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From experimentation to structural change: fostering institutional entrepreneurship for public engagement in research and innovation

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Many researchers experiment with participatory settings to increase public engagement in research and innovation (R&I). Because of their temporary nature, it often remains unclear how such participatory experiments can contribute to structural change. This paper empirically explores options for bridging this gap. It analyzes how participants can be supported to act as institutional entrepreneurs to actively promote public engagement in R&I. To draw lessons, we analyze empirical material gathered on nineteen Social Labs which were set up to promote the uptake of Responsible Research and Innovation in a European R&I funding program (Horizon 2020). Involvement of motivated participants, insight in their institutional context, and specific methods and management choices that enhance a sense of agency are identified as essential for organizing change. These findings and the resulting framework of interventions may prove valuable for further (action) research into the institutionalization of public engagement in R&I.

Keywords: participatory experiments; Social Labs; institutional entrepreneurship; public engagement; public participation; Responsible Research and Innovation; institutionalization.

1. Introduction

To address the grand ecological and social challenges of our time, policymakers are interested in involving a wider range of actors in research and innovation (R&I) (Kuhlmann and Rip 2018). Approaches that go under the banner of Mission-oriented Innovation, Open Science, Citizen Science, Co-design, Responsible Research and Innovation (RRI), and Transformative Innovation Policy (Owen, Macnaghten, and Stilgoe 2012; Stilgoe, Owen, and Macnaghten 2013; Von Schomberg 2013; Mazzucato 2018; Diercks, Larsen, and Steward 2019; Smallman 2019; Robinson, Simone, and Mazzonetto 2020; Armeni et al. 2021) all promote the inclusion of citizens and stakeholders in research or innovation. While they differ according to the 'depth' of public involvement, they share the ambition of improving R&I through responsiveness to societal concerns and openness to diverse inputs (see D'Este et al. 2018). Despite heightened policy attention to these approaches and some scholarly recognition of their benefits (Stirling 2008; Chilvers and Longhurst 2016),

structural opportunities for public participation in R&I are still lacking (Jasanoff 2016; Braun and Könninger 2018; Macq, Tancoigne, and Strasser 2020).

In the absence of structural inclusion, there is a surge of interest in experiments with temporary forms of participation in R&I (Lezaun, Marres, and Tironi 2017). In a specific branch of these experiments, the so-called real-world labs (Følstad 2008; Hassan 2014; Lezaun, Marres, and Tironi 2017; Schäpke et al. 2018; Timmermans et al. 2020) serve to typically provide participants with a setting and the means to experiment with developing and discussing solutions to complex technological, societal, and ecological challenges. While evaluations of the output of such 'living labs' (Erisman et al. 2023) are highly promising, they have not yet led to a structural opening up of R&I to include a broad range of actors (Braun and Könninger 2018). This prompts questions about the relationship between temporary experiments and structural change (Kivimaa et al. 2017: 25; Potjer 2019; Sengers, Wieczorek, and Raven 2019; Ghosh et al. 2021).

The relation between temporary participatory settings and structural change in R&I remains empirically underexplored (Braun and Könninger 2018; Cohen 2022). This paper aims to address this gap by exploring, conceptually and empirically, how temporary participatory experiments may create conditions for more structural public involvement in R&I. Thus, we intend to answer the question: how can temporary participatory settings contribute to structural change that enables public engagement in R&I?

The conceptual perspective takes as a point of departure Owen et al.'s (2021: 3) statement that there is a 'critical need for effective and enterprising institutional entrepreneurship' in R&I (see Reale 2022). This has been further elaborated by Cohen (2022) into a framework that proposes (action) research to study the construction of collectives of institutional entrepreneurs that may support an institutionalization of public engagement in R&I. We will use a refined version of this framework to analyze nineteen temporary participatory experiments that were set up to promote the uptake of 'RRI'. RRI was a policy construct to instigate changes in European R&I via R&I funding in the Eighth Framework Programme, Horizon 2020 (H2020). Among the envisioned changes, grouped under the RRI label, was public engagement in R&I. The temporary participatory settings were set up in a Coordination and Support Action funded under H2020, dubbed NewHoRRIzon, that sought to promote the integration of RRI in R&I funding. The temporary settings designed in NewHoRRIzon were called Social Labs (see Hassan 2014; Braun et al. 2022). A systematic comparison of the experiences with the nineteen Social Labs through the lens of the Cohen (2022) framework will allow us to draw conclusions on how temporary participatory experiments can promote institutional entrepreneurship that supports participatory change in R&I.

