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# *Transformative Translations?*

## *Challenges and tensions in territorial innovation governance*

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## ABSTRACT

Since the 1990s, changing ways of producing and circulating knowledge have been accompanied by debates that diagnose and call for change in the relationship between science, society, politics, and innovation. Most recently in Europe, some of these debates emphasize the concept of responsible research and innovation (RRI). In this paper, we present a comparative analysis of different territorial RRI-pilots within the Horizon 2020-funded project TRANSFORM. In these pilots, different translations of RRI become visible. RRI (1) gets translated as participatory and deliberative modes of innovation governance aimed at transformative change, (2) takes the shape of citizen science projects; and (3) is enacted as participatory agenda setting and (plans for a) citizen assembly. We argue that it is the often-invisible work of establishing, nurturing, and caring for relationships within the territorial R&I ecosystems – what can the thought of as ongoing "maintenance work" – that creates the conditions for more responsive modes of innovation governance, and thus a shift towards transformative change in innovation policy. Through describing these translations and the related practices we will direct attention to the potential, challenges, and systemic barriers of this kind of work.

**Keywords:** Innovation Governance; Responsible Research and Innovation (RRI); Translation; Maintenance.

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# INTRODUCTION

Since the 1990s we have witnessed a debate about changing ways of producing and circulating knowledge both diagnosing and calling for changing relations of science, society, politics, and innovation. Most recently in Europe, some of these debates emphasize the concept of responsible research and innovation (RRI) (Owen *et al.*, 2012). One of the central aims of RRI is to rethink how science and society become responsive to each other in order to gear innovation processes and practices towards a common good, and transformative change. As such it is a move beyond linear narratives of innovation (Strand *et al.*, 2016), which calls for locally situated engagements with innovation cultures, practices and processes (Pfotenhauer *et al.*, 2019). The Rome Declaration on RRI in Europe states that "RRI requires that all stakeholders, including civil society, are responsive to each other and take shared responsibility for the process and outcomes of research and innovation."[1] To achieve that objective the European Commission launched its Science with and for Society (SwafS) programme, which funded a sizeable number of projects that aimed to implement ideas and principles of RRI. This framing of implementing RRI, is usually entwined with particular ideas about impacts, benefits, and success criteria of such projects, not the least due to the increasing projectification of publicly funded work, and the marked audit culture of the European Commission.

While it is generally commendable to reflect on how exactly RRI projects become responsive and what their contribution to transformations in regional RRI ecosystems is, this framing also comes with a set of challenges. Implementation as a concept implicitly assumes that there is a right way of doing RRI, a script of sorts, or a core set of principles that can be applied and followed. The idea then, is that these principles can be put into action in the right or the wrong way, leading to implementation success or failure, respectively. The problem with this framing is that it overlooks a central insight from science and technology studies, namely the pervasive importance of context and situatedness in the practice and governance of research and innovation (Pfotenhauer & Jasanoff, 2017). Within the SwafS programme, this tension was almost constitutive to the projects, in that several of the calls for funding described the expected impact of the projects to be funded in terms of standardised and highly decontextualised criteria, the so-called MoRRI indicators (Völker *et al.*, 2023). This brought what was called the SwafS ecosystem to consider alter-

[1] https://digital-strategy.ec.europa.eu/en/library/rome-declaration-responsible-research-and-innovation-europe, accessed August 15, 2022.

native approaches to monitoring their own progress, such as evaluative inquiry (Fochler & De Rijcke, 2017). This paper is one instance of this development towards evaluative inquiry, in which we move from the framing of "implementation" to that of "translation" (Konopásek *et al.*, 2018; Soneryd & Amelung, 2016), seeing RRI as a general principle that has to be translated in order to work, and to make sense, at different scales and contexts.

Specifically, we present a comparative analysis of different territorial RRI projects within the Horizon 2020-funded project TRANSFORM[2] that carves out a range of different translations of RRI in territorial pilot projects in the three TRANSFORM clusters in Lombardy, Catalonia and the Brussels-capital region, while also directing attention to the organizational and institutional ecosystem that both enables the pilot projects' work and shapes how it plays out in practice. In these pilot projects RRI (1) gets translated as participatory and deliberative modes of governance aimed at transformative change, (2) takes the shape of citizen science projects, and (3) is enacted as participatory agenda setting and (plans for a) citizen assembly. Thus, we see different translations of RRI steered by diverse actors and confronted with distinct tensions and challenges. We are interested in precisely these multiple translations of RRI, the organizational and institutional orderings with which they co-emerge, shifting notions of citizenship, and the challenges and dilemmas that come with these translations. Related to this, we emphasise the often invisible and neglected work of "maintenance" in innovation discourses and practices, and how maintenance work is a necessary condition for enabling certain translations of responsible innovation. In doing so, we able to unpack the different conceptualizations of impact that surfaces in the accounts of our interviewees.

[2] https://www.transform-project.eu/, accessed September 20, 2022.

# INNOVATION, RESPONSIVENESS, AND MAINTENANCE

> Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society) (von Schomberg, 2012)

From its very start as one of the central concepts in innovation governance in Europe in the 2010s, the notion of Responsible Research and Innovation (RRI) included the principle of "responsiveness" to describe what were considered desirable science-society relations. The Rome Declaration described responsiveness as a "shared responsibility for the process and outcomes of research and innovation" and von Schomberg relates responsiveness to questions of "acceptability, sustainability and societal desirability" of innovation processes and their outcomes.

This way of thinking about the relations between science and society marks the latest iteration of a debate that can be traced back to the so-called "linear model" of innovation, often ascribed to Vannevar Bush (1945) and the discussions about this model in the decades after its initial formulation (see e.g. Godin, 2006; Strand & Funtowicz, 2016). Post-WWII, the idea that strengthening basic research will lead to economic growth and social welfare[3] became powerful to the point of becoming an often-unquestioned point of departure in innovation governance. It still underpins European Union policy (see e.g. the Lisbon Treaty, initiatives like "Innovation Union"[4] or the European Green Deal[5]) where it is often imagined as a "panacea" for societal challenges (Pfotenhauer & Jasanoff, 2017).

