other stakeholders to find out market requirements in the countries that are targeted. The aim is to check before the challenges start whether these are really the most important groups to work with.

The two companies that are part of the consortium, who are the drivers and main organisers of the challenges are motivated due to their wish to enter this market, they want to get into frugal innovation. One of them already works in the area. Also the idea of having customers who are strongly involved in the innovation process is attractive for them. Having customers/citizens in an active role like that is unusual for them. For scientists the topic is very important - the combination of citizen science and frugal innovation. There are not many projects where citizens develop products therefore combining these two topics is very interesting for them. It is not very clear what will motivate citizens to take part. The big question in the project is how to motivate citizens. The assumption of the consortium is that people are enthusiastic about new things, about the future. They want to have an impact on the future. Citizens will develop the innovation and then companies will take over and they turn them into real products. The assumption is that some people will be motivated to see something they contributed to on the market. There are behavioural scientists in the consortium who will study this. The financial incentive for the citizens is quite small, best teams get a grant (few thousand EUR) to partially cover their time and the other incentives are non-financial.

Dimension 2: Methods and Process

The methodology is currently being set up by looking into citizen science and frugal innovation projects and interviewing leaders of CS projects and frugal innovators.

Launched in February 2021, the first phase of the project in 2021 will establish a scientific foundation with recommendations on how to involve different participants groups in the challenges and how to encourage the shared development of ideas. The second phase, which will take place in 2022 and 2023, will run two open innovation challenges, each mentored by an industry partner, who supports the participants in detailing their ideas.

The challenges run in FRANCIS will follow three phases. Each phase will end with a selection process based on a vote.

The industry partner mentoring the challenge as well as two External Advisory Board members (an expert on Frugal Innovation and an expert on Sustainable Entrepreneurship) will do the voting (other voting committee members may be added). Voting criteria will include

- the quality of the Frugal Innovation idea (soundness of concept)
- its market fit (including cost-effectiveness/affordability for target end consumers) and

- its potential economic, environmental and social sustainability

At the beginning of each challenge, FRANCIS will launch a call for Frugal Innovation ideas. The project expects about 250 citizens from the four target countries to register for participation in this call. Citizens can either register as a so-called “Driver” that develops an idea (alone or together with teammates) or as a so-called “Enabler” that supports the development of ideas by assisting in requirements analysis and feedback provision.

The first phase, and first call, will end with the identification of 12 to 20 Frugal Innovation ideas (and teams). The Drivers will now have a fixed period of time to develop their ideas into concepts, supported by a grant. FRANCIS will then launch a second call for the second phase that is limited to the first call winners. The second phase, and second call, will end with the selection of four to five of concepts that will receive a grant. The Drivers of these concepts, i.e. the grant recipients, will have a fixed time period to further detail their concepts and design a simple demonstrator. All concepts and demonstrators will be presented at an official event (award ceremony). The industry partner mentoring the challenge may take up one or several of the concepts and develop them further into marketable products.

In the voting, teams get feedback and in addition to the group of people who develp ideas, there are also those who test/discuss ideas – more passive supporters. The feedback will be given back to the teams to incorporate. It will be iterative in these phases, but the process won’t jump back to the beginning, there will be feedback cycles.

The main challenges are related to the citizens, to get the right people, to get them to stay involved. Also will they be able to come up with ideas that have the potential of entering the market. Fugal innovators usually see problems and start coming up with ideas, sometimes it takes years. What is offered in FRANCIS is different, there is a limited amount of time. That’s why companies are strongly involved in the voting teams. They must keep in mind strategic orientations of the companies. Sometimes when frugal innovation is developed in a corporate setting, it’s too far off from usual business of the companies.

Dimension 3. Outcomes and Impacts

Not a lot can be said about the outcomes and impacts of the project as it is only in its initial phases and the challenges themselves haven’t started yet.

The consortium hopes to get good frugal concepts, at least one or two. It will be a great result if there will be interesting ideas along the way, even if they are crazy or out of scope, simply to show the potential of citizen involvement in frugal innovation. For the scientific community and the partners, there is expectation to get a lot of learnings: what works, what doesn’t in these kinds of processes. Industry’s ambition is to enter new markets and make a profitable product but with a strong social benefit. They want to bring something to the market that helps people and that is affordable. FRANCIS stops with a good prototype, but it’s then up to the companies to develop it further and bring it to the market.

In terms of impacts of the project, there is social and environmental impact. SDGs are used as the main orientation. Impact on citizen involvement is important - that they feel more motivated to take an active

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part in society, that they are ready to get in contact and work with the industry. In terms of sustainability, the goal is to produce solutions that are environmentally friendly and that have a positive impact on the lives of marginalised communities.

What was heard a lot in the interviews partners did with innovators was that there are silos. There seem to be different worlds that don't connect. For example, medical products, services and solutions that are produced don't gain enough trust from doctors or medical workers, they are often suspicious for the industry. FRANCIS hopes to build bridges and show that one can make something that is profitable and has a good social benefit. At the end of the day if something is profitable it is self- sustaining.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy

It is worth mentioning separately that both challenges that citizen groups will be working on are lead and driven by two companies who are members of the consortium. These companies have selected the challenges that are related to their work and countries where they have an ambition to enter the market, they will be mentoring and working alongside the citizens with a strong methodological support from the academic partners.

GoNano

GoNano aims to improve the responsiveness of research & innovation processes to public values and concerns. The project is ran a pilot in each of the nanotechnology research areas 'Health', 'Energy' and 'Food'. The pilot projects engaged citizens with researchers, professional users, civil society organisations, industry, and policy makers in a continuous process of deliberative workshops and online consultations to co-create concrete suggestions for future nanotechnologies.

Sources:

- Cordis platform
- GoNano website
- D4.4 Final report on the insights and lessons from the engagement activities
- D2.1 Method and manuals for the pilot studies
- D4.3 Evaluation report on the outcomes of the MML platform

Consortium breakdown

The consortium members are the following (see table below):

FONDEN TEKNOLOGIRADET	Denmark	Research Organisations
SCHUURBIERS DANIEL	Netherlands	Private for-profit entities
TECHNOLOGICKE CENTRUM AKADEMIE VED CESKE REPUBLIKY	Czechia	Research Organisations
OSLOMET - STORBYUNIVERSITETET	Norway	Higher or Secondary Education Establishments
UNIVERSITEIT TWENTE	Netherlands	Higher or Secondary Education Establishments
OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Austria	Research Organisations
ASSOCIAZIONE ITALIANA PER LA RICERCA INDUSTRIALE - AIRI	Italy	Other
CENTER FOR INTERNATIONAL ENVIRONMETAL LAW INC	USA	Other
EUROPEAN INSTITUTE OF WOMEN'S HEALTH COMPANY LIMITED BY GUARANTEE	Ireland	Research Organisations
ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY SPAIN SL	Spain	Private for-profit entities

Dimension 1: Motivations and Participants
Over the course of three years, GoNano enabled collaborative development (co-creation) between citizens, civil society organizations, industry, researchers and policy-makers across Europe to align future nanotechnologies with societal needs and concerns. **Researchers** The majority of the participating researchers responded positively to the co-creation process. Some were absolutely convinced of the potential added value of co-creation. However, the reality is that most

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researchers remain sceptical about the need to include wider societal considerations in research and innovation. They may well feel a responsibility to explore the broader societal impacts of their work, but they do not consider it to be their core business. Feedback from participants and the project Advisory Board suggests that the co-creation process may need to focus more on technological content if it is to produce convincing examples for researchers. In other words, it is not necessarily the conceptual foundations or methodological soundness that convinces technology enactors: they will be persuaded by the practical usefulness of the outcomes.

Citizens
The citizens who participated in the co-creation process appreciated the events, but it was not easy to involve them in the process. It also proved difficult to maintain contact with them throughout the process. To engage citizens, the process has to speak to the intrinsic motivation of participants. The need to speak to the intrinsic motivation of participants however implies that co-creation processes like the one developed in GoNano attracts specific subsections of the population, i.e. those with an interest in technology and participation

Industry
Industry proved difficult to reach. Again, those companies who joined the stakeholder workshops appreciated the initiative but other companies may not yet be convinced of the added value of co-creation. To convince companies to include co-creation and stakeholder engagement as part of their innovation processes, more compelling examples are required that clearly demonstrate the added value for companies. This will also likely require a more focused proposition: what exactly will the co-creation look like? Who will be involved, and to what end? Which of the business factors above does it seek to address? Will it save costs, spur innovation or enhance their reputation? What is the expected result, and what do they stand to gain from it?

Civil society
Civil society organisations seem logical candidates for co-creation, being focused on representing specific societal interests. These organisations however must focus their attention on those initiatives where these interests are best represented, given their limited resources. This made it difficult to involve them in the explorative GoNano co-creation sessions. Their limited interest suggests that nanotechnologies, despite continuing policy calls for public engagement, are not considered to be among the most urgent societal problems of today. Still, the civil society representatives that did attend the co-creation events generally appreciated the process.

The GoNano Consortium has identified four roles that could be assigned to participants depending on the tasks they needed to accomplish alongside the production process. These roles were (a) deciders (people who are involved in making high-level decisions such as authorizing expenditure and setting high-level strategy), (b) planners (people who have responsibility for how projects are to be approached, from specifying what activities are to be undertaken to setting and managing timelines), (c) makers (people actively involved in creating something during the project, whether implicitly or explicitly, from those directly involved in undertaking research to those putting together front and back ends of systems), and (d) users (people who will ultimately use the products and services)

Based on a series of questionnaires and follow-up interviews with participants, co-creation activities of the type developed by GoNano are fruitful ways of getting to know considerations from different types of stakeholders and listening to suggestions from citizens. Both citizens and other stakeholders agreed that bringing their perspectives together adds value and insights in what is important to consider when developing nanotechnology applications. Citizens appreciated the co-creation process. The stakeholders

indicated that co-creation contributes to the acceptability of nanotechnology innovations and leads to an increased understanding of other stakeholders' perspectives on nanotechnology and product development.

One observation was that pilot partners were 'outsiders' to the research projects at hand. This meant that they could not rely on the commitment of a predefined group of stakeholders. Instead, they had to identify professional stakeholders who satisfied all criteria for participation in the co-creation process: being focused on the right topic area, being at the right stage of innovation (concrete enough to be discussed, but malleable enough to be redesigned), and in the right country. They needed to convince these stakeholders to voluntarily commit to the co-creation process.

Dimension 2: Methods and Process

Building on the knowledge base and the proposed methodology, the project partners established an iterative, four-step co-creation process to integrate societal considerations in nanotechnologies:

Co-creation step 1: Citizen workshops Three thematic deliberative and envisioning citizen workshops on health, food and energy formed the first step of the co-creation process. The goal of the workshops was to inform citizens on nanotechnologies and possible future application areas in order to facilitate their reflection on wishes, needs and concerns. The citizen workshops took place in the three pilot countries: the citizen workshop on food applications in Prague was organised by TC CAS. The citizen workshop on energy took place in Barcelona, Spain.16 The citizen workshop on nanotechnology applications in health took place on Twente in Enschede.

Co-creation step 2: First stakeholder workshops The first stakeholder workshops were arranged in the three designated pilot countries in February and March 2019. All workshops followed a similar structure, featuring four interrelated co-creation sessions: an exploration phase, where participants got to know each other and explored the needs and values expressed by citizens as well as their own needs and interests; an ideation session, where participants imagined and co-created responses to the needs and values expressed by the citizens by imagining revisions of ongoing research and innovation trajectories; a prototyping session, where participants generated a storyboard that visualized how the resulting research lines and product suggestions could be designed in relation to the needs and values expressed by the citizens and suggested concrete actions to be taken to realise this vision; and a concluding reflection, where participants presented their visions and reflected on the overall workshop outcomes.

Co-creation step 3: Online consultation The results from the first stakeholder workshops were discussed in an online citizen consultation. The aim of this consultation was to get a response from citizens to the product suggestions coming out of the first round of workshops with professional stakeholders, to rank the needs and values connected to the potential applications in health, food and energy, and to get an idea on how the European respondents perceive nanotechnology in general. The data collection for the online consultation started on July 1st 2019 and ended on September 13th 2019. A questionnaire drafted by TC CAS in collaboration with all partners was translated into five languages (Czech, Dutch, Spanish, English and Danish). Standardized vignettes were used for five concrete product suggestions or research aims for each of the three themes. These were based on the outcomes from the collaboration between citizens and stakeholders in each of the pilot countries. 893 responses were received in total. The results from the citizen consultation were in turn expected to feed into the second round of stakeholder workshops, focusing on the uptake of the responsive design suggestions of the previous round

Co-creation step 4: Second round of stakeholder workshops The second round of stakeholder

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workshops was then organised in the pilot countries. The aim of the workshops was to elucidate the preconditions for cocreation, building on the insights gained in the earlier stages of the project.
The workshops explored how input from citizens can be productively integrated in concrete research and innovation decisions, taking the product suggestions derived from the first workshops as a starting point and discussing how the main actors identified in the product suggestions (as 'problem owners') could mobilise the considerations of citizens and other stakeholders to co-create more 'socially robust' research or product designs. Like the first stakeholder workshops, the programme was structured around the four main pillars of co-creation: exploration, ideation, prototyping and reflection. The exploration session aimed to present the overall co-creation process in further detail, introduce concrete product suggestions derived from the first stakeholder workshop and input from the citizen consultations, functioning as enabling conditions for further development of the product suggestions. In the ideation session, participants joined subgroups where each of the product suggestions was presented in further detail. In the prototyping session, participants defined next steps to integrate societal considerations in the further development of the product suggestions. The concluding reflection session aimed to consider broader reflective questions about the feasibility of the action plan, the integration of citizen perspectives and the opportunities and barriers of the co-creation process.

Dimension 3. Outcomes and Impacts

With the GoNano approach, the aim was too demonstrate how researchers can work with publics and professional stakeholders to create novel suggestions for future nanotechnology products the nanotechnological application areas of food, health and energy.

Outcomes of co-creation in GoNano:

- Demonstration of a state of the art early and continuous engagement process with citizens and private professional stakeholders (research, industry, interest and consumer representatives) that take into account gender and differences in culture and communication traditions across the EU
- Co-creation of concrete nanotechnology product suggestions aligned to public values, needs and expectations, and understood by the participants of the co-creation process as sustainable, desirable and acceptable
- Increased understanding on the side of societal actors of the possible contribution from nanotechnologies in the realisation of solutions to societal challenges in Health, Food and Energy application areas

3 Increased understanding on the side of industry and researchers of the societal context in which their innovation outcomes will have to be functional.

4 Building of a community of citizens, consumer and interest organisations, researchers, engineers, and policy-makers working as change agents for the development of RRI conditions in nanotechnology R&I

One of the specific objectives of GoNano was to develop nine concrete product suggestions for future nanotechnologies in each of the research areas. These product suggestions were meant to demonstrate the possibility of using co-creation to align research and innovation outcomes with societal needs, values and concerns. Over the course of the GoNano co-creation process, a wealth of creative ideas for future

nanotechnologies has been produced. Some 92 product suggestions were collected across the pilot studies. These suggestions varied wildly in scope and nature. Some were optimistic, like 'Easy Paint': a paint that is permanent yet easy to remove from walls if one decides to redecorate the house. Others were very concrete, pointing to incremental innovations in medicine, like mobile diagnostic and monitoring devices for specific afflictions. Some suggestions were discarded or amalgamated during the workshops themselves through brainstorming, focussing and selection procedures. The suggestions were also categorised by GoNano partners after each step, to use them in subsequent steps.
Given the specific objectives and limited timeframes of the project, it was impossible to follow up on every single suggestion. Still, each of the 92 ideas could in principle serve as the start of a new cycle of co-creation – provided that one of the participants sees merit in the idea. The co-creation process was not just intended to generate wild ideas, however. It was also meant to produce concrete 'responsive' design suggestions which can be fed back in ongoing research and innovation activities. This is why the product suggestions became more focused and directed towards concrete suggestions over the course of the events.

The product suggestions from citizens were highly creative, and their wishes, needs and messages suggested important design requirements for research and innovation – but they were not actionable or ready to apply 'as is' to concrete research and innovation trajectories. This would have required several intermediate steps (steps which the pilot partners could not possibly take with the resources at their proposal).

An adaptive approach to the co-creation process, allowing for more flexibility in terms of the engagement activities as the process unfolds, might help to produce more tangible outcomes. Ideally, the outcomes of initial steps would inform the objectives and structure of the next steps: who should attend, what the main objective should be, and what output would be expected.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy

One of the main challenges concerns the *continuity* of the process. It sometimes proved difficult to use the outcomes of initial steps of the co-creation process as direct input for the next steps. For instance, it was hard to use the wishes and messages from citizens as direct input for the co-creation of concrete research or product suggestions. Even though the pilot partners tried to convey the meaning of the wishes, needs and messages from citizens to the participants of the stakeholder workshop (and citizens that had attended the citizen workshop were also present at the stakeholder workshop to clarify the wishes, needs and messages from citizens), participants sometimes had difficulty connecting to these suggestions.
One reason why it proved difficult to make the connection was that the suggestions from citizens were often formulated at a high level of abstraction: for instance, citizens emphasized the importance of values like sustainability, respect for nature and transparency as design considerations. While the participants of the stakeholder workshop acknowledged the importance of these social needs and values, it was not always clear to derive concrete design recommendations from these high-level considerations.
Another reason why it was difficult to connect to outcomes of the citizen workshops was that the professional stakeholders did not attend the citizen workshops. Their absence from the citizen workshops was deliberate: the idea was to prevent 'expert opinion' from dominating the discussion. As a result of this setup however, the professional stakeholders only had indirect evidence from the citizen workshops, making it difficult for them to assess the underlying value of the recommendations from the citizen workshops.

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A similar point applies to the translation of outcomes from the first stakeholder workshop to the online consultation: it proved difficult to turn the rich and varied results from the workshop discussions into the type of brief, clear statements with multiple choice answers that an online consultation requires. And the same held for the translation of the findings from the online consultation into recommendations for the second round of stakeholder workshops, where succinct responses to multiple choice questions needed to be turned into design requirements for concrete research lines.
One way to strengthen continuity could be to involve the same participants (or possibly a 'core group' of participants) throughout the various steps of the co-creation process. This would help participants to create a shared language. Participants became better at exchanging the value of their contribution to the shared problem over time. This process of bartering relevant pieces of knowledge has been described as a 'Trading Zone'27 where stakeholders develop a 'pidgin', a shared language to exchange the value of one's own contribution to a shared problem in a way that makes sense from the perspective of the other. This process takes time and commitment from all participants.

Keeping participants motivated to join several events may not be easy, however. It already proved difficult to keep participants engaged in one or two events. Attracting their continued interest will require even more attention to participants' own motivations, be it to improve the technology, increase attention to societal considerations, or to learn from others.

GRECO

Fostering a Next Generation of European Photovoltaic Society through Open Science

Key findings:

- Researches six Photovoltaics products linked to societal challenges in energy, circular economy and agriculture
- Citizens, industry, government and policy, and research collaborate depending on which challenge and which product is addressed/developed, within framework of Open Innovation
- Stakeholders targeted through industry and policy events and engaged through a Mobilisation and Mutual Learning Methodology framework
- Outputs include a Citizen Science online Generation Solar Platform, an ageing model and repair procedure for photovoltaics, and a Guide for Integrating Open Science for researchers

Sources

- Website: GRECO CORDIS Project page or website
- D3.1: Deliverable 3.1 Report on the result of the Open Innovation Process. November 2018.
- D2.1: Deliverable 2.1 Results on the public engagement and citizen science with the research for developing an ageing model and repairing procedure
- MML: Mobilisation and Mutual Learning (MML) action plan. Proof of Milestone 4.1.
- Practical Guide to Open Science for researchers

The GRECO Project: Open Science, Open Innovation and Photovoltaics

GRECO (June 2018 – May 2021) researches six innovative Photovoltaics (PV) products relating to three societal challenges linked to energy, the circular economy, and agriculture: an "in-situ repair methodology that saves the cost of replacing defective modules"; an "ageing model for photovoltaic modules to improve the estimation of energy production"; a "more sustainable solution for irrigation"; "cheaper and more efficient solar cells"; a "novel modular system that provides energy to buildings"; and "improved PV heat-pump systems". It applies principles of Open Science, which is understood to be twofold: opening up science to participatory process among different stakeholders and citizens; and facilitating the discoverability, reuse and transparency of research outputs. To this end, GRECO's objective is "to bridge the gap between the theoretical Open Science approach and its practical implementation, by generating a valid, inclusive and understandable rationale model" (Source: Greco Project website).

GRECO aims to demonstrate how Open Innovation (OI) can align research products with societal challenges. OI here is "a process that refers to the inclusion of external experts into a solution finding process" and the "outcome of a complex co-creation process involving knowledge flows across the entire economic and social environment (D3.1). GRECO exemplifies this through a research case on PV applications for agriculture, in three stages: Planning (Gather Insights); Development; Validation (End-user experience). The co-creation process takes place in the Planning phase of this research activity, but during the Development phase and Validation phase GRECO does not cooperate with stakeholders, although insights are gathered for a showroom for irrigators planned for Month 32 of the Project.

Dimension One: Actors and Configurations

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Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
Universidad Politecnica de Madrid (coordinator)	HSEE	Spain
Universidad Pompeu Fabra	HSEE	Spain
Universidade de Evora	HSEE	Portugal
Euromediterranean Irrigators Community	Other	Spain
European Science Communication Institute (ESCI)	Other	Germany
Insolight SA	PFPE	Switzerland
Central Laboratory of Solar Energy & New Energy Sources of the Bulgarian Academy of Sciences	RO	Bulgaria
Consejera de Medio Ambiente y Ordenacion del Territorio	PB	Spain
Helmholtz-Zentrum Berlin fur Materialien und Energie	RO	Germany
Reiner Lemoine Institute	RO	Germany
Universidade de Sao Paulo	HSEE	Brazil

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

Stakeholder communities vary depending on the PV product researched (six in total) and are context specific to the societal challenge "mission" area (energy, circular economy, agriculture). For example, the stakeholders involved in the "more sustainable solution for irrigation" PV product research agriculture-related case-study are: Irrigators Community ("Heads of National Associations, Presidents of the Irrigation Communities, Technicians, Engineers, Financial Managers, Legal Advisors and farmers"); Governments ("Water Departments Managers and Energy Departments Managers"); and Irrigation companies ("SMEs at European level related to design, engineering, construction, etc." (D3.1). As another example, the stakeholders involved in the "in-situ repair methodology that saves the cost of replacing defective modules" and an "ageing model for photovoltaic modules to improve the estimation of energy production" are: enterprises ("constructors and operation and maintenance teams of the PV installations which provide the data stored during the system lifetime, as well as the

defective modules"; citizens ("owners of the PV installations which provide data stored during the system lifetime"; academia ("which analyses the data from PV installations"); and public administrations (D2.1). In total, 110 PV installations, usually in operation for some time (at least 10 years), were engaged, mostly in Portugal, Spain and Germany, but also in Bulgaria, Italy and Austria, to study their performance and degradation over time and thus co-develop both an ageing model and a repairing procedure.

Dimension Two: Methods and Processes

Open Innovation activities at major stakeholder events

Open Innovation defines "three types of co-creation methods: those devoted to gather insiders, those for ideation and those devoted to prototyping and testing". The co-creation exercise involved a "Master Plan" for strategy definition and event planning. For instance, for the products linked to agriculture (PV irrigation and desalination systems), insider insights were gathered at four different major water-irrigation events: European Union of Water Management Associations; General assembly of FENACORE, nationally representing dozens of local Irrigator Communities; Intermediterranean Commission Working Group on Water & Energy, involving policymakers from several countries; and the MASLOWATTEN meeting, the technology transfer meeting of a previous H2020 project. To overcome barriers in the Open Innovation Process (e.g., lack of time), GRECO has adopted a variety of measures such as "traditional tools" for "Open Innovation co-creation work" such as "face-to-face meetings" both in the form of "personal interviews and group interviews", and ensuring Open Innovation Meetings are not ad-hoc but joined to "relevant events in order to guarantee the presence of relevant stakeholders" (D3.1).

Mobilisation and Mutual Learning (MML) methodology

GRECO's methodologies articulate around Mobilisation and Mutual Learning (MML), and stated three objectives during the Project's General Assembly: (i) identify how photovoltaic energy could have a greater presence in the daily life of citizens (ii) identify the requirements of a next generation of PV products from a social point of view; (iii) identify how the different stakeholders can actively take part in the energy transition (Source: MML Mobilisation and Mutual Learning action plan). While there are "many MML actions to stimulate dialogue and involvement of different strands of society", GRECO applies three. Firstly "World Café" is a dialogical activity that involves rounds of conversations in several small groups of 4-6 people each around a table. In the different rounds, all group members change tables except for one person who sits at the same table in every round, enabling each new group to be filled in with what happened in the previous round at the table. Secondly, "Focus groups" are conducted that consist in an introduction, some discussion exercises and an evaluation part, for a total of two hours. Here, participants and selected according to particular characteristics relating to the topic, and the focus group is scripted. Thirdly, "Reversed science café" involves small audiences (maximum eight people) around a table with a group moderator and an expert. The expert asks questions to the audience, who try and formulate answers. This is the reverse of a science café in which the audience asks questions to the expert. Six MMLs are implemented in GRECO.

Dimension Three: Outcomes and Impacts

Development of an ageing model and repairing procedure for PV

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The ageing model and repairing procedure (two of the six research products) is of particular importance for the future of solar energy due to the fact that, although "lifetime warrantied by manufacturers is 25 years and a lot of researchers think that the lifetime of many PV modules will overcome 30 years", "nowadays 85 percent of the installed PV power all around the world lasts less than five years, that is, these modules have not overcome 20 percent of their lifetime", while only 3% of PV modules exceed 10 years of age (B). The engagement of owners of such "aged" PV modules provides highly valuable data on the energetic behaviour of older PV cells. This data is obtained, for example, through "the sales invoices of the electrical company when the installation is grid-connected", and is analysed in collaboration with GRECO staff who measure solar radiation in the locality of the installation, and who also attempt to repair any defective PV modules.

Generation Solar: online platform for Citizen Scientists

The Generation Solar mobile app is presented as "the first platform to create a unique solar energy community and promote data exchange between photovoltaic installation owners and scientists" (Source: Generation Solar website). It acts as a database of photovoltaic installations which incorporates input both from research scientists and Citizen Scientists. Its purposes include to enable data exchange between PV installation owners but also to allow data to be fed into scientific models to analyse energy efficiency.

Guide for integrating Open Science and RRI

GRECO has also produced a comprehensive guide to help researchers integrate Open Science and RRI. It provides a checklist for Open Science and a comprehensive Q&A pertaining to practical questions such as "where to start", "open data", "open access", "open to society", "other open practices", "property", "resources", "politics", "metrics", and "incentives" (Source: Practical Guide to Open Science for researchers). Throughout the guide some examples of Open Science initiatives and projects, some of which from H2020 (e.g., OpenAIRE) are provided to illustrate particular points or questions.

Grenoble CivicLab

The Grenoble CivicLab (GCV) is an open challenge whose participants co-design and prototype projects which include a digital dimension and are of general interest for the citizens of the French agglomeration of Grenoble. Two editions have been so far organized, in 2018 and 2019.

Dimension 1: Motivations and Participants

The Grenoble CivicLab initially emerged as an idea during a work group organized by the City of Grenoble to reflect on future methods of facilitation and innovation. The idea of the CivicLab was taken up to be concretized by La Turbine.Coop (then called Scop La Péniche), a cooperative enterprise conceiving and managing digital collaborative projects with societal positive impact.

To implement the CivicLab, La Turbine - which is the one piloting the project - partnered with some stakeholders who were already part of this reflection group and with others who joined the initiative later. They all formed a steering committee, involved in decisions about the CivicLab governance, its fundings and the panel of territorial subjects it intends to tackle. These stakeholders are divided between financial partners submitting challenges to the participants and operational partners providing additional resources. The former are mainly public local authorities, like the City of Grenoble or the Grenoble-Alpes Metropole, but also GEG (the enterprise locally supplying gas and electricity) and, from the second edition, Citeo (a private company advising industries on how to reduce the environmental impact of their packaging). As for operational partners, they include the CCSTI La Casemate (a scientific mediation organization), La Belle Electrique (a concert hall), the French Tech in the Alps (a cooperative enterprise promoting and supporting the local digital economy), KissKissBankBank (a private crowdfunding platform), Grenoble INP (a higher education and research engineering institute), GEM (a business school). Orange (a large telecommunications company) participated as well in the first edition while Simplon (a social enterprise offering digital courses) joined the second. Overall, only a few private companies are partnering with the CivicLab, as they are less attracted by it. Indeed, contrary to a more standard hackathon organized by a firm which chooses a challenge designed to its specific need, the CivicLAB participants here work on challenges conceived to address broader territorial issues. The private partners that find value in the CivicLab are therefore those whose missions are somehow related to the general interest, like the electricity company GEG or Citéo which is in charge of the collection and sorting services of Grenoble.