2. Promoting collective institutional entrepreneurship: a conceptual framework

Public participation in decision-making on R&I has been reflected upon for almost a century and calls to include the public in R&I have increased strongly over the last 40 years (Dewey 1954; Jamison et al. 1999; Wilsdon and Willis 2004). In Europe, the European Union's Science and Society action plan and subsequent funding programs have provided some momentum to these calls (Macq, Tancoigne, and Strasser 2020) by funding many different participatory experiments in the form of living labs, Social Labs, and all kinds of temporary forms of participatory engagement in R&I. Despite these efforts, resulting participatory experiments remained by and large an add-on to mainstream R&I (Braun and Könninger 2018; Cohen 2022). This may not be surprising, considering that researchers and innovators are embedded in institutional contexts that are not very receptive to public engagement (Pieczka and Escobar 2013; Cook 2014; Escobar 2014; Loeber, Griessler, and Versteeg 2011; Cohen 2022).

Because of structural impediments in R&I institutions, Owen et al. (2021) have pointed at the crucial role of institutional entrepreneurs in producing change in these institutional contexts. A key question for institutional entrepreneurship is how actors, which are embedded in and thus limited by existing structures, possess the agency to envision alternatives to

these structures and translate these into new practices (Garud, Hardy, and Maguire 2007). Institutional entrepreneurs are, according to Maguire, Hardy, and Lawrence (2004: 657), 'actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones'. Various authors in (new) institutionalist and organizational research have identified specific requirements that enable individuals to act as (collectives of) institutional entrepreneurs (Battilana, Leca, and Boxenbaum 2009; Weik 2011; Lowndes and Roberts 2013; Randles 2016).

Drawing on these requirements, Cohen (2022) developed a conceptual framework that proposes (action) research into the construction of collectives of institutional entrepreneurs that may support further institutionalization of public engagement in R&I. To support such (collectives of) institutional entrepreneurs, organizers must (1) acquire insight in the dominant institutional arrangements in a particular setting. Furthermore, they must be able to (2) mobilize others to secure support for their proposed changes, notably because exercising 'collective agency' (Lowndes and Roberts 2013) contributes to their success. To enhance their agency, involved stakeholders then can be invited to (3) reflect on the past, imagine alternative futures, rules and/or practices that deviate from dominant ways of doing and thinking, and plan for concrete actions to break 'with existing rules and practices associated with the dominant institutional logic(s)' (Garud, Hardy and Maguire 2007: 962). To make sure that their plans are implemented, they must (4) engage with the existing institutional context, (5) develop concrete interventions which they (6) can try to anchor in the existing institutional context so as to institutionalize alternative rules or practices. Finally, (7) in the long-term, this may lead to pathways that open up R&I more structurally (Cohen 2022).

In this paper, we build on Cohen's conceptual work to articulate a set of research questions that guide our analysis of the nineteen Social Labs. For the purpose of this study, we emphasize the Labs' institutional contexts, how their organizers were able to mobilize and engage support, what they did to enhance a sense of agency among their participants, and how the Labs helped them to design and implement interventions, including specific attempts at 'anchoring' (Loeber 2003 in Elzen, Van Mierlo, and Leeuwis 2012), that is, at instigating pathways toward institutionalization (Fig. 1). This means that we pay attention to Cohen's (2022) aspects (1)–(6) of the aforementioned framework, combining aspects (4)–(6) into one conceptual category. (An earlier application of the framework showed that the conceptual distinction between these aspects, though conceptually interesting, was not necessary to uphold to draw lessons and insights from empirical case studies for practice (Cohen and Loeber 2023)