Academically, the linear model is largely discredited. Godin (2006) points out that the contemporary idea of innovation as a linear path from basic research to economic growth and well-being was very much promoted and stabilized not by Bush himself but that this is rather a retrospective ascription. Regarding the idea of innovation itself, scholars have called out the simplistic assumptions about cause and effect and searched for more

[3] This argument resonates with earlier thinking about the relation between science and society as well as economic progress (in a free market) in the work of Francis Bacon and Nicholas de Condorcet (Strand & Funtowicz, 2016). Citizens will profit from this in the form of employment and better consumer products; thus, they enter the relationship mainly as employees and consumers.

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0546&from=EN, accessed August 19, 2022.

[5] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en, accessed August 19, 2022.

dynamic accounts on innovation processes and their governance. (Etzkowitz & Leydesdorff, 1998; Strand & Funtowicz, 2016). In addition, the idea that there can be universal models to describe innovation is rejected and instead, more granular approaches that allow for increased attention to the situatedness of innovation processes are suggested. Pfotenhauer and Jasanoff (2017) direct attention to what they call "models of practices", i.e. the local ideas and assumptions about how innovation works and what actors need to be involved and how.

So-called third generation innovation policy calls for modes of innovation (and its governance) geared towards the public good and transformative change, supplementing if not replacing first generation innovation policy related to the linear model and the idea that new scientific discoveries would translate into technological innovation through applied R&D in the private sector. In between, second generation innovation policies have been more focused on globalization and the idea that knowledge production is also an interactive learning and capacity building process, where stimulating competition and entrepreneurship is key. (Diercks *et al.*, 2019; Pfotenhauer *et al.*, 2019; Schot & Steinmueller, 2016, 2018). RRI may be seen as one policy concept that responds to the call of third generation innovation policy. A central element in RRI as in the entire third generation innovation mode, is the need to rethink the range of actors who could and should legitimately participate in innovation practices and processes as well as their repertoires of interaction.

## Broadening the range of "response-able" actors

Parts of these debates about innovation governance and practice crucially also address the actors who are and should be involved. Who is given a voice and can thus become a responsive societal actor? In this way it resonates with the principles of responsible research and innovation. This should come as no surprise as this notion grew out of debates of changing relations between science-society and innovation asking the question of who should be "response-able" (Felt, 2017) to whom, by what means, under what conditions and through which practices?

From the early 1990s there has been a debate about new modes of knowledge production between diagnosis and calls for changing relations between science and society. These debates are captured in various terms, and Mode 2 science, post-normal science (PNS), and Triple Helix are among the most influential of these.

In terms of the actors involved the concept of the triple helix (Etzkowitz & Leydesdorff, 1998) can be considered the most faithful to Bush's vision, in the sense that the main three actors involved are governments, universities and industries. However, the model of interaction is no longer a linear one, but rather one that is captured by the metaphor of a "helix". The aim of using this metaphor is to move beyond "the ideology of basic research" (Etzkowitz & Leydesdorff, 1998, p. 205) and towards a more dynamic model that envisions a "continuous series of experiments between science, industry and government" (ibid.). The endless frontier in that way becomes an "endless transition". While initially the set of actors who are supposed to become responsive to each other was very close to Bush's vision, more recently this idea has been extended by notions of a quadruple or even quintuple helix, pointing to the importance of involving publics (the fourth helix), and the environment (the fifth helix).

While work using the Triple Helix metaphor thus focuses on changed relations between science, industry, and governance, Mode 2 focuses very much on forms of transdisciplinary knowledge production and thus acknowledges the importance of what is called "contexts of application" for knowledge production practices (Gibbons ,1994; Nowotny, Scott, & Gibbons 2001). This in turn means that a broader set of actors is envisioned to contribute to knowledge production and innovation processes from the outset. The idea of post-normal science entails a similar conclusion, arguing for an "extended peer community" that evaluates inputs from science into decision-making (Funtowicz & Ravetz, 1993). In this way responsiveness is thought of as a democratization of science in the sense of nurturing public debate about science and technology.

A parallel and partly overlapping strand of literature also works toward a re-ordering of science-society relations, but this strand focuses more on keeping science (& technology) in check. Different forms of technology assessments challenge the assumption that untethered science will automatically lead to economic wealth and societal progress and wellbeing, with negligible side effects. Therefore, some version of checks and balances need to be put in place. Accordingly, methods of technology assessment (Guston & Sarewitz, 2002; Rip & Kulve, 2008) have moved from a more post-hoc and reactive endeavour (Nordmann, 2014) towards real-time assessment (Schot & Rip, 1997) and modes of anticipatory governance (Barben *et al.*, 2007; Guston, 2013). Research on the Ethical, Legal and Social Aspects or Implications – ELSI or ELSA – Is usually regarded as the immediate predecessor of RRI (Fitjar *et al.*, 2019)

While these concepts challenge our understanding of what responsiveness can mean in the context of innovation governance, there is still some critique of the temporality involved in this kind of work. Assessments and reflections on the potential consequences and implications of newly emerging technoscientific fields tend to be relegated to isolated work packages in projects or conducted towards the end of innovation processes. One of the core ideas of RRI is to move these reflections "upstream" (Krabbenborg & Mulder, 2015). The idea of Responsible Research and Innovation grew out of these strands of work in both academia and policy. It proposes a mode of governing technoscientific innovation by making a broad range of actors responsive to each other across various sectors of society (Frahm *et al.*, 2021; Owen *et al.*, 2012; Rip, 2016). In recent years different approaches towards citizen engagement and deliberative democracy have become the dominant mode in which RRI gets translated. Knowledge production and innovation practices are thus taking on board ideas of care and maintenance.

## Alternative ways of thinking about innovation and its governance: maintenance and care

The idea of care has been part of the conceptualisation of RRI from its early days (Groves, 2013; Kjølberg & Strand, 2011). Stilgoe, Owen and Macnaghten (2013) explicitly relate this notion to the governance of science and technology: "Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present." (Stilgoe *et al.*, 2013, p. 1570).

Care – as presented in this quote as well as in other work on care in technoscience – is an explicitly temporal concept and positions itself also normatively in at least two ways: care calls for long-term engagement in contrast to short-term or one-off decision-making that follows a logic of choice. In addition, following a logic of care in the governance of technoscience is about the timing of engagement with certain issues or technoscientific objects. At what point in the knowledge production and innovation process are which actors expected (or empowered) to become responsive to each other? Whereas many approaches of engagement in the governance of technoscience (think TA or ELSI/ELSA) intervene towards the end of the process, following a logic of care means early intervention and ongoing collaboration throughout the process. The aim of such a shift is "to emphasize caring responsiveness in technoscience" (Puig de la Bellacasa, 2011, p. 87). On a broader level, this position resonates with a critique of the "Cartesian dream" of control (Guimarães Pereira, 2015). The idea is that instead of aiming for control, innovation governance and practice should be guided by a logic of care and consequentially strive for "caring

transformations to sustainability facilitate adaptation, ongoing tinkering, fine-tuning, and repair of processes and products by users situated in their settings." (Arora *et al.*, 2020, p. 248).