The challenge was open to everyone, but mainly intended for local citizens. The participants - who were the ones concretely engaging in the co-creation activities - covered a wide range of motivations and expertise, but were all volunteering. They could be people simply curious about the CivicLab, people willing to put their technical skills (e.g. in web development or design) at the service of projects in the interest of the community or eager to reinforce these skills, and people already having an idea of a project - at a more or less advanced stage - and wishing to further explore it during the CivicLab. Some were even in an entrepreneurial approach and saw in the CivicLab an opportunity to boost their project. Students participated as well, but their number depended on whether their yearly school calendar matched the CivicLab schedule. In general, besides being interested in the incubating dimension of the CivicLab, participants were also attracted by a desire to learn how to conceive a digital project, to know more about the issues concerning local data, to explore the resources of their territory (like the Fab Lab), to extend their networks and to engage in a collaborative and convivial experience. Each edition managed to gather around 200 participants at the launching event. Approximately 40 of

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them then attended the support sessions (see Dimension 2) on a regular basis, while others chose to get involved only more punctually. A few decided to develop their project on their own (even if they solicited outside help), but the vast majority of participants teamed up, as they were encouraged to do so. A survey was conducted by Orange Lab at the end of the first edition to study the participants' profiles: although they were quite varied, a large part was coming from the city center and had an academic degree. The CivicLab is thus seeking to be more inclusive for its next edition, to reach citizens that have not already developed close ties with the innovation or digital worlds. To do so, the pilot team is thinking in particular of intervening in more different neighbourhoods, earlier in the program, and not only in third places dedicated to innovation such as open labs (fablabs, makerspaces, hackerspaces, living labs and so on).

Dimension 2: Methods and Process

Each year, the challenge is structured around five sub-challenges: four are linked to a specific theme (like waste sorting or neighborhood concierge services) and the last one is left open to any other ideas. Those first four thematic challenges are each submitted by a partner of the CivicLab. For instance, the City of Grenoble challenged the participants on urban signage, Citéo on waste sorting and GEG on local energy production.

Overall process:

Each edition of the CivicLab starts with a launching event. It is a key unifying moment, both creative and convivial, during which participants meet and begin to imagine potential projects and collaborations. The 4 to 6 months that follow the launching are then dedicated to the emergence and support of the projects. During this period, many events or workshops are organized so that participants can complete their teams and benefit from all the resources and tools put at their disposal by the CivicLab partners to help them co-design their solutions. These gatherings can be "idea barcamps" where emerging projects are presented and discussed, practice sessions to learn how to pitch a project, workshops to start designing economic models (with the help of the business school GEM), to discover the resources of the territory they can use (like datasets or equipments) or to learn about the technical tools they can use to manufacture their prototypes in the FabLab of La Casemate. Looking back at the first edition, the pilot team found that some workshops came too early in the process while others too late, and therefore reorganized their order. Many of these events are open to everyone, which enables some people to provide their help (whether it be technical skills or user feedback) even if they do not properly belong to any team.

At the end of this support period, each team must have created a prototype. A jury made up of the financial and operational partners of the CivicLab selects one winning project per challenge (and the corresponding partner of each challenge is given a larger voice). The selection criteria cover the innovative nature of the project, its potential territorial impact, the quality of the prototype (e.g. functionalities and user experience) and the future prospects for the project with regard both to its viability (in particular financially) and to the capacity and desire of the team to continue. The jury also takes a look at the resources that have been used and whether the project embraces a participatory dimension, since one of the goals of the CivicLab is to show how local resources can be mobilized for the general interest. An award ceremony is organized, where everyone can come and test the prototypes.

The projects selected benefit from a 2,000€ prize and a crowdfunding campaign supported by KissKissBankBank. They enter a four-month monitoring and mentoring phase which does not follow a predetermined structure but is adapted on a case-by-case basis. The Turbine is in charge of this follow-up phase and is helping the projects mainly on the teams' request, depending on their needs.

Obstacles and improvements

A major challenge for the CivicLab is to facilitate the constitution of teams and make sure that they find all the expertise they need. Indeed, whereas some ideas of projects are very inspirational and easily manage to mobilize participants, others have more trouble federating a team around them and require a stronger support of La Turbine to do so. The teams start to form during the first events organized (carefully planned workshops but also more informal times that are very appreciated) which are therefore defining moments for the future of the projects. Many teams happen to lack developers or designers when the prototyping phase arrives, after the ideation one. La Turbine must use its network to find these missing profils. While professional experts often lack time, students have proven to be more available resources. The pilot team is thus seeking to engage them more in the coming editions, which would help staging this deficit of indispensable skills. Besides, participants fill out a description of their projects on an online platform (Sparkboard), where they list their needs, especially in terms of expertise. This digital tool was however exploited only a bit in the past editions. The pilot team is planning on relying more on it for the next edition, as well as on other collaborative online tools (like Slack or Canalchat Grandialogue).

Participants are volunteers who are busy with their professional or academic lives during the week and can therefore only work for their projects during their free time, on evenings or weekends. Maintaining a strong dynamic around the CivicLab obviously required more time and effort than programs soliciting participants as part of their jobs do. Around 40 project notes are usually created after the launching event, but less than half really continue thereafter. However, although the participants engaged on the remaining projects have little time to dedicate to the CivicLab, it has rarely proven to be a real impediment, as there is often an active core group inside each team. Furthermore, the program takes into account their limited availability: the workshops organized are not compulsory, participants choose for themselves which one they deem appropriate to attend. The CivicLab also helps them to gain autonomy, by letting them free to choose the resources they use: they are for instance introduced to a panel of tools to conceive their prototypes but nothing is imposed on them.

Ideally, the organization in charge of a particular challenge should provide strong support to its winning project (in terms of knowledge, networks, feedback…). In practice, these partnering organizations often find it difficult to gather the internal resources needed, especially since they do not know what will exactly come out of the project. La Turbine would like to strengthen their support, in order to favor a longer term impact of the CivicLab results.

Intellectual property can also be an issue, especially when participants have an entrepreneurial idea in mind and are firstly interested in benefiting from resources to develop their projects. This approach does not constitute an issue in itself, as long as they remain transparent not to hamper the co-creation approach of the CivicLab. In general, for non-entrepreneurial situations, La Turbine would like to help more participants to anticipate the future of their projects so that they become Commons for the territory. This implies not to wait for the last moment of the program to work with them on the issue, as it would be too late in terms of code, documentation or intellectual property. This work of opening their project would enable them to be freely accessible and eventually taken over by others after the CivicLab.

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Dimension 3: Outcomes and Impacts

Each edition resulted in about 15 prototypes developed. The project behind each of this prototype could either have emerged during the CivicLab or preexisted before as an idea which was concretized thanks to the program. 4 projects were selected in 2018 (as the jury deemed that one of the 5 challenges was not met by any team) and 5 in 2019, to receive a 2,000€ award. Two editions have so far been launched but another is planned once in-person events - indispensable for the success of the CivicLab - become possible again (in the COVID-19 crisis context).

What the projects became after the program is quite diversified. The CivicLab can be seen as an opportunity to explore and test diverse ideas and to identify which ones were worth being taken further. Some participants, especially those bearing a more entrepreneurial goal in mind (who are not the majority), took their project one step further thanks to the CivicLab. One participant had worked for instance on in-store returnable containers and the program enabled her to explore the digital dimension of her project, which she continued after. The CivicLab also helped final year students to decide if it was relevant to continue their projects at a professional level. Other participants did not continue, often because they had been satisfied with designing a concrete prototype and improving their skills (e.g. by learning a programming language or producing a model) but were not available or willing to take their ideas any further: their projects were just enriching experiences that came on top of their professional activities, but did not have any vocation to replace them. In some cases, they could however hand over their projects to others, as they were pleased to see them going beyond the prototyping phase, even without them. The CivicLab partners were willing to provide some projects with more resources so that an experimentation and implementation phase could begin. For instance, one project creating a ludic tool to facilitate waste sorting emerged during the first edition and came back for the second one. The City of Grenoble offered additional financial resources to go beyond the digital prototype and to deploy the tool in one specific neighbourhood on an experimental basis. Another project addressing Citeo's challenge has also entered an experimentation phase. The projects that won GEG's challenge for the past two editions have not moved forward, largely because the GEG interlocutor had trouble finding the right people internally that could support the projects after the CivicLab.

No strict impact survey has been conducted after the CivicLab, but a satisfaction questionnaire revealed that participants were very pleased with their experience (some even participated in the two editions). Financial and operational partners have also renewed their support, as they regard the CivicLab as a valuable initiative in the local innovation ecosystem. The CivicLab has contributed to change mentalities among its public and private partners, by showing the potentialities of open innovation. More must however be done at an institutional level. For instance, the operational public services are not involved in (or even aware of) the waste sorting project mentioned above, even though their contributions would be essential to scale up the project impact. Additionally, the CivicLab is mainly in contact with the innovation services of the city, but not with the ones of citizen participation, which highlights the necessity to make internal organizational changes within public authorities in order to decompartmentalize services and adopt more transversal approaches.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

The CivicLab was contacted in 2018 by TUBÀ, a living lab in the French city of Lyon and whose programs BizArTech and Datathon Déchets were taken as two other case studies. TUBÀ discussed with La Turbine to know more about their methodologies and draw upon them to elaborate a new citizen participatory program. While the CivicLab is open to everyone, TUBÀ has chosen to pre-screen some projects before accompanying them. This illustrates that there is not a unique 'right' process to adopt in order to mobilize citizens in innovation programs.

* * *

Sources:

24 Interview on July 27th 2021 of Marine Albarède (Innovation and Data Project Manager, responsible for the Grenoble CivicLab)
25 Grenoble CivicLab website (https://grenoble.civiclab.eu/)
26 Grenoble CivicLab Sparkboard (https://grenoble-civiclab.sparkboard.com/)

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mosaic

Ground Truth 2.0

Environmental knowledge discovery of human sensed data

Key findings:

- Aims to prove utility of Citizen Observatories in fostering sustainable outcomes in environmental and spatial planning issues
- Sets up Citizen Observatories in six countries (EU and Africa) that are focussed on different issues linked to natural resource management
- Enabling technologies (digital data collection and online platforms) at heart of Citizen Observatories
- Citizen stakeholders participate in every step of co-design and not just data collection

Sources:

- W: CORDIS Project page or Project website/platform
- D1.1 Initial Stakeholder Analysis of the Demonstration Cases
- D1.13 Guidelines for Citizen Observatories and Future Recommendations
- D1.12 Updated validation and socio-economic impacts report

The Ground Truth 2.0 Project

This Project (September 2016 – December 2019) aims to demonstrate the benefits of citizen observatories ("CO") for spatial planning related to sustainable natural resources management through environmental indicators. It makes use of enabling technologies and methods that enable citizen-sensed data usage and citizen engagement, which allows for testing and validating of these technologies with regard to the desired societal and economic impacts of the observatories. Seven observatories are formed, with a view to capturing a broad spectrum of citizen sensing and engagement: (i) for Belgium, the citizen observatory, Meet Mee Mechelen sets up a platform enabling information sharing related to air quality and noise and another one, KlimaatRobuust St-Andries, provides a physical and online meeting place for citizens, scientists and policymakers to gather and share knowledge on heat stress; (ii) for Spain, the citizen observatory RitmeNatura.cat enables citizens to collect data that is used to create collective knowledge on local impacts of climate change and improve local policies and practices; (iii) for Kenya, the Maasai Mara Citizen Observatory aims to balance biodiversity conservation with sustainable livelihoods by getting different stakeholders to work together; (iv) for Zambia, the Niti Luli citizen observatory comprises a platform for a community-based approach to natural resources management; (v) for the Netherlands, the citizen observatory Grip Op Water Altena aims at data and knowledge sharing related to excess local rainfall linked to severe floods and to measures citizens can take; (vi) for Sweden, the VattenFokus citizen observatory focusses on water quality management through a platform that targets stakeholder collaboration through data collection and access as well as knowledge exchange to complement formal governance, using an EarthWatch application that allows citizens to measure and record water quality with the help of a field kit.

Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
STICHTING IHE DELFT INSTITUTE FOR WATER EDUCATION (coordinator)	RO	Netherlands
HYDROLOGIC RESEARCH BV	PFPE	Netherlands
STICHTING AKVO	O	Netherlands
TYGRON BV	PFPE	Netherlands
VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.	RO	Belgium
STARLAB BARCELONA SL	PFPE	Spain
ALTRAN INNOVACION SL	PFPE	Spain
CENTRO DE INVESTIGACION ECOLOGICA Y APLICACIONES FORESTALES	RO	Spain
STOCKHOLMS UNIVERSITET	HSEE	Sweden
GAVAGAI AB	PFPE	Sweden
CONSERVATION EDUCATION AND RESEARCH TRUST	RO	UK
TRANS-AFRICAN HYDRO-METEOROLOGICAL OBSERVATORY	O	Kenya
UPANDE LIMITED	PFPE	Kenya
WORLD WIDE FUND FOR NATURE (WWF) ZAMBIA	O	Zambia

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

The overall main stakeholder categories are defined by GROUNDTRUTH 2.0 following three main typologies of actors, that are coordinated by the Project consortium partners. Firstly, “Citizen Observatory Core Stakeholders” involve “Community Members” (citizens, scientists, data aggregators, decision-makers and policy-makers) and “Expert Advisors” (in citizen science, technology, science and policy). Secondly, an “Enabling Environment” involves “Regular Entities” (legislative, executive,

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technical, project), “Allies & Umbrella Movements” (like-minded groups, associations, endorsers), “Media & the Public” (social groups, multipliers, media, channels) and “Opponents and Critics”. Thirdly, “Market Forces” involve “Suppliers”, “Customers & Buyers”, “Shareholders & Investors” (D1.1).

Dimension Two: Methods and Processes

Stakeholder engagement

The Ground Truth 2.0 co-design method consists in five phases and clusters of activities: (i) “Process Planning” (identify which stakeholders are involved and plan the co-design process); (ii) “Social Innovation Design” (negotiate a shared vision for the CO’s purpose); (iii) “Tool Development and Launch” (develop and test functional components of the platform and data aggregation tools); and (iv) “Roll-out and Community Mobilization” (design, customize and test the interface together with core stakeholders); and “Operation, Maturing and Evolution” (ongoing tasks implemented during long-term operation of the observatory) (D1.13).
At core, the engagement strategy in GROUNDTRUTH 2.0 is based on data collection empowered by (mobile) ICTs. Citizen Observatories are “particular examples of Citizen Science, consisting of dedicated communities of citizens, policy-makers and scientists using ICTs to actively collaborate in the collection, exchange and use of information and knowledge for a shared purpose”, and “empower citizens and communities to strengthen science and increase their influence in policy and decision making” (D1.13).
The Project’s approach to addressing recurring challenges in CO implementation is based on a “socio-technical approach” that articulates the “sustainable community of relevant actors in tandem with co-designing enabling technologies” (ICT technologies that enable data collection which is at the heart of COs).
The methodology for co-design follows five guiding principles: “Living Lab principles” (e.g., creates value for users by understanding their needs and motivations), “Involve relevant stakeholders & problem definition” (a diverse range of stakeholders should be involved in co-design as early as possible, including citizens and civil society, scientists and experts, public sector legislative and executive actors, industry and private sectors); “Open-source tools and existing tools of partners” (use open source tools and meet data management requirements); “Scope of Citizen participation in scientific activities” (citizens can participate in any stage of knowledge production: framing the research question, research design, data collection, data analysis and interpretation, understanding results, publication/management action, and quality control – not, therefore, limited to “data collection”); and “Scope of citizen participation in natural resource management” (the co-design methodology, rather than focus solely on data and knowledge production, considers COs to serve to facilitate stakeholder interactions in three domains: Environmental Monitoring; Cooperative Planning through consultation, feedback and discussion; and Environmental Stewardship through dialogues and shared responsibility for natural resource management (D1.13).
The Guidelines provide an extensive book of methods that can be applied in different phases of the co-design process. These include – as a very partial illustration, “Brainstorming”, “Canvas Business Model” (a template for developing new or existing business models), “Empathy Map” (visualize emotional and rational viewpoint of users), “Focus group”, “Tangible Typology” (teaching landscape and topography skills and basic ecology visualization concepts to audiences that include architects/planners and laypeople).

Dimension Three: Outcomes and Impacts

Social, institutional and environmental impacts from the six citizen observatories

GROUNDTRUTH2.0 organizes its review of outcomes and impacts around three core areas: “Social” (among other Social criteria: “shared stories”, “trusted sources”, “timely and accurate information”, “working together”, “creativity and flexibility”, “ability to learn”, “internet savviness”, “formal engagement”) (not relying only on government), “trust and belonging”; “Institutional” (among other Institutional criteria: “communication paradigm”, “access to and control over data”, “authority and power”; and, for “Environmental” outcomes and impacts, these depend on the aim of the CO (e.g., in Sweden, it is about “improved water health”). Across al projects, the Social and Institutional outcomes and impacts are the ones that appear to come to fruition in shorter and medium terms, whereas the Environmental outcomes and impacts are longer term and, more importantly, rely precisely on fundamental changes in the other two core areas.

On a case-by-case basis, the outcomes and impacts appear mostly in line with the objectives set out and co-designed by the CO stakeholders, with certain caveats which are very specific to each CO. For instance, for the Belgium “air quality and noise” CO, the “most substantial social change triggered is related to ‘dependable information’ which “produced a much more detailed picture of local air quality”, a topic which “has gained traction as a shared story” and a situation where “data is also trusted”. Institutional changes has involved a “diversification of participants (beyond civil society organisation)” and changes in the “communications paradigm related to air quality” that is “more interactive (rather than uni-directional”. Environmental impacts – in air quality and noise management – are harder to evaluate currently because they will appear progressively as a direct result of the amelioration of the social and institutional processes. Taking illustrations from another CO country, the Kenyan case demonstrated impact on “empowerment” and “capacities”, thanks to community members becoming “more aware of their potential to influence authorities”: however, “the collected data is still very scarce and scattered” and it is a “struggle to arrive at a finalised policy on data sharing (which) illustrates trust issues between CO members”. In Sweden, data interpretation on water quality was not always clear to participants. (D1.12)

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Hackability@Barilla

The Hackability@Barilla Project was launched in 2017 (and ended in 2018), starting from the collaboration between Hackability – a not for profit organisation born in 2016 in Turin which aims at fostering co-creation processes – and Barilla (a well-known big Italian food firm). Goal of the project is to find new food tools and packaging solutions for disabled and elderly people.

Dimension 1: Motivations and Participants
Guiding Questions: **27** *What are the announced reasons for the different Quadruple-Helix individuals and groups to come together in co-creation?* **28** *Can we see a difference in the motivation of each corner of the Quadruple-Helix?* **29** *What is the composition of those organising and taking part in the co-creation activities?*[14] **30** *Why have the organisers of the project's different co-creation activities chosen this particular configuration of participants? Is there a clear rationale behind the choice of participants?* **31** *In the description of the co-creation initiative, is it described what added value each participant group (e.g. Quadruple-Helix groups) brings to the activity? If yes, what is the announced added value?*
The implementation of the project is conducted by Hackability, whose approach is to bring together the competences of makers/designers with the needs/creativity of disabled people by using digital fabrication, co-creation processes, enabling technologies (such as 3D printing), open-source tools to find new solutions to respond to the unmet needs of disadvantaged groups. So, **makers and designers** involved in the Hackability community play a key role in the conduction of the whole process. The Hackability goal is twofold: from one side its co-creation and open innovation methodology aims at **building personalized new objects, services and solutions at low costs** that are also **scalable**; from the other side, the idea is to foster **social inclusion** and to contribute to the knowledge on the accessibility issues connected to aging and disability by bringing new case studies on the topic. The results obtained through Hackability co-creation processes are shared online. They are available for everyone using Creative Commons-BY-SA-NC and all commercial rights belong to the team that developed the co-created solutions. The goal is to favour the circulation, adoption and adaptation of the new solutions developed according to a Do It Yourself (DIY) approach, and also to promote new digital craft enterprises with high social impact. The target group is **disabled people and elderly** that need new packaging and cooking solutions to be independent when cooking. The announced reason for them to come together in co-creation is to develop useful solutions that can help them in reaching independence. Barilla's employees are also invited to take part in the process, providing their expertise, mentoring the co-creation activities and therefore contributing to the development of new solutions. Key events of the project took place at Barilla's premises.

Dimension 2: Methods and Process

14 For SwafS and other H2020 projects, it is also useful to study the composition of consortium members, which are involved in running the overall project.

Guiding Questions: **32** *Which particular tools, methods, communication devices or settings are mobilised in the project?* **33** *Was the process of co-creation (a) stage-gate or (b) iterative?*[15] **34** *Outline the key steps or elements in the co-creation process.* **35** *Which particular challenges were observed (e.g., resources in time or funding, legitimacy, flexibility between participants…)? Does the project face challenges in successfully implementing co-creation? Were these challenges subsequently overcome in the co-creation activity?* **36** *Which process elements are particularly striking and successful in the project?*
The co-creation process was launched through an open call for designers, makers, creative people and disabled people/ people with particular needs. 140 people in Italy have responded to the call and 50 have been selected to match needs with competences that emerged from the same geographic area. A series of team have been created, aiming at creating collaborative solutions through different stages, from an initial brainstorming to the concept and prototyping. The solutions finally developed from the different teams have been presented in a "project final event".

Dimension 3. Outcomes and Impacts
Guiding Questions: **37** *What outcomes have been announced and/or demonstrated by the co-creation initiators and participants? More specifically, have any technologies, services or new organizational structures been produced by the co-creation activity?* **38** *Have the co-creation processes and/or outcomes led to any desirable impacts and if so, in which areas (e.g., environmental, economic, institutional…)? Were specific indicators developed/used to develop the project's impacts?* **39** *Have any changes in roles and practices of the participating Quadruple-Helix representatives been observed? Has there been institutional change?* **40** *Are new forms of partnerships or relationships visible in the co-creation initiative or as an outcome of the co-creation activities?*
Six solutions have been selected: ● Sesamo: a corkscrew that can be used with one hand ● Buona Forchetta: a special fork for people affected by Parkinson disease ● PiCAP: a set of tools for the preparation of food by visually impaired people ● Rompiscatole: a tool to easily open pasta packaging in a quick and effective way ● Hackbox: braille labelling for products acquired online ● Artù: a tool for quadriplegic people to grasp knifes and hot boxes

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy
Some inspirations:

15 Stage-gate means that there is a period of action reaching a milestone, and then there is a next phase of the exercise. Iterative means that the process goes through one cycle, and then reiterated, with learning and feedback loops.

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- *Each co-creation project will have specific roles for each type of participant, however, who decides on the roles and what form they take is a key issue. Are tensions observed in the co-creation initiative? Do "actors" follow their "scripts"?*[16]
- *Are details provided of changing worldviews?*[17]
- *Do all representatives of the Quadruple-Helix get fairly rewarded for participating in the co-creation activity? Can we see differences in the nature of these "rewards" for different types of co-creation participant? Specifically, how are citizens rewarded (financially or otherwise) for contributing to the co-creation activity?*

The advantages for participants in taking part in the process are:

- new solutions for unmet needs at low price
- all the commercial rights belong to the team that developed the co-created solutions
- access to financial support for travel and accommodation for meetings of the project
- build community of practices
- access to open-source solutions

According to Barilla: around 1 million people could benefit from these solutions in Italy. The initiative goes beyond corporate social responsibility: the issue of diversity and inclusion is not only a matter of "being good", but also a chance to increase the company competitiveness.

Unfortunately, many relevant information regarding the call and the project rules are not available online anymore.

16 Organisers of co-creation processes may normatively prescribe the roles of the various members of the Quadruple-Helix, which may close down certain pathways of co-creation. One can think, for example, of "smart" ideologies which may reduce creativity by inscribing citizens as predetermined data collectors rather than insight providers. By "prescribed" we mean that the roles of certain actors within the co-creation activity are decided upon and incorporated into the co-creation process by another actor. For example, in the SwafS co-creation project *WeCount*, we can see that the system of traffic monitoring is co-created between small firms, public authorities and citizens, but the role of the citizen is prescribed to be "citizens as data gatherers" using technology that has been previously developed by private initiatives. In this sense, citizens follow a "script" that is embedded in the project. For those interested in the theory behind "scripts" see Madeleine Akrich "The de-scription of technical objects." (1992): 205-224.

17 Whilst being beyond the scope of the co-creation review, how participants in co-creation activities may change their worldview and then enact in their day-to-day life is of key interest. For example, a member of a firm may participate in a co-creation activity, and not only gain knowledge about the innovation focus, but may also change their view on their own practices (institutional change). SoScience provided an example of this in a "Future Of" activity in Packaging innovation.

IRIS

Integrated and Replicable Solutions for Co-Creation in Sustainable Cities

Key findings:

- Sets up IRIS Solutions through Five Transition Tracks that relate to energy, mobility and ICT, in three Lighthouse Cities
- One of the Tracks is specifically geared to implementing citizen engagement and co-creation, through a range of measures implemented in different cities
- Measures are varied, including gamification, workshops, pedagogical initiatives, self-monitoring, and creation of innovation hubs

Sources:

- W: CORDIS Project page or Project website/platform
- D5.7 Launch of T.T.#5 Activities on Citizen Engagement and motivating feedback: Utrecht
- D6.7 Launch of T.T.#5 Activities on Citizen Engagement and motivating feedback: Nice
- D7.7 Launch of T.T.#5 Activities on Citizen Engagement and motivating feedback: Gothenburg

The IRIS Project

This Project (October 2017 – March 2023) seeks to participate in the transition to decentralized energy and to develop smart solutions that integrate energy, mobility and ICT. IRIS develops a set of Integrated and Replicable Solutions for Co-Creation in Sustainable Cities ("IRIS Solutions" or "IS"), along five Transition Tracks: (Tr1) "Renewables and energy positive districts" (positive energy buildings, near zero energy districts, symbiotic waste heat); (Tr2) "Flexible energy management and storage" (flexible electricity grids, multi-sourced district heating, 2nd life batteries); (Tr3) "Intelligent mobility solutions" (vehicle-to-grid and smart solar charging, innovative mobility services); (Tr4) "Digital transformation and services" (urban monitoring, city management and planning, mobility services, energy management); (Tr5) "Citizen engagement & co-creation" (changing everyday energy use, participatory city modeling, Living Labs, behavior changing information). Three "Lighthouse Cities" are chosen: Utrecht, Nice and Gothenburg, which are replicated in "Follower Cities" Vaasa (Finland), Alexandroupolis (Greece), Santa Cruz de Tenerife (Spain) and Foscani (Romania).

Dimension One: Participants and Motivations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
GEMEENTE UTRECHT (coordinator)	PB	Netherlands
STICHTING BO-EX 91	O	Netherlands
KONINKLIJKE KPN NV	PFPE	Netherlands
STEDIN NETBEHEER BV	PFPE	Netherlands
PARKHUIS LOMBOK	PFPE	Netherlands

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*ENECO ZAKELIJK BV**	PFPE	Netherlands
QBUZZ B.V.	PFPE	Netherlands
UNIVERSITEIT UTRECHT	HSEE	Netherlands
STICHTING HOGESCHOOL VOOR DE KUNSTEN UTRECHT	HSEE	Netherlands
METROPOLE NICE COTE D'AZUR	PB	France
UNIVERSITE COTE D'AZUR	HSEE	France
ELECTRICITE DE FRANCE	PFPE	France
ENEDIS	PFPE	France
CENTRE SCIENTIFIQUE ET TECHNIQUE DU BATIMENT	RO	France
*VEOLIA INNOVE**	PFPE	France
COTE D'AZUR HABITAT	PB	France
NEXIMMO 96	PFPE	France
VU LOG	PFPE	France
GOTEBORGS KOMMUN	PB	Sweden
JOHANNEBERG SCIENCE PARK	PFPE	Sweden
CHALMERS TEKNISKA HOEGSKOLA AB	HSEE	Sweden
METRY AB	PFPE	Sweden
HSB GOTEBORG EK FOR	PFPE	Sweden
RIKSBYGGEN EKONOMISK FORENING	PFPE	Sweden
AKADEMISKA HUS AKTIEBOLAG	PFPE	Sweden
TRIVECTOR TRAFFIC AB	PFPE	Sweden
TYRENS AB	PFPE	Sweden
VAASAN KAUPUNKI	PB	Finland
OY MERINOVA AB	PFPE	Finland
VAASAN YLIOPISTO	HSEE	Finland
MINICIPALITY OF ALEXANDROUPOLIS	PB	Greece
ENERGY HIVE SYSTADA EPICHEIRISEON ENERGEIAS KAI FYSIKON PORON ANATOLIKIS MAKEDONIAS KAI THRAKIS	O	Greece
AYUNTAMIENTO DE SANTA CRUZ DE TENERIFE	PB	Spain
ASOCIACION CLUSTER CONSTRUCCION SOSTENIBLE	O	Spain
MUNICIPIUL FOCSANI	PB	Romania

UNIVERSITATEA POLITEHNICA DIN BUCURESTI	HSEE	Romania
INSTITUTUL NATIONAL DE CERCETARE-DEZVOLTARE PENTRU ENERGIE ICEMENERG-BUCURESTI	RO	Romania
ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	RO	Greece
IMCG SWEDEN AB	PFPE	Sweden
RISE RESEARCH INSTITUTES OF SWEDEN AB	RO	Sweden
EUROPEAN SCIENCE COMMUNICATION INSTITUTE (ESCI) GGMBH	O	Germany
VRIJE UNIVERSITEIT BRUSSEL	HSEE	Belgium
CIVITY BV	PFPE	Netherlands
ENECO CONSUMENTEN BV	PFPE	Netherlands
ENGIE ENERGIE SERVICES France	PFPE	France
ATMOSUD PROVENCE ALPES COTE D'AZUR France	RO	France

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.
* Participation ended (according to CORDIS Website).

Stakeholders from Project activities

Citizens, in particular residents of local communities, are at the core of interactions alongside the very large number of other Quadruple Helix actors that are part of the Project consortium. These include municipal actors and energy companies.