2.1 Making sense of one's institutional context
A first step in using temporary participatory experiments to support participants in developing into (collectives of) institutional entrepreneurs is helping them to gain insight in the often unnoticed or implicit structures under which they operate (Cohen 2022). A new institutionalist perspective helps to disaggregate structures into rules and incentives, narratives, and practices (Lowndes and Roberts 2013), which may inform proposals for making change and overcoming structural barriers to change. This implies that the rules and incentives
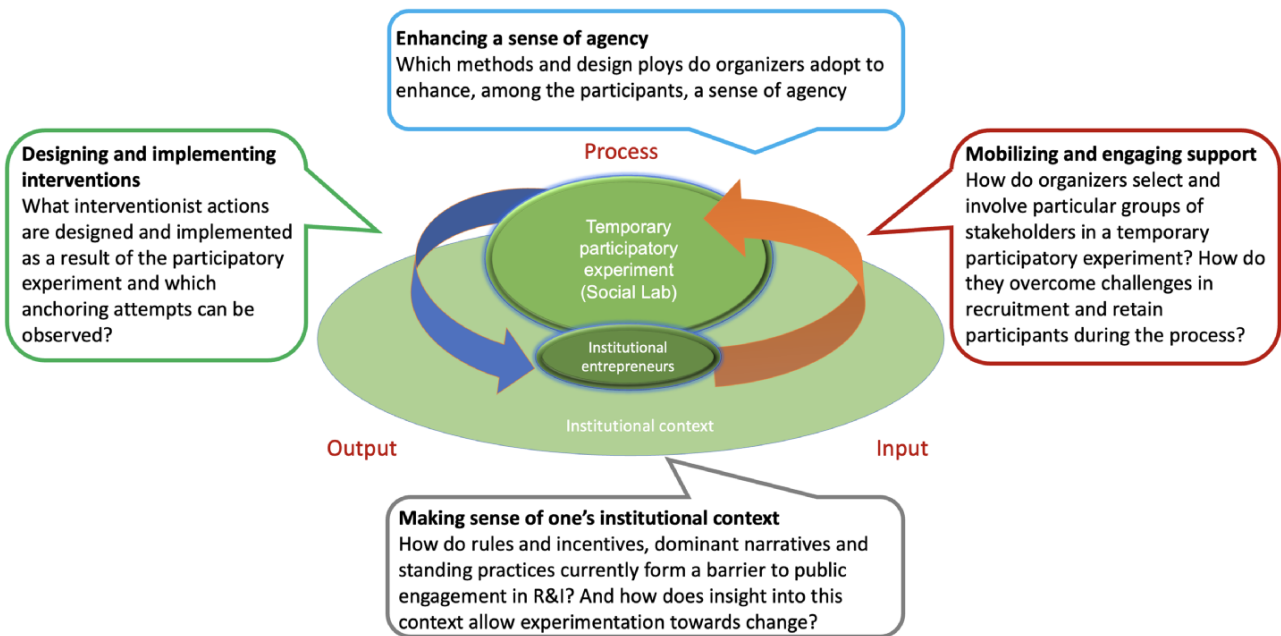
Enhancing a sense of agency
Which methods and design ploys do organizers adopt to enhance, among the participants, a sense of agency

Process

Designing and implementing interventions
What interventionist actions are designed and implemented as a result of the participatory experiment and which anchoring attempts can be observed?

Temporary participatory experiment (Social Lab)

Institutional entrepreneurs

Mobilizing and engaging support
How do organizers select and involve particular groups of stakeholders in a temporary participatory experiment? How do they overcome challenges in recruitment and retain participants during the process?

Institutional context

Output

Input

Making sense of one's institutional context
How do rules and incentives, dominant narratives and standing practices currently form a barrier to public engagement in R&I? And how does insight into this context allow experimentation towards change?

Figure 1. Organizing institutional entrepreneurship through temporary participatory experiments. A conceptual overview of the steps involved in a temporary participatory experiment to support the development of institutional entrepreneurship in a certain institutional context. This ranges from making sense of one's institutional context to the mobilization and engagement of support, the enhancement of a sense of agency, and the resulting design and implementation of interventions.

involved in R&I (funding) decisions and promotion criteria are explicated (see Åm 2019). Attention should go too to narratives that convey ideas about how to do proper R&I and that pertain to the relationship between R&I and society (see Randles et al. 2016; Genus and Iskandarova 2018; Sigl, Felt, and Fochler 2020). Rules and narratives in turn shape practices as practitioners tend to comply with what is standard and routine (see Schuijff and Dijkstra 2020). This implies the following empirical question: how do rules and incentives, dominant narratives, and standing practices currently form a barrier to public engagement in R&I? How does insight into this context allow experimentation toward change?