More recently a similar notion has entered discussions about innovation: the idea of maintenance. Maintenance is presented as an alternative way of thinking about innovation, a way that does not fetishize the new but focuses of taking care of what is already there (Vinsel & Russell, 2020). Maintenance is therefore positioned in contrast to more "traditional" ideas of innovations:

> "In some ways, maintenance is the opposite of innovation. It is the practice of keeping daily life going, caring for the people and things that matter most to us, and ensuring that we preserve and sustain the inheritance of our collective pasts. It's the overlooked, undercompensated work that keeps our roads safe, our companies productive, and our lives happy and secure." (Vinsel & Russell, 2020, p. 14f.)

The idea of maintenance as presented by Vinsel and Russell is also a decidedly temporal perspective on the issue of responsiveness. It is about taking care of our "inheritance" and about "persevering" and "sustaining" what is already there. We believe that these concepts sensitize our analysis to the often neglected, invisible and marginalized practices of building networks, nurturing relationships and in doing so slowly transforming cultures of responsibility in innovation governance. This perspective requires an extension of Russell and Vinsel's definition of 'maintenance' to encompass not only technical and physical orders (Russell & Vinsel, 2018), but also social orders, under which we subsume techniques for involving and rendering responsive different societal actors in RRI. Understood in that way, focusing on the role of maintenance work in the regional translation of RRI may also be a good way to think about the impact of such projects. When it comes to concrete RRI projects such as those funded by the EU SwafS programme, responsiveness is operationalized in terms of 'impacts' and 'benefits', a direct consequence of the general rules of play, that is the accountability measures of EU funding schemes for research and innovation. 'Impacts' and 'benefits' are notoriously hard to measure, however, especially when it comes to transformative innovation governance.[6] One way of explaining why is to notice that transformative governance ambitions are not well suited for top-down, command and control intervention logics. Rather, RRI is better addressed in terms of network approaches and self-governance (Strand *et al.*, 2015). But this means that the metaphor of 'impact' as the result of an external force hitting the system is ill-chosen.

[6] For more background on this discussion in the context of RRI see the discussion paper published by the H2020-funded project Super MoRRI: https://super-morri.eu/findings/, accessed August 23, 2022.

The aim of this paper is thus to zoom in on RRI activities in three different regions to ask how responsiveness is practised within different R&I ecosystems, explore the role that care and maintenance play in the translation of RRI in the different regional clusters, and carve out how this relates to and creates tensions with notions of (long-term) impact and benefits as well as with aspirations of transformation.

## FROM IMPLEMENTING TO "TRANSLATING" RRI

Translation as a literary concept refers to the transfer of a text from one language into another. In science and technology studies, it is used similarly as a relational concept, denoting a process of replication through imitation and differentiation (Barry, 2013). Translation focuses on both similarity and difference simultaneously: "When public participation instruments are situated in specific local contexts, however, their ideas, values, formal rules, and tools become remixed, giving rise to new meanings." (Soneryd, 2016). This way of thinking about translation directs attention to the shifts – 're-mixes' – in meaning of concepts like participation, citizen, or expert, to the making and re-making of links between different actors, and, finally, to the political and organizational settings in which they are applied. Hence, we see a double movement of translation: RRI is translated in a specific way in different cases of RRI application, be it through different methods, approaches, or tools. This in turn means that also these methods are translated as RRI in specific ways. Importantly, these shifts and changes are not random or arbitrary. They are entwined with the political and organizational contexts in the three different clusters.

In other words, the term translation can be used to understand exactly how ideas – or policy concepts like RRI – travel and materialize in ever-new forms. This is especially relevant in the SwafS (Science with and for Society) projects that are precisely concerned with the idea of RRI travelling from a transnational context to regional or territorial scales, and across different sectors in the quadruple helix. In these processes of translation and travel, RRI itself gets transformed and assembled in new ways.

In this paper, we explore different translations of RRI in territorial pilot projects in the three TRANSFORM clusters in Lombardy, Catalonia and the Brussels-Capital region, while also directing attention to the organizational and institutional ecosystem and the often-invisible maintenance work that enables the pilot projects' work and further shapes how it plays out in practice. Through describing these translations we will also draw attention to some of the implicit challenges in an effort to overcome attempts at governance of

complexity – with its remnants of dreams about prediction and control – on the way towards what has been referred to as governance *in* complexity (Kovacic *et al.*, 2020).

## MATERIALS AND METHODS

We present a comparative analysis of RRI pilot projects in three different regions: Lombardy, Catalonia, and Brussels-Capital region (BCR). These pilot projects are part of the broader project TRANSFORM, which is funded by the Horizon 2020 SwafS programme. The aim of the project – as described on the project website[7] – is to put "RRI principles into practice" by bringing together these three European regions "to design, test and disseminate three sound co-creation methodological frameworks (participatory research agenda setting, design for social innovation and citizen science) within their Smart Specialisation Strategies (S3)." The overarching goal is to "establish more open, transparent and democratic R&I ecosystems for more responsible territorial development." The authors of this paper were participants in the project, with responsibility for a work package called "Monitoring and Evaluation". This paper presents results from that work package.

In these pilot project we see different translations of RRI: it takes the shape of citizen science projects, design thinking, participatory agenda setting and (plans for a) citizen assembly. These translations are mediated by the actors involved and their relative positions within the different R&I ecosystems.

To carve out these translations, we draw on data gathered in the project TRANSFORM. The core material consists of interview data from 12 semi-structured interviews (Lamont & Swidler, 2014) with 15 project partners working in the different territorial RRI pilots of the TRANSFORM project. Two of these interviews involved more than one interviewee. The interview guide addressed four key themes:

1. the concrete activities in the RRI pilot projects, how they put RRI into practices, and the various rationales that are guiding this work;

2. the specific (systemic) challenges and also resistances that our colleagues were facing in their work. During this section of the interviews, we also discussed the different institutional-political contexts of the regional pilot projects;

[7] https://www.transform-project.eu/about-transform/, accessed August 19, 2022.