Dimension Two: Methods and Processes

Stakeholder engagement in the four core Transition Tracks

Inherent to the four Transition Tracks central to the Project, the decentralization of energy production/consumption requires new forms of citizen involvement which are exemplified in some of the strategies detailed throughout the different Tracks and their related IRIS Solutions (“IS”). For instance, in Track 2, the IS-2.1 “Flexible electricity grids (PV // batteries // lighting network)” aims for

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"consumer empowerment (including active participation) and autonomous management / self-consumption"; the IS-2.2 "Multi-sourced district heating (excess heat from buildings equipment // heat pumps // thermal storage // decision and citizen apps)" introduces "innovative algorithms for increasing energy-efficiency in existing DHNs (note: District Heating Networks)" that "promote citizens engagement and city planning". In other Tracks, involvement is less obviously stated but involves, for example in Track 1 IS-1.1 "Positive Energy Buildings", the local production of energy at the level of buildings (e.g., solar panels on residential rooftops, heating from geothermal heat pumps, surplus energy storage and trading between buildings), which may involve citizens more than in currently centralized energy production/distribution grids (W). More generally, the fifth Transition Track applies co-creation and citizen participation to all the other Tracks (see next section).

Focus on Transition Track #5: Citizen engagement and co-creation

This track, which is transversal to the other four tracks, proposes two "IRIS Solutions" ("IS"). The first solution is "IS-5.1: Changing everyday energy use", which considers that "citizens should become prosumers producing energy for their own consumption. In this context, engagement actions are needed across Europe in order to achieve behavioral change towards more sustainable choices and decisions for energy" (W). To this end, IRIS suggests a range of strategies: (i) "Identification of Change Agents" (e.g., housing corporations can help identify who is already involved in energy transitioning); (ii) "Creation of local Innovation Hubs" (hubs are created as an enabling environment for citizens to identify and solve energy and mobility issues, to facilitate conversation between local stakeholders including residents, but also to co-design and co-implement solutions); (iii) "Game design interaction scenarios" (interaction scenarios with app-based interfacing and sensors such as smart lampposts that are used to generate data in different scenarios, gamified scenario development for local development decisions, personalized and interactive behavioral energy/mobility decisions in real time). Secondly, "IS-5.2: Participatory city modeling", which involves a spatial design contest relating to electrified bus stops, using *Minecraft* (best-selling game of the "sandbox", building type that grants much creative freedom) on the basis of a real survey map. Thirdly, "IS-5.3: Living Labs" are set up in which residents behavior is monitored 24/7. Fourthly, "IS-5.4: Behaviour changing information" sets up a tool, "Personal Energy Threshold" ("PET") which integrates real-time data on energy production and consumption and also provides "prosumer" citizens with alternatives on how to dispose their energy needs to match availability and demand.

Dimension Three: Outcomes and Impacts

Each Lighthouse City (Utrecht, Nice, Gothenburg) implement measures that relate to every of the four core Tracks, but that are different and context-specific.

Utrecht measures and outcomes (D5.7)

Measure 1: "Community Building by Change agents" seeks to create a network of engaged citizens that can influence tenants/citizens without liability. This measure was not particularly successful with local residents, so a "professional" change agent had to be recruited. Measure 2: "Campaign District School Involvement" seeks to involve parents and youth while installing the integrated smart solutions. Primary school involvement was successful, but this was less so with students from a professional school. Measure 3: "Evaluation and co-creation" creates an innovation hub at district level. This measure is two fold, with a that hub provides room to facilitate conversation between stakeholders, solution design and implementation, and organizing co-creation sessions/workshops; and the co-creation of a user-designed interface for a smart energy meter (HEMS Toon). Measure 4: "Campaign

smart street lighting" organizes a process of co-creation where people can think about and work on feasible solutions for smart street lighting. Measure 5: "Virtual Reality Platform" enables households to experience their future 'new' home through interactive information on new smart energy and mobility services, with the aim of gaining support from tenants for refurbishment plans.

Nice measures and outcomes (D6.7)

Measure 1: "Public awareness campaign Air Quality" raises awareness of air quality targets to change mobility habits, involving citizens in measuring of air quality through sensors (AtmoSud). Measure 2: "Public awareness campaign Energy – School and Collège; Youth & Family" seeks to raise awareness and knowledge on energy and change behavior, for instance through innovative teaching devices and workshops for primary school and collège (secondary school). Measure 3: "Citizens individual engagement" seeks to integrate in an app the energy consumption of each tenant from different sources and inform them on their consumption behavior, to increase understanding of the link between individual behavior and its impact on personal energy bills.

Gothenburg measures and outcomes (D7.7)

Measure 1: "Minecraft as a dialogue tool for citizen engagement" investigates whether the Minecraft digital platform can be used as a tool for children to work on a city development plan, thereby arousing their interest in city development and planning in general. Measure 2: "Min Stad as a dialogue tool for citizen engagement" tests citizen engagement working with open data and through workshops to determine the possibilities for citizens to influence decision-making, articulating their needs, challenges and problems. Measure 3: "3D – VR/AR visualisation of BIM and sensor data" engages citizens (and future residents in some cases) in the inner workings and properties of a building and a deeper understanding of the building's processes. Measure 4 "Personal Threshold Application (PET)" develops an app that monitors energy usage and gives feedback to users regarding their energy consumption, with a view to helping tenants develop a deeper understanding of their individual energy consumption and let them choose what type of energy source is to be used and when, thus nudging individuals to choose "green" energy such as energy from the PhotoVoltaics installed on their façades and roofs.

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mosaic

LIV.IN

Program started in 2018. Last news on web side 2019. Just one report dated 2018-05-01 to 2019-07-31

Liv.In

In the LIV:IN project, major industry leaders from the ICT sector join forces to co-create more responsible approaches to innovation for the first time. LIV:IN builds on the premise that recognition of the value of RRI among industry is necessary for achieving the aim of the call "to progress further in integrating RRI in industrial contexts". The project follows an opportunity oriented approach in order. They rely on know-how in design and monitoring of tools applied in the LIV_IN Labs (Dialogik) and the largest available database of RRI tools held by a project partner La Caixa Foundation.

Key features :

41 6 LIV:IN Labs and a virtual community of practice
42 application and continuous improvement of RRI tools
43 embedded audio-visual story-telling for disseminating results
44 continuous dialogue with earlier and present initiatives in the areas of RRI, CSR and open innovation

<u>Dimension 1. Motivations and Participants</u>

Coordinator : WIRTSCHAFTSUNIVERSITAT WIEN Austria (universty)

Other partners of the project :
University DE MONTFORT UNIVERSITY United Kingdom (university)
Societa cooperative ISTITUTO DI STUDI PER L'INTEGRAZIONE DEI SISTEMI (I.S.I.S) Italy –(Research)

- Institute for Advanced Sustainability Studies (IASS) DIALOGIK GEMEINNUTZIGE GESELLSCHAFT FUR KOMMUNIKATIONS UND KOOPERATIONSFORSCHUNG Germany
- STICHTING SMART HOMES Netherlands

Foundation

- FUNDACION BANCARIA CAIXA D'ESTALVIS I PENSIONS DE BARCELONA LA CAIXA

Private for-profit entities (excluding Higher or Secondary Education Establishments)

- SIEMENS
- TELEFONICA MOVILES ESPANA SA
- ATOS SPAIN SA
- SIVECO ROMANIA SA ERICSSON NIKOLA TESLA D.D. Croatia
- INFINEON TECHNOLOGIES AUSTRIA AG Austria
- COMARCH SA Poland
- GOPA COM. Belgium
- SOFTWARE IMAGINATION & VISION SRL

Not clear who participated to what.

<u>Motivations</u>

The whole project is about IofT
Experiencing and exchanging for more responsible approaches (RRI)
https://www.living-innovation.net/knowledge/overview
Messages to business :
- Learn from the users
- Co-create with peers
- Uncover new business opportunities

Dimension 2. Methods and Process

- a series of co-creation workshops bringing together industry and lead users are being implemented all across Europe. These so-called LIV_IN Labs provide a physical space for exchange, experimentation and learning about co-creating innovations in a responsible way. The first five co-creation workshops have taken place in 2019 and were hosted by Siemens/Germany (How can new digital services enhance daily life when growing older?), Telefonica/Spain (Internet of Things in daily life) and Stichting Smart Homes/Netherlands (Sleep tech and user concerns). In order to share learnings from the co-creation workshops, LIV_IN also organized webinars to follow up on each workshop, which were open to the public.

- a virtual community platform (https://www.living-innovation.net/knowledge/overview). The community invited experts from industry, academia and other backgrounds. 10 joint actions addressing questions, such as: Is there a business case for Responsible Innovation? or How to integrate responsibility considerations into human-centered design approaches? In addition, they are working to identify, collect and share good practices and are developing a Responsible Innovation sector benchmark and maturity model. Could not evaluate the community since it is necessary to register.

- The LIV_IN project is currently working on identifying, collecting, and sharing RRI tools that are particularly relevant to Responsible Innovation in industry contexts. For this purpose, the project can rely on the expertise of a dedicated partner supporting the design and monitoring of tools applied in the LIV_IN Labs (Dialogik) and the largest available database of RRI tools held by project partner La Caixa Foundation.

- Audio visual story telling for communication

Dimension 3. Ethics and Governance

Unknown

Dimension 4. Outcomes and Impacts

- https://www.living-innovation.net seems to be a flagship initiative whose aim is to demonstrate the added value of RRI in the area of smart future living.
- LIV_IN has produced about 60 video stories in different formats (fireside chats and interviews with thematic experts, webinars, image and event films). The project has been represented at a range of high-level events and has hosted its own innovative Virtual Summit on Responsible

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Innovation, a fully online conference which attracted participants from more than 50 countries.

- *https://www.living-innovation.net seems to be a platform providing RRI tools for high tech design and communication*

MIT Solve

Solve is a marketplace for social impact innovation launched at the initiative of the Massachusetts Institute of Technology (MIT). Each year, Solve issues new challenges addressing social, environmental and economic global problems, selects the most promising solutions and catalyzes partnerships across its large community to scale their impact.

Dimension 1: Motivations and Participants

In the context of the new 17 Sustainable Development Goals (SDGs) defined by the United Nations in 2017, MIT was seeking, as a leading academic and research institution, to reinforce a use of technological knowledge that is at the service of society. To concretely do so, even though MIT has a very broad community, it realized it needed to appeal to external stakeholders: some of the complex problems of today are indeed less about fundamental research or novel technology and may instead require work on the application and affordability of technology in different contexts, along with the need to engage a wide array of actors across industry, sector and geography. Solve chose to define four pillars upon which to take action through its annual Global Challenges: learning, health, sustainability and economic prosperity. The program is piloted by the Solve team, which includes 28 people in 2021.

The annual Global Challenges are open to everyone across the world. Each competing team is composed of people that already teamed up before the challenge and want to further develop their common project - which must preferably be at a prototyping phase already. Even though participants can apply as individuals, almost all of them come from organizations (either for-profit or non-profit): a team can for instance be a whole startup or just a group of innovators belonging to the same private company. Various backgrounds are represented: academic, social entrepreneurship, associative or philanthropic sector, business, etc. Diversity across the teams is favored by the Solve team, to gather different approaches, expertises, ressources, geographical areas and contexts.

The core of the collaboration begins once the winning teams (called Solvers) of each challenge are selected, as it will be detailed in Dimension 2. Solve defines itself as a marketplace which connects Solvers with Solve Members, who thus represent the second side of the co-creation. Solve Members are more advanced organizations (mainly private groups, foundations and non-profit organizations) paying an annual fee ($5,500) to participate in the choice of the annual Global Challenges, in the selection of the finalists and in workshops and other events. Solve Members are interested in joining Solve's network because it provides them with many opportunities to invest and partner with Solvers. More broadly, they are eager to enter a network of actors - carefully selected thanks to Solve's expertise - who share their concerns about socio-environmental issues and through which they can easily identify the key trends and stakeholders of their ecosystems of innovation. For partners willing to go further, Solve also seeks and works with sponsors: in return for their larger contribution, they benefit from a customized package to participate in the Solve community (e.g. invitation to Solve workshops or hosting of Solve events, discussions within their organization or with their stakeholders, brand recognition around large events). There are 18 sponsors in 2021, among which for instance General Motors, the Bill & Melinda Gates Foundation, Vodafone Americas Foundation and the Australian Department of Foreign Affairs and Trade. Sponsoring Solve is a way for those organizations to find more promising innovators for partnership or investment.

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In addition to the Global Challenges that Solve has issued on its own since the beginning, it started in 2019 to organize Partner Challenges: those partners are organizations launching their own challenge through the open innovation online platform of Solve, that is thus acting as a service provider (and is still the one powering the challenge). It was in fact those organizations themselves that approached the Solve team with that idea, and the latter saw it as an opportunity to replicate its methodology and funnel more money and partnerships to responsible innovators. The specific needs of partners (in terms of topics, geography, branding…) must be combined with Solve's vision of innovation and positive impact. Many of those partners are foundations, but there are also some private companies whose needs manage to be aligned with societal concerns. For instance, ServiceNow (an American software firm developing a cloud computing platform to help companies manage digital workflows for enterprise operations) launched two challenges, in 2020 and 2021, about how to include historically underserved populations in the digital workforce.

Dimension 2: Methods and Process

Overall process:

45 Defining challenges. Each year, the new Global Challenges are defined by the Solve team with the Solve Members community, which is solicited through some workshops. Based on their diversified insights, the Solve team finds questions that encompass a variety of stakeholders' interests, while also being relevant to millions of lives and being addressable using technology.

46 Open applications, for about 4 months. Once the challenges are launched, anyone can submit a solution on Solve's open innovation platform: each team applies independently of others, this stage does not aim at establishing new collaborations. Projects are more likely to be selected if they are already at a prototyping, pilot, growth or scale phase (but not still at an ideation stage). Every application is available online for everyone to see, comment or enrich. Applicants are asked to describe what specific problem they are trying to solve, the population and regions they focus on, their outcomes, how they will measure their impact, how technology is used, and how their solution is unique and human-centered. In order to gather applications, the Solve team gets in touch with organizations which could either apply or disseminate the challenges through their large networks. Some workshops are also organized across the world to support participants in their application and help them refine and pitch their solutions.

47 Selecting finalists and Solvers. Once the solutions that are incomplete or do not address their challenge are removed, the remaining applications are judged by Solve's staff and community (including their Members, MIT faculty, and Solvers from previous editions) to determine 15-20 finalists per challenge. The finalists are then invited to pitch their solutions at a large event gathering a live audience. Challenge Leadership Groups are constituted around each challenge to select its winners. Those Groups are made up of people from MIT faculty, leaders and experts (that are Solve Members or not) coming from industries, entrepreneurship, non-governmental or governmental organizations. They are thus not only scientific and technological researchers but include leaders across sectors, industry and geography. They judge applications based on the following criteria: alignment with the challenge at hand, potential for impact, implementation feasibility and technical sustainability, innovative approach, inclusive human-centered design, scalability, partnership potential and technical feasibility. An average of 8 Solvers are chosen for each challenge, but this number can change depending on the solutions that are deemed promising every year.

48 Supporting Solvers. The new Solvers enter a 9-month support phase, during which co-creation really begins. The Solve team catalyzes partnerships within the Solve community (mainly with Solve Members) in order to help them develop their solutions: it identifies partners who will be able to help them meet their financial and non-financial needs. Solvers win a $10,000 grant as well as other prizes from other organizations. They also access tailored mentorship, coaching, and strategic advice from the Solve and MIT networks of experts, resources (such as software licenses and legal services) from partner organizations, and monitoring to measure their impact. They finally benefit from a large exposure in the media and at conferences. Following this support phase, the Solve team remains in touch with Solvers, helping them build partnerships if needed, and stays updated on the output, outcomes and impact of each solution. In the light of this advanced support phase, the challenge modality adopted by the Solve team with its call for proposals must be regarded as just a preliminary - but crucial - step before developing collaborations.

Obstacle:
Over the years, the Solve team has realized that it takes a long time to develop partnerships inside its community. Even though they try to create the right environment and assemble all the conditions conducive to collaborations (by facilitating meetings between the relevant actors for instance), it remains impossible to predict or guarantee what the exact outcomes will be. It could be quite stressful not to see as many partnerships as hoped after the very first challenges launched in 2016 - especially given the means deployed - but the Solve team saw that more results emerged at longer time scales (one of the largest partnerships took for instance two years to be formalized) and a steady flow of partnerships is now in place.

Virtual meetings have proven to be not as efficient as in-person ones to foster new collaborations. Before the COVID-19 crisis, Solve used to host three-day events to connect people: participants met each other during workshops but were also prone to exchange on their own outside of these planned working sessions. Many online events have been organized to compensate, but they do not establish a collaborative momentum as smoothly.

Dimension 3: Outcomes and Impacts

The first edition of Solve in October 2015 was a launch event, and new challenges have then been launched each year since 2016. In total, from 2016 to 2021, more than 6,500 innovators from 157 countries have submitted solutions to the Global Challenges and 165 Solver teams (headquartered in 43 countries) have been selected. These teams are 56% for-profit organizations and 41% non-profit/hybrid ones (and 3% are unregistered). The phases of development of the projects selected are quite wide (6% prototype, 33% pilot, 50% growth, 5% scale). Solve has catalyzed over $40 millions in funding and resource commitments and over 350 partnerships for Solvers and social entrepreneurs. Many of these partnerships are established within the Solve community, mainly Solver to Member but also Member to Member, or Solver to Solver. These collaborations can take various forms, like exchange of money (grant or investment), deeper strategic partnerships, joint collaboration. Introducing Partner Challenges in addition to Solve's Global Challenges have benefited the universities, foundations and private companies which launch them (as they find innovators that answer their specific needs), but also to participants who are thereby provided with new opportunities to be supported. For instance, the team selected as part of the ServiceNow's Challenge on Digital Workforce (mentioned in Dimensions 1) won $100,000.

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To measure its impact, the Solve team watches various indicators simultaneously. First, Solvers must report their progress to the Solve team every three months during the first year and then every year. All these key metrics, defined by project carriers to track their impact, cannot however be added up together as they vary from project to project. In addition, they do not reveal the role that Solve has played in their advancement: maybe the selected teams could have developed their solutions just as well without Solve, which therefore cannot directly take credit for their successful results. To assess what they have really brought to each team, Solve tracks the partnerships that have emerged thanks to them (by looking at their monetary value, now above 47$ millions in total). Finally, to build a bridge between the individual metrics of each solution and the overall number of partnerships, Solvers are asked if their participation in Solve has been beneficial or neutral to their project and if their new partnerships (along with the mentorship and coaching) have contributed to their success. Measuring Solve's impact remains a complex task: the Solve team is not always kept informed of all the partnerships that emerge, Solvers or Members can genuinely forget to report them (which turns out to be a recurring issue encountered by facilitating third parties). Collaborations can also occur at a secondary level: teams can meet members of the Solve community who then introduce them to other actors outside the community and with whom they will build partnerships. This raises the question of where to draw the line that delineates the direct impact of Solve.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

Solve's vision of co-creation is framed into a cycle of innovation: Solvers who develop their project and acquire experience will ideally later mentor future new Solvers in turn, and even become Solve Members themselves. Through this cycle and its progressively growing community, Solve aims at driving a strong collaborative momentum which will have long-term impact - which constitutes a common struggle for more "single-shot"-like challenges that often have trouble creating lasting dynamics after their closing event.
The selection phase takes into account the proximity of teams with the issue they are trying to solve. For instance, the jury looks if the teams have a close understanding of the specific needs of the underserved population they want to help and if they are not trying to impose preconceived technological innovations regardless of the local context. To further develop this approach, the Solve team aims at including more the targeted populations in the co-creation itself. To reach innovators that are not part of the typical hubs of innovation, it is necessary to bridge the existing trust gap. The 2021 Indigeneous Communities Fellowship is for instance supporting Native innovators in the US in using traditional knowledge and technology to meet the social, environmental, and economic goals of their communities. The Solve team had to change their view of innovation, and accordingly change their language to speak about it as well, in order to include ancestral technologies within the scope of solutions sought, and thereby be in a position to reach those innovators and include Indigenous communities in the co-creation.

* * *

Sources:

- Interview on August 1st 2017 of Alexander Dale (Community Relations Senior Officer at MIT Solve)
- Interview on August 16th 2021 of Alex Amouyel (Executive Director of MIT Solve)
- MIT Solve website (https://solve.mit.edu/)

A Collective Research Impact Framework and multi-variate models to foster the true engagement of actors and stakeholders in Health Research and Innovation

Key findings:

- Aims to support multi-stakeholder initiatives in brain disease through establishment of a Collective Research Impact Framework with guidelines to improve health treatment accountability
- Stakeholders from all helices of the QH linked to healthcare engage together, with patient organizations at the centre
- Develops a Governance Model or "Model for Collaborative Initiatives"

Sources:

- W: MULTI-ACT Website (from Project website or CORDIS project page)
- D1.4 Consolidated mapping of existing patient engagement initiatives and analysis of gaps and barriers to patient engagement in current health R&I processes. November 2019.
- D5.4 MULTI-ACT Model for collaborative initiatives. June 2019.
- D3.6: MULTI-ACT Master Scorecard
- CRIF Integrated Manual for Research & Innovation Actors

The MULTI-ACT Project: a collective research impact framework involving patients

MULTI-ACT (May 2018 – April 2021) aims to increase the impact of health research on brain disease. To achieve this the Project develops a Collective Research Impact Framework (CRIF). This Framework takes the form of an Online Toolbox and a Set of Guidelines to improve stakeholder co-accountability in health/brain R&I. The Framework supports Multi-Stakeholder Research Initiatives (MSRIs) comprehensively, from research priority and agenda setting to implementation, monitoring, and impact evaluation. The CRIF provides MSRIs with tools and knowledge but also integrates a mission-related dimension to drive accountability. Three key phases take place in MULTI-ACT:
(i) Phase 1 "Build knowledge" builds the theoretical foundations of the CRIF, with focus on two core components: a Governance Model, and a Master Scorecard with indicators covering five impact dimensions (efficacy; social impact; economic impact; excellence; patient-reported impact). Phase 1 thus consolidates "Science with and of patients inputs", meaning "how the need and claims of the ultimate beneficiaries of research (i.e. the patients) can be better integrated in R&I processes via their inclusion in the decision and management processes and the introduction of a specific patient reported dimension among the ones measured" (MULTI-ACT Website).
(ii) Phase 2 "Apply knowledge" implements the CRIF developed in Phase 1, testing it in a real life setting with an MSRI focused on Multiple Sclerosis (MS). An online Toolbox designed to be an entry point for MSRIs wishing to use the CRIF is developed.
(iii) Phase 3 "Use knowledge" expands the community of potential CRIF users beyond the MS domain and produces manuals and guidelines to accompany users and improve the Toolbox functionalities.

Dimension One: Actors and Configurations

<u>Consortium participants</u>

The Project's consortium members are listed in the table below:

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Name	Type (EU taxonomy)	Description / role in MULTI-ACT	Country
Italian Multiple Sclerosis Society Foundation (coordinator)	RO	Leading funding agency of research in the field of Multiple Sclerosis (MS)	Italy
Università degli Studi di Trento, UNITN	HSEE	University. Department of Economics and Management.	Italy
ERNST & YOUNG Italy	PFPE	Audit company. Responsible for the design and implementation of the health collaborative initiatives' approach and policies.	Italy
Universidad de Burgos, UBU	HSEE	Theoretical insights and empirical evidence about accountability, indicator measurement and impact assessment of research	Spain
Tampere University	HSEE	University.	Finland
European Brain Council (EBC)	Other	Non-profit organization aiming to promote brain research in Europe, improve treatment, care and quality of life of people living with brain disorders.	Belgium
INTRASOFT International S.A., INTRA	PFPE	European IT Solutions and Services Group	Luxembourg
European Health Management Association, EHMA	Other	Non-profit membership organisation that focuses on enhancing the capacity and capability of health management in order to deliver high quality healthcare	Belgium
Fondation pour l'Aide à la recherche sur la Sclérose en plaques, ARSEP	Other	Leading funding agency of research in the Multiple Sclerosis (MS) field in France.	France
Dane-i-Analizy.pl Sp. z o.o., DiA	PFPE	Company that focuses mainly on the health care sector, dealing with data analysis, producing analysis and reports on data presentation and innovation and providing modern solutions for public administration.	Poland
Universidade Catolica Portuguesa, UCP	HSEE	University. School of Business and Economics.	Portugal

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). O = Other.

Stakeholders in Project activities

MULTI-ACT develops a multi-stakeholder approach to increase the co-accountability of health research. In doing this, the Project encourages engagement of actors from performing or funding health research initiatives – the MSRIs – that may involve stakeholders from all helices of the Quadruple Helix (QH), for instance: pharmaceutical companies, research institutes, health products or services companies, patient organizations, brain-health focused NGOs, universities, neurology hospital departments (MULTI-ACT Website).

MSRI stakeholders

The Stakeholder Typology as indicated in the CRIF Manual (which is the key consolidated output of MULTI-ACT) provides details on the natures of stakeholders involved in the MSRIs. Firstly, "Patients", a type which includes both those with a disease but also those affected by a disease (i.e. relatives, caregivers). This recognizes that "all these people may provide crucial information about influence of (the MSRI) initiative on lives of persons with the disease or those around them". Secondly, "Patient organisations" are non-profit organisations in which patients normally constitute majority of the governing bodies. Thirdly, "Society" represents "individuals, civil society organizations and civil society networks". Fourthly, "Care providers" are "health and social care organizations and professionals (doctors, nurses, assistants, etc.)". Fifthly, "Payers and purchasers" are "public or private entities responsible for underwriting the costs of health care", whose respective roles depend on the national system in place.

Non-MSRI stakeholders

Alongside MSRI stakeholders, the CRIF Manual describes the roles of other QH stakeholders who may be involved. "Research Funding and Performing Organizations" (RFPOs) are defined as "universities, research hospitals, foundations, and all private public research funders". "Policy makers" are understood to operate on different levels, such as the EU Commission, national health ministries, and various regional and local authorities empowered to make decisions concerning health programmes. "Regulators" include "regulatory agencies and Health Technology Assessment (HTA) bodies". Finally, "Industry" concerns "companies developing and selling health products and services", including "pharmaceutical companies" but also "small medicinal products retailers" or other actors such as "health mobile apps developers", among others.

Dimension Two: Methods and Processes

MULTI-ACT Toolbox: Analysis, Patient Engagement Plan, Materiality Analysis and Master Scorecard indicators

The MULTI-ACT Toolbox provides MSRIs with a set of tools that helps put patient engagement at the heart of their operations, by helping MSRIs assess and improve their governance system and create patient engagement plans that fit the MSRIs needs and capabilities (Website). The Toolbox provides a wide range of indicators which are summarized along four dimensions. Firstly, a Baseline Analysis, through a questionnaire, identifies gaps in the management structure and operations, and provides a customized set of recommendations to help the MSRI "adopt participatory practices, deep patient engagement, excellence in doing science (…) and financial sustainability". Secondly, a Patient Engagement Plan helps MSRIs "decide which stakeholders to engage and how much decision-making power to give them", depending on the stage or research – for which a Research and Innovation 7-steps Path is provided as a guide. This Plan also provides a set of quantitative and qualitative indicators

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to help monitor progress and research gains from engaging their patients. Thirdly, a Materiality Analysis tool enables the MSRI to invite its stakeholders to "directly engage in the process of choosing which aspects of (their) activities should be assessed in terms of impact". This tool seeks "balance of power of stakeholder groups" and the "areas to assess are already mapped" for the stakeholders. Fourthly, the Master Scorecard is "a collection of 125 indicators" (See: D3.6 MULTI-ACT Master Scorecard) which are mobilized in order to "assess and monitor the impact of the research (their) initiative conducts". This Scorecard is (co-)customized by different MSRI stakeholders in the Materiality Analysis stage. The indicators cover "five strategic dimensions: efficacy; social impact; economic impact; research excellence; patient-reported impact" (D3.6).

Dimension Three: Outcomes and Impacts

Results from the mapping of existing Patient Engagement initiatives

The mapping of existing Patient Engagement (PE) initiatives is conducted by MULTI-ACT prior to elaboration of the CRIF Manual, aiming to define the current patient engagement landscape and identify gaps. The mapping actions "indicate that the research projects in the health sector appear to have a rather limited repertoire of methods used for engaging patients" and that "the methods are not discussed in terms of their (potential) impact", making it "not possible to determine return on engagement of the methods". At the EU FP project level, there are "few results for projects where patients are involved in the governance structure and agenda, as stakeholders" (D1.4 Consolidated mapping of existing patient engagement initiatives and analysis of gaps and barriers to patient engagement in current health R&I processes). MULTI-ACT concludes from its extensive study of existing PE initiatives that "patient's engagement in line with RRI's vision still deserves attention and innovative guidelines, for "empowering the experiential knowledge of patients, as co-researcher and a key stakeholder" (D1.4).

The CRIF (Collective Research Impact Framework)

The CRIF addresses governance and collective impact assessment of MSRIs by enabling better cooperation and co-accountability. The Framework will reach the health research community (funding and performing) through the digital Toolbox and the set of guidelines communicated throughout in the CRIF Manual (D1.4 Consolidated mapping of existing patient engagement initiatives and analysis of gaps and barriers to patient engagement in current health R&I processes). To develop the CRIF, a mapping of relevant stakeholders has been conducted "with a view to enable diversification of constellations of actors as well as participation and inclusion of all relevant stakeholders in R&I processes", in particular for patients who are mostly uninvolved in decision-making roles and limited to only certain phases of the research path. Through the Framework, its guidelines and especially its online Toolbox, MULTI-ACT hopes to create a "community of practices" and promote "mutual learning and sharing of aggregated information on research impact and relevant good practices" (D1.4). The CRIF's governance model is implemented through a case study (on Multiple Sclerosis) for testing and improving, and its model is designed to be flexible and gradually adoptable for different MSRIs wishing to evaluate their preparedness for transformation or implement a phased transformation process focussed on their particular criteria of priority.