2.2 Mobilizing and engaging support

To mobilize others so as to collectively exercise agency is important to secure support for the changes proposed (Weik 2011; Lowndes and Roberts 2013; Randles 2016; Hoogstraaten, Frenken, and Boon 2020). Cohen (2022) posited that action research formats such as Social Labs may be used to mobilize stakeholders in R&I and thus organize support for participatory change. There are yet several intricacies in mobilizing and involving participants in a participatory experiment such as a Social Lab. Which agents of change are involved will codetermine the (substantive) focus of a participatory venue, while, vice versa, the initial substantive closure will be of influence on the selection of particular stakeholders (Grin, Van De Graaf, and Hoppe 1997). Furthermore, since agents of change serve as a linking pin between the experiment and its institutional context, their eventual selection and continued involvement is critical to increase prospects for structural change (Loeber 2004). Research on stakeholder engagement in RRI shows that frictions and politics in the selection and involvement of particular stakeholders can be

challenging (Blok 2014). Taking these insights together begs the following empirical questions: how did organizers of the Social Labs select and involve particular groups of stakeholders? How did they overcome challenges in recruitment and retain participants during the process?

2.3 Enhancing a sense of agency

Helping participants to develop a sense of agency, feel empowered to question the status quo, and act as agents of change is crucial to the endeavor. Agency is taken here to mean a form of social engagement, 'informed by the past (in its habitual aspect)' in combination with an orientation on the future 'as a capacity to imagine alternative possibilities' that informs actions in the present 'as a capacity to contextualize past habits and future projects within the contingencies of the moment' (Emirbayer and Mische 1998: 963). There is a rich literature on methods that enable individuals to reflect on past habits and frames (e.g. Loeber et al. 2007), imagine alternative futures (e.g. Hajer and Pelzer 2018), and spur a sense of ownership to spark contextualized action in the here and now (e.g. Quist and Vergragt 2006). To make sense of whether and how participatory experiments such as Social Labs may support participants to develop into genuine institutional entrepreneurs, an empirical question hence is the following: which methods and design ploys did organizers adopt to enhance, among the participants, a sense of agency?

2.4 Designing and implementing interventions

To observe the exercise of agency, the focus must be on the design and implementation of actual interventions addressing some institutional context (see Wiek et al. 2016). In line with the new institutionalist perspective, we look at interventions that challenge standing practices, dominant narratives,

and formal rules and incentives. However, to make a lasting impact, interventions require 'anchoring' (Loeber 2003; Elzen, Van Mierlo, and Leeuwis 2012), that is, the adoption of the intervention by, and continued embedding in, existing organizations and networks. This is seldom addressed in the literature (Kivimaa et al. 2017; Schot and Steinmueller 2018: 1563). (Besides intentional acts of anchoring, analysts can also pay attention to unintended 'ripple effects' (Trickett and Beehler 2017). These are consequences of the intervention that are unintended or unanticipated.) The associated empirical question is the following: what interventionist actions were designed and implemented in the Social Labs, and which anchoring efforts can we observe?

3. Research context and methods

Research funding in the European Union is organized in 5-to-7-year schemes called Framework Programmes. Over time, the role of citizens in R&I was elaborated in notions of public engagement and science literacy, which in H2020 got grouped under the label of RRI. The NewHoRRIzon project was set up in 2017 with H2020 funding to help ensure that RRI would be taken up in each of the funding scheme's sections. These sections covered various types of research (roughly put: researcher-driven research through *Excellent Science*, challenge-oriented research focusing on *Societal Challenges*, and business-driven research matching investments in R&I from the private sector through the *Industrial Leadership* scheme and through a diversity of other approaches focusing on a multitude of themes and topics). The Labs that NewHoRRIzon's contributors organized each addressed a section, resulting in a total of nineteen Labs.

Organizing Lab teams included researchers, facilitators, and assistants from various disciplines and backgrounds representing eleven countries, in some cases sharing responsibility for two or more Social Labs. Among these, the Social Lab managers were the 'backbones' of the Social Lab processes, responsible for communication and the recruitment of participants, taking care of logistics, and overlooking the whole process. Facilitators helped to structure formats for participation and facilitated debates between Lab participants. Facilitator and assistant roles were often held by partners, but also by freelancers, since the Lab process required experienced moderators.