3. the lineage of their work in terms of how experiences with previous attempts of doing RRI and RRI-like work in the region informed their TRANSFORM project activities;

4. the legacy and impact of their work, including reflections on what they expect will happen in the aftermath of the various pilot activities.

The interviews were conducted partly in person and partly online, lasted between 60-120 minutes, and were transcribed and coded. Furthermore, project documentation and relevant policy documents have also been analysed. The analysis followed a framework approach (Srivastava *et al.*, 2009) which means that we developed a coding framework based on a thorough literature review while also allowing for additional codes to be developed during the analysis (Charmaz, 2006). In addition to that, we participated in project meetings and had several online meetings with colleagues from the TRANSFORM clusters discussing our monitoring activities and the progress of the project's pilot activities. We participated in project meetings as project members and did not do participant observation. The coding of the interview transcripts was done in NVivo with 10 items that correspond to the structure of the interviews described above. These items included 'activities', 'R&I ecosystem', 'predecessors', 'legacy', 'carriers and mediators', some of which were divided into dimensions.

Our empirical work follows recent developments in the literature on evaluation, which stresses the importance of moving away from solely relying on quantitative measurement and more towards 'indicating' (Marres & de Rijcke, 2020) and 'evaluative inquiry' (Fochler & De Rijcke, 2017):

> " 'Evaluative inquiries' are not solely structured along the lines of externalizing explanations and metrics. They are also capable of representing the heterogeneous associations and practices that constitute our work. (…) Evaluative inquiries perform a shift from a predominantly bureaucratic to more substantive modes of assessment. In this, a standardization of indicators and methods is less relevant than "staying with the trouble" (Haraway 2016); staying closer to the epistemic missions, frictions and resonances of the work under scrutiny." (Fochler & de Rijcke 2017, p. 34)

This approach allows for representations of complexity by paying close attention to the different missions and frictions, and by asking how they are entwined with social, epistemic, normative and organizational orderings. The aim of the analysis is to explore in detail regional translations of RRI in the different pilot projects in the three TRANSFORM

clusters, and to further ask what challenges the actors have encountered – in particular challenges of creating long-term impact of their work. This also entails looking carefully at how ideas about impact, benefits, and the temporality of these concepts enter translations of RRI.

# RESULTS

We have explored translations of RRI in the three clusters of the TRANSFORM project and analysed how these translations relate to distinct forms of maintenance work. Our results fall into two main parts. First, we describe the activities in the different clusters together with the distinct translations of RRI and how are expected to become responsive to society. We then move on to examine the work that is taking place simultaneously with these core pilot activities; work that – taking inspiration from Vinsel and Russell (2020) – we came to see as "maintenance work".

## Part I: Translating RRI in pilot activities

### Participatory agenda setting in Lombardy

The Lombardy part of the TRANSFORM project focused on a participatory research agenda setting process conducted by Fondazione Giannino Bassetti (FGB) and their partners from the regional administration, Regione Lombardia (the Region) and Finlombarda between April and May 2022. The aim of this exercise as described on the project website was "to render S3 more inclusive and transparent, ensuring that citizens' voices are heard, and opinions are taken into account in setting up key regional R&I policies (deliberative process).".

This process involved a telephone and online survey of one thousand Lombardian citizens with the aim of getting a representative sample of the population and then to focus on a single topic selected from the surveys through a qualitative process. This topic – which turned out to be energy transition – was selected based on the survey and because of its relevance to the EU and to national and regional policymaking. The qualitative process was an 8-hour deliberative workshop with the title "Just Energy Transition in Lombardy", conducted online with 18 participants on a Saturday. The workshop was divided into an information phase, a discussion, and time for the elaboration of recommendations. The objective of this workshop was to collaboratively work on recommendations for work towards a just energy transition.

> "In our case in the participatory agenda setting it was very important to understand the needs of the citizens because the activities were focused on these and it was very helpful and also the social demographic variables were very important to understand." (Int_06)[8]

Citizens were engaged as holders of certain "needs" accessible through different kinds of survey and interview methods. This conceptualization also ties into a particular theory of change in which these needs of the citizenry had to be expressed in order to be properly understood, needs that were pursued further in the workshop. Once these needs would be understood by the Region, innovation strategies that are developed by the Region together with different innovation clusters (populated by "stakeholders" from industries and academia) were imagined to address these needs. The relation of innovation policy and society in this translation of RRI is thus one of providing solutions to regional problems.

In addition to understanding the needs of the Lombardian citizenry, there was another important rationale for conducting this kind of participatory agenda setting process.

> "So, the first was to really to think about representativeness of the citizens to have this broad survey with sample of representation of a population in Lombardy. So to show the Region that that means to consult your population in a, from a strong methodological point of view (…)" (Int_05)

By producing a methodologically sound, representative "consultation", one could provide a showcase for the Region. In that way the participatory agenda setting process was also a way to develop and nurture the relations between FGB, the Region and Finlombarda. This way of showcasing the potential of certain approaches is part of work that goes beyond the pilot activities themselves in important ways. We shall return to this point below.

[8] Throughout the empirical section of this paper, we use quotes from the interviews. These quotes are lightly edited for clarity and readability.

## Waste management and health services in Catalonia

The Catalan part of the TRANSFORM project – similar to the work of the Lombardy cluster – could rely on a close collaboration between the research and administrative partners. Furthermore, the cluster partners could draw on a rich culture of various forms of citizen engagement in the region, and they had a clear sense of how RRI could fit into what was happening in Catalonia and of how the actors were responsible – and should be held responsible – for this kind of work. However, two differences are noteworthy: firstly, the existence of two pilot activities, both guided by citizen science approaches; and secondly, the so-called "Think Tank", a group of stakeholders from across the regional innovation ecosystem who were strategically recruited based on their actual or potential interest in RRI.