The MULTI-ACT Governance Model

The MULTI-ACT Governance Model, or MULTI-ACT Model for Collaborative Initiatives, develops five core criteria/areas: (i) Vision and agenda; (ii) Participatory Governance; (iii) Clear, effective and inclusive methodology of stakeholder engagement; (iv) Effective and efficient management and coordination of the initiative; and (v) Co-accountability assessment. Within the second criterion of Participatory Governance aimed to “guarantee an inclusive and equitable governance model, which allows the involvement of all interested parties through a co-design approach”, a sub-criterion called “Adopt a multi-stakeholder approach enabling co-creation” presents recommendations to “build up participatory structures and processes, which aim to create shared ownership of a program/project between different stakeholders”, for which it is “necessary to shape the governance structure of the initiative under a multi-stakeholder perspective” (D5.4 MULTI-ACT Model for collaborative initiatives.).

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Opencare

Open Participatory Engagement in Collective Awareness for REdesign of Care Services

Call: H2020-ICT-2015 – Research and Innovation Action
EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT)

Sources
Website: opencare website; CORDIS Project page; periodic reporting of the project: other project's materials

Dimension 1: Motivations and Participants

Scope of the project is to prototype a **community driven approach** of addressing social and health care and explore its implications at scale. OpenCare draws on: advances in **collective intelligence** research to lend coherence and summarize large-scale online debates; advances in **digital fabrication** and **cheap-and-open hardware technology**; and the rise of a global **hacker community**, willing and able to look for solutions to care problems. Final goal of the project is to contribute to rethinking care provision and provide solutions to **shift from a top-down to a bottom-up approach**.
Opencare brings diverse communities together – citizens with expert knowledge on health care, social care, service design, digital fabrication, collective intelligence and public policy evaluation – through **online and offline actions** to design, prototype and evaluate care services by communities for communities.

Consortium Partners
OpenCare is delivered by a consortium composed of universities, the grassroots hacker community and a municipality. All actors from the 4H are present: academia, public administrations, civil society organisation and private companies (see Table 1).

Consortium Participants:

Name	Type (EU taxonomy)	Description/Role	Country
University of Bordeaux	HSEE	Coordinator Community building	France
Edgeryders LBG	PEPE	Community stewardship Prototyping contribution Expertise in service design	United Kingdom
WeMake SRL Italy	O (Fablab)	Prototyping lead Design and open hardware	Italy
Stockholm School of Economics	HSEE	Policy development	Sweden
SCImPULSE Foundation	O (Public Benefit Organisation)	Expertise in care provision	Netherlands
City of Milan	O (Public Institution)	Prototyping contribution Expertise on policy development and	Italy

		concrete experience in policy-making and implementation "Internal client"	

Table 1 - Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). O = Other.

Stakeholders in Project activities

OpenCare involves participants from all four of the QH (Quadruple Helix), but in the project description they are often described as "citizens" carrying different expertise. Professional care-givers, scientists, managers, entrepreneurs, including representatives of vulnerable groups and minorities (elderly people, LGTB, familiars of subjects affected by developmental disorders, musculoskeletal rare diseases, etc.) also took part in the project activities.

Consortium partners «intentionally excluded conventional methods of engagement, such as institutional meeting or round table with stakeholders/organizations representing specific targets or interests». Conversely, they «considered "clusters" of practices to identify and engage people starting from their direct experience». Project documents underline that «citizens are, in a way, "experts" of their everyday life and the related "care needs"». The engagement of actors from the 4H (both in the Consortium and in the participatory activities) builds on the fact that each of them brings knowledge and expertise that is useful for the co-creation process and outcomes (including the actionability and scalability of results). By doing so, OpenCare goal is to engage people without «intermediation».

Makers play a key role in the process, especially when it comes to fabrication, which happens in hackerspaces.

Citizens are the center of the project and the announced reasons behind each process stage are synthetized in Table 2 (which also anticipates some useful information on methods and process).

WHAT	Information	Engagement	Involvement	Sharing	Empowerment	Capability	Exploitation
WHY	To provide citizens with objective information to assist them in understanding the aim, the process and the results	To obtain citizen' feedback on analysis, alternatives and/or decisions	To work directly with citizen throughout the process to ensure that the public concerns and aspirations are consistently understood and	To partner in each aspect of the decision including the development of alternatives and the identification of the preferred solution	To place final decision-making in the hands of the public	to empower citizens to identify their knowledge and skills	To increase sharing practice, process, knowledge and skills

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			considered				
HOW	Storytelling and hand-on events, experiential workshops, individual connection through emails	Inquiring about content they have understood, asking them instances, sharing experience, pushing them to ask everything about your project	Asking the public what they are interested on. listen to their stories and their trouble. Let them to decide which narrative they want to carry on.	Finding with citizens a solution, an ideas and assist them in understanding evaluation criteria	Finding with citizens solutions and ideas. Assist them in understanding evaluation criteria in order to design feasible solutions	Prototyping and testing a solution	Documenting and sharing prototyping process and tools

Table 2

Prototyping activities involved four main groups of citizens: 1) elderly people the common passion of dancing; parents of disabled children; migrants; a “social street”.

Dimension 2: Methods and Process

«OpenCare orchestrates an open-to-all, community-driven process for addressing care issues. This entails the complete design cycle of sensemaking => selection of a problem-solution pair => prototype => testing => evaluation at scale. Each step of the cycle is open, with the debate happening online and the fabrication happening in hackerspaces and fully documented».

The project release open data and deploy onto them online ethnography and social network analysis (also assembling a software stack to monitor and assist collective intelligence social dynamics in online communities).

The OpenCare engagement process can be described with different steps:

- Local and online engagement of citizens on specific issue, in this case: care (a webplatform developed within the project, in person meetings/workshops/events; community meeting, festivals, maker faire);
- Face to face dialogues for the collective detection of troubles and solutions (workshops, hackatons, open residences, etc.);
- Prototyping as a the making of a service or a device from a concept (typical instruments used in the project come from the hacker/makers culture: 3D printing, laser cutting, etc.) also thanks to a Call for solutions, an Incubation programm (MIR, Maker In Residence).
- Sharing documentation to facilitate replicability of processes and results for anybody (playbooks, open publications and opendata, online open repositories, etc.), outreach (participations to external events, social media).

A social lab was also conducted to reflect on the accountability, governance and ownership of distributed participatory design in care provision.

A challenge observed by partners was the lack of internal communication within the Consortium (for example in the development of Informed Consent for the implementation phase, which was solved).

In line with the hackers culture behind the project, **open innovation and open data are concepts emphasized in the project.**

Dimension 3. Outcomes and Impacts
The output of OpenCare consist mainly in practical guidelines for co-creation processes, policy recommendation for the implementation of community based approaches for healthcare, a digital platform for community building, new methods and digital tools for ethnographic and social media research and analysis, concrete healthcare bottom-up solutions, etc. Key project outcomes are the following: ● An online platform to host EU citizens' conversation about care needs, worries, personal experiences and other ideas to work within the current welfare ecosystem, whether as practitioners, beneficiaries or stakeholders. ● A new quali-quantitative research method (UBX, EDGE); it combines ethnography and network science and is called Social Semantic Network Analysis (SSNA). ● 3 main prototypes (e.g. "InPe", a device designed as a wearable that calls the caregiver and sends SMS with coordinates, in order for them to come and help the person who accidentally fell). ● An interactive dashboard to aggregate, visualize and explore semantic social networks, called GraphRyder. ● Publications/recommendation for open-care bottom-up policy making. ● OpenCare Maker Playbook: co-designing care services: a practical guide. ● A social contract draft for community driven care.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy
All the project stages were open to all: the roles of different participants were mainly assigned depending on their needs and expertise (and not on their stakeholder categories). Certain roles were often overlapping, like in the case of citizens in need that also played the role of makers/designers. A reflection on the nature of accountability, governance, and ownership in distributed participatory design in care provision was conducted thanks to a social lab, which led to a draft social contract that can be found here. By role-playing, simulations, and storytelling, OpenCare explored the dynamics of the distributed innovation systems under a spectrum of desirable, and less so, schemes of governance, and value propositions from the community members. Some forms of benefits in taking part to the co-creation process that are either explicit or implicit in the project are: ● For citizens/patients: citizens lobbying; community building; care products/services responding to their needs/finding new solutions at lower costs; better integration in their community; finding psychological support to the "sense of loneliness deriving by the lack of sense of care throughout the whole society". ● For makers: building community of practice; improving/making their products more effective by testing them in a real-life setting; increasing the outreach/visibility of their activities; trust building. ● For policy makers: fostering cohesion; answering to unmet healthcare needs; supporting society resilience; trust building; testing a bottom-up approach for healthcare, providing support to an overweighted healthcare system Other notes Project keywords (from the project website): Digital Social Innovation, Social Welfare, Social Network Analysis, Open Source Software, Open

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Hardware, Open Design, Public Policies, Online Communities, Collective Intelligence, Participatory Innovation, Knowledge co-creation networks, Collective Awareness Platforms

POCITYF

A POsitive Energy CITY Transformation Framework

Key findings:

- Seeks to improve smart city transition in energy and e-mobility in cities with strong cultural and historical heritage
- Integrated Solutions are developed within Energy Transition Tracks to develop Positive Energy Districts and Positive Energy Buildings, taking into account technical and regulatory dimensions
- Citizens are involved alongside policymakers, local authorities and the private sector in co-creation, co-development, co-planning and co-implementation of the solutions

Sources

- W: Website: POCITY Project page or website

The POCITY Project: city transformations that take into account their historical heritage

The Project (October 2019 – September 2024) delivers a set of "positive energy blocks" in cities in the Netherlands, Portugal, Denmark, Greece, Hungary, Italy, Slovenia and Spain. These "blocks" refer to a "limited and socially well-embedded geographic area where the average local renewable generation exceeds its consumption". A specificity of this urban transformation is that the blocks are in cultural and historical protected "heritage" areas, which contain cultural protected buildings with legal restrictions for their retrofitting. POCITYF sets up 10 Integrated Solutions (IS) comprising 73 individual innovative elements (technologies, tools, methods) rooted under existing City Information Platforms (CIPs). POCITYF works along 4 Energy Transition Tracks (ETTs) than encompass the IS. ETT#1 focuses on the examination and application of ISs transforming exiting and new building stock into energy positive entities. ETT#2 focuses on the application of grid flexibility strategies and energy storage systems geared towards energy flow optimization to maximise self-consumption and reduce grid stress. ETT#3 focuses on decarbonisation of the mobility sectors. ETT#4 coordinates existing CIPs with innovative apps and instruments, offers inclusive and holistic services for interdisciplinary citizen engagement and co-creation between citizens, city stakeholders and industry, in a city development "bold city vision" for 2050 (W). POCITYF hopes to demonstrate (i) solutions that increase energy self-consumption, energy savings and a high share of locally produced renewable energy, developing positive energy districts (PEDs) in the process; (ii) P2P energy management and storage solutions supporting grid flexibility and curtailment reduction; (iii) integration of the latest generation of ICT solutions within existing city platforms; and (iv) active citizen engagement services and solutions providing an

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open innovation ecosystem for citizens to participate in co-creation, decision making, planning and problem solving. To replicate these solutions in different cities, measures are taken to identify regulatory barriers, legal aspects and data security/protection and propose practical recommendations to overcome these; to design bankable business models that consider the whole PED lifecycle; and to strengthen the links and cooperative innovation with other Smart Cities and Communities Projects (from Horizon 2020 call 3.3.1.3). Finally, POCITYF hopes to create and coordinate a network of smart cities for cultural heritage areas, whose qualities can be used to enhance the liveability of urban areas as heritage represents social cohesion, creativity, local community values and drives urban regeneration.

Dimension One: Actors and Configurations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
LABELEC - ESTUDOS, DESENVOLVIMENTO E ACTIVIDADES LABORATORIALS SA (coordinator)	PFPE	Portugal
CAMARA MUNICIPAL DE EVORA	PB	Portugal
UNINOVA-INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOCIACAO	RO	Portugal
UNIVERSIDADE DE EVORA	HSEE	Portugal
UBIWHERE LDA	PFPE	Portugal
DECSIS SISTEMAS DE INFORMACAO S.A.	PFPE	Portugal

SCHNEIDER ELECTRIC SPA	PFPE	Italy
PACT PARQUE DO ALENTEJO DE CIENCIAE TECNOLOGIA	PFPE	Portugal
SONAE MC - SERVICOS PARTILHADOS, SA	PFPE	Portugal
ONYX SOLAR ENERGY SL	PFPE	Spain
TEGOLA CANADESE SPA	PFPE	Italy
BETTERIES AMPS GMBH	PFPE	Germany
KIMATICA MONOPROSOPI ETAIREIA PERIORISMENIS EUTHYNIS	PFPE	Greece
INESC TEC - INSTITUTO DE ENGENHARIADE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA	RO	Portugal
GEMEENTE ALKMAAR	PB	Netherlands
STICHTING NEW ENERGY COALITION	O	Netherlands
STICHTING HOGER ONDERWIJS NEDERLAND	O	Netherlands
NV HVC	PFPE	Netherlands
NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO	RO	Netherlands
STICHTING WOONWAARD NOORD-KENNEMERLAND	O	Netherlands

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WONINGSTICHTING VAN ALCKMAER VOOR WONEN	O	Netherlands
DUURZAAM BOUWLOKET B.V.(participation ended)	PFPE	Netherlands
CONNEXXION OPENBAAR VERVOER NV	PFPE	Netherlands
ALLIANDER NV	PFPE	Netherlands
NEROA BV	PFPE	Netherlands
AYUNTAMIENTO DE GRANADA	PB	Spain
ASOCIACION AGENCIA PROVINCIAL DE LA ENERGIA DE GRANADA (participation ended)	RO	Spain
INSTITUT DE TECNOLOGIA DE LA CONSTRUCCION DE CATALUNYA	O	Spain
COMUNE DI BARI	PB	Italy
ENERGY@WORK SOCIETA' COOPERATIVA A R.L.	O	Slovenia
MESTNA OBCINA CELJE	PB	Slovenia
ZAVOD ZA GRADBENISTVO SLOVENIJE	RO	Hungary
BUDAPEST FOVAROS IV. KERULET UJPEST ONKORMANYZATA	PB	Hungary
EMI EPITESUGYI MINOSEGELLENORZO INNOVACIOS NONPROFIT	RO	Hungary

KFT		
MUNICIPALITY OF IOANNINA	PB	Greece
HVIDOVRE KOMMUNE	PB	Denmark
EUROPEAN GREEN CITIES APS	PFPE	Denmark
ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	RO	Greece
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY	RO	Finland
FONDAZIONE ICONS	O	Italy
RINA CONSULTING SPA	PFPE	Italy
FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS	RO	Spain
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH	RO	Austria
ASSOCIATION EUROPEENNE DES AGENCESDE DEVELOPPEMENT	O	Belgium
ENERSIS SUISSE AG	PFPE	Switzerland
RIJKSUNIVERSITEIT GRONINGEN	HSEE	Netherlands
DIPUTACION PROVINCIAL DE GRANADA	PB	Spain
STICHTING INVESTA (INSTITUTE FOR	RO	Netherlands

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VALORISATION AND EXPERTISE OF THERMOCHEMICS ALKMAAR)		

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

As demonstrated through ETT#4, existing CIPs are mobilised alongside new apps and tools to offer services for interdisciplinary citizen engagement and co-creation between citizens, city stakeholders and industry, for the development of city visions for 2050. POCITYF aims for active citizen engagement services and solutions that help providing an open innovation ecosystem for citizens to participate in co-creation, decision making, planning and problem solving.

In addition, a key focus of POCITYF is on energy self-generation and self-consumption in order to reduce grid stress and generation curtailment. Decentralised energy generation of this sort is to rely on local household and block/district level systems.

Dimension Two: Methods and Processes

Citizen driven co-creation

To improve citizens' quality of life, the Citizen driven co-creation set of solutions (linked to ETT#4 in particular) involve citizens in the development, design and evaluation phases of the solutions, and related services, that are implemented by POCITYF. A "Rapid Prototyping" approach is mobilised, a process that allows to virtually instant feedback from citizens, involving (i) incentives to citizens for co-creating, co-delivering and co-capturing value, (ii) the creation of an open innovation ecosystem between different experimentation set-ups, (iii) empowering consumers to become "prosumers" by enabling them to monetise their excess of electricity (e.g., rooftop solar energy) by recording data and sending/receiving payments automatically.

Social innovation mechanisms are used to better engage citizens in several processes: co-creation, co-development and co-implementation. Innovative social engagement strategies

are designed to incentivise citizens into participation alongside industry and policymakers, in particular for the inclusion of disadvantaged communities.

Dimension Three: Outcomes and Impacts

The solutions implemented by POCITYF, facilitated by citizen driven co-creation processes, involve

- Positive Energy Buildings & Districts: achieving energy savings at building and district levels to reduce energy bills for citizens and enabling a high share of locally produced/consumed renewable energy, through Positive Energy Buildings and Districts retrofitting, feeding PEDs with waste streams promoting symbiosis and circular economy

- P2P energy storage and management (e.g., maximising self-consumption)

- E-mobility integration into smart grids.

The project is ongoing, so the specific outcomes are yet to be determined.

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Riconfigure

In the Riconfigure project, industry leaders, and academics, aim at inviting diverse stakeholders from civil society to join them in social labs for RRI. The overall aim of the project was to obtain a better understanding of what happens when the four main sectors of society (industry, academia, policy and civil society) collaborate during research and development (R&D) projects. They rely on 4 social labs where QH may gather. It is not clear whether the stakeholders are CSO or individual citizens. Also, the goals ar not clear whether it is aimed at accelerating the Transfer of Research and Innovation Results to civil society, or to really co creating for RRI.

The ultimate outcomes of the project include handbooks, training materials, and a forum for ongoing learning between innovators experimenting with these new forms of collaboration.

Dimension 1. Motivations and Participants

The active involvement of the civil society in innovation is, in many cases, a challenge. Of the 54 cases considered in this practice analysis, only 24 actively included the civil society across the collaboration process and included these in relevant decision-making processes (see Figure *). As the fourth Helix is often the last to join a new QHC, they observe a power relation where citizens/CSOs enter collaborations on conditions already established by other partners and/or are merely consulted along the innovation process. While many cases expressed openness towards civil society, they also experienced reluctance to extend the involvement of civil society, paired with the fear that these may slow down the innovation process. Similar concerns were expressed for partners of the public sector. The biggest challenge for extensively including actors from civil society is a lack of knowledge on how to best achieve this and which methods to apply. Additionally, the fourth helix is often understood as the selective and privileged types of publics such as civil society organizations (CSOs) or users of a specific product or service. hey thus see very different understandings of what civil society really is. As a result, marginalized groups of civil society are often less visible. Citizens who enter QHCs need to have the resources and motivation to engage in such activities besides their work and other public and private responsibilities. They found that the involvement of the fourth helix (civil society) happens more effectively in cases where public funds and public missions are involved, and also in cases that aim for social innovation.

Members of the RiConfigure Project Consortium

- Danish Board of Technology Foundation (coordinator), Denmark
- Institute for Advanced Studies, Austria
- Wageningen University & Research, The Netherlands
- Center for Responsible Research and Innovation at the Fraunhofer Institute for Industrial Engineering IAO Germany
- Frauenhofer IOSB-INA Industrial Automation Branch, Germany
- The Colombian Association for the Advancement of Science, Colombia
- The Adriano Olivetti Foundation, Italy
- Corvinus University of Budapest, Hungary
- CoroLab, Denmark
- Ludwig Boltzmann Gesellschaft, Austria
- Institute for Sustainable Process Technology, The Netherlands
- Universitat Pompeu Fabra, Spain

Third parties

- Organization for Economic Co-operation and Development OECD
- Österreichische Bundesbahnen, Austria

Motivations

In order to gain an empirical understanding of Quadruple helix collaborations and whether they live up to their promise, the RiConfigure project has gathered insights from real life or collaborative practices in RRI.

Dimension 2. Methods and Process

The project was methodologically anchored in two points. First, the method of action research (Reason & Bradbury, 2001; Whitehead & McNiff, 2006). Second, social labs (SL) were instruments for studying and intervening in real-life innovation projects (Hassan, 2014; Timmermans, Blok, Braun, Wesselink, & Nielsen, 2020). In this project, a social lab is the platform through which RiConfigure researchers interact with the selected real-life cases of QHC. They launches 5 social labs to study crosssectorial collaboration. The social labs create spaces for mutual learning through interactive processes involving an eclectic group of stakeholders that all represent a certain aspect of society. There are various tools within social labs that can be used to solve the most pressing global problems through multidisciplinary collaborations.

The four social labs are

- Social Lab I: Has a research perspective; focuses on *Internet-of-Things applied to manufacturing and production*; takes place in the OstWestfalenLippe region of Germany
- Social Lab II: Has an industry perspective; focuses on *collaboration innovation renewable energy*; takes place in the Utrecht region in the Netherlands
- Social Lab III: Has a public sector perspective; focuses on *open and customer-focused innovation in public transportation*; takes place in Vienna, Austria
- Social Lab IV: Has a civil society perspective; focuses on *water supplies and water usage in cities*; takes place both in the region of Zealand in Denmark and in Bogota, Colombia

Researchers of the project will study in depth how the social labs function, where they succeed and where they fail.

The observed cases are diverse as they have been initiated by stakeholders from different helixes, have different modes of financing and providing funds for the innovation process, and work towards different types of output, ranging from commercial products to social innovation. Each of them was designed in order to answer the following three questions. 1. How do partners interact within a QHC and what contributes to the success of such interaction? 2. To what extent do the parties engage in practices, and develop competences, that are in line with the model of RRI? 3. What is the relationship between public governance frameworks on the creation and success of QHCs?

At the end of the project a series of handbooks will be produced targeted the industry, civil society, public sector, academia and policy makers. The booklets will be a easy to follow guide of how to involve civil society in the innovation process. You can read more about the RiConfigure project which enters the innovation process from a civil society perspective

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Social labs (collaborative workshops)

Co-writing of guides

Dimension 3. Ethics and Governance

The project pinpointed the unequality in policies as a major problem for civil society participation.

They did not clearly state how it worked in the social labs.

Dimension 4. Outcomes and Impacts

Deliverables

Website riconfigure.eu

Training courses on collaborative innovation (and training material to prepare your own)

- RiConfigure policy briefs here.
- RiConfigure booklet here.
- RiConfigure training materials here.
- RiConfigure comparative analysis on Quadruple Helix Collaborations here.
- Eugen Popa's PPT on Quadruple Helix Collaboration in Practice here.
- Alfonso Alfonsi's PPT on what we still need to know about Quadruple Helix Collaborations here.
- Dimitri Corparkis' PPT on what we still need to know about Quadruple Helix Collaborations here.
- Robert Braun's PPT on Results and Lessons on Social Labs here.
- René von Schomberg's PPT on Institutional Change for Responsible Innovation here.
- Loet Leydesdorff's PPT on Triple, Quadruple, and Higher-Order Helices here.

1.Practitioners Guide that collect and structure experiences from open innovation practitioners to help others set up and manage Quadruple Helix Collaborations

2.Policy Brief that will help policy makers to understand what inclusive innovation processes need to thrive

REFLOW project

constRuctive mEtabolic processes For materiaL flOWs in urban and peri-urban environments across Europe

H2020 non SwafS (2019-2022) – Innovation Action

Sources: project website, cordis website, project documents and materials.

The REFLOW Project aims to develop circular and regenerative cities through enabling active citizen involvement and systemic change to re-think the current approach to material flows in cities.

Dimension 1: Motivations and Participants

Consortium partners

The REFLOW Consortium is composed by 28 partners and it is coordinated by the Copenhagen Business School. It entails actors from the 4H, including municipalities from different countries.

Participants engaged in the project activities

Citizens: Citizens who wish to co-create solutions towards more environmentally, socially, and economically city.
Businesses: Organizations, manufacturers, and start-ups that want to future-proof their industries by supporting social, environmental, and economic transformation.
Governments: Governments seeking to adopt holistic, innovative policies in each of the Social – Technological – Economic – Environmental – Political (STEEP) aspects.

Fab Labs and maker spaces play a peculiar and central role in the project. They are described as «catalysts for change in urban and peri-urban environments to be used for co-creation processes» since they «enable, visualize and regulate "four freedoms": free movement of materials, people, (technological) knowledge, and commons, in order to reduce materials consumption, maximize multifunctional use of (public) spaces/building and envisage regenerative practices».

The project is based on six co-creation pilots in six different European cities.
In each Pilot city, a local interdisciplinary team with actors from public institutions, civil society and SMEs, and entrepreneurs, including entrepreneurs, maker spaces and fab labs, focus on one specific resource stream.
Pilots focus on their own local topic, dynamics, cultures as well as social, economic, and technical challenges. They are recipients and test-sites for the application of the wider project knowledge, tools, and learnings. Pilot leaders will co-create, test and implement circular practices within their local context, fostering the transition towards regenerative and circular cities, as well as providing useful examples for other cities to engage in this necessary transition.

Pilot	Activity	Short term	Long term	Challenge	Members
Amsterdam (Netherlands)	Increase the recycling percentage of home textiles, through redesigning diverse	Increase of the clothes, home and leisure (hotel linen) textiles collection at a city level by	Create an exchange system platform. This platform will track and trace materials,	Textile Life(cycling) aims to transform the textile stream from linear to circular in the	Waag (research organisation); Municipality of Amsterdam (public boies); Parkhus de

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	methods for collection with citizens, while providing feedstock for the recycling industries.	engaging citizens in a series of hands-on educational experiences, lectures and expert talks which provide iterative learning entry points.	valorise the achievement of circular flow and cycles, and incentivise business opportunities through promoting and mapping businesses involved in material recycling.	Amsterdam region. The pilot will focus on recirculating collected textiles, provide feedstock for the recycling industry and create business opportunities through supplying other stakeholders.	Zwijger (other); BMA Techne (privat for profit)
Berlin (Germany)	Harnessing renewable energy in the form of waste-heat, reusing water from the built environment for reuse in different contexts.	Create a waste-heat database that reflects its potential to citizens, public institutions and companies. This will be a co-created initiative which is launched at the neighbourhood scale	Represent Berlin as the European pioneer for data-driven usage and recycling of waste heat.	Explore how to reuse water in the form of waste-heat from industrial processes in the urban metabolism system. This will be done by mapping waste heat water data and the potential for productive activities (e.g. urban farming), developing a neighbourhood urban production hub, and creating a sustainable business model.	Prototypes; Fraunhofer (research organisation); MCS Datalabs (private for profit), Berliner Wasserbetrieber

Milan (Italy)	Supporting the transition to a circular agri-food system by connecting and adapting the current system to how modern citizens consume and live. This will be done through co-creation, co-design processes and democratized technological advancements .	Engage and map five municipal markets, establish co-design labs to co-develop circular solutions, prototype and experiment with these solutions.	Impact food and market policies, and make current practices of the 23 local city markets more circular.	Support the city's vision on circular food by providing sustainable solutions at the local market level. The pilot will foster and test sustainable food logistics, develop market laboratories to disseminate circular practices, track the origin and quality of agricultural products and analyse the interrelations between rural-urban communities.	Milan Municipality (public body), WeMake (private for profit and fablab), OpenDot (private for profit and fablab)t, Politecnico di Milano – Polifactory (research organization and fablab)
Paris (France)	Develop a circular protocol, a digital platform and a smart storage facilities for reused materials. It will establish a CE tracking label for materials, a CE certification for events and temporary architectures and will also develop a specific	Understand and help the market of temporary construction in shifting to a more circular model with a strong focus on the digitalisation of the circular economy approach.	dDevelop an active lobbying activity towards the European institutions and other relevant stakeholders to upgrade waste regulations.	Create a use and reuse system for wood materials used in events and temporary structures. This will be done through involving designers, event planners, site managers and waste management companies in the process. The Pilot will	Fab City Grand Paris (other and fablab), Municipality of Paris (public body), Ars Longa (other, fablab), Volumes (private for profit and fablab).

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	incubation program to support the establishment of new business cases.			also create a "tracking label" for materials and furniture, and for the re-use status of materials.	
Vejle (Denmark)	Reduce, reuse and recycle plastic. The Vejle Pilot will conduct waste and stakeholder analysis, innovative ideation and prototyping with stakeholders and create a local movement towards a more sustainable future. The Western part of Vejle will become a testing ground to incorporate plastics into circular strategies.	Engage different stakeholders – e.g. public institutions, small businesses, and citizens to achieve 25% plastic recycled in the chosen test sites in Western Vejle	Reveal the potential for a more circular strategy in the city as well as better procurement policy for the Municipality.	Explore innovative circular measures to reduce consumption and increase the recycling of plastic. Seven micro test sites will showcase the potential by mapping plastic streams, developing prototypes and new business models. Establishing an advisory board, a local steering committee group and working groups will ensure a holistic implementation.	Vejle Municipality (public body), Dansk Design Center (other)
Cluj-Napoca (Romania)	Co-design the city's energy transition together with the local	Conduct energy consumption analyses of municipality-	Raise awareness, gather contextualized input and kick-	□ same as long term objectives	Cluj-Napoca Municipality (public body), Aries Transilvania

	community. The Pilot will invest in energy efficiency, optimizing consumption, sharing open data and uniting local administrators, communities and energy service providers. The objective is to fast-track the adoption of low carbon tech within Cluj-Napoca's local context.	owned buildings and public lighting hubs who have invested in energy efficiency. The aim is to observe the impact and the potential of circular economy-like actions for Cluj-Napoca energy efficiency practices.	start a community of practice in relation to the city strategy for a circular economy. Cluj-Napoca will involve citizens in the co-creation of future local governance tools regarding energy.		(other), Institutul Național de Cercetare (research organization)

Table 1

The Detailed Pilot Planning and Evaluation Framework document revolved around four challenge dimensions, to provide a shared understanding among different pilots, but at the same time allowing the necessary flexibility in executing complex multi-year pilots in different contexts.