Each organizing Social Lab team set out, as a first step, to diagnose the 'state of RRI' (including public engagement) within their section in H2020, on the basis of document review and expert interviews (for results, see Novitzky et al. 2020). The diagnosis informed the design of the nineteen Labs, which ran from spring 2018 to summer 2020. In that time span, every Social Lab arranged a series of three workshops of 1–2 days and dedicated activities in between these, such as training-on-demand, teleconferences, or public engagement events, among many others. A shared RRI-oriented Social Lab manual (see www.newhorrizon.eu) ensured coherence among the Labs yet allowed teams to adapt workshop designs to participants' needs and contexts (Marschalek et al. 2022).

Each Lab involved some fifteen to twenty-five participants, drawing from the H2020 section on which each focused. The participant selection was informed by the document review and interviews used for the diagnosis of the institutional context, identifying, e.g., funding program officers, board

members of international research networks, and project leaders, each in potential positioned to become an institutional entrepreneur. Prospective participants were interviewed and invited to join or to provide alternative contacts. Supportive methods included sending targeted invitations to actors selected through stratified random sampling or preliminary network analysis, supported by a CORDIS-keyword research (see Novitzky et al. 2020). Participants were invited to reflect on and engage in RRI in the H2020 section most relevant to them and to develop interventions (dubbed 'pilot actions') aimed to change the aspects of these sections and related practices. For these interventions, NewHoRRIzon provided a seeding budget of €15.500 per Social Lab.

Data on the Social Lab processes were gathered by Lab managers, who acted as 'engaged researchers' (Levin and Ravn 2007), and two of the current author team who conducted a comparative evaluation of all nineteen Social Labs (Loeber and Cohen 2018). In the narrative, responsive, and reflexive evaluation (Arkesteijn, van Mierlo, and Leeuwis 2015; Ivaldi, Scaratti, and Nuti 2015; Constant and Roberts 2017) designed for the project, Social Lab teams were asked to share views and experiences via dedicated reflection and reporting documents, before and after each of the three workshops. The template included questions about the activities carried out by Social Lab participants addressing RRI, the workshops' design, and the Social Lab teams' motives for developing this design. The teams were also asked to produce short narratives on critical moments they experienced during the Social Lab process, the choices they made in response to these, and the resulting consequences. These narratives were later analyzed in a cross-case analysis, in which also stakeholder selection criteria, design choices and methods applied were taken on board as well as the development of interventions. These data form the core of the empirical evidence collected for the development of this study.

Collected data were synthesized in running narratives (see Polkinghorne 1995) for each Social Lab. These narratives were shared with the respective Social Lab teams for validation and refinement purposes, upon which complementary interviews were conducted with each individual Lab manager. The results were reworked into concise narratives covering a Social Lab's institutional context, process, and interventions. For further validation and to gather lessons learned, these drafts were shared with Social Lab participants by way of a member check in reflection sessions during the third workshop (see 'learning histories', Roth and Kleiner 1998). The outcome of these sessions was described by Social Lab teams in a final reflection report. In addition, the data fed into a narrative per intervention. These 'pilot action narratives' were categorized and fed back to those involved by way of a final member check.

For the purposes of the evaluation of the project and this specific paper, both the reflection and reporting templates per Lab, as well as the pilot action narratives, were coded using a codebook. The latter took its inspiration from both the conceptual framework and involvement in the evaluation of the project. Atlas.ti software was used in executing the coding (see Supplementary material for an example of a reflection and reporting template, the reflection process to get to a validated pilot action narrative, and for the codebook that was used to code the material). These comparative results are complemented here with a selection of case descriptions (Yin 2003) by authors responsible for the respective labs.

4. Research findings

This section presents the findings through the lens of our framework.