## The Waste Game

One of the Catalan pilots applied a citizen science approach to work with young citizens (secondary school pupils) in the suburban town Mollet del Vallès and several departments of the municipality with the aim to improve local waste collection practices. This was done through the co-design of an interactive digital waste game and the subsequent use of this game with the assistance of secondary school students. The rationale behind this activity was to address actual problems in a certain region by increasing the knowledge about waste collection and management and by learning more about the preferences of the citizens. As one interviewee told us, "it would be nice if we can work with somebody's real challenges" (Int_01). This in turn also means that the particular situation – the regional context – in which this pilot takes place strongly shaped what was being done:

> "So, what we want to do with the game is to co-create with people like the ideal waste collection system for their neighbourhood. And then you of course need to be able to implement that. So also people in charge needs to be flexible and understand that maybe not all one solution fits all. That maybe you need to have different solutions for the different neighbourhoods." (Int_01).

In terms of RRI, the pilot aimed to align the technical waste collection system better with the values, needs and demands of the local population. The role of the young participants was to serve as ambassadors and door openers to the wider population of the town. The pilot worked towards RRI outcomes in the sense of improved transversal communication and collaboration in the municipality of Mollet del Vallès, between the technical, financial and educational services. This is a translation of RRI that aims for responsiveness at the community level of knowledge production.

## Endometriosis

Based on the interactions and ideas that emerged in the Think Tank (see below), an additional pilot project with the objective of improving service for the diagnosis, care and support in relation to endometriosis was developed. This pilot also employed a citizen science approach and involved patients, medical staff at Hospital Sant Pau in Barcelona, and the Catalan Agency for Health Quality and Assessment. The goals of this pilot activity were twofold: firstly, co-creation of recommendations to inform a new protocol for endometriosis care in Catalonia; and secondly, capacity-building and improved transversal communication and collaboration between public administration, health personnel and patients.

> "[I]n her team there were some other people working on that and she saw a very good opportunity to advance in a different way on this. To talk with the patients and involve them in all of the process. And they are super happy and in fact they are changing the protocols in the hospital." (Int_01)

The activity thus combined a conventional research interest with a willingness to do things differently by involving the patients. What we see here is the application of citizen science to gather information on the needs of a vulnerable group of people and then involve members of this group in the creation of an improved health service protocol.

Overall, these pilot activities are exemplars of a multi-faceted translation of RRI as citizen science. First, there is an element of gathering information about the needs and expectations of citizens in order to integrate them into policy – and decision-making processes. This idea is supplemented with the aim to work on "real challenges" (Int_01) in the region through "involving people that are (…) actually contributing to the research" (Int_01). Hence, actors on different levels are ascribed agency in these pilots, they are conceptualized as epistemic actors. Still, there is also an element of education and awareness raising in the translations of citizen science in the Catalan activities, something that is quite common in citizen science projects, see e.g. Strasser *et al.* (2019). We will return to this point.

## Urban development and engagement with innovators in the Brussels-Capital Region (BCR)

There were two pilot activities in the part of the TRANSFORM project conducted in the Brussels-Capital Region (BCR). RRI was translated in two quite distinct ways: first, as an urban development project addressing problems with regard to unsold food, and second as quadruple helix engagements following a design thinking approach with young researchers at the Catholic University of Louvain.

### Unsold Food

This pilot activity addressed the issue of how to deal with unsold food in the BCR, an issue that was brought up by local citizen-led initiatives, not-for-profit and for-profit organisations. Several different initiatives were addressing the challenge of food waste in Brussels that were in competition with each other. The cluster partners Be Participation and INNOVIRIS organized engagement activities to co-develop solutions for this issue. The general aim of RRI, as it was translated in the BCR cluster's work, was to provide a service or to give support to publics already formed around a certain issue.

> "It's this project called No Javel! that is a citizen initiative, so it is completely unstructured. It exists as a non-for-profit thing, association, but it's totally handled by volunteers, citizens and they go and get tons and tons and tons of unsold products from organic supermarkets, only organic places and they redistribute it to poor people." (Int_09)

This stance resonates with Callon and Rabeharisoa's idea of "the wild" and with work from Noortje Marres on the simultaneous formation of publics and issues. The pilot engaged with locally situated knowledge and lived experiences of food production and consumption systems combined with social innovation for groups described as "disadvantaged" and "people who don't feel entitled or interested" to participate in political processes. So, what we see is a clear normative stance in the objective to contribute to an improvement of regional governance approaches.

The ethos of "being of service" is crucial here. It is a central pillar of what it means to do "good engagement" in this case and also a translation of the idea of R&I becoming responsive to society. In the Unsold Food pilot this meant, for example, identifying needs and building networks, a version of responsibility that focuses on "facilitating meaningful engagement" with regional bottom-up initiatives focused on social innovation.

Simultaneously, the pilot aimed to be useful for the project partner from the regional administration. This particular idea of service we see here – focused on the "sustainability" of the initiative – managed to integrate INNOVIRIS into this translation. For INNOVIRIS a central concern is the longevity of the initiatives they fund: this is simultaneously about the initiative and maintenance of local RRI projects. Thus, the idea is a twofold one: on the one hand to help solve the problems by facilitating "meaningful engagement", and on the other hand to find ways to avoid such situations by influencing the evaluation grid at INNOVIRIS in a way that makes it sensitive to such issues.

## AcquaSens and Algorella – Working with Innovators at UC Louvain

The second pilot in BCR focused on practices of co-designing innovations, specifically on the development of water sensors (AcquaSens) and in the broader area of circular economy (Algorella). The consortium partners BeParticipation and the Catholic University of Louvain worked together with PhD students on their projects and innovations.

RRI here took the form of design-thinking in so-called quadruple helix workshops. RRI got translated into a network of BeParticipation (a civil society organisation), a university and PhD committees, students and their innovation projects, selected actors from civil society, industry and academia, INNOVIRIS, and potential evaluation mechanisms at (potentially) several levels. These quadruple helix workshops constituted a form of organized and guided deliberation. There were several interdependent and entwined aims which included (1) discussing the political issues involved in the innovations, (2) a process of collaborative prototyping, (3) feedback on the marketability of the innovation as a product, and finally (4) a showcase of the Spheres protocols (we will return to that point in the next section).

These activities were explicitly discussed by the actors as a form "upstream engagement" organized over a long span of time on several occasions with different foci. The figure of the "innovator" is crucial here. Innovators are developers of a certain product to be. At the same time, however, they are PhD students primarily concerned with research. Their PhD research brings in a particular idea of innovation that resonates with RRI principles: the concept of a "360 degree view of innovation". RRI translated as quadruple helix engagement here is explicitly linked to Jasanoff's idea of "technologies of humility" (Jasanoff, 2003).