- Material flow analysis: mapping and analyzing city production capacity, materials and material flow;
- Governance, network and policy: co-developing circular economy design in local multi-stakeholder ecosystems;
- Technological development: implementing materials, hardware and/or software that support new circular economy strategies;
- Citizen Engagement and Capacity Building: creating awareness and behavioral change of citizens and organizational stakeholder in circular economy practice.

Dimension 2: Methods and Process

Core of the project's co-creation activities are the six pilots described above (see Table 1), which rely on a design-thinking based approach. A pilot approach provides the ground to understand concrete best practices that can align public, market and government needs and create favorable conditions for the public and private sector to adopt circular principles.
Pilot cities will firstly **map** existing urban manufacturing, innovation and recycling infrastructure to assess the current state of urban metabolic processes pertaining to a specific resource.
Cities will then be involved in the **development and assessment of tools and applications** that support and manage potential transitory changes to circular economy.

Through an **iterative approach,** pilot cities will **document tools** that can **enable the scaling and replication of processes in other cities**.

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Importantly, in line with the **multiscale approach** of REFLOW, the pilots will focus on how actors and stakeholders - from industry, SMEs, government grassroots innovators and civic society - are able to co-create and implement circular economy practices at the **neighborhood** and **city levels.**

The pilots will engage citizens, that are at the core of the project.

The project will also make use of blockchain technologies to incentivise the circular practices in local ecosystems and create data visualisation tools to enable continuous monitoring and optimisation of "urban metabolic" processes and rapid intervention management. Networks of sensors, urban computing and geo-localisation will capture data ensuring accuracy, integrity and interoperability of relevant data infrastructures, while data visualisation and standard templates will be available for effective communication, public consultation, and exchange of experiences.

Dimension 3. Outcomes and Impacts

Expected outcomes (the project is on-going)

- **Handbook**: To collect and consolidate the knowledge from cities around Europe -including policies adopted, good practices on collaborative governance, sustainable urban models and tools to deploy strategies for a bottom-up circular economy - into a handbook. The HB will provide insights and learnings to foster, assess, and monitor the transition towards establishing circular and regenerative cities.
- **Toolkit**: Practical approaches that will be tested and explored by the REFLOW pilot cities; intended as a 'how-to' for city, civic and industry leaders to begin the transition to circularity in their city. The "Productive Cities Toolkit" aims at supporting urban systems to adopt and implement circular practices in local manufacturing and innovation policies by facilitating the deployment of methods and tools for co-creation and decision-making processes.
- **Documentation**: The project's people-centered approach will be shaped by conducting fieldwork in the pilot cities meant to understand citizen and institutional behavior. Doing so will allow REFLOW to best understand what is really needed in cities while also helping to establish partnerships between local actors and the pilot programs. Research will also be conducted to understand 1) potential circular economy governance and business models and 2) the city metabolism, anatomy, and resilience index and consolidate data in order to assess their impact on the circular economy strategy.
- **Business Strategies**: REFLOW will co-create, design and implement specific methodologies and models allowing pilot cities to test new forms of circular governance to foster the development of local manufacturing ecosystems and emerging business models. Through the definition of business models for circular economy practices, REFLOW will assess the social, economic, and environmental impact of the pilot cities.
- **Platforms**: REFLOW will develop and implement an Open Data Dashboard: a decision-making tool for policy makers and stakeholders to enable flexible and innovative urban planning approaches. The Dashboard will also include instruments to support and guide the transition towards achieving circular cities. This will be a decentralised open data platform, connecting the multiple nodes in the REFLOW network, reinforced by Blockchain technology and accessible to citizens, specialists and policy and industry leaders. REFLOW platforms will also consolidate data visualization tools to enable continuous monitoring and optimization of urban metabolic processes.
- **Webinars**: will be used throughout the project as an interactive educational tool, featuring live

interviews, conversations, and debates on REFLOW deliverables and objectives. They will focus on knowledge transfer, tackling successes, problems and how-to's to inspire and serve as a guide for stakeholders and cities around the world. Webinars will be conducted between consortium and pilot members as well as with various stakeholders. Each webinar will typically be directed to a particular group of stakeholders, who will have the opportunity to submit questions and comments on the webinar topic. All webinars will be recorded and published on the REFLOW website for reference.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy
The project is on-going and pilot activities have been impacted strongly by COVID-19. Participation in most of the city pilots (dialogues, co-creation workshops, prototyping, webinars) seems to be open/is foreseen to be open to citizens and beyond (but it's not always clear in the pilot description on the project website). Rewards are not mentioned in the project and in the pilots description.

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mosaic

RESYNTEX

The RESYNTEX project aims at designing, developing and demonstrating new high environmental impact industrial symbiosis between the unwearable blends and pure components of textile waste and the chemical and textile industries. Industrial symbiosis is the process by which waste or by-products of an industrial process become the raw materials for another.

RESYNTEX aims to create a new circular economy concept for the textile and chemical industries. Using industrial symbiosis, it aims to produce secondary raw materials from unwearable textile waste. .Those quantities entering into landfill and other end markets of negligible value, the RESYNTEX process offers a new solution to not only revalue and reprocess but divert from the waste stream.

Reducing the environmental impact from textile production and consumption, while maintaining economic and social benefits, calls for a systemic change towards circularity. In 2020, EURATEX, a partner in the project, published a position paper with recommendations for the Extended Producer Responsibility (EPR) policy debate as it felt the problem with most EPRs is that they were designed for linear economy models.

The project includes:

a strategic design of the whole value chain from textile waste collection, until the new marketable feedstock for chemical & textile industry, by which the symbiosis opportunities are evaluated (by public authorities and the private sector) in terms of their social, technical, economic, environmental and legislative aspect

the improvement of collection approaches particularly for non-wearable textiles for recycling by changing citizen's behaviour and creation of tools for higher social involvement and recycling promotion. This will ensure a greater accessibility to textile waste as resource and increase the textile waste rates destined for recycling. With 50% collection rate all over Europe would be a significant improvement in order to provide large quantities of feedstock

a data aggregation system that will be developed and implemented in order to ensure waste traceability and also provide relevant data for economic and environmental assessment;

the development of new business models adapted for different synergies identified and for new markets. In addition, environmental LCA and LCC for different scenarios and identification of the most promising routes and synergies will support this objective

automation of the macro separation and sorting for pure or blended textiles, in order to enhance productivity and competitiveness of the whole recycling process

a new demonstration process based on a synergistic chemical and biotechnological cascading separation/transformation approach of textile basic components (proteins, cellulose, polyamide and polyester) from textile blends as basic feedstock materials for chemical & textile industries. Liquid and solid waste treatment and valorisation will close the loop.

Why did RS select the project? This project, called "A new circular economy concept: from textile waste towards chemical and textile industries feedstock", introduces a form of industrial symbiosis between unwearable clothing "blends" and the chemical and textile industries. This involves citizens through a sought improvement of collection approaches through the changing of citizens' behaviour

and the creation of tools for higher social involvement and recycling, with a view to increasing the textile waste rates destined for recycling. It develops a data aggregation system to monitor waste traceability. It involves citizens alongside the textile industry. I also chose this project because of a personal research interest in the textile industry but this project might also be replaced with another "Nature" Based Solution" project (there are several).

Websites

https://cordis.europa.eu/project/id/641942/results
http://www.resyntex.eu/

Dimension 1: Motivations and Participants
Guiding Questions: **49** *What are the announced reasons for the different Quadruple-Helix individuals and groups to come together in co-creation?* **50** *Can we see a difference in the motivation of each corner of the Quadruple-Helix?* **51** *What is the composition of those organising and taking part in the co-creation activities?*[18] **52** *Why have the organisers of the project's different co-creation activities chosen this particular configuration of participants? Is there a clear rationale behind the choice of participants?* **53** In the description of the co-creation initiative, is it described what added value each participant group (e.g. Quadruple-Helix groups) brings to the activity? If yes, what is the announced added value?
RESYNTEX is led by the SOEX GROUP, a German company active in high quality collection, sorting and processing of used textiles at global level. The project co-coordinator IOS (Institute for Environmental Protection and Sensors) is based in Slovenia. RESYNTEX includes industrial associations, businesses, SMEs and research institutes.. Working together, the partners aim at creating an effective model for the whole value chain. 18 Members, either private for profit, academics, except 3 quadruple helix members : ● EUROPEAN APPAREL AND TEXTILE CONFEDERATION AISBL based in Brussels ● Conseil européen de l'industrie chimique AISBL based in Brussels ● Prospex institute, a not for profit organisation based in Brussels whhich « enables and promotes the participation of citizen and stakehçolders in societally relevant dialogue and decision – making process ». Three co creation activities brought together different stakeholders (BtoB or citizen). ● « Citizen Labs will further RESYNTEX's understanding of the purchasing and disposal behaviour of individuals when it comes to clothing and textile products. This will ultimately enable the project to design better strategies for increased collection of textile waste and improved consumer awareness and participation in take-back and recycling schemes. », that the « Regional workshop aim at discussing how circular economy processes could revolutionise the region. » ● Focus group workshops brought together key stakeholders throughout the local and regional textile collection, waste, recycling and environment fields. For assessing the feasability of RESYNTEX within a specific territory

18 For SwafS and other H2020 projects, it is also useful to study the composition of consortium members, which are involved in running the overall project.

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- Value chain Workshops gathered key industry stakeholders to assess the viability of industrial symbiosis approaches

We assumed that they are expected to contribute to increase dissemination to new stakeholders, and public awareness of textile waste and social involvement. However, we can assume that they will contribute to the design of a complete value chain from textile waste collection to the generation of new feedstock for chemicals and textiles, including collection approaches.

Dimension 2: Methods and Process

Guiding Questions:

54 *Which particular tools, methods, communication devices or settings are mobilised in the project?*

55 *Was the process of co-creation (a) stage-gate or (b) iterative?*[19]

56 *Outline the key steps or elements in the co-creation process.*

57 *Which particular challenges were observed (e.g., resources in time or funding, legitimacy, flexibility between participants…)? Does the project face challenges in successfully implementing co-creation? Were these challenges subsequently overcome in the co-creation activity?*

58 Which process elements are particularly striking and successful in the project?

The project mobilised 3 methods which may be considered as participatory althgough it is not co construction per se : 1. citizen labs for consultation of consumers, 2. Regional workshops to inform and discuss with concerned stakeholders, and 3. Value chain workshops to inform and discuss with concerned stakeholders. In addition, they also organised public debates (after movie session).

Three Citizen Labs

RESYNTEX and its partners Prospex Institute and the Manchester Metropolitan University have designed the Citizen Labs, as an entertaining and interactive way of collecting information about stakeholders' behaviour when it comes to disposing or recycling clothes and textiles. Complementing traditional survey techniques with exercises where participants were able to interact with textile items and choose whether to discard them. The « exciting and ludic experience » is aimed at encouraging them to share and explain their daily experience with textile waste. Refreshments were offered.
Three citizen lab were organised in Manchester (october 2017), Maribor (4-5 décember 2017) and Annecy on 27-28 February 2018)
Publics : young pupils and students (Maribor) and citizen (Manchester and Annecy)
By considering purchase, donation and disposal motivators, as well as information and communication preferences, RESYNTEX is carving out strategies to effectively communicate with citizens regarding responsible end-of-life options for clothes and textiles, and to widen citizens' participation in textile collection schemes. This increases the supply of used clothes and textiles being recycled and diverts them from landfill and incineration.

Four Regional workshops on waste mapping

The project partners from Prospex Institute along with a local partner organised the workshops.

19 Stage-gate means that there is a period of action reaching a milestone, and then there is a next phase of the exercise. Iterative means that the process goes through one cycle, and then reiterated, with learning and feedback loops.

The first Focus Group workshop took place in Manchester on Thursday 12th May 2016. The day kicked off with a collaborative mapping exercise in which stakeholders identified sources of discarded textiles in the Greater Manchester region. Participants included the British Heart Foundation,i + g cohen Ltd, Rochdale Borough Council and the British Textile Recycling Association.
The second Focus Group workshop took place in Maribor in november 2016. Stakeholders from organisations such as the Municipal Office, apparel retailers, charities, private and public waste collectors, but also designers, environmental NGOs and the Chamber of Commerce were all encouraged to speak freely in discussions tackling critical points in the development of a new circular economy model for textiles. To establish a clear picture of the textile waste situation in Maribor, participants worked to identify where the main sources occurred, from car repairs and hospitals to households, schools and cleaning services.
Continuing the waste mapping exercise, stakeholders then categorised the various ways in which waste could be dealt with locally, from landfill and incineration to storage and various recycling routes. RESYNTEX partners from the University of Maribor's Mechanical Engineering faculty outlined the technical process of converting waste textiles into secondary raw materials for the chemical and textile industries. Stakeholders then discussed the necessary conditions and considerations that would need to be addressed to put this process into place as part of the regional circular economy.

The third and 4th **Focus Group workshop** were held in Annecy (France) and Prato (Italy).

Three Value Chain workshops

Designed and facilitated by Prospex Institute, two-day workshops gathered key industry stakeholders to assess the viability of industrial symbiosis approaches such as the one pioneered by RESYNTEX, where outputs from the textile industry become marketable secondary resources for the chemical industry. Business representatives and entrepreneurs from the fashion, waste management and chemical industries shared their thoughts on how to bring about such a circular economy, with a focus on market demand, technological performance, resource availability and policy frameworks.
The first Value workshop was organised Ljubljana, Slovenia (7 et 8 décembre 2017) and looked in particular at natural textile fibres (wool, silk and cotton).
The second Value chain workshop in Lyon on 22-23 March 2018 addressed the recycling of synthetic (polyamide and polyester) fibres.
The third RESYNTEX Value Chain Workshop in March, organised and moderated by Prospex Institute, convened the fibre, fabric, apparel, automotive and chemical industries at the pilot site in Slovenia. Project partners shared results in a transparent manner and engaged with business representatives on the necessary steps to transition from pilot to commercial scale. Leading industry players looked critically at the product-market connections that the project should pursue in the near future, and the role for Life-Cycle Analysis in decision-making.

Dimension 3. Outcomes and Impacts

Guiding Questions:

59 *What outcomes have been announced and/or demonstrated by the co-creation initiators and participants? More specifically, have any technologies, services or new organizational structures been produced by the co-creation activity?*

60 *Have the co-creation processes and/or outcomes led to any desirable impacts and if so, in which areas*

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(e.g., environmental, economic, institutional…)? Were specific indicators developed/used to develop the project's impacts?

61 *Have any changes in roles and practices of the participating Quadruple-Helix representatives been observed? Has there been institutional change?*

62 Are new forms of partnerships or relationships visible in the co-creation initiative or as an outcome of the co-creation activities?

Citizen labs :
Initiators draw information on acceptability by consumers and involvement in waste treatment.
Participants are expected to be informed. They received refreshments.
Regional workshops :
Initiators draw information on feasibility of RESYNTEX at the local level (enough waste to collect)
Participants were updated on how to stay in touch and follow the process of the RESYNTEX project, and what the next steps will be in revaluing locally produced waste textiles.

Value chain workshops :
Bringing creative minds from industry and research together, the workshop made important strides towards valorising the project's innovation potential within industrial supply chains. Important insights were shared as to the requirements that secondary raw materials, such as purified terephthalic acid and dye-free recycled cotton fibres, need to meet in order to fit into current standards for manufacturing, traceability, certification and quality compliance.
« Through stakeholder engagement, the research proposes how conditions for collectors' adoption of circular practices can be improved, while avoiding sectoral disruption and ensuring maximum effectiveness of the redesigned chain of secondary textiles. « (Boiten et al. 2017)
« The engagement of stakeholders throughout the value chain played a crucial role in designing new concepts of industrial symbiosis and demonstrating possible revenue streams that could emerge from valorising textile waste. The outcomes of the research can be used to make effective strategic decisions around which products and processes are feasible and commercially viable at industrial scale, in a circular economy system for waste textile fibres. » (Hall et al. 2021)

Scientific articles mentionning impact of co creation (out of a total of 7)
Boiten, Valérie Julie, S. Li-Chou Han, and D. Tyler. "Circular economy stakeholder perspectives: Textile collection strategies to support material circularity." *European Union's: Brussels, Belgium* (2017).
Hall, Nicholas, and Valérie Julie Boiten. "Circular textiles: building business case scenarios through stakeholder dialogue." *Sustainable Textile and Fashion Value Chains*. Springer, Cham, 2021. 377-402.

Report 3 mentioned the following outcomes for RESYNTEX :

• created a strategic design for a complete value chain from textile waste collection through to the generation of new feedstock for chemicals and textiles
• identified different post-consumer textile collection approaches and their potential improvement
• increased public awareness of and social involvement with the issue of textile waste (created a guide to prevent textile waste)
• collected data to evaluate the performance of the new value chains by means of life cycle assessment (LCA) and life cycle costing (LCC), compared to existing end-of-life scenarios
• developed innovative business models for the chemical and textile industries
• demonstrate an automated sorting and cleaning of textiles as input for biochemical processes as well as a complete reprocessing line for basic textile components, including liquid and solid waste treatment.

As of « changing citizens' behaviour and creating tools for higher social involvement and recycling promotion » : Several stakeholder workshops in different European cities have helped to identify different and partly new textile waste streams suitable for the RESYNTEX processes, obstacles towards their collection as well as possible solutions. Furthermore, citizen labs and the mobile application "WhatUWear" gathered information on consumers' attitudes, behaviours, and levels of acceptance related to textile collection and recycling. Finally, industry stakeholder workshops on the RESYNTEX biochemical feedstocks and potential end products brought to the project a) a prioritisation of the most promising applications, products and commercialisation strategies, b) insights into the supply chain and ecosystem in which RESYNTEX can promote the adoption and upscale of its products and c) bilateral conversations about collaborations in the project's post-H2020 future.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy
Some inspirations: ● *Each co-creation project will have specific roles for each type of participant, however, who decides on the roles and what form they take is a key issue. Are tensions observed in the co-creation initiative? Do "actors" follow their "scripts"?*[20] ● *Are details provided of changing worldviews?*[21] ● *Do all representatives of the Quadruple-Helix get fairly rewarded for participating in the co-creation activity? Can we see differences in the nature of these "rewards" for different types of co-creation participant? Specifically, how are citizens rewarded (financially or otherwise) for contributing to the co-creation activity?*
No data provided of changing worlviews. The partnership was to create a new value chain through textile recycling into chemical industry, neither to change the progression of the apparel consumption, nor to improve the textile production chain in terms of environmental cost. The guide to citizen was aimed at : preventing textile waste We consider that citizen were not fairly rewarded. They received refreshments for participating to a "exciting and ludic experience « aimed at collecting information from them. Although environment friendly stakeholders are mentioned, there identity is not revealed, nor their reward.

20 Organisers of co-creation processes may normatively prescribe the roles of the various members of the Quadruple-Helix, which may close down certain pathways of co-creation. One can think, for example, of "smart" ideologies which may reduce creativity by inscribing citizens as predetermined data collectors rather than insight providers. By "prescribed" we mean that the roles of certain actors within the co-creation activity are decided upon and incorporated into the co-creation process by another actor. For example, in the SwafS co-creation project *WeCount*, we can see that the system of traffic monitoring is co-created between small firms, public authorities and citizens, but the role of the citizen is prescribed to be "citizens as data gatherers" using technology that has been previously developed by private initiatives. In this sense, citizens follow a "script" that is embedded in the project. For those interested in the theory behind "scripts" see Madeleine Akrich "The de-scription of technical objects." (1992): 205-224.

21 Whilst being beyond the scope of the co-creation review, how participants in co-creation activities may change their worldview and then enact in their day-to-day life is of key interest. For example, a member of a firm may participate in a co-creation activity, and not only gain knowledge about the innovation focus, but may also change their view on their own practices (institutional change). SoScience provided an example of this in a "Future Of" activity in Packaging innovation.

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La Ruche qui dit Oui!

A digital-material platform for local food

Key findings:

- Dual digital-material local food provisioning network facilitates reconnection between food producers and citizens
- Study shows that producers and citizens have common ground in terms of motivations, values and strategies in improving the future of food
- Producer function and workload are redefined by autonomy and increase in capabilities, especially with digital e-commerce tools
- Network introduces the function of "hive-manager" as an independent entrepreneur with mostly autonomous decision-making in setting up (local) food operation(s) in urban areas

Sources:

- W: Project website/platform
- Journal article: Stephens, R. and Barbier, M. (2021). Digital fooding, cashless marketplaces and reconnection in intermediated third places : Conceptualizing metropolitan food provision in the age of prosumption. *Journal of Rural Studies*, 82 , pp. 366 – 379.
- Journal article: Stephens, R. (2021). Un nouveau métier de l'alimentation. Le modèle de "la Ruche qui dit Oui" ou l'organisation d'un réseau de circuits courts numériques entre producteurs et consommateurs locaux. *POUR*, 239, pp. 85-102.
- Doctoral thesis: Stephens, R. (2020). Circuits alimentaires alternatifs et transition du régime de "provision". Etude sociotechnique dans le contexte francilien. *Doctoral dissertation, Paris, Institut agronomique, vétérinaire et forestier de France (AgroParisTech, ED ABIES)*.

La Ruche qui dit Oui!: detailed presentation of the organization

La Ruche Qui dit Oui is a French company founded in 2010. It coordinates a centralized network of food operations, called "hives", using a digital platform. The hives organize "assemblies" (temporary food distributions), where local food "suppliers" deliver pre-ordered food items directly to "members" (customers) at fixed weekly times. The digital platform hosts the company's employees, who coordinate the network virtually. The material operation is run by independent auto-entrepreneurs called "hive-managers" who may run one or several hives. Suppliers may not be located more than 250 km from a hive, as per the company's definition of "local". Members may order food in any quantity, and at any frequency, free of any subscription constraints.

The company's European network grew rapidly over the past ten years, reaching 1424 hives as of November 2020. France remains the core area of influence, with 745 hives nationwide, including 170 in Ile-de-France – the Paris metropolitan region and present case-study area, which has by far the densest hive concentration across the network. The European expansion, which began in 2013 in Belgium, counts in total 679 hives in Italy, Germany, Belgium, Spain, Switzerland, and the Netherlands (in order of importance) – so that nearly half of the network is now found outside France.

Items sold cover most food categories, regrouping raw foods (e.g., cabbage, honey) and transformed foods (e.g., conserves, breads). Items are pre-ordered online forty-eight hours before each assembly. For each item, a description is provided, which ranges from very short to extensive. For each supplier, a description is also provided. Both descriptions are entirely written by suppliers, who thus directly "speak", virtually, to members.

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On their website, *La Ruche qui dit Oui!* claims 1500 hives, 10 000 suppliers, 210 000 regular members, and to have organized, since its creation, 225 000 distributions, representing 250 million euros in supplier revenues. Disproportionate to the European reach of its network, such figures are comparable to that of a handful of large supermarkets: this is emblematic of digital platform models, where flexible, employee-light operations can spread to continental or global scales with very little material structure (e.g., no walls) and very few employees (*La Ruche qui dit Oui!* hive-managers are never under employee status). Suppliers and hives "find each other", with few contractual constraints, which enables a degree of experimentation in finding the right relational fit.

Dimension One: Participants and Motivations

Organization of the network: breakdown

The network stakeholders are are of four types stemming from the private sector (digital platform and its employees) (see table below):

Name	**Type**	**Description / role in La Ruche qui dit Oui!**	**Country**
Ruche-Mama platform (employees)	Private company	Centralized platform for information and monetary flows	France
Hive managers (independent "auto-entrepreneurs")	Auto-entrepreneurs	Intermediaries in charge of running the "hives" virtually and physically	France
Producers	Private (variable statuses)	Providers of local produce	France
Members	Citizens/consumers	Customers of local produce	France

These four categories of stakeholders (Ruche-Mama; hive-managers; producers; members) form and interact in a network in which information and knowledge on (local) food is exchanged in ways that differ from conventional food provisioning. Such interactions are facilitated by a dual infrastructure virtual-material online/onsite network of spaces (the distribution points) where reconnections between producers and members (customers) can take place, due to the fact that producers deliver food products themselves at the food distributions points during the same window of time where members have to come and collect the food they have pre-ordered.

Motivations

To be able to participate in this network, the different stakeholders face certain temporal/material constraints. For members, these include having to pre-order, having to collect at specific times at specific places, and the reduced food choice due to the 250 kilometer distance constraint. For producers, these involve having to deliver the food themselves (and to dispatch their deliveries in different distribution points without any help from the company), but also having to market directly to members through the platform. For the hive-managers, these include having to operate under the auto-entrepreneur status rather than being under employee status (much like, for example, Uber

drivers), having to set up the distribution point and customer base independently, and having to operate under the decisions coming from the platform without a specific way of participating in decisions on how the network is run.
Yet the network has developed strongly due to strong societal motivations around local food transitions and, overall, the functionality of the network. Ruche-Mama, on its website, advertises food "values" that revolve around concepts such as "circuits courts" (Short Food Supply Chains) where producers gain autonomy in price-fixing and decisions regarding how they commercialize and distribute their produce, "origin of products" (or transparency), "contributing to agricultural and ecological transitions" in production modes and transportation means, and "quality and freshness" (W). Producers, although they face an extra workload in having to commercialize and deliver their food using time-consuming digital tools they are not always accustomed to, find these beneficial in valorizing their food's preparation techniques, identity/originality, artisan and nutritional qualities, and transparency directly to members/customers, without having to go through the margin-reducing and quality-distorting funnel of agri-business or large retail (Stephens and Barbier 2021). Members motivations stem from reasons as diverse as dietary concerns, a search for freshness and quality, a growing desire for transparency, a wish to interact with and support producers from their region or whom they have met directly, and environmental concerns, while they also enjoy shopping and meeting up with producers and other food-transition oriented members in "third-spaces" that host distributions in settings that are as diverse as they are convivial and value-laden towards solidarity, open-mindedness or simply practical or enjoyable as opposed to standardized (Stephens and Barbier 2021). Hive-managers are motivated by a hybrid set of factors. All have in common the same broad societal desire to participate in improving the quality, environmental impact, social and geographical accessibility of food. However, while some seek to make a living out or running a (usually large, or two) hive(s), other hive-managers have non-financial motivations (e.g., opening up to their neighborhood).

Dimension Two: Methods and Processes

Stakeholder engagement: a dual virtual-material network of food provisioning

The network is organized around a dual virtual-material network constituted of, on the one hand, the digital e-commerce platform (operated by Ruche-Mama), and on the other hand, a material network of "hives" (distribution assemblies where physical interactions take place). The Web 2.0 platform thus constitutes the access point to the hives in which physical encounters will subsequently take place between hive-managers, suppliers, and members. That is, the *La Ruche qui dit Oui!* device articulates two dimensions:
(i) Digital e-commerce platform (called Ruche-Mama), operated by *La Ruche qui dit Oui!* employees (mostly computer engineers, claiming "300 000 lines of code to build it") whose role is to ensure strategic development, and seamless online selecting, ordering and payment. For these services the platform receives 11.65% of sales (note: this percentage increased significantly over the past few years, up from 8.65%). As noted above, the website's content (food item and supplier descriptions) is mostly edited by suppliers, and the remainder by hive-managers for general communication to members. Neither of these website content providers are *La Ruche qui dit Oui!* employees. Members may register with up to three hives simultaneously, and change hives as they please. Each hive has its own mini-website, all of which have the exact same aesthetic and functional structure designed by the Ruche-Mama platform.
(ii) Material network of hives, operated by hive-managers whose role is to: find suppliers, find a distribution point, build membership, host distributions and deal with unforeseen events (e.g., supplier quality or reliability problems; assembly space no longer available). For these services they receive

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8.35% of sales (note: this percentage has remained stable over the years). Food distribution assemblies are conducted in "third places", which host distributions for free, but otherwise exist for entirely separate purposes and are often places of socialization. Suppliers, who thus receive the remaining 80% of sales, may fix prices and minimum order amounts as they wish. Their role is to deliver food items, in good time and almost always to several hives the same day. Also, depending on the hive, they are required, or at least encouraged, to help out or to at least be present during distributions. Members, suppliers, and hive-managers may thus theoretically, in a context where no monetary exchange takes place, focus their interactions on fruitful discussions about food, leaving financial transaction issues entirely aside. In practice, however, suppliers are not always present. Being mostly small operations (often one or two employees), their resources often only allow them to conduct deliveries one half-day a week, possibly two; meaning their presence at some assemblies can be fleeting, as they edge out to deliver the next hive on the round. When suppliers do remain present, they may equally be too busy with the logistics of distributions for in-depth discussions with members. While these logistics are coordinated by hive-managers, they may be assisted by a range of participants: suppliers able to hang around; professionals delivering on behalf of suppliers; or pro-bono participants (often members themselves). For all these reasons, supplier-member interaction is variable throughout the network, ranging from high to low degrees of interaction and knowledge exchange.
While *La Ruche qui dit Oui!* suppliers may not always be able to remain physically long enough to properly converse with members, they do however, have one means of reaching members in a systematic way, through the digital platform. In directly communicating their product and supplier descriptions, they mobilize a form of ubiquitous reconnection at relatively low cost, time and effort.
La Ruche qui dit Oui! promises "local" food (defined at maximum as 250 km) and claim that one can "buy directly from producers", "meet the producers", "eat better" and "support local agriculture". The emphasis is on proximity, both geographic (maximum distance allowed) and organizational (through disintermediation). Thus, suppliers speak to members virtually and may meet them during assemblies/distributions. Quality and economic support for local, small-scale suppliers are also emphasized.