4.1 Making sense of Social Lab participants' institutional context

H2020 was the largest R&I funding program in Europe, funding nearly €80 billion between 2014 and 2020 across Europe. Because H2020 sections served as the organizational foci of the NewHoRRIzon Social Labs, these various sections (see Fig. 2) formed a key point of attention in the discussions about the institutional contexts in which Lab participants operated as researchers and innovators. Social Lab teams had analyzed the various sections' rules and incentives, dominant narratives, and standing practices as a starting point for setting up a Social Lab, identifying to which extent the RRI concept was embraced in a particular funding scheme and which barriers to its (further) uptake could be detected. They found striking similarities between the *Excellent Science, Industrial Leadership*, and the *Societal Challenges* schemes in regard to public engagement, in spite of wide differences between outlook and purpose. It was striking that even within the sections that focused on tackling societal challenges and other diverse approaches, public engagement was mostly deemed important on the narrative level only: it featured in formal texts only, emphasizing the importance of engaging the public, but hardly in incentives and practices. With the notable exception of e.g. sections focusing on health, food systems, environment, science with and for society, and joint research undertakings, R&I was mostly practiced and incentivized from a 'deficit perspective' (see Simis et al. 2016) that reduces citizens to users of innovations and recipients of information on scientific findings, and not as sparring partners.

Within *Excellent Science*, for example, the *European Research Council* chose to fund curiosity-driven ('blue sky') research, fiercely defending its autonomy against public interference in the choice of research topics. Also, in *Future and Emerging Technologies* and the *Marie Skłodowska-Curie Actions* (MSCA), despite some enthusiasm for RRI at the policy level, public engagement was mostly understood and practiced as a necessity to disseminate project results and to attract large public support. In *Industrial Leadership*, there was some sensitivity to social and ethical challenges and interest in open innovation in practice, but many companies notably saw RRI as something that could harm their competitive advantage. Apart from user testing and customer research, there was no engagement with the public in practice. Even in *Societal Challenges*, as well as in the *diversity of approaches* sections, RRI and public engagement were scarce, and limited to existing traditions, e.g. of medical ethics (in HEALTH) and user involvement (in mobility research). Only in FOOD and

EXCELLENT SCIENCE
SOCIAL LAB 1
European Research Council
SOCIAL LAB 2
Future and Emerging Technologies
SOCIAL LAB 3
Marie Skłodowska Curie Actions
SOCIAL LAB 4
Research Infrastructures, including e-Infrastructures

INDUSTRIAL LEADERSHIP
SOCIAL LAB 5
Leadership in Enabling Industrial Technologies
SOCIAL LAB 6
Access to Risk Finance & Innovation in SMEs

SOCIETAL CHALLENGES
SOCIAL LAB 7
Health, Demographic Change and Wellbeing
SOCIAL LAB 8
Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
SOCIAL LAB 9
Secure, Clean and Efficient Energy
SOCIAL LAB 10
Smart, Green and Intergrated Transport
SOCIAL LAB 11
Climate Action, Environment, Resource Efficiency and Raw Materials
SOCIAL LAB 12
Europe in a changing world - Inclusive, innovative and reflective societies
SOCIAL LAB 13
Secure societies – Protecting freedom and security of Europe and its citizens

DIVERSITY OF APPROACHES
SOCIAL LAB 14
Spreading Excellence and Widening Participation
SOCIAL LAB 15
Science with and for Society
SOCIAL LAB 16
European Institute of Innovation and Technology
SOCIAL LAB 17
Non-Nuclear direct actions of the JRC
SOCIAL LAB 18
Instruments of H2020
SOCIAL LAB 19
EURATOM

Figure 2. An overview of the nineteen institutional contexts with reference to which Social Labs were organized (*source*: newhorrizon.eu). An overview of the different H2020 sections that the Social Labs focused on in their efforts. This includes Social Labs 1–4 that focused on particular sections of Excellent Science, Social Labs 5–6 that focused on sections of Industrial Leadership, Social Labs 7–13 that focused on sections of Societal Challenges, and Social Labs 14–19 that focused on the diversity of approaches.

Table 1. Participant composition over the Social Labs' lifetime.

Stakeholder group	First workshop cycle	Second workshop cycle	Third workshop cycle
Academia	144	136	126
Business	12	29	10
Policy	55	50	32
CSOs and others	62	39	28
Total	273	254	196

the *Joint Research Centre* (JRC), there was growing attention to multi-actor approaches and opening up to outside stakeholders, and in *Science with and for Society* (SWAFS), RRI and public engagement were its reasons for being, until in mid-2018, the European Commission (EC) decided to dissolve this unit.