Interestingly, while the partners in this pilot argued strongly in favour of the integration of heterogenous actors into innovation processes, there was also a palpable attentiveness to the "risks" of such engagements and a sensitivity to the need to protect PhD students and their projects to a certain degree. We observed a careful demarcation or purification work on the side of the researchers. There are areas where engagement is "not interesting" (Int_12), e.g. in "highly technological" (Int_12) areas where also simple models of knowledge transfer work. Thus, we see a simultaneous processes of entanglement and purification. Citizens appear in multiple roles: they appear as providers of valuable feedback for the innovators that can help to improve the innovators work, but they are also seen as posing some risk to these projects. That is, there is a risk and potential for the projects to get in "trouble", for example if the citizens negatively evaluate a PhD-project. This idea ties back to a translation as publics or citizens as an obstacle in need of being tamed.

What we see in the BCR cluster are two distinct translation of RRI, one focusing very much on co-creation and community-based needs and goals (Ludwig & Macnaghten, 2019), the other centred around changing innovation cultures in the education of engineers at universities.

## Part II: RRI, impact and maintenance work

As will be clear from the previous section, the regional clusters were busy with conducting their RRI activities, but they were also doing something else. As one colleague insisted when discussing their work: "yes, but there is more than that". Another colleague described their pilot project as "technical but not so technical". These statements point to important work that goes beyond what can be captured in the description of work in grant agreements and even beyond what is measurable in project assessments. In what follows, we would like to highlight some of these activities, ask for their enabling conditions, and indicate some of the systemic barriers that make this kind of work difficult.

### The "more than" preparatory stage in Lombardy

The participatory agenda-setting activities in the Lombardy were grounded in a broader idea about legitimate purposes and rationales of RRI work. First and foremost, this meant working with decision-makers:

> "So, you can talk about and you can make responsible innovation if you work with people really involved and key in governing innovation, which means not only of course policy-makers but the people in charge of decision-making" (In_05)

With this strong focus on the governance realm, RRI was understood mainly as a form of innovation governance in which policy, and decision-makers, are the primary collaborators. Furthermore, there was a clear idea about what constitutes "good" engagement, demarcated from "fake" participation. This distinction points to perceived risks in the work of the Lombardy cluster. "Fake" here means engagement without any commitment to act on what has been discussed, similar to the phenomena of regulatory capture and window dressing (Schot & Steinmueller, 2016). One of the main ambitions in the work of the Lombardy cluster was to ensure that citizens' input actually mattered in the innovation governance work.

The actors in this cluster saw it as key to nurture and maintain existing relations with administrative partners. Maintenance work was thus a central element of all the activities in this cluster, be it in the form of collaboratively developing the engagement process and methods, activities to build awareness and capacity within the Region, or through working towards more visibility of RRI principles on a national level.

The distinction between a "preparatory stage" and the actual "engagement activities" has already been briefly mentioned, but deserves some more attention here:

> "So, before the concrete starting of the engagement stage, we had a preparatory stage which was the key to be sure that the public engagement activities were actually actionable from the Region." (Int_06)

The aim of the preparatory stage was to make sure that the activities were "actionable" (Int_06). To that end, several meetings were organized to define the scope and purpose of these activities. In addition, these meetings were also used to build capacity, awareness and mutual understanding. What is important to note here is that this work is premised on a pre-established relationship of trust, and that this work contributes to the maintenance of the relationship. FGB could rely on an already existing network within the regional administration before the project started – a network that at the start of TRANSFORM was already convinced that RRI is important.

These actors then worked towards convincing and enrolling others within their ecosystem. Without these people and the work done before (and after) the actual TRANSFORM project, the project activities would have looked very different and might not have been

possible to conduct at all. Our colleagues from the Lombardy cluster described this relationship as a dynamic one. One should find actors that are interested and then slowly build a relationship with them, so that they become allies within the regional administrative ecosystem:

> " … I met the team [from the regional administration] a few times before TRANSFORM. […] And I think that their approach, their attitude towards this kind of engagement activities really changed a lot. The knowledge also. Now when we talk, we are sure that we are talking about the same things." (Int_06)

This is also where it becomes clear that the so-called "preparatory" stage was actually more than that: it was careful maintenance work that made the project activities possible. Once these relationships were established and somewhat stabilized, the actors became more willing to work towards transformations within the organizational cultures of the regional administration, to "disseminate" this kind of thinking and working together within the different departments of the Region.

Such work is not without fragility. The reliance on individual actors within the administrative ecosystem bears the risk that, in case these actors are either moved or themselves decide to move, you need to start over again. Therefore, the relationships with the Region needed constant care and maintenance:

> "And that's why as I said I think it's very important that we have these outreach communication activities within the Region, with the other civil servants. We also need to plan the public event to share the TRANSFORM results and also this will be very important." (Int_06)

Thus, in parallel with the work on the project activities – that is the core and most visible of the work done in TRANSFORM – the cluster members were constantly reflecting on how to best expand the network. What we see is thus a constant process of translation, also in the more classical sense of enrolment and enactment developed by Latour and Callon (Callon, 1986; Latour, 1987).

The overarching objective of these activities, then, was to try and influence the "cultural environment" (Int_07) and also attempt to "shape the public administrative discourse" (Int_07). This clearly resonates with the core objective of RRI, which is to have a transformative effect on cultures of innovation governance (Strand *et al.*, 2015). What is sometimes imagined happening more or less automatically by inserting funding into a certain system, needs constant – and in terms of project assessment often marginalized and invisible – work that involves adapting and making something fit into a certain context.

## Doing RRI as citizen science and "more than that" in Catalonia

Similar to the collaboration in Lombardy, also in Catalonia we see a strong connection with the administrative partners. In particular, the Generalitat of Catalonia (GENCAT) played a very active role in the pilot projects in this cluster. This became visible in the way the so-called Think Tank was used in this cluster. In general, the rationale for establishing Think Tanks in this project was to actively engage regional stakeholders to contribute to the cluster activities throughout the projects. The partners from the Catalan cluster, however, explicitly highlighted how the Think Tank was one of their central elements in developing the pilot projects:

> "I mean we talk first with the more active actors in the Think Tank and it was the city council of Mollet del Vallès on waste and they agreed to lead the challenge to define the pilot on that area. Then with Hospital de Sant Pau where we are working with endometriosis, and they just agreed. (…). So, we couldn't have the three but these two we're running and they're working very well because they are real." (Int_01)

Here we see how the idea to have "real" activities is closely linked to the model of citizen science as co-creation and a form of participatory governance that is a central pillar of this cluster. The Think Tank was the central means for integrating local administrative actors and other regional actors. What is important to note here, however, is that this kind of integration and creation of responsiveness may reach well beyond the project-lifetime of TRANSFORM.