Dimension Three: Outcomes and Impacts

La Ruche qui dit Oui! helps bridge societal needs from members for better quality, more transparent, and more sustainable food, with the need for producers to redetermine their economic food provisioning models. Building unusual mediations between producers and members/citizens within particular third places that are hosted by a novel type of function in the (local) food sector in the person of the hive-manager, with the help of an ambitious and overall well-functioning digital platform, the network contributes to developing phenomena of "food prosumption", whereby citizens are able to develop a much improved understanding of food characteristics and issues, and are in addition much more able to communicate their ideas and concerns to food sector actors. The interactions are not entirely two-way, in the sense that, in the virtual part of the network, producers address members but members cannot write back; however, in the material interactions during food distributions, the interaction process is dual and potentially iterative. Also, the hive-manager plays a role in facilitating communication even when face-to-face is not possible.

Ruche-Mama's role is somewhat apart since its employees' two key functions are running the network's online infrastructure and developing the network's strategy at the strategic/corporate level. On a daily/weekly basis, they interact mostly with hive-managers (e.g., when there are technical issues to deal with, or during early stages of the setup of a hive, etc.), although they do interact with producers and citizens – be they members of a hive or citizens in general – at food fairs, big (e.g., Salon

de l'Agriculture) and small (e.g., Sortons l'Agriculture du Salon), which they often participate in alongside a multiplicity of other food transition actors (Stephens 2020). Ruche-Mama occasionally involves hive-managers in their strategic development decisions, so they can help co-create development strategies for new locations, types of distribution space, type of product, workshop organizations with citizens, etc., but it should be noted that, on the basis of hive-manager interview accounts, the quality of this involvement and the degree to which their contributions are incorporated in actual decisions, is also questionable (Stephens 2021).

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mosaic

SCALINGS

Scaling up Co-creation: Avenues and Limits for Integrating Society in Science and Innovation

H2020-SwafS-2017-1 – RIA, Research and Innovation Action

Sources: project website, cordis website, project documents and materials.

SCALINGS is an interdisciplinary research project funded by EU Horizon 2020. Over the course of three years (2018-2021), the project investigated how co-creation varies across different contexts and explore what is needed for successful scaling.

Dimension 1: Motivations and Participants

Consortium partners

The SCALINGS Consortium is composed of 10 partner institutions (academia, CSOs, enterprises) from 9 European countries (Germany, Austria, Poland, Denmark, France, Spain, Netherlands, UK and Switzerland) and over 37 experts from different fields. The project coordinator is the Technical University of Munich.

SCALINGS studied three cocreation instruments (see Box 2 on Methods and Process). One of the reasons for selecting the three instruments relates to the following "each instrument brings together different stakeholders in co-creation (academia, industry, government, citizens), each instrument emphasizes one particular stakeholder group for its key input" (SCALINGS project deliverable D9.4).

The project had three main targets that placed emphasis on three different stakeholder groups:

- empower citizens: "We foster co-creation practices that are aligned with the needs, norms and values of local populations. To achieve this, we work in close cooperation with our case study partners and implement our findings in collaborative and reflexive settings. We hereby place great emphasis on questions of social justice, diversity, and inclusion. Not only does this contribute to better-targeted innovation practices and policy support, but also meaningful roles for citizens in the innovation process" (source project website).
- inspire policies: "We draft an EU Policy Roadmap to mainstream co-creation in a responsible and socially robust way. The roadmap is based on a comparative analysis of both existing co-creation policies across the EU and the specific opportunities and challenges for socially inclusive and diverse co-creation practices at the SCALINGS field sites. In this way, we synthesize our findings into a programmatic agenda that will help policy-makers harness international "best practices" in a manner that is suited to their own socio-cultural particularities" (source: project website).
- shape [industrial] practices: "We will shape industry and business practices by providing guidance for scaling up activities across contexts. As we cooperate closely with case study partners, we implement our frameworks for 'situated co-creation' and 'socially robust scaling' together with practitioners and thus co-create enhanced practices that feed directly back into their work and strategy. Moreover, we will disseminate our findings to other European consortia-in-the-making through a training program ('boot camp') to enhance their sensitivity for socio-cultural differences in co-creation while learning from international best practices (source: project website).

On the project website, co-creation is defined as follows: "Co-creation is a new approach to improving innovation processes and their outcomes. The term "co-creation" broadly denotes the collaboration of

diverse actors, such as companies, universities, policymakers and members of the public, in innovation processes. Co-creation is often understood as a way of sparking new ideas for innovation processes and making innovations more user-friendly and hence more successful on the market. However, at the same time, co-creation is also heralded as an opportunity for making innovation processes more socially inclusive and responsible because it allows innovators to integrate diverse actors into the innovation process. It is the latter perspective that we foreground in this roadmap". According to this definition, SCALINGS approach is based on 4H, but specific emphasis is placed on the scope of co-creation, which is to render innovation socially inclusive and responsible and for the "very communities for whom innovation ought to solve problems in the process of innovation itself" (Project Deliverable 1.3).

The main project outcome, which is the SCALINGS Roadmap, aimed at providing targeted information and recommendations to implement responsible and inclusive co-creation processes, identifies four main targets: policy-makers, funding institutions, co-creation practitioners and members of the public.

Dimension 2: Methods and Process

SCALINGS studied three co-creation instruments:

- Living Labs (LL). "LLs take the development of new technologies from traditional settings to real-world conditions. Within these sites, new forms of collective invention and experimentation test and demonstrate new technologies, as well as future sociotechnical arrangements".
- Public Procurement of Innovation (PPI). "PPI schemes put the public sector and its purchasing power among the primary drivers for addressing public concerns through the adoption of innovative solutions. As they steer the innovation process, public end-users also become co-creators by identifying collective needs and working hand-in-hand with solution providers".
- and Co-creation Facilities. "CCFs are open, physical, or virtual infrastructures for collaborative innovation. In addition to providing lab space, expertise, and equipment for internal staff and external users, they act as platforms for "Triple Helix" interactions between academia, companies, and policy makers".

The project applied these instruments across three technological domains: Robotics and Urban Energy, Autonomous Driving.

Instruments across sectors were studied in 10 EU countries: Austria, Denmark, France, Germany, Italy, The Netherlands, Poland, Spain, Switzerland, UK.

The project unfolded in three stages:
1) **collecting experiences on the ground** (qualitative analysis conducted by project partners in their respective territories). This stage was aimed at comparing different co-creation experiences (i.e., how different actors use co-creation instruments in different local and technological contexts, aiming to identify and reflect on similarities and differences, best practices or failures), involving key co-creation practitioners from different countries.
A total 40+ in-depth case studies, comprising 231 interviews, were conducted to investigate the state-of-the-art use of three co-creation instruments.
2) **test & engage**. Based on the findings of the first stage, through experimental interventions (such as joint workshops or co-creation activities), the project planned to feed back SCALINGS insights to the practitioner community, and to prototype and test enhanced co-creation practices, together with our technical partners, that are specifically attuned to their situated context.

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3) **disseminate**. This stage aimed at disseminating findings among diverse communities, reaching out to co-creation practitioners, technology developers and manufacturers, public authorities, citizens, students, and researchers.

Dimension 3. Outcomes and Impacts

Outcomes

- **SCALINGS interactive policy roadmap**: the tool provides co-creation organizers and policymakers with a set of prompts that can help steer their co-creation efforts towards more desirable, sustainable, and impactful outcomes. Also available in pdf/report form, here. The SCALINGS interactive roadmap offers a set of criteria formulated as assessment questions that empower co-creation actors to design co-creation activities that work in their specific context (instead of prescribing what co-creation must look like). The roadmap provides co-creation organizers and policymakers with a set of prompts that can help steer their co-creation efforts towards more desirable, sustainable and impactful outcome: Projects must develop socially inclusive recruitment strategies; Decision-making power must be shared between different actors; Social and technological solutions must be equally considered, no pre-commitments to technological solutions; Funders must build capacities to adequately evaluate co creation activities with regard to their role in and impact on a project's research agenda; Projects need to engage in a detailed context analysis to successfully transfer co-creation practices between different local settings; this will often require the inclusion of social scientists as part of the project team.

  Based on empirical research, SCALINGS partners systematized the various potential effects of cocreation in a SWOT matrix, including strategies for the future of co-creation in Europe. The content of the analysis focused on questions of social justice, equity, and inclusion. The research showed that policy issues regarding co-creation cluster specifically around five thematic areas: recruitment, decision-making power, technological vs. social innovation, co-creation as a funding requirement, scaling-up.
  For each of these areas, SCALINGS elaborated the strengths, weaknesses and opportunities of, threats to as well as potential strategies for the future of cocreation in Europe, and also provided case study vignette, to describe the different tensions that emerged from the empirical studies.
  The SCALINGS SWOT analysis: an overview (Deliverable D8.2: Roadmap)

Overview

	Strengths	Weaknesses	Opportunities	Threats	Strategies for the Future of CC in Europe
Participation	Opportunity to participate in technology design as a lay person	Opportunities for participation are socially stratified.	Democratization	Democracy for the few? Who becomes the *demos?*	Projects must provide detailed strategies for social inclusion across strata.
Decision-making	Multi-stakeholder approach	Power differential between stakeholders persists	Plurality of interests represented in technology	Tool to legitimize predefined technologies	Decision power must be shared and distributed between different actors.
Technological vs. Social Innovation	Technology development from problem-based angle	Exclusion of non-technical solutions	Actually tackling societal challenges	Reinforce technological fixes	Social solutions must be considered, too.
Funding	Funding requires citizen participation.	Citizen participation only included to fulfil funding requirements	Transformative effects across research and funding institutions; capacity building in the area of enabling participation	Participation becomes a check-box without transformative effect on research and development agendas.	Qualitative evaluation is needed of how citizen participation will impact research and development agendas before funding is granted.
Scaling-up	Potential of knowledge transfer between different co-creation projects	Knowledge transfer imagined as copy-paste	Knowledge transfer that takes situatedness into account (context analysis)	Failure of projects and method if situated context is not taken into account	Context analysis is required if practices shall be transferred between context.

- **Educational programs on co-creation** (university courses)

- **Development and implementation of a training program** ("boot camp") for current or planned H2020 consortia to enhance their sensitivity for socio-cultural differences co-creation

1

- **Peer reviewed publications.**

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy

The Social Impact Assessment at the basis of the SCALINGS Interactive Roadmap was complemented with an explorative analysis of key legal aspects that practitioners of co-creation must consider. Co-creation challenges existing legal frameworks in multiple ways by inviting the public into innovation activities that usually happen behind closed doors. SCALINGS legal experts have identified three domains of the law that are of particular importance: 1) public procurement law, 2) intellectual property law and 3) experimental law.

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SeeRRI

Building Self-Sustaining Research and Innovation Ecosystems in Europe through Responsible Research and Innovation

Key findings

- Creates the SeeRRI Framework to guide use of RRI in regional innovation policy
- Framework developed by and for QH territorial actors and tested in three EU pilot territories
- Each pilot territory focussed on an area, consisting in coastal issues, plastics industry cluster and zero waste
- Ongoing project has mapped out stakeholders using same guidelines yet showing highly context-specific territorial differences

Sources

W: CORDIS Website SeeRRI Project page, or SeeRRI website
D2.1 – Report on SEERI methodological guidelines for active mapping
D2.2 – Report on R&I ecosystem mapping of the territories from a comparative perspective
D2.3 – RRI within regional development policies: the case of Catalonia, Lower Austria and Nordland
D4.1 – Thesaurus and Conceptual Framework of Self-Sustaining R&I Ecosystems
D6.1 Plan for Activities Evaluation
D7.3 – Platform for Stakeholder integration

The SeeRRI Project: Framework and roadmap for RRI implementation

SeeRRI (January 2019 – October 2021) aims to create a general framework, the “SeeRRI framework”, and roadmap, that regions can use for guidance when seeking to integrate RRI into regional innovation policy while integrating territorial actors from industry and business to academia, policymakers and the public. This framework is developed with stakeholders from these different arenas and its implementation is tested in three pilot territories: Catalonia (Spain), Lower Austria, and Nordland (Norway), with an aim to subsequently sharing lessons and proposing governance strategies for different regional contexts beyond the three pilot territories. Each territory is focussed on one specific R&I area: “Responsible management of coastal areas” (Nordland), “The contribution of the plastics industry to a CO2 neutral economy” (Lower Austria) and “Zero Waste” (Catalonia).

Dimension 1: Actors (configurations and motivations)

Consortium breakdown

The consortium members are the following:

Name	Type (EU taxonomy)	Country
Nordland Research Institute (coordinator)	RO	Norway
Austrian Institute of Technology	RO	Austria
Innaxis Foundation and Research Institute	RO	Spain
WeDo Project Intelligence Made Easy	PFPE	Spain
Research and Innovation Management	PFPE	Austria
University of Haifa	HSEE	Israel
University of Bologna	HSEE	Italy
Universitat Autonoma de Barcelona	HSEE	Spain
Generalitat de Catalunya	PB	Spain
EcoPlus	PB	Austria
Nordland Flykeskommune	PB	Norway
NHO Nordland	O	Norway

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from project activities

At the current stage of SeeRRI, the detail of participants in the different project activities (e.g., workshop, conferences) has not been provided in the reports. The stakeholders expected to partake in the activities are presented in Dimension 2 and Dimension 3, since their definition, targeted interactions and roles played are part of both the methodological aspects of the Project and the envisioned SeeRRI framework.

Dimension 2: Methods and process

The SeeRRI overall process is in eight steps: mapping the R&I ecosystems in the three European territories of focus (Catalonia, Lower Austria, Nordland); developing a conceptual framework; involving relevant R&I stakeholders; implementing concrete activities; evaluating the implementation of these activities; validating the integrated framework; transferring learning and governance innovation; and consolidating all results for policy implications.

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Stakeholder mapping (sources: D2.3 and D2.2)

The first step, mapping the R&I ecosystem in each territory, has "two main goals: the systematic identification of the actors within the R&I ecosystems and their interactions and linkages; and the understanding of RRI inclusion within the regional development policy instruments and planning tools" (D2.3) RRI within regional development policies: the case of Catalonia, Lower Austria and Nordland). This step results in a comparative characterization of each region "in terms of their knowledge creation endowments, their institutional architectures and their thematic orientations". Public authorities, for instance, were questioned following seven "SeeRRI mapping dimensions": Governance; Public Engagement; Gender Equality; Science Literacy and Science Education; Open Access; Ethics; Sustainability. This mapping step enables the identification of these territories' R&I actors of different organizational types, their engagement in R&I activities of different forms, and their collaborations and engagements in regional, national and international networks (D2.2 Report on R&I ecosystem mapping of the territories from a comparative perspective). Therefore, this mapping seeks a "General ecosystem characterization" that looks into the territories' "Institutional composition" (industry, education, research organizations, consulting, government, other) and their "Sectoral composition and science disciplines" based on the International Patent Classification (IPC) for a range of topics (e.g., Chemistry and Metallurgy; Textiles & Paper; Mechanical Engineering, Lighting, Heating; Weapons & Blasting). "R&I actors and collaborations" are also studied to identify "the leading R&I actors – such as industrial firms, universities, research organizations, etc." based on patenting, participation in EU-funded FP projects and scientific publishing.

Citizen involvement (sources: D4.1

With regard to the nature of the stakeholder interactions, SeeRRI seeks to move away from a "mechanistic worldview" towards "a process of mutual learning" and "invites all territorial stakeholders to collaborate in co-creating the conditions for the R&I ecosystems to develop new patterns of relevance to address our existential challenges" (D4.1). In driving RRI deployment in R&I ecosystems, SeeRRI sees co-creation as "large scale pro-bono involvement of citizens in RRI activities" and as one of four structural factors alongside the "state-driven perspective", the "market-driven perspective" and "cultural change". The SeeRRI framework is "co-created with the stakeholders, among others by practicing Anticipation Exercises with them" (D4.1). Citizen involvement may however mean many different things, from a basic level of open consultation to stronger involvement through "citizen science" projects or even an actual co-creation with citizens of the agendas for future R&I activities. What is feasible and appropriate in terms of citizen engagement remains dependent on territorial specificities and in particular on the different cultures for public debate and decision-making" – for which Austria, Norway and Spain seem to have "quite different histories and practices". In Lower Austria, innovation processes are led by an industrial "Polymer and Mechatronic Cluster" which is specialized and dependent on certain industries that are being questioned in the light of sustainable development (e.g., plastics) with potential repercussions on employment; while in Catalonia, the government promotes "the emergence of a new space for engagement in which there is a community-oriented perspective" that involves the "construction of a new process involving local administrations, the business sector, NGOs and associations, and academic institutions in an unprecedented attempt to explicitly co-create desirable futures" (D4.1).

Dimension 3: Outcomes

SeeRRI framework

The core output is the "SeeRRI Framework", that is, "the creation – in collaboration with stakeholders – of an integrated framework for developing self-sustaining and responsible R&I ecosystems" (Source: Website). SeeRRI explicitly states co-creation as integral to such R&I ecosystems which must be "open to innovation, co-creation, users", and that to enable co-creation, "Science Literacy and Scientific Education" are key for making "the language and tools of science available to everyone" and "to better equip citizens with the necessary knowledge and skills so they can participate in R&I debates", and "increase the number or researchers (promote scientific vocations)" (D2.1).

Stakeholder engagement for RRI implementation in three territories

Stated outputs also include "identification of cross-country and interregional RRI collaboration opportunities among the three pilot territories and the affiliate territories", a "reorientation of the strategic focus of smart specialization strategy towards circular-economy driven policy in the pilot territories", and "implementation of RRI-based policies and initiatives internally in the partner institutions of SeeRRI" (Website). At time of writing, SeeRRI is currently in the process of engaging stakeholders, so the actual (rather than merely expected) project outcomes have yet to be determined. However, outcomes from three stakeholder workshop activities, one in each of the three regions, show that identified "allies" range from country, regional and national policymakers, companies, future employees, and R&I institutions (Nordland "We Want to use Natural Resources to create a sustainable society" workshop) to government, industry & intermediaries, researchers, educators, associations, independent professionals, communities (Lower Austria "CO2 neutral in 20 y with higher standard of living" workshop) and citizens, public administration, industry, academia (Catalonia "For a future proof economy based on a Zero Waste society" workshop), while the identified recipients of these respectively are consumers and society as a whole (Nordland), citizens as a whole and industry (Lower Austria), and citizens as a whole and the environment (Catalonia) (Website).

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mosaic

Sharing Cities

Innovation Action funded under H2020 - SCC-01-2015 “Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse projects” – 2016-2020

Sources

Website: project website https://www.sharingcities.eu/

projects deliverables:

D2.1 Methods Book of existing and next stage customer insight and engagement methods

https://nws.eurocities.eu/MediaShell/media/MethodsBookofexistingandnextstagecustomerinsightandengagementmethods.pdf

D2.2 Report on Community Engagement Hubs

https://nws.eurocities.eu/MediaShell/media/ReportonCommunityEngagementHubs.pdf

D2.5 Portfolio of co-designed urban services

https://nws.eurocities.eu/MediaShell/media/D2-5-Portfolio-of-codesigned-Urban-Services.pdf

Dimension 1: Motivations and Participants
Guiding Questions: *What are the announced reasons for the different Quadruple-Helix individuals and groups to come together in co-creation?* *Can we see a difference in the motivation of each corner of the Quadruple-Helix?* *What is the composition of those organising and taking part in the co-creation activities?* *Why have the organisers of the project’s different co-creation activities chosen this particular configuration of participants? Is there a clear rationale behind the choice of participants?* *In the description of the co-creation initiative, is it described what added value each participant group (e.g. Quadruple-Helix groups) brings to the activity? If yes, what is the announced added value?*
Consortium: 34 partners composed of 6 cities government, industry representatives, non-governmental organisations and academia from across Europe. Cities engaged in the project are Lisbon, London, Milan (Lighthouse cities that actually implemented replicable urban digital solutions and collaborative models); Bordeaux, Burgas, Warsaw (Fellow cities that worked in partneship with the lighthouse cities on solutions with high potential to be replicated within their own city). Goal of the project is to bring together different stakeholders from the 4H to create solutions to address the most pressing urban challenges such as energy use, low carbon transport, sustainable buildings and data harnessing for the good of the city.

The project builds on three principles:

1) PEOPLE: User-centric smart city services co-designed with citizens

2) PLACE: Infrastructure solutions for a) low-energy districts, b) e-mobility, c) retrofitting of buildings, d) installation of sustainable energy management systems and e) smart lamp posts. Demonstrator areas have been selected in all cities to test new technologies and measures engaging citizens.

3) PLATFORM: Urban sharing platform based on open data

The Community Engagement Hub is a crucial element of Sharing Cities, aiming at supporting the project actions to build low carbon neighbourhoods with actively involved citizens. Sharing Cities Community Engagement Hubs bring together local communities and innovation. The Community Engagement Hub aims to unite a range of stakeholders in one place with a shared purpose to help implement and support new mobility and energy solutions in Sharing Cities demonstrator areas.

Primary User Groups of these Hubs are: • People living in the demonstrator area (citizens) • Community groups • People working or studying in the demonstrator area • Local Businesses and SMEs

Secondary User Groups are: • Sharing Cities partners • Civil servants of the city • City decision-makers • Tourists • Investors.

Announced reason for USER RESEARCH (key citizens engagement step in the project):

Learn about the everyday lives of people who live/work within the demonstrator areas, understanding the problems they face, the things they like and the ideas they have.

Learn how those living in the demonstrator areas view the proposed measures and how they could be incentivized to use the measures, if at all.

Provide those involved in the co-design process with evidence and inspiration, on which to develop new solutions and refine the planned measures.

Develop the skills of local partners in conducting user research to inform future designs and decision-making.

Dimension 2: Methods and Process

Guiding Questions:

Which particular tools, methods, communication devices or settings are mobilised in the project?

Was the process of co-creation (a) stage-gate or (b) iterative?

Outline the key steps or elements in the co-creation process.

Which particular challenges were observed (e.g., resources in time or funding, legitimacy, flexibility between participants...)? Does the project face challenges in successfully implementing co-creation? Were these challenges subsequently overcome in the co-creation activity?

Which process elements are particularly striking and successful in the project?

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Different engagement actions: user research: digital diaries filled out by participants (citizens living in the demonstrator areas, 10 for each city) and interviews (in each city, 15 participants were scheduled to complete the interviews, some of whom would had also completed the diary study) conducted by researchers , developing user profiles – to inform the co-design teams about the types of people they are designing for - and identifying emerging themes – to summarise issues around the themes of mobility, energy and community. This stage was accompanied by two workshops to train the local project partners (one workshop to set the scene and one workshop to start the analysis of results). co-design activities to develop concrete solutions and services in the pilot area of each city, including workshops with local residents, students, different stakeholders, surveys, design competitions, surveys, meeting with citizens. online engagement (foster good behaviours, share practices, collaborative platforms to share services/needs, social network that provides rewards for good behaviours).

Dimension 3. Outcomes and Impacts
Guiding Questions: *What outcomes have been announced and/or demonstrated by the co-creation initiators and participants? More specifically, have any technologies, services or new organizational structures been produced by the co-creation activity?* *Have the co-creation processes and/or outcomes led to any desirable impacts and if so, in which areas (e.g., environmental, economic, institutional…)? Were specific indicators developed/used to develop the project's impacts?* *Have any changes in roles and practices of the participating Quadruple-Helix representatives been observed? Has there been institutional change?* *Are new forms of partnerships or relationships visible in the co-creation initiative or as an outcome of the co-creation activities?*
Output of "user research": 1. The profiles: The types of people they are designing for; 2. The emerging themes: The general issues arising around the focus areas of mobility, energy and community; and 3. The measures: Issues specifically relating to the measures. In addition to these outputs, the research teams identified a set of design considerations to inform the design of the measures.

A set of tools was also produced at this stage:

recruitment pack

toolkit for workshop 1 and 2

diary study pack

interview pack

analysis pack

report on engagement methods and methods library

Other project outputs:

co-designed infrastructure solutions for low-energy districts, e-mobility, retrofitting of buildings, installation of sustainable energy management systems and smart lamp posts

digital platform: urban sharing platform based on open data

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy

Some inspirations:

Each co-creation project will have specific roles for each type of participant, however, who decides on the roles and what form they take is a key issue. Are tensions observed in the co-creation initiative? Do "actors" follow their "scripts"?

Are details provided of changing worldviews?

Do all representatives of the Quadruple-Helix get fairly rewarded for participating in the co-creation activity? Can we see differences in the nature of these "rewards" for different types of co-creation participant? Specifically, how are citizens rewarded (financially or otherwise) for contributing to the co-creation activity?

Some of the lessons learned in terms of rewarding/incentives to participants:

MULTIPLE PARTICIPATION OPPORTUNITIES Provide a range of participation opportunities so that all citizens can shape the Sharing Cities measures. This includes opportunities requiring varying levels of commitment and time, that fit a range of skill levels, that are flexible, welcoming and held in convenient locations.

REWARD PARTICIPATION Participation can be encouraged by rewarding those that take part in the

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development of measures or those that bring others to community events.

User research (diaries and interviews):

All participants must be given an incentive for their participation (often vouchers are given in place of cash) but only on completion of the research activity • Those taking part in the diary study and interviews should be given their incentives at the end of the interview (to prevent withdrawals)

INCENTIVES It is common practice to provide participants with incentives for taking part in diary studies and in-depth interviews. How or what is given should correspond to the amount of effort required for each research activity. Usually, the greater the effort required, the greater the incentive provided. In the commercial world, money or vouchers from known high-street stores are the most frequently given incentives. In the Sharing Cities context, vouchers to municipal amenities or local businesses have been used. Whatever is used, it is important that incentives are given or the research will likely suffer.

SISCODE

Co-design for society in innovation and science

SISCODE aimed at stimulating the use of co-creation methodologies in policy design. In order to achieve this goal, the project consortium run a European wide research to understand the dynamics within these co-creation environments as well as the outcomes we can obtain from such approaches. These results were then compared to devise a set of co-creation methodologies suited for scalability and replication. The project used experimentation as a key element to succeed in its objectives. 10 co-creation labs spread around Europe worked with design-driven approaches to co-creation, generating real life knowledge. They each selected a challenge to tackle with local stakeholders to find solutions together.

Sources:

- Interviews with Marion Real, IAAC and Felicitas Schmittinger, POLIMI
- SISCODE toolbox for cocreation journeys
- D3.5 Assessment report
- https://siscodeproject.eu/

Consortium breakdown

The consortium members are the following (see table below):

POLITECNICO DI MILANO	Italy	Higher or Secondary Education Establishments
AGENZIA PER LA PROMOZIONE DELLA RICERCA EUROPEA	Italy	Research Organisations
TECHNISCHE UNIVERSITAT DORTMUND	Germany	Higher or Secondary Education Establishments
Ecsite	Belgium	Other (network)
STICHTING MUSEUM VOOR INDUSTRIE EN SAMENLEVING	Netherlands	Other (museum)
SPI	Portugal	Private for-profit entities
INSTITUT D'ARQUITECTURA AVANCADA DE CATALUNYA	Spain	Research Organisations
CIENCIA VIVA-AGENCIA NACIONAL PARA A CULTURA CIENTIFICA E TECNOLOGICA	Portugal	Other (museum)
ASSOCIATION TRACES THEORIES ET REFLEXIONS SUR L APPRENDRE LA COMMUNICATION ET L EDUCATION SCIENTIFIQUES	France	Other (museum)
ARISTOTELIO PANEPISTIMIO THESSALONIKIS	Greece	Higher or Secondary Education Establishments
UNIVERSITY COLLEGE LONDON	UK	Higher or Secondary Education Establishments
BIOSENSE INSTITUTE - RESEARCH AND DEVELOPMENT INSTITUTE FOR INFORMATION TECHNOLOGIES IN BIOSYSTEMS	Serbia	Research Organisations
Science gallery Dublin	Ireland	Higher or Secondary Education Establishments

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KRAKOWSKI PARK TECHNOLOGICZNY SP ZOO	Poland	Private for-profit entities
DESIGN SOCIETY FOND	Denmark	Other
MAKEA INDUSTRIES GMBH	Germany	Private for-profit entities
MAKER	Denmark	Other
EUROPEAN NETWORK OF LIVING LABS	Belgium	Other (network)

Dimension 1: Motivations and Participants
SISCODE labs tried to involve all Quadruple Helix stakeholders in the co-creation process with a special focus on policymakers. The types of stakeholders that were targeted were policymakers and decision makers, researchers, innovators, members of the industry, the general public or end users. Sometimes NGOs were also involved. Depending on the challenge of a certain lab different types of stakeholders were selected. For example, if the lab's desired outcome was to develop a new policy, their primary target would be policy makers. All labs started their activities with a stakeholder mapping/identification exercise. The original plan was to have all quadruple helix stakeholders represented but it was not compulsory to have all, it was rather focused on the chosen challenge. In Barcelona, the lab focused on creating a circular district and the use of food waste to provide new forms of materials/products. Participants were restaurants (companies), designers/makers from Fablabs, local associations (urban gardens), city administration and makers innovators. No big difference in motivations of stakeholder participation was observed. One aspect that assured motivation of stakeholders was that every lab chose the challenge that was important for them (they knew it was local or national, they knew there were stakeholders that were interested in solving it). A stakeholder persona canvas was used. Labs tried to map their motivations and barriers beforehand, but the main interest came when the activities started, there were some surprising findings. It was interesting that in some cases policy makers said it was important for them and they were interested from a personal point of view. Having said that, policy makers were the hardest to engage in the labs. There were some stakeholders that didn't participate but it was already hard to manage 10 of them. For private companies it was sometimes hard to attend meetings due to the limited resources, but they were motivated. Usually, the kinds of people that were gathered already had a co-creation mindset. Due to the nature of the co-creation activities as being entirely open-ended, the roles and therefore levels of engagement and involvement of stakeholders may change throughout the process. This demands for a regular check and evaluation of the initial mapping of stakeholders and their roles within the process. As part of the self-assessment, labs have been asked to upload their current stakeholder map in the beginning and the end of their journey. The request served the twofold function of providing valuable material for drawing some conclusions in terms of evolution of the stakeholder engagement through time, and also served to labs themselves as a means of reflection. Mapping the stakeholders in two different moments of the process allowed them to observe changes, transformations, and even shifts of roles.