4.2 Mobilizing and engaging support

As concerns selecting and engaging participants, and retaining their involvement throughout the 2-year process, differences between programs were striking. In the *Excellent Science* pillar, the main challenge was to recruit important policy actors, while in the *Industrial Leadership* pillar Social Lab teams had a hard time identifying and recruiting relevant business actors. In the *diversity of approaches*, there was a low initial response rate, informed by confusion and skepticism about RRI. Some Social Lab managers managed to achieve institutional 'buy-in'. For example, in JRC, once organized around a single project with the assistance of the JRC directorate, the Social Lab took off. Also, the SWAFS lab filled when the EC Research Executive Agency sent a request for participation to project coordinators. Eventually, recruitment efforts resulted in a gender-balanced and geographically spread group of participants working in academia (144), Civil Society Organizations (CSOs) (62), policy (55), and business (12) (Table 1).

Retention of initial participation proved problematic across Labs. The main reasons for dropping out were a lack of time and of support from participants' home institutions. In all cases, snowballing methods—asking departing or remaining participants to identify new potential participants—proved vital to substitute the losses. In specific cases, Lab managers and participants engaged in targeted recruitment based on specific pilot action needs.

4.3 Enhancing a sense of agency

Early in the formation of the Labs, organizers triggered participants to start reflecting on the institutions that governed their R&I practices and the context in which they worked professionally. Once participants explicated these and came to question the current state of affairs, they were better positioned to consider alternatives and their own role in making changes.

Between the Labs, the methods for enhancing a sense of agency among participants differed widely. Methods included Bohmian dialogues (Mandl, Hauser, and Mandl 2013), walk-shops (Wickson, Strand, and Kjølberg 2015), world cafés, or sociometric techniques, asking participants to position themselves physically in the room in response to questions about RRI. Furthermore, all Social Labs presented the results of the

diagnosis as material for reflection. Next, most Lab organizers invited participants to cultivate and share future visions for RRI as a critical step toward developing alternatives to the status quo and thinking of concrete interventions.

A particular successful approach to help participants on their way was to ask them to envision alternative, RRI-imbued futures and then engage them in 'backcasting' (Quist and Vergragt 2006), taking the desired future visions as a point of departure and then reasoning back to the here and now to design and plan targeted interventions. The various ideas for intervening actions were subsequently prioritized by multicriteria voting procedures with sticky dots. Subsequently, dedicated templates were provided to help participants plan their interventions in detail.

The second workshop was highly contributive to rebuilding a sense of ownership and agency. The focus of this second gathering was on sharing experiences with trying to make a change, implementing interventions, and reflection on the barriers they had encountered in doing so. Social Lab managers used various methods to unlock divergent, creative thinking. Some teams invited experts (e.g. in management and leadership, transdisciplinarity, or RRI) to scaffold participant experiences. Social Lab organizers also shared experiences in other Social Labs so as to inspire ideas and spark greater appreciation of what might be possible to conceive and implement. This second workshop proved a watershed moment for several interventions: some were abandoned for a lack of enthusiasm or lack of time and resources.

On top of that, advancing RRI seemed less relevant as, at that time, there were clear signs that the EC itself would not include RRI as such in the then-developing next research funding Framework Programme (Griessler et al. 2023). To defuse concerns over the future of RRI, organizers (re-)emphasized the intrinsic motivation of participants to renew a sense of purpose to their interventions, as well as the relevance of the themes, among them public engagement, gender equity, and ethical issues, which were now collided under the label 'RRI' for future R&I. And indeed, quite some interventionist plans were not abandoned but revised and elaborated in concrete implementation plans.

A third and final workshop offered an opportunity to take stock of completed interventions, share experiences, and articulate lessons learned. In some labs, new participants were invited to validate the developed interventions and/or to 'adopt' these and implement them, also after the project had come to an end. Insights from the *ex-durante* narrative evaluation were shared, which showed, among other things, that participants reported positive personal effects of the collaborative, trial-and-error experimental nature of the Labs in helping them to grasp RRI and make it tangible in their own institutional contexts.

4.4 Designing and implementing interventions

In total, with support from the nineteen Social Labs, some seventy-two interventionist actions were designed and implemented. Of these, fifty-nine were identified as presenting unique, fully elaborated interventions with ideal-typical functions (Fig. 3), each touching on specific RRI themes. Out of these fifty-nine interventions, twenty-three addressed RRI in general, twenty-six set out to improve Public Engagement, only three addressed Gender Equality, eight targeted Ethics, ten Science Education, four Open