> "And in fact, the idea at the beginning was to have much less people in the Think Tank. I think in the proposal you only need to have like ten people involved but because in this case, [NN] is the right key player and involved a lot of people. And then that's why we had so many people at the first session especially of the Think Tank and then the pilots were so successful." (Int_01)

There are two things that are noteworthy here. First, this is about temporalities and the limits of R&I governance through project funding. One of the reasons why the Think Tank was considered successful by the project members is the fact that the regional administrative partners were able to draw on previous work in the selection of actors. Second, it was also this experience that led to a particular framing of the Think Tank:

> "I told them that if we want to have impact we need that Think Tank. That was, it has been like a process. For the Think Tank we selected stakeholders that were already somehow engaged in the work I was doing and that could have some relation to citizen science and we open it a little bit more also." (Int_03)

The Think Tank in this framing was a process to select not only pilot activities but also to build and stabilize relationships with actors from the Catalan R&I ecosystem. As such it built on previously established links and was a means to make use of those. So, in a sense the Think Tank was a way to select both pilot projects and also partners who were interested in collaborating.

As a consequence, the Catalan Think Tank brought together a comparatively large number of actors in the beginning and the scaled it back as the project progressed. Before that, the Think Tank was used to discuss citizen science as a way of working or governing with a broad audience of potentially relevant stakeholders. The Think Tank was understood as a way of "changing mindsets" (Int_03) not necessarily just for TRANSFORM but potentially also for future projects. In addition to nurturing relations between stakeholders in the R&I ecosystem, TRANSFORM as a project also aimed at establishing new organisational links within the regional administration:

> "For example, in the city council the people in the environment department never work together with the people in the participation department. Never. And this is happening now." (Int_01)

The reason why the administrative partners needed a project like TRANSFORM for this is – as one actor from the administration told us – that in order to be able to do things differently, there is always the need for some mandate, "it's an opportunity also to start talking" (Int_02). A project like TRANSFORM then is described as an opportunity or "umbrella" (Int_03) to do this kind of nurturing work within the administration. And this nurturing – doing something "different" – reaches beyond the administration and also includes understandings and translations of citizen science of the different partners in the pilot activities. Here we come back to a point we raised in the previous section about the translation of citizen science as education or awareness raising. And this point is crucial, because what we see in the pilot activities of the Catalan cluster is a multi-faceted translation of RRI as citizen science:

> "The doctors talking about awareness which is OK and yes I agree with them but the project is more than that. Otherwise, you just can hire a company, a media company and they will do a big campaign with a similar money amount on the problem itself, the health problem that people is not aware of. But the idea is also that without even them not be fully conscious that they're starting to navigate through this much more complex ecosystem, no." (Int_04)

Our project colleagues were very aware of certain – one could argue – narrow framings of citizen science in terms of education and awareness raising. The crucial point here is, that they were ok with that. The idea of awareness has its place and importance in these activities, as long as there is "more than that", as one colleague was eager to stress. This something more is precisely the maintenance work of creating and nurturing of new links between different academic, governance and (civil) society entities as well as within these different entities and in doing so subtly re-arranging the Catalan R&I ecosystem. Through their participation in TRANSFORM, certain actors began to "navigate" through the ecosystem in a different way.

This directly relates to the particular theory of change that we encountered in this cluster and to the temporality of responsiveness that is implied in this theory. TRANSFORM – and other projects like it – were not framed as something completely new or as something that is expected to initiate something entirely novel. Much rather, projects like this are part of a long lineage of activities, it is an enabler of sorts, that makes it possible for actors in the Catalan R&I ecosystem to actually try to do "something more". To do so, they crucially depend on work that is done by the project team before and after the actual project. One colleague from an administrative partner stated that "it never works if you build things from nowhere […] these projects have no [significant, our comment] money for anything so you need to connect with something that is already happening in the territory." (Int_03)

It is this kind of invisible work that makes projects successful and has the potential to initiate long-term cultural change that will lead to an integration of RRI principles in territorial innovation governance processes and practices.

## Building a network in a fragmented R&I ecosystem in the Brussels-Capital Region

In many ways, the situation in the BCR case provides a contrast to both the cases in Lombardy and in Catalonia. Where the former two can build on and further develop already established and stable relations between the research and administrative partners, the BCR cluster activities basically started from zero. This case therefore allows us to focus on what the absence of certain kinds of relationships means for RRI work and its impact.

In conversations with project partners from the BCR cluster, the overall situation in the R&I ecosystem was described as fragmented and "complex" (Int_11) both by the research and the administrative partners. In addition, the system is perceived to be characterized by "constant movement" (Int_09) or as a "cycle" (Int_09) of the various actors, which made it hard to know who actually is a relevant actor:

> "So, there's this constant movement of, because they are all functionaries, so civil servants. So basically, there were some of the people who were in the ministry ended up in Innoviris. Some of the people who were in Innoviris ended up in the in the government. So, there is constant cycle." (Int_09)

The central challenge here thus was to decipher this R&I ecosystem and to identify or carve out spaces for RRI inspired pilot activities. Additionally, the issues that were supposed to be addressed through RRI approaches needed to be identified, as one of the consequences of the dynamic situation in the administrative part of the R&I ecosystem was that topics and priorities tended to shift. Overall, the activities in the BCR cluster are perceived as more "disconnected" (Int_09) compared to the other cases. These difficulties were already becoming apparent in the process of setting up the project in the proposal stage, where different partners from the administrative realm were envisioned as contributors at different points in time. It was only at the very end of the process Innoviris turned out to be the partner who would contribute to this project. Innoviris describes their participation in the project as "accidental" (Int_11). Another crucial difference between the Brussels-capital region and the situation in the other clusters is the standing of the research partner, who see themselves as "newcomers" (Int_09).

What we see in this case, then, are various translations of RRI that co-emerge with the particularities of the R&I ecosystem and the place of the pilot activities within them. This also corresponds to a different form of maintenance work geared towards building trust and finding niches.