Dimension 2: Methods and Process
The SISCODE co-creation methodology was based on the co-design process and it consisted of the following key phases: ● Analyse context: what is out there, what was in the field, mapping stakeholders, seeing the

entire context

- Reframe problems: narrow the challenge down to specific problem together with stakholders
- Envision alternatives: ideation phase, try to find solutions, narrowing it down to final concept/solution.
- Develop and prototype: trying to make these solutions real and tangible – this phase was repeated at least twice.

The model was iterative – the first stage happened in 6 months, then there were two loops of experimenting/prototyping. The difficulty in having such iterative approach was that it was challenging to know when to do the iteration as it depended on the ecosystem and the type of change. Sometimes there was a need to make a short loop, sometimes it had to be very long. For example, when developing a software you can take a lot of time iterating. On the other hand, in educational projects, they had to fit with school years. Sometimes they wanted to go fast on prototyping. Sometimes prototyping could help better understand the problem.

A lot of different challenges were observed for every lab. First, in bringing so many different participants together. Everyone's voice needed to be equal, citizens needed to feel comfortable talking to policy makers and experts. Whereas in turn the expertise of citizens should be recognised too. Not everyone spoke the same language, not in terms of laws or technical issues, rather sometimes professionals were focused on the technicalities of the topic and citizens on everyday life. It was important to make everyone feel aligned and comfortable. Some partners e.g. KTP decided to separate citizens and other stakeholders. It was very important in the beginning. They were more comfortable to express themselves separately. The overall issues of alignment was complex as there was also the issue of capacity from the lab's team. They needed to move forward. It was often hard to make collective decision. It was not so much about collective governance, but rather diverse perspectives to prototype and design. From co-design to co-productions there are so many dimensions.

The design perspective was particularly successful in the whole process. If people who worked in a group had the value of cocreation and curiosity to explore together, the process worked. If there is a good outcome in terms of prototypes, it could serve many purposes. The whole process doesn't become just theoretical, it becomes tangible. One thing is to talk about air pollution, another thing to talk about a specific programme to reduce air pollution. It really helps shape the object of discussion. The discussion can go beyond but having something tangible to start with is important.

Dimension 3. Outcomes and Impacts

The outcomes of the co-creation process were mostly prototypes that ranged in nature depending on the lab. There were some new materials and programmes: a set of products/materials for moist, an incubation programme and an exhibition, an ecosystem model for food waste material on a the district level, circular ecosystems for plastic recycling. There were a lot of educational programmes: a new high school module focusing on ICT and precision agriculture in Serbia, an education module on mental health in Ireland. One of the few technological prototypes came from Milan: a therapy system for children suffering from cerebral palsy, a smart bracelet that can transform movement into sound. In Copenhagen they developed new products from plastic waste, they engaged with makers who were producing products from these materials. In Poland a new policy programme for air protection was develop.

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In terms of indicators and assessment. The original plan was to assess the prototypes, however as they were so different in nature and dimensions, it was very difficult to assess them in comparable way. Sometimes the prototype was not so interesting but there was a huge change in the institution.

Some institutional changes were observed although they varied in nature and size of institutions. Most partners reported that SISCODE provided a great learning and capacity building opportunity for cocreation. For FabLabs it was nice to go beyond technology, there is a need to upscale in terms of system and service design. In the Barcleona FabLab, there was an experience before on codesign, citizen science projects, there was a culture to work with citizens. What came from SISOCDE was the ability to better organise work internally. Now there is new process in the organisation that makes sure resources are distributed wisely. Also, now there is a common knowledge hub in the neighbourhood for discussion on how to engage with different stakeholder, how to run another cocreation activity. The partner from Poland, decided that cocreation is something that should be done in the future, they created a team responsible for cocreation.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy

Stakeholders and actors appear to shift their role not only by taking an active part in cocreation activities, but starting being involved even before the beginning of the initiative, as a part of the entire set-up. However, their active involvement as well as their contribution need to be planned and assessed apart, in order to increase consistency and alignment. This means eventually requiring a preliminary involvement for aligning expectations and commitments. These aspects have often not been considered from the beginning, but they emerged during the co-creation process underlining the importance of the role that stakeholders play beyond their direct contribution to the ideation and development of the prototype.

The complexity of capacity building in co-creation has been pointed out several times, especially in relation to the choice, adaptation, and application of its tools and methodologies. These appear to require a certain guidance or knowledge in order to be applied correctly. Moreover, if a learning-by-doing process is combined with other novel practices like novel techniques or environments for stakeholder engagement it bears the risk of being too overwhelming for the acquisition of new capacities. One potential solution for a step-by-step learning process has been identified in the creation of a safe space during internal meetings and activities: an opportunity for experimenting and discussing practices before running into their application, where to explore possibilities and possible issues ahead of time, and without the necessity to deal with the complexity of stakeholders and the development of solutions at the same time.

SMART-map

http://projectsmartmap.eu/
SwafS project

Dimension 1: Motivations and Participants
Guiding Questions: **63** *What are the announced reasons for the different Quadruple-Helix individuals and groups to come together in co-creation?* **64** *Can we see a difference in the motivation of each corner of the Quadruple-Helix?* **65** *What is the composition of those organising and taking part in the co-creation activities?*[22] **66** *Why have the organisers of the project's different co-creation activities chosen this particular configuration of participants? Is there a clear rationale behind the choice of participants?* **67** *In the description of the co-creation initiative, is it described what added value each participant group (e.g. Quadruple-Helix groups) brings to the activity? If yes, what is the announced added value?*
SMART-map is a SwafS EU-funded project which ran for 30 months from May 2016 to October 2018. Fondazione Bassetti was part of the consortium, acting as deputy-Coordinator. The consortium didn't resemble the QH since policymakers were not included but in the implementation of the project activities the participation of decision-makers as well as regulators was highly requested and achieved in all the key stages of the project. Some outcomes (Smart Maps) were also addressed to policymakers of innovation ecosystems. Primary scope of the project was to co-produce (in terms both of co-design and co-creation) feasible tools and processes to introduce and test RRI in three cutting edge technological industrial settings, such as precision medicine, synthetic biology and 3D printing in biomedicine. The industrial focus obliged the consortium to specifically look to innovation landscapes linked to the market and then to explicitly involve industrial actors and the wider QH community revolving around the 3 explored tech fields. Part of the process of the project was inviting QH actors to dialogue – through ad hoc multi-stakeholders workshops called Industrial Dialogues - in order to identify reasons and motivations for embarking on RRI, useful ways to do it in industry-led pathways through the co-design of a list of RRI toolboxes. For each tech theme, one or a few tools were selected to be tested in pilots (co-led by one of the partners of the project and one industrial selected actor), running during the project timeframe. The stage of the pilots was the occasion to test the toolboxes, that in some cases entailed co-creation exercises. The list of motivations to embrace RRI - and thus performing co-creation and multi-stakeholders processes- emerged during the project have been collected in the final outcomes "Report on Industrial Development of Precision Medicine/SynBio/3DMed" in which a specific chapter was fully devoted to the benefits of implementing RRI. The benefits clearly highlighted the added value brought to the activity by using multi-stakeholder processes and in particular through the involvement of citizens and/or patients (the focus of 2 out of 3 themes application was the health realm).

Dimension 2: Methods and Process
Guiding Questions: **68** *Which particular tools, methods, communication devices or settings are mobilised in the project?*

22 For SwafS and other H2020 projects, it is also useful to study the composition of consortium members, which are involved in running the overall project.

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69 *Was the process of co-creation (a) stage-gate or (b) iterative?*[23]
70 *Outline the key steps or elements in the co-creation process.*
71 *Which particular challenges were observed (e.g., resources in time or funding, legitimacy, flexibility between participants…)? Does the project face challenges in successfully implementing co-creation? Were these challenges subsequently overcome in the co-creation activity?*
72 *Which process elements are particularly striking and successful in the project?*

As previously mentioned, there was no particular pre-selected co-creation approach, but co-creation processes were part of the activity of the project in identifying and selecting useful and concrete approaches and methods to bring RRI in industrial settings. In doing this, some co-creation experiences and methodologies have been co-designed and listed in the three topics-related RRI Toolboxes and then tested (one shot) once selected for the pilots.

In the case of Precision Medicine pilot, co-led by a company – partner of the project – and the University of Aarhus (coordinator of the project and also working on this tech topic) a Spanish-based end-users panel has been implemented, involving both local health professionals and patients representatives, already somehow in contact with the organizers. The panel took place in a sole 1-day event held in person in Madrid , even if the organizer firm was based in Valencia. The panel aimed at collecting feedback on the prototype of a new product in the pipeline of the organizer company and fresh ideas on services to complement the launch and the usage of the new product. The health professionals panel was moderated by a person of the company, previously briefed. The patients panel was conducted by a representative from Aarhus, experienced in participatory processes and fluent in Spanish.

In the case of the 3Dbiomed pilot, an international multi-stakeholder workshop has been set to discuss and co-produce recommendations – RRI-by design – for new technical standards for producing 3D printed protheses. The co-leaders of the pilot were FGB and the coordinator of an EU H2020-funded project (SYMBIONICA) on 3Dmed, which is an Italian company. The format of the dialogue was conceived ad hoc by FGB and conducted for 1.5 days in English by FGB as well. Members of the consortium took part in the workshop as participants together with the external guests. Main challenge in this experience was the involvement of patients/civil society representatives, not so familiar with technical and mandatory procedural requirements pre-marketing (standards, certification). Several attempts to engage societal actors have been made even if unsuccessfully.

Dimension 3. Outcomes and Impacts

Guiding Questions:

73 *What outcomes have been announced and/or demonstrated by the co-creation initiators and participants? More specifically, have any technologies, services or new organizational structures been produced by the co-creation activity?*
74 *Have the co-creation processes and/or outcomes led to any desirable impacts and if so, in which areas (e.g., environmental, economic, institutional…)? Were specific indicators developed/used to develop the project's impacts?*
75 *Have any changes in roles and practices of the participating Quadruple-Helix representatives been observed? Has there been institutional change?*

23 Stage-gate means that there is a period of action reaching a milestone, and then there is a next phase of the exercise. Iterative means that the process goes through one cycle, and then reiterated, with learning and feedback loops.

76 *Are new forms of partnerships or relationships visible in the co-creation initiative or as an outcome of the co-creation activities?*
Precision Medicine pilot. The pilot – as well as the co-creation approach – was positively assessed by the participants but above all by the company/partner of the project which gathered novel ideas to refine its product but also insights on novel services relying on a continuous involvement of stakeholders. Suggestions emerged in the panel were effectively taken into consideration and used by the company already during the project lifetime. **3Dmed Pilot.** Reflections emerging from the workshop have been used and mentioned in a STOA work on regulating 3D printing applied to the health sector. The consortium, thanks to the experience in SMART-map enhanced the willingness to involve stakeholders in the project activities, but just in terms of recommendations for the partners and as sort of legacy of the project (no further co-creation activities were performed). Summative and formative evaluation was performed by a partner of the consortium within the project but at general level (not specifically addressed to the co-creation actions). A further evaluation was also conducted as a self-assessment (satisfaction rate) by the firms involved in the pilots before entering the pilot and at the end of the process. The satisfaction grid was produced by FGB and Aarhus with the support of the Advisory Board of the project.

Dimension 4. Other striking characteristics, insights and experiences that are noteworthy
Some inspirations: ● *Each co-creation project will have specific roles for each type of participant, however, who decides on the roles and what form they take is a key issue. Are tensions observed in the co-creation initiative? Do "actors" follow their "scripts"?*[24] ● *Are details provided of changing worldviews?*[25] ● *Do all representatives of the Quadruple-Helix get fairly rewarded for participating in the co-creation activity? Can we see differences in the nature of these "rewards" for different types of co-creation participant? Specifically, how are citizens rewarded (financially or otherwise) for contributing to the co-creation activity?*
Precision Medicine pilot. At the end of the project the company decided to appoint a person (actively involved in SMART-map and in the pilot) in charge of RRI actions for the firm, developing a factual *institutional change*.

24 Organisers of co-creation processes may normatively prescribe the roles of the various members of the Quadruple-Helix, which may close down certain pathways of co-creation. One can think, for example, of "smart" ideologies which may reduce creativity by inscribing citizens as predetermined data collectors rather than insight providers. By "prescribed" we mean that the roles of certain actors within the co-creation activity are decided upon and incorporated into the co-creation process by another actor. For example, in the SwafS co-creation project *WeCount*, we can see that the system of traffic monitoring is co-created between small firms, public authorities and citizens, but the role of the citizen is prescribed to be "citizens as data gatherers" using technology that has been previously developed by private initiatives. In this sense, citizens follow a "script" that is embedded in the project. For those interested in the theory behind "scripts" see Madeleine Akrich "The de-scription of technical objects." (1992): 205-224.

25 Whilst being beyond the scope of the co-creation review, how participants in co-creation activities may change their worldview and then enact in their day-to-day life is of key interest. For example, a member of a firm may participate in a co-creation activity, and not only gain knowledge about the innovation focus, but may also change their view on their own practices (institutional change). SoScience provided an example of this in a "Future Of" activity in Packaging innovation.

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No reward has been foreseen for the patients/patients' associations involved in the panel.

3Dmed Pilot.
Not applicable.

Co-creation is not mentioned as such in the project dissemination/outcomes documents.

Suez / TAPAJ

SUEZ, a French utility company, and TAPAJ, a professional inclusion program, have collaborated to provide work to young people in very precarious situations. This co-creation initiative does not include a technological or scientific dimension, but is an example of social innovation which succeeds in meeting business and social needs at the same time, and is thus worth a study case.

Dimension 1: Motivations and Participants

Suez is a French-based utility company mainly operating in the water and waste management sectors, it is the largest private water provider worldwide, by number of people served. Their social innovation department focuses on circular economy, employment and ecological transition, within the perspective of finding other complementary actors (and in particular social entrepreneurs) with whom to collaborate in order to scale their impact.

TAPAJ which stands for “Travail Alternatif Payé à la Journée” (namely, “Alternative Work Paid by the Day”) is an access to employment scheme, initially deployed in Canada in 2000 by a local non-profit organization. The program was born out of the realisation that very little was done, in terms of professional inclusion, for people that were already in situations of total exclusion. TAPAJ is intended for young marginalised people, from 16 to 25 years old, often living on the streets, facing addiction issues, and who cannot be supported by more conventional integration mechanisms. It provides them with work paid at the end of the day, that does not require any qualification nor any long-term commitment. They are additionally supported by psychologists, education workers and health professionals, to help them find a way out of exclusion. This introduction scheme was first taken up in France in 2012 by the Studies and Information on Drugs Committee of the city of Bordeaux and then benefited from the support of the inter-ministerial Mission against Drugs and Addiction of France. A non-profit organization, TAPAJ France, was created in 2016 to lead, structure and assist the network of TAPAJ initiatives that have been locally replicated in other cities since.

The collaboration between Suez and TAPAJ - whose different steps will be further detailed in Dimension 2 - started in 2014. This partnership provides TAPAJ with labour opportunities they can offer to the young people participating in the inclusion scheme (called the TAPAJeurs). Finding a company or organization with whom TAPAJ can build a trusting relationship is indeed integral and necessary to the operation and viability of the program. On its side, Suez is interested in this collaboration within the context of a differentiation strategy: including a social dimension in their services is an added-value that can be attractive for their clients. Indeed, many cities do not know how to provide efficient and sustainable assistance to these young people, nor how to address the problems posed by their presence in the streets for local businesses for instance. In addition, the works carried out by TAPAJeurs (like manual weeding) come to complete the commercial offer of Suez with services that are not part of its core business. TAPAJ and Suez motivations (and even Suez clients’ ones) thereby complement one another in a win-win approach which manages to combine social and business needs.

Dimension 2: Methods and Process

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The collaboration between TAPAJ and Suez enters the scope of co-creation, as it goes beyond a simple provision of services or subcontracting.

Overview of the collaboration

Suez and TAPAJ began to work together in 2014. They first tested each other on small missions, internal to Suez at first. TAPAJeurs contributed to their office relocation or desarchiving for instance. These punctual services were part of a broader acculturation process, which revealed quite long and demanding. Among others, this process required a very sustained dialogue between the Social Innovation Director of Suez and TAPAJ Director. As a private company and a non-profit organization working in radically different worlds, the two structures had to understand each other's issues, needs, expectations and possibilities for action. A skills-based sponsorship was implemented by Suez to train TAPAJ teams about the diverse roles and missions of private companies and help them develop their commercial offer. This sponsorship was useful for TAPAJ beyond its collaboration with Suez, as they were seeking to work with other companies as well.

In 2018, they finally answered a call for proposals to sign a public contract about the urban cleanliness of the French city of Bordeaux. To do so, they partnered with two social enterprises: Eco Mégot which develops solutions to avoid cigarette ends thrown on the ground, and L'Atelier Remuménage which offers solidarity and sustainable removal services. The four of them won the call for proposals as co-contractor for four years, which marked a significant step forward in their collaboration. While Suez continues to appeal to TAPAJ for punctual missions, they have also extended their collaboration as co-contractors to other territories, by winning calls for applications in Dijon and Lyon for instance. TAPAJeurs are solicited there to offer services of cardboard collection on bikes, of weeding without pesticides, or of litter detection and removal. Suez is also present in national seminaries organized by TAPAJ France and other additional events, to see how they can further work together.

Obstacles encountered

The first and major challenge that TAPAJ and Suez had to overcome was understanding each other. The first exchanges revealed a deep mutual incomprehension, as the culture of the two organizations differed dramatically. Even before trying to understand their respective perspectives, they had to familiarize themselves with the professional jargon that the other was using. This acculturation process thus required time and patience. TAPAJ, as a quite recent association led by social workers, was not used to exchanging with private companies, and even less with groups as large as Suez. Likewise, Suez was not familiar with the specific social issues that TAPAJ was addressing (concerning the situations of total exclusion of some young people), and especially the medical, psychological and education issues they were referring to. The workshops organized as part of the skills-based sponsorship, but also - and even more - the punctual missions they set up, led them to start putting themselves in the position of the other, and thus to understand their respective concerns and expectations. But greater progress was made when they co-constructed their answer to the call for proposals of Bordeaux and had to concretely imagine a broader and longer-term collaboration. In brief, a persevering step-by-step approach was key to building a trusting and transparent relationship.

Another impediment to the collaboration - not completely unrelated to the previous issue - was the stereotypes that were associated with the social innovation that TAPAJ was developing. Patient effort to explain and raise awareness were necessary to make the collaboration successful. Some Suez employees could for instance be reluctant to see TAPAJeurs coming to their workplaces. The city of Bordeaux which launched the call about urban cleanliness had many doubts at first, as they feared the collaboration was not sufficiently viable and professional, almost 'too social'. It was indispensable to overcome these stereotypes and build trust, since the support of those other stakeholders (like the

city) was necessary to find more work opportunities around which TAPAJ and Suez could collaborate. The most efficient way to do so was to concretely show on the field that their partnership was working.

Dimension 3: Outcomes and Impacts

As mentioned, the collaboration between TAPAJ and Suez resulted in the winning of calls for proposals in Bordeaux, Dijon and Lyon, which benefited both to Suez business activities and TAPAJ social mission. It therefore met their respectives motivations, by contributing to the differentiation strategy of Suez and providing opportunities of employment that TAPAJ could put at the service of its social and professional inclusion scheme.

This collaboration also enabled TAPAJ to gain in visibility, to find other partnering private companies and to extend their activities to other territories than Bordeaux (where it originated), thus scaling up its impact. Showing that they could partner with a large group like Suez helped them reinforce the credibility of their offer. In particular, starting from the acculturation phase, TAPAJ has learnt to familiarize itself with the business world, as well as to better identify which services they could solicit for their TAPAJeurs. TAPAJ is now present in 46 territories, has 145 public and private partners and has worked with 2,500 young people since 2016. Studies on the TAPAJ scheme (especially on the comparison of its deployment in Canada and France) were conducted from 2017 to 2019 by Canadian universities and ministries who solicited Suez for their analysis.

The partnership they built finally contributed to change mentalities about people in very precarious situations or facing drug addiction issues. Suez employees and the inhabitants of the cities where TAPAJ and Suez won the calls for proposals began to overcome the stereotypes they had on these young people, by seeing them directly working on the field. Public authorities who were reluctant at first and did not really believe in this social innovation also changed their minds. These people in isolation situations also changed perspective on themselves, by recovering more dignity and progressively opening their future perspectives.

Dimension 4 : Other striking characteristics, insights and experiences that are noteworthy

This study case highlights how business and social concerns can be combined through a co-creative approach. As this requires much perseverance, a key success factor is to have ambassadors in each organization who are determined to co-construct and implement solutions together. Those ambassadors who learn to familiarize themselves with the other's culture have a crucial role of intermediary to play, as they are able to build bridges between the two organizations. This role is all the more important when they hand over a project to the operational teams (once the project they designed as co-contractor must be implemented) who are less familiar with the collaboration.

* * *

Sources:

77 Interview on July 27th 2021 of Benoit Bonello (Social Innovation Director at Suez)

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78 Presentation of TAPAJ by the MILDECA, the inter-ministerial mission against drugs and addiction of France (https://www.drogues.gouv.fr/sites/drogues.gouv.fr/files/atoms/files/tapaj_fr_can_v2_def.pdf)

The Future Of Waste

The Future Of (TFO) is an open innovation program designed by SoScience aiming at creating new research and innovation collaborations with positive business and societal impact. It involves a wide variety of actors, like private companies, research institutes, NGO/NPO, social entrepreneurs, incubators or local authorities. Nine editions of the program have so far been conducted up to 2021, each addressing a specific social or environmental issue, such as plastic waste or urban agriculture. This study case will focus on the fifth edition of the program, The Future Of Waste (TFOW).

Dimension 1: Motivations and Participants

TFOW was organized in 2018 by SoScience, a company specialized in Responsible Research and Innovation (RRI) and in new practices of collaboration resulting in projects having social and environmental positive impact. It partnered (as a service provider) with Diana Symrise (a food company delivering three industries - human food, pet food and aquafeed) and the IRD (the French National Research Institute for Sustainable Development). Diana was motivated by the industrial necessity to find sustainable ways of production and consumption, a necessity accentuated by the current environmental crisis and increasing demand for food. Communication and branding issues were not what prompted the launch of TFOW, as Diana delivers its products to other industries and is thus less concerned with its image among final consumers. It was genuinely looking for scientific and technological innovations in the valorization of food waste and found in the TFO program a new way of finding relevant partners to collaborate with. Its R&D Director initiated the program and employees from other departments were also involved, while the CEO validated the results. SoScience had already developed other TFO editions in partnership with the IRD, interested in engaging in multi-actor programs that can help them find applications of their research, especially in developing countries. Mainly regional directors participated in the different workshops, along with knowledge transfer officers.

Following an international call for applications launched by SoScience and its two partners (further detailed in Dimension 2), 48 candidates from 9 nationalities around the 5 continents were finally co-selected by SoScience, Diana and the IRD to attend the meeting day of the program, ideally tailored for 30 to 50 participants. The candidates were assessed on their motivation and their potential for collaboration: their activities had to be relevant with respect to the announced scope of the program and future synergies among them could already be envisaged. The diversity of actors was closely monitored, as it is a constitutive desired feature of all TFO programs: the selected attendees were social entrepreneurs and start-ups (34%), companies (26%), researchers (23%), 'boosters' such as investors (14%) and NGO/NPO (3%). This variety of actors accordingly matched a range of different reasons to engage in the program, often combining economic or business motivations with R&D or technological needs (that both require finding new partners), along with social and environmental concerns. The call for applications was only addressed to structures, not to individuals, since the program aimed at gathering profils already having a precise expertise or a lasting power of action.

The Quadruple Helix model does not exactly match the categories usually used by SoScience. Companies and researchers can of course still be affiliated to their countervailing branches of the Quadruple Helix, and NGO/NPO to the Civil Society Branch. Social entrepreneurs hold a special intermediate place, as they are individuals from the Civil Society Branch building emerging structures to engage in the Company Branch. The 'boosters' category is even more transversal: in TFOW case,

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they included knowledge transfer officers from research institutes (therefore belonging to the Academic Branch), startup incubators and consulting firms (from the Company Branch), local authorities and public investment bank (from the Public Agency Branch) and a Think Tank (itself consisting in individuals from diverse branches but as a whole coming from the Civil Society Branch). Distinguishing the participants in this way was deemed more adequate in the context of the program, to better reflect their diverse types of expertise and respective contributions and needs.

Dimension 2: Methods and Process

Since the work prior to the meeting day of the program is essential to ensure that concrete co-creative projects can emerge from the day, we will detail all the phases that composed TFOW (and which in fact make up any TFO edition).

Preparation and scope. SoScience organized a workshop with Diana and the IRD whose goal was to delineate the scope of the program. Through brainstorming and clustering sessions, design thinking methods and small group discussions, a key question corresponding to Diana's needs was first obtained: how to further improve the industrial valorization of fruit and vegetable waste? This question had to be precise enough so that future participants would be working on fields sufficiently related to make co-creation projects possible, but had to be sufficiently large so that enough actors with diversified expertise felt concerned by the call for applications. Diana was initially interested in finding innovative solutions to valorize banana peels, but they understood during the workshop that they needed to enlarge this scope.

The call for applications was disseminated by SoScience, Diana and the IRD, and their respective networks, while a few specific key organizations were also directly solicited to participate in the program. A month before the end of the candidacy period, SoScience organized a first round of selection with Diana and the IRD: they sorted the candidatures already received and identified the missing profiles, in particular by closely looking at the proportion of participants coming from each category (i.e. companies, startups, research institutes...). SoScience took advantage of the remaining month to target those missing profiles. A second workshop then finished sorting the candidates who were informed of the selection result. A week before the meeting day, each participant received a report with a short description of the other attendees, featuring their expertise and external needs. They could thereby already start to imagine some complementarities prior to the event.

The meeting day gathered all the participants selected. It began with six pitches of 20 minutes given by participants and chosen to cover a large range of topics which gave a general overview of the challenges related to food waste valorization and some ideas of solutions. After each pitch, SoScience drew attention to possible synergies that could emerge with other attendees identified beforehand. Afterwards, an open-forum consisting of two rounds of 1h15 discussions was organized: after selecting topics of interest (such as "Organizing a circular valorization system: barriers and needs"), participants chose their round tables. They were however encouraged to move throughout the entire open-forum with the aim of always being where they felt the most useful and inclined to develop new ideas of collaboration. The breaks and the lunch were also opportunities to exchange more freely, discuss new topics with yet unknown participants or explore an idea that had already come up. All along the day, attendees were invited to stick their intentions of collaboration on a wall. Each participant had its own profile pasted on it and could use post-it notes to suggest an idea on someone else's profile.

Participants could then gather accordingly and deepen these ideas at the end of the day when a one-hour time slot was scheduled for that purpose.

The success of the meeting day crucially relied on the previous phases of the program: it depended on whether the scope had been judiciously defined, the call for applications well disseminated, the sourcing and the selection of the participants relevant. The good execution of all these steps, along with a careful practical organization of the event itself, aimed at creating an environment conducive to co-creation.

The monitoring phase. After the meeting day, SoScience asked the participants willing to seriously develop their collaborative intentions to send a description of their projects within the month. The goal of this task was not only to refine the projects themselves, but also to see how participants would interact on their own after the meeting day and thus to assess their motivations. Three projects were selected, based on their potential impact and viability, to benefit from a 6-month follow-up program by SoScience and from the opportunity to further collaborate with Diana and the IRD. Their respective announced goals and outcomes will later be detailed in Dimension 3. The purpose of this support phase was to enable these three collaborative ideas to turn into concrete projects. Depending on their specific needs, SoScience's support could consist in:

- structuring the project and facilitating the collaboration between all the actors involved (via project management tools, frequent meetings or longer workshops...),
- using its network to provide the expertise needed (whether it be legal, scientific, commercial...),
- searching funding that the project could be interested in,
- giving more visibility to the project (through its network, media, events, newsletters…).

Following the meeting day, the main obstacle that TFOW faced was a lack of foresight with respect to funding for the development of the projects. In addition, Diana had neither planned any internal resources nor specific funds destined to the follow-up phase by SoScience whose support, as a trusted third party, was yet essential for the success of such emerging multi-actor projects. For instance, arranging regular meetings, conceiving a timeline for the project and providing a co-creation methodology (by assigning roles, stating respective expectations, etc.) speed up decision processes - which otherwise tend to overly lengthened - and favor dialogue among all the stakeholders rather than letting discussions being conducted internally in the corporation involved.

The workshops and the meeting day of TFOW were held in person, but other editions of TFO program have also been successfully conducted online following the COVID-19 crisis. The platform Discord provides an environment that greatly eases the communication between the participants because it allows them to freely circulate between the different vocal channels and to discuss with the participants of their choice (during the open-forum or free-format breaks for instance). Mural is a convenient platform to conduct online workshops or to replace the physical wall of collaboration used during the meeting day.

Dimension 3: Outcomes and Impacts

20 collaborative projects emerged during the meeting day. One month later, 4 projects involving a total of 10 structures were willing to continue and applied to the follow-up program. This conversion

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rate from 20 to 4 projects could in part be explained by the lack of dedicated fundings from Diana for the three future projects, which consequently discouraged some teams from further developing their ideas. Here is what the selected projects were about and how they evolved:

- The Industrial AgroBiotechnologies Chair of AgroParisTech (the higher education and research Institute of Technology for Life, Food and Environmental Sciences) collaborated with the Micronut team of the University of Avignon to extract and purify acids contained in olive pomace to valorize them through health applications or food flavourings and fragrances. They started to carry out tests and signed a contract to continue to further collaborate.

5 The Food Technology Institute in Senegal wanted to join forces with ESPERE (a cooperative specialized in the training and monitoring of organizations to integrate sustainability principles in their strategies) and SOGEVADE (a Senegalese company specialized in waste valorization) to structure an integrated valorization of the increasing vegetal byproducts in Senegal, thus contributing to the sustainable development of its agro-industry. But conflicting schedules at the beginning of the project combined with a lack of active commitment of the actors hampered the initiation of a real dynamic and, without winning any call for proposals and thus lacking funds, the project did not gain any momentum.

6 Diana Nova (the incubator of Diana) wanted to partner with three start-ups (Labiocrac, L'Atelier Du Fruit and RethinkRessource) and a team of AgroSup Dijon (a higher education and research institution specialised in agronomy and food sciences) to find nutritional applications and adequate technologies for the industrial valorization of banana peels. The implication of a company such as Diana in the consortium was very useful because of the financial means, internal expertise, potential customers and large impact it provided. The project finally led to the creation of Flore, a startup offering food products improving the balance of the intestinal microbiota: launching a potential new line of B2C business for a traditional B2B group was an interesting achievement, although the lack of internal resources and business development skills within the team tempered this result.

The TFOW program was also enriching for the attendees whose projects were not selected for the follow-up phase, as it had led them to engage in enriching discussions with new actors. The impact is however more difficult to assess, especially in the long term. A survey was conducted after the meeting day to gather feedback from participants and analyze how the event could be improved. Besides the very positive impression of the participants (100% were satisfied by the day, 95% would recommend it), the survey also revealed that a vast majority believed that they benefited from it professionally: 88% felt they identified new relevant contacts and 61% had new elements to develop their activity (exchanges, experience feedbacks, ideas of solution, etc.). Finally, 36% considered they acquired a clearer vision of the issues at stake.

Dimension 4: Other striking characteristics, insights and experiences that are noteworthy

Although the TFO programs are part of the very diversified and ever-expanding ecosystem of innovation facilitation, they must be differentiated from more standard open innovation or impact challenges, hackathons and networking events. The role of the call for applications is not to select already existing projects or ideas of projects that the program could help, but to identify and gather organizations that seem prone to co-create new viable projects that are expected to continue even after the follow-up phase. Furthermore, the call for applications is formulated so as to ensure a

diversity of actors: it places emphasis on a social or environmental issue (such as food waste) rather than on a specific technological or mere business need that would lock the program into an industrial perspective and would not make NGO, social entrepreneurs or researchers - yet working in the same field - feel concerned. While this atypical format is what gives the program its value, it also constitutes a challenge to communicate about it, as the program sponsors and participants must be convinced to launch or join the TFO although they cannot know at first what will come out of it: the TFO creates a space for experts conducive to co-creation but its outcome cannot be forecast.

* * *

Sources:

- Internal documentation of SoScience (including REX from participants)
- Discussions with Mélanie Marcel (Founder and CEO of SoScience) and Yoann Malinge (Head of The Future Of programs) in June 2021

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The Future Of Positive Packaging

The Future Of Positive Packaging (TFOPP) is the sixth edition of the open innovation program The Future Of (TFO) designed by SoScience. The overall program structure is similar to the one of The Future Of Waste (TFOW) that was taken as another case study, but the improvements made based on past experiences and the differences between the two editions in terms of participants, motivations, methods and outcomes make this edition worth a full study case, thus enabling an enriching comparison.

Dimension 1: Motivations and Participants

As consumers are gaining a greater awareness of the current environmental crisis, they are becoming more demanding and are expecting companies to rise to the urgent challenges posed by this crisis. In particular, plastic waste and pollution constitute critical environmental issues and it is becoming strategically crucial for companies to tackle this problem through concrete changes in their processes, services and products. Perrier was thus looking for sustainable and innovative packaging solutions that would go beyond recycled plastic bottles and that could be brought to market. They wanted to meet new innovative actors working on this issue and appealed to this end to SoScience, a company specialized in Responsible Research and Innovation (RRI) and in new practices of collaboration resulting in projects having social and environmental positive impact. This partnership led to the launch of a new edition of a TFO program: The Future Of Positive Packaging (TFOPP).

The team of Perrier was composed of people coming from various departments. It involved the CSR Officer and members of the Marketing, Innovation and R&D Departments. Other employees from Sales, PR and Communication also participated in some workshops. Finally, the Business Unit Director came to see and validate the results obtained at the end of these workshops. The Nestlé Institute of Packaging later took part in the project selection process. This variety of expertises, although difficult to manage, ensured that the perspectives of all the relevant departments were taken into consideration and integrated in the process. Perrier initially wanted to create a Task Force mixing external experts (scientists, economists, designers...) and Perrier's team, but involving so many actors at the early stages of the program turned out to be more of an impediment than a real help and the Task Force implementation was not maintained.

Following the call for applications for TFOPP, 41 participants coming from 13 different countries were selected by SoScience and Perrier. A large range of profiles was favored: were represented social entrepreneurs and NGO (51,2%), companies (31,7%), researchers (9,8%) and 'boosters' like incubators and investors (7,3%). It is worth mentioning that some startups that Perrier had already contacted in vain in the past agreed to participate in TFOPP, as SoScience's collaborative approach was more appealing to actors of the SSE (Social and Solidarity Economy) or RRI worlds than a mere business-oriented approach.

The participants gathered during the meeting day of the program, and three of the resulting projects were then selected by Perrier and SoScience. Two of them were formed by attendees coming from different countries and continents (France, Kenya, Zambia, Uganda, Vietnam, India, Spain and France), thus echoing the international dimension of the program that was already sought for during the dissemination of the call for applications and the selection process. These three projects will be

developed in Dimension 3. Several social entrepreneurs and one NGO, which can be considered parts of civil society, were part of these new projects.

Dimension 2: Methods and Process

The structure of TFOPP is globally the same as the one of TFOW, already detailed in another study case. We will therefore mainly focus on the specificities of this edition.

Preparation and scope. SoScience organized a workshop to define the exact problem that Perrier wanted to tackle through this TFO. The workshop's activities led to the following question: how to reinvent the source and the end of life of packaging in the beverage industry in order to generate solutions with positive social and environmental impacts?

The call for applications. It was disseminated by SoScience, while Perrier decided not to make use of its usual innovation ecosystem: although their networks could have brought interesting profiles, they were not prone to communicate about their need for external partners and about a new program which had not yielded any results yet. This communication stake was thus in tension with the general co-creation approach of TFOPP.

The meeting day. As for TFOW, the meeting day was also structured around 6 pitches, an open-forum and free-format talks designed to favor the emergence of project ideas that attendees could stick on a wall of collaboration. The open-forum was divided into several tables, each covering topics chosen by Perrier or suggested by the attendees (such as "How to ensure the quality of the beverage packaging and product?") with the aim of gathering actors so that they could explore their complementaries in greater detail.

The monitoring phase. Following the meeting day, SoScience asked the attendees who wanted to concretize their projects to answer a few questions to precise them. The three most promising projects were then selected with Perrier during a workshop that was designed for the occasion by SoScience and later reused in other TFO editions. Each member of the Perrier team and one person from SoScience rated the projects on 5 criteria: the diversity of the impacts targeted by the project, its scale and replicability, its difficulty of realization, its systemic dimension, its need for guidance and its collaborative potential. Apart from the monitoring program by SoScience, the winning projects also benefited from the support of Perrier. Indeed, at the beginning of the TFOPP, Perrier had already reserved some fundings for the projects that would emerge: in total, more than 300k€ went to the three projects, which was a key driver of success. But Perrier support was not purely financial, it also provided its technological and business expertise. The announced goals and outcomes of these three projects will later be detailed (see Dimension 3). Because SoScience wanted to improve its accompanying program, it appealed to Makesense, a social company supporting entrepreneurs and organizations in their development. SoScience benefited from its expertise and learned new methods that were implemented in later TFO editions. During this 6-month support program and for each project, SoScience and Makesense organized three full-day workshops involving the entire team, as well as regular short meetings with reduced teams. The content of this support program is tailored to each project's needs: in the TFOPP case, because funding, visibility and network could be provided by Perrier, SoScience mainly focused on helping the structuration of the projects (by aligning the interests of the diverse stakeholders, laying out roadmaps…).

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The obstacles that the projects faced during their developments were of various nature. In general, the more actors are involved in a project, the more complex it becomes to manage their diversity: interests and motivations can diverge. The first workshops therefore focused on this point, to favor transparency, so that the different stakeholders could work together even if their reasons to engage in the projects were not similar. The multiplicity of actors was also a challenge on a very pragmatic basis, in particular for international projects: schedules and time zones were more likely to conflict, and internet connexion was unequally stable from country to country. Intellectual property was also an issue that had to be addressed by signing new contracts. Moreover, personnel changes within Perrier, which were not expected from the outside, led to a challenging discontinuity in the follow-up phase, especially due to new internal decreased degrees of interest and support for the projects. Finally, the temporalities of the actors engaging in the program could sometimes differ and thus hamper intentions of collaborations or their concretizations. Whereas Perrier was more interested in obtaining results in the short term, research institutes and NGO were used to developing their activities over longer timeframes. For instance, it took more than one year and a half for a consortium (see PlastiSkul in Dimension 3) whose members met during the meeting day of the TFOPP, to finally enter the process of registering as an association.

Dimension 3: Outcomes and Impacts

Following the meeting day, 12 collaborative projects applied to the follow-up program and three of them were selected (involving 12 organizations in total). Here is what each of them initially intended to do in December 2020 and where they stood in June 2021.

- Biotic: Neslté France wanted to partner with Lwanda Biotech (a Kenya based startup) to develop a biosourced and biodegradable plastic material produced from agricultural waste, while creating well-paying jobs for women in Africa. They finally signed a Joint Development Agreement. Thanks to the help and expertise of the Nestlé scientific team, Lwanda Biotech developed bioplastic samples. In June 2021, the startup intended to soon develop new samples so that the Nestlé team could proceed to material tests, check the compliance of the bioplastic with Nestlé's standards and decide if it can ultimately be used to produce Perrier bottles.

- Perrier wanted to create an "Ecollaboration" with the French startup Flexikeg to produce innovative reusable flexible kegs to deliver water and other beverages. Their partnership finally took the form of a client-supplier relationship. Perrier Innovation team assisted Flexikeg in adapting their kegs to industrial standards, and the support program helped the startup to strengthen its development strategy. In June 2021, they intended to put the new kegs into use within a dedicated pilot program involving a selection of Nestlé Waters clients.

- PlastiSkul: A global consortium involving six countries was formed, composed of social entrepreneurs, companies, third places and NGO (Matières, Conserve India, Lwanda Biotech, Takataka Plastics, Fablab Saigon, Forth Line Limited, Volumes and 8fablab), with the aim of creating micro factories for waste transformation in developing countries that would be easily replicable and adaptable to different local contexts. The consortium structured its governance, defined its activities and designed a first version of the PlastiSkul kit. In June 2021, they were about to form an association and intended to implement their first mobile micro-factory in Uganda in September 2021, before moving to Kenya and Zambia. Although Perrier and the consortium decided not to extend their partnership for these following steps, Perrier team worked jointly with the French PlastiSkul team to produce VIP urban furniture made from recycled

plastic that would be provided to Parisians bars and restaurants for their post-lockdown reopenings.

As it was highlighted in the TFOW case, other attendees also benefited from the program even though they did not continue any project. Besides the 100% satisfaction rate, the post meeting day survey revealed that 68% of the participants felt they had identified new potential partners, 59% had engaged in discussions leading to new ideas or specific solutions and 38% had acquired a better understanding of packaging challenges.

TFOPP also had some impacts internally for Perrier. The marketing and R&D departments were not at all used to working together and the first workshop about the scope of the program revealed they lacked a common vision about their objectives. The diverse meetings organized by SoScience thus offered opportunities for them to discuss their specific views and to align their interests.

Dimension 4: Other striking characteristics, insights and experiences that are noteworthy

During the phase of definition of the TFOPP scope, Perrier was not very prone to invite competing companies to the meeting day and was more focused on startups. SoScience pointed out that sustainable packaging constituted a challenge that was not specific to Perrier and that potential solutions could (and even should) benefit others. While this position clearly felt outside their strategy and was thus out of question at first, some members of Perrier embraced a similar one during a public event organized with SoScience after the program. Although this changing point of view concerning the role of Perrier as a leading company occurred late in the process and at a small scale, it revealed how TFO (and more generally multi-actor programs oriented towards social or environmental impact) can bring about changes in mentalities, especially as a consequence of the various workshops and discussions carried out by SoScience with Perrier's teams.

The changes made in the TFO's method based on past editions enabled the collaborations to be longer lasting, which reveals the key role that third-parties can play in the success of multi-actor projects. Contrary to TFOW, Perrier had planned specific funds for the three projects and for SoScience. Those funds, combined with strong internal resources and the improvement of the monitoring phase, can explain why the collaborations are still ongoing more than one year after and more generally, why this edition could achieve a higher impact in the long-term.

* * *

Sources:

- Internal documentation of SoScience (including REX from participants)
- Discussions with Mélanie Marcel (Founder and CEO of SoScience) and Yoann Malinge (Head of The Future Of programs) in June 2021

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TransForm – Transnational Forum on Integrated Community Care (ICC)

Non H2020, from September 2018 to spring 2021, TransForm is a joint initiative of six Foundations, hosted by the Network of European Foundations.

Sources

Website: TransForm website, Synthesis reports from the four conferences of the project.

Dimension 1: Motivations and Participants

Guiding Questions:

2. *What are the announced reasons for the different Quadruple-Helix individuals and groups to come together in co-creation?*
3. *Can we see a difference in the motivation of each corner of the Quadruple-Helix?*
4. *What is the composition of those organising and taking part in the co-creation activities?*[26]
5. *Why have the organisers of the project's different co-creation activities chosen this particular configuration of participants? Is there a clear rationale behind the choice of participants?*
6. *In the description of the co-creation initiative, is it described what added value each participant group (e.g. Quadruple-Helix groups) brings to the activity? If yes, what is the announced added value?*

The Transnational Forum on Integrated Community Care (TransForm) is a joint initiative of Foundations in and beyond Europe that aims to put the community at the centre of primary care and integrated care. It seeks to combine strengths-based and needs-based approaches to enabling communities to develop their own models of caring for their people.

The overarching aim of the Forum is to trigger the interest of and inspire policy-makers, key stakeholders and practitioners to foster integrated community care (ICC). It seeks to achieve this through finding and analysing promising practices in integrated community care and learning from their experiences and impact.

According to the project vision, it is key that ICC the move beyond 'delivery' to genuine 'co-development' with the individuals and communities that are traditionally seen as recipients. ICC engages and empowers people in the local communities and values the position of the informal care sector. Furthermore, it assumes accountability towards a territorially defined population. Place-based interventions are often designed to improve population health and strengthen community bonds simultaneously. This requires a dynamic, assets-based approach to community development. ICC is goal-oriented in nature, supporting people's priorities and life goals and improves both health and social cohesion.

Project partners: a network of Foundations

Compagnia di San Paolo	Italy
Conconi Family Foundation	Canada
Fondation de France	France

26 For SwafS and other H2020 projects, it is also useful to study the composition of consortium members, which are involved in running the overall project.

Graham Boeckh Foundation	Canada
Fund Dr. Daniël De Coninck	Belgium
King Baudouin Foundation	Belgium
Robert Bosch Stiftung	Germany
La Caixa Foundation	Spain
St. Paul's Foundation	Canada
The International Foundation for Integral Care	The Netherlands

Changemakers Forum

The project is guided and supported by the Changemakers Forum in identifying priorities and activities to advance to the field of integrated community care. The Forum is composed by 15 members (15 initiatives from Belgium, Italy, Germany, France, and the Netherlands have been selected to join by an independent selection committee). The Changemakers Forum will serve as an international advisory group and learning community that will connect participants with stakeholders across Europe and Canada and will be supported through workshops designed by and tailored to the interests, priorities and needs of participants.

Conference participants

The project is structured in four different conferences. Each conference will build upon the previous ones, creating a crescendo of learnings on integrated community care and engaged 80-100 stakeholders from the quadruple helix.

Announced reasons for taking part to the community:
The citizen/user:
¬ I am the expert on my own health.
¬ I feel my uniqueness and life goals acknowledged.
¬ I know where to go for support (access).
¬ I feel like I am part of my community (social cohesion).
The professional
¬ I am part of and feel connected to the ecosystem of care.
¬ I recognize the user as the expert of his/her own health.
¬ I have access to all the information I need.
¬ I feel well supported to perform at the highest quality.
The policy maker
¬ I am part of and feel connected to the ecosystem of care.
¬ I have a holistic understanding of the notion of health and wellbeing (my decisions are informed).
¬ I recognize the merits of sharing power and decision making.
The community
¬ We are embedded in the system.
¬ We have sustainable resources and funding.
¬ We have the opportunity, capacity and power to take part in decision making.
¬ We have the necessary capacity to express and address the needs of our community.

Dimension 2: Methods and Process

Guiding Questions:

7 *Which particular tools, methods, communication devices or settings are mobilised in the project?*

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8 *Was the process of co-creation (a) stage-gate or (b) iterative?* [27]
9 *Outline the key steps or elements in the co-creation process.*
10 *Which particular challenges were observed (e.g., resources in time or funding, legitimacy, flexibility between participants...)? Does the project face challenges in successfully implementing co-creation? Were these challenges subsequently overcome in the co-creation activity?*
11 *Which process elements are particularly striking and successful in the project?*

The project is structured in four different conferences. Each conference will build upon the previous ones, creating a crescendo of learnings on integrated community care. Each conference lasted 2/3 days and was organized in frontal sessions and interactive sessions.

1) First Transnational Conference on Integrated Community Care - Making the case for integrated community care - to codevelop a common framework on Integrated Community Care and demonstrate through evidence the positive impact integrated community care can have on tackling inequalities, improving care experiences and care outcomes. This included the exploration of essential design elements in the provision of integrated community care that make the approach successful. It included interactive sessions (world café) and around 80 stakeholders from the 4H took joined.

2) Second Transnational Conference on Integrated Community Care - Engaging and empowering individuals, carers and families through integrated community care - explores different strategies and approaches aiming to empower and engage citizens, carers and families in the management of their own health and welfare in the context of their community. Specifically, the conference will examine how micro level actors can be supported to actively participate, facilitate, and implement integrated community care through new relationships. It will also explore the role that peers and volunteers can play in the empowerment process. Around 100 stakeholders from the 4H took part to the event (which also included interactive sessions, like world café).

3) Third Transnational Conference on Integrated Community Care - Building stronger communities through integrated community care – examined how to enable participation of communities in decision-making, including how to respond to different cultural contexts and how to build social capital. A selection of existing and emerging practices and models was discussed during the conference, all of them aiming to improve people's health and wellbeing. Specific attention was given to specific groups/issues: Canada's Indigenous Peoples, vulnerable populations, social inequalities and discrimination in health, youth and mental health, drug abuse and the role of the Canadian provincial and federal government. 106 participants from policy making, civil society, public health sector joined the conference, which also included interactive sessions (mini-hackathon, workshop).

4) Fourth Transnational Conference on Integrated Community Care - Making integrated community care a reality – which was in fact a workshop with 27 participants from the four helices. They succeeded to formulate 7 effectiveness-principles for ICC. The output of the workshop resulted in the strategy paper 'ICC 4 all' to spur debate and define further needs in health and social care systems.

27 Stage-gate means that there is a period of action reaching a milestone, and then there is a next phase of the exercise. Iterative means that the process goes through one cycle, and then reiterated, with learning and feedback loops.

Dimension 3. Outcomes and Impacts

Guiding Questions:

12 *What outcomes have been announced and/or demonstrated by the co-creation initiators and participants? More specifically, have any technologies, services or new organizational structures been produced by the co-creation activity?*

13 *Have the co-creation processes and/or outcomes led to any desirable impacts and if so, in which areas (e.g., environmental, economic, institutional…)? Were specific indicators developed/used to develop the project's impacts?*

14 *Have any changes in roles and practices of the participating Quadruple-Helix representatives been observed? Has there been institutional change?*

15 *Are new forms of partnerships or relationships visible in the co-creation initiative or as an outcome of the co-creation activities?*

Main output (co-production of knowledge and suggestions for policy makers embarking on ICC):

1 Each conference produced as outcome a Synthesis report, including the main information/best practices/results from shared reflection. The main outcome of the Fourth Conference was a Strategy Paper to move ICC forward, including a set of New Principles for Care.

2 Also in 2020 and 2021, the Forum is investing in a collective reflection on the numerous innovations and the hurdles that have been overcome to tackle the Covid-19 pandemic. A mixture of online and live events took place in 2020-2021. These include a series of webinars and opinions by experts and practitioners published on the website.

3 An online repository and a blog collecting case studies/knowledge/reflection on ICC and gathering the project outputs.

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WeCount

Citizens Observing UrbaN Transport

Key findings

- Directly involves citizens in traffic-counting using low-tech sensors
- Citizens capture data but also participate in policy co-design of traffic management
- Project aims to demonstrate effectiveness (and lowered costs) of direct citizen science involvement in (traffic) policy at communities level

Sources:

- W: WeCount Project website or CORDIS Project Page
- D3.1: Initial WeCount platform and sensor kits – DEM. July 2020.
- D5.1: Monitoring and Evaluation Framework. February 2020.
- D6.1: Dissemination and Communication Strategy. February 2020.
- D6.5 Dissemination and Communication Strategy – UPDATE 1. July 2020.

The WeCount Project

In WeCount (December 2019 – November 2021), citizens produce traffic counting data at street-level using low-tech sensors. These data feed into the WeCount Platform and are designed to help citizens contribute actively to traffic management policy alongside local policymakers. Traffic sensor kits are deployed in five European cities: Leuven (Belgium), Madrid, Ljubljana, Dublin and Cardiff. The results of data collection and analysis, as well as results from workshops with citizens and policymakers, are to be used in the context of particular policy pathways which are unique to each one of these cities. The overarching aim of WeCount is to provide capacity building for citizens in the area of traffic counting and evidence of their high relevance in co-designing traffic management and transport policies.

Dimension One: Actors and Configurations

Consortium breakdown

The consortium members are the following (see table below):

Name	Type (EU taxonomy)	Country
TRANSPORT & MOBILITY LEUVEN NV (coordinator)	PFPE	Belgium
IDEAS 3493 SL	PFPE	Spain
UNIVERSITY OF THE WEST OF ENGLAND	PFPE	UK
UNIVERSITY COLLEGE DUBLIN	HSEE	Ireland
UNIVERZA V LJUBLJANI	HSEE	Slovenia
MOBIEL 21 VZW	HSEE	Belgium
POLIS - PROMOTION OF	O	Belgium

OPERATIONAL LINKS WITH INTEGRATED SERVICES, ASSOCIATION INTERNATIONALE		

Taxonomy: HSEE = Higher or Secondary Education Establishments. RO = Research Organisations. PFPE = Private for-profit entities (excluding HSEE). PB = Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments). O = Other.

Stakeholders from Project activities

In WeCount the key stakeholders are the traffic counting citizens. They take the leading role in the production of data around mobility in their own neighborhoods, at a particularly fine, street-level granularity. This data can then be used by local policy makers and the transport policy research community with an aim to building better transport systems. Indeed, "Collecting Traffic data is essential as a basis for any sensible transport policy and support of citizen(s) is needed to implement changes in mobility management" (W). Citizens are to be involved not only in the evidence gathering, but also in co-designing analysis and changes to mobility plans. Alongside citizens, local policy representatives also participate in some workshops.

Dimension Two: Methods and Processes

The WeCount Platform

The WeCount "central data platform serves as a basis to receive, process and report traffic counting data from a range of autonomous sensor data from the citizen science activities" (D3.1). Data capture is done by "a wide range of citizens, not just tech specialists" (D3.1) with the help of automated Raspberry-Pi (very small computer units) based sensors. It is based on an existing platform by Telraam (www.telraam.net) and its functionalities are continuously improved based on a co-creation process of user interaction, user feedback and hackathons. The sensors are deployed in five partner cities: Madrid, Ljubljana, Dublin, Cardiff and Leuven (Belgium). 200 to 250 traffic counters are deployed per city.
Given the importance of citizens in the project, a range of engagement strategies is also developed in each city, ranging from workshops to surveys and datathons/hackathons (e.g., to analyze the data they produce through their sensors). Some of these engagement venues involve collaborations with other Quadruple Helix (QH) stakeholders, although these mainly involve policy makers at the local level.

Dimension Three: Outcomes and Impacts

Impact Statement: citizens at the center of the co-creation process

The WeCount Impact Statement states that it aims to be "the first European citizen science project to enable citizens to create a substantially better understanding of road traffic flows at a (hyper local level)", involving citizens in "genuine co-created or extreme scientific enquiry with special attention to a low technological and scientific threshold to involve everyone who wants to participate" (D6.1). WeCount aims to offer citizens "the mechanisms to generate evidence and utilise tools to quantitatively determine their local transport mix; understand and challenge mobility behaviour;

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proactively lead local transport discourse; and participate in co-designing traffic policy". Citizens would then "evolve from citizen scientists to citizen advocates and local champions that can influence a number of intractable societal and environmental challenges" linked to traffic issues and nuisance (D6.1).

Research objectives and evaluation framework

WeCount has five Research Objectives, which will be evaluated at the end of the Project. The first objective, to "Advance citizens (and broader scientific) knowledge on traffic counting, transport management and related impacts", will be evaluated by examining the data collection and use by citizens, changes in their attitudes, values and knowledge regarding traffic counting, their participation in various co-design workshops (e.g., datathon, hackathon), and user understanding of the data generated on the platform.
The second objective, "Establish a durable ecosystem for citizen science traffic counting and related impacts", will be evaluated by examining the percentage of sensors installed without hands-on support (and comparing whether successive improvements on instruction manuals and videos make a difference), evaluating the role of local champions (community leaders in the traffic counting process), and examining the retention rate of citizens (e.g., causes for drop-out).
The third objective, "Lower the technology threshold to reach a more diverse audience and ensure broader citizen inclusiveness", will be evaluated by looking, notably, at the representativeness (e.g., gender, social, education) of citizens engaged in the different co-creation activities.
The fourth objective, "Demonstrate the diverse potential applications, in five use cases, to tackle five different societal issues related to local road traffic", will be evaluated by looking at successful (or not) creation of local citizen science networks in each city, applicability of WeCount to tackle different societal issues in different cities (e.g., emissions reduction, speed compliance, air quality, network of cycle tracks), and measuring stakeholder attitudes before/during pilot processes and outcomes.
The fifth objective, "Achieve meaningful research and local policy change, as a direct result of the evidence collected from the citizen science activities" is to be evaluated by estimating impact of the WeCount community on decision-makers involved in traffic issues (e.g., local politicians), by collecting evidence for policy changes (not necessarily implementation but public statements or strategy/vision documents), and estimating whether the data quality is high enough to be used in scientific policy support research/consultancy (D5.1 Monitoring and Evaluation Framework). These evaluations will mobilize interviews, surveys, and media coverage depending on the stakeholder role, method or material being evaluated.

City-specific policy impact from citizen science activities

Each WeCount case study has a specific policy impact pathway, so that the citizen science approach can be seen to generate meaningful output for policy development in different use cases and contexts (D6.1). In Leuven, the pathway consists in "efficient traffic flow in a bottom-up established transport management system". In Madrid, the "data, tools and citizens' insights will contribute to assessing the impact and compliance of "Madrid Central", a traffic restriction measure launched in late 2018 aiming to reduce NO2 in a 480 hectare area". Similarly, in Cardiff, the WeCount data will be used to "support local transport measures to reduce NO2 concentrations within the Cardiff Air Quality Management Area". In Dublin, the pathway is to "give people in deprived neighborhoods a voice in the local transport management debate". Finally, in Ljubljana, WeCount data will be used to "develop effective bicycle infrastructure strategies" (D6.1).