The overarching idea for how to deal with this situation in the BCR cluster is to provide what is called a "protocol" that enables actors from the R&I ecosystem to assess projects and give advice on how to make them more resonant with RRI principles: the so-called "Spheres protocol". In this protocol RRI is described as a set of "techniques" or "scripts". As such it has the ability to "travel" across different sites and sectors, and it can be taught from one actor to another. This necessarily implies an objective of standardization. Framed like this, this protocol solves a number of problems that are specific to this cluster: it can be used in a university setting to introduce students to a broader view of innovation and it can easily be connected to evaluation procedures at Innoviris. As such it works as a boundary object to discuss concepts of innovation through the evaluation infrastructures in place.

In our conversations the "Spheres" pilot was described as a "protocol" but was also talked about as a "prism", a "service" or a "vehicle". As such it is intended to be used as a lens for analysis and as a set of guiding principles that give input to these projects. Spheres,

then, is about "first analysing what could be interesting to bring to the project from the RRI like tools and then organise some activities based on the need that we have identified" (Int_10).

This would mainly be a service for researchers and could help them take into account issues that they had not previously considered – in accordance with RRI principles. There is also a strong element of research and analysis – using RRI concepts – but always as a means for a service to be provided, never as an end in itself.

As we described in the previous section, the cluster partners from UC Louvain used the Spheres protocol in their PhD training programmes with the aim of establishing it as a standard part of the University's PhD education. This approach implies a particular theory of change and thus how to create impact. This theory starts with the concrete things developed by researchers in the community of researchers and innovators. The idea is that by changing the perception of the innovators through the pilot activities a long-term change in the cultures of research and innovation can be achieved. Hence, the aim is also to establish this as a standard activity within universities and PhD projects – built around the idea of a "360 degree" view of innovation. Maintenance work then takes the form of participating in PhD committees and trying to convince university managers of such a change in the very notion of innovation materialized and institutionalized in the university's PhD education. The Spheres protocols play a crucial role in this model. They are introduced into a PhD program as a sort of "test" of whether or not an innovation can be an actual 360 degree view of innovation. The impact of this could initiate a cultural shift towards RRI with the next generations of innovators-in-training in a sense.

## CONCLUSIONS

In this paper we proposed to think about RRI through the lens of translation. This meant to focus on how different versions of RRI are stabilized in the territorial RRI ecosystems and to ask how these ecosystems contribute to shaping the particular translations and how – in turn – they themselves are re-shaped in the process. We combined this perspective with an interest in the often-overlooked work of creating, nurturing and caring for the relationships that allow for research and innovation to become 'responsive' with society – one of the central aims of RRI.

In the territorial clusters that provide the case studies explored in this article, RRI gets translated as a set of distinct approaches or methods: as participatory agenda setting, shared agendas, and (a move towards) citizen assemblies as a means of innovation governance. In addition, RRI pilot projects take inspiration from design thinking and citizen science. We showed how these translations are entwined with the particular R&I ecosystems in the different regional clusters and how they enable certain kinds of work while rendering others more difficult.

However, while RRI is often understood as an alternative mode of innovation governance – as a remedy, an antidote or antiserum to the runaway train of (biotechnological, biomedical or nanotechnological) innovation, with the aim of infusing "irresponsible" (amoral or immoral) research and innovation with 'good' values and thereby changing and correcting its directionality – what we see in the work of the different regional clusters of the TRANSFORM project, is something different. We see efforts to implement change in the way innovation is practised and thought of. This resonates with work in the innovation literature that calls for broadening the notion of innovation and for developing ways to work towards community-based goals (Ludwig & Macnaghten, 2019). This change is not necessarily a change in research and innovation trajectories. Rather, it is social and political change, change in public administration practices, policies, social interactions, and social dynamics.

This becomes visible in the different purposes and objectives of the RRI pilots in the regions: regional RRI pilots can strive towards introducing deliberative democracy into territorial innovation strategy development, a pilot can aim at transforming regional urban development or may attempt to re-shape how innovation is conceptualized in the education of engineering PhDs, or activities can have the objective to transform health and waste management projects by introducing citizens perspectives.

One important shared feature that draws this plurality of objectives and purposes together is the fact that the work that is being done mostly does not start from zero but builds on pre-existing relationships and repertoires of collaboration. While these clearly correspond to RRI principles (often selectively so), what is happening in the different activities might be better understood as a form of "maintenance work". What we mean by maintenance here is that existing relationships are cared for or re-kindled, networks are nurtured and further developed (by extension or by cutting unnecessary elements) (Arora *et al.*, 2020; Puig de la Bellacasa, 2011). The absence of such pre-existing relationships (or previous work to build on) can cause significant trouble and frustration for the actors involved.

While maintenance work is crucial for creating the conditions for actors and organizations to become "response-able" (Felt, 2017), we also encountered a number of challenges for this kind of work. First, it is often dependent on individual actors that are already convinced about these approaches and become the 'inside (wo)man'. Second, this work is often marginalized and invisible, which also means there are no clear measures for success or performance, which can become an issue when such projects are judged against traditional project performance criteria in terms of impact and benefits. Third, this may lead to a focus in RRI projects to prioritize 'easy-to-sell' success stories, instead of working towards cumbersome and long-term cultural change. And finally, there is a tension between the aim of becoming responsive and the risk of 'regulatory capture' when it comes to questions about what is a relevant topic and where it makes sense to involve citizens and where to keep them out. This is a challenge that also Schot and Steinmueller (2016) point to in their discussion of different framings of innovation policy.

What the actors in the different clusters thus strive for, is to find a balance between transformation and maintenance. One could even argue that they try to achieve long-term transformation towards sustainability through careful maintenance work. This is often achieved through activities and practices that are 'invisible' to the project impact assessment, and thus rather different from the 'heroic' acts so common in mainstream innovation narratives (Vinsel & Russell, 2020). Fetishizing the 'new' and 'unique' of singular projects makes it harder to adequately value the 'old' or that which is already there. Without the already existing relations, there is nothing to maintain. Based on this finding, we argue that it is crucial to develop ways to make this kind of work 'visible' in how impacts and benefits are conceptualized and described – in the SwafS program and beyond. This is necessary in order to provide the conditions for this kind of work and thus for research and innovation to become more responsive to multiple facets of society.

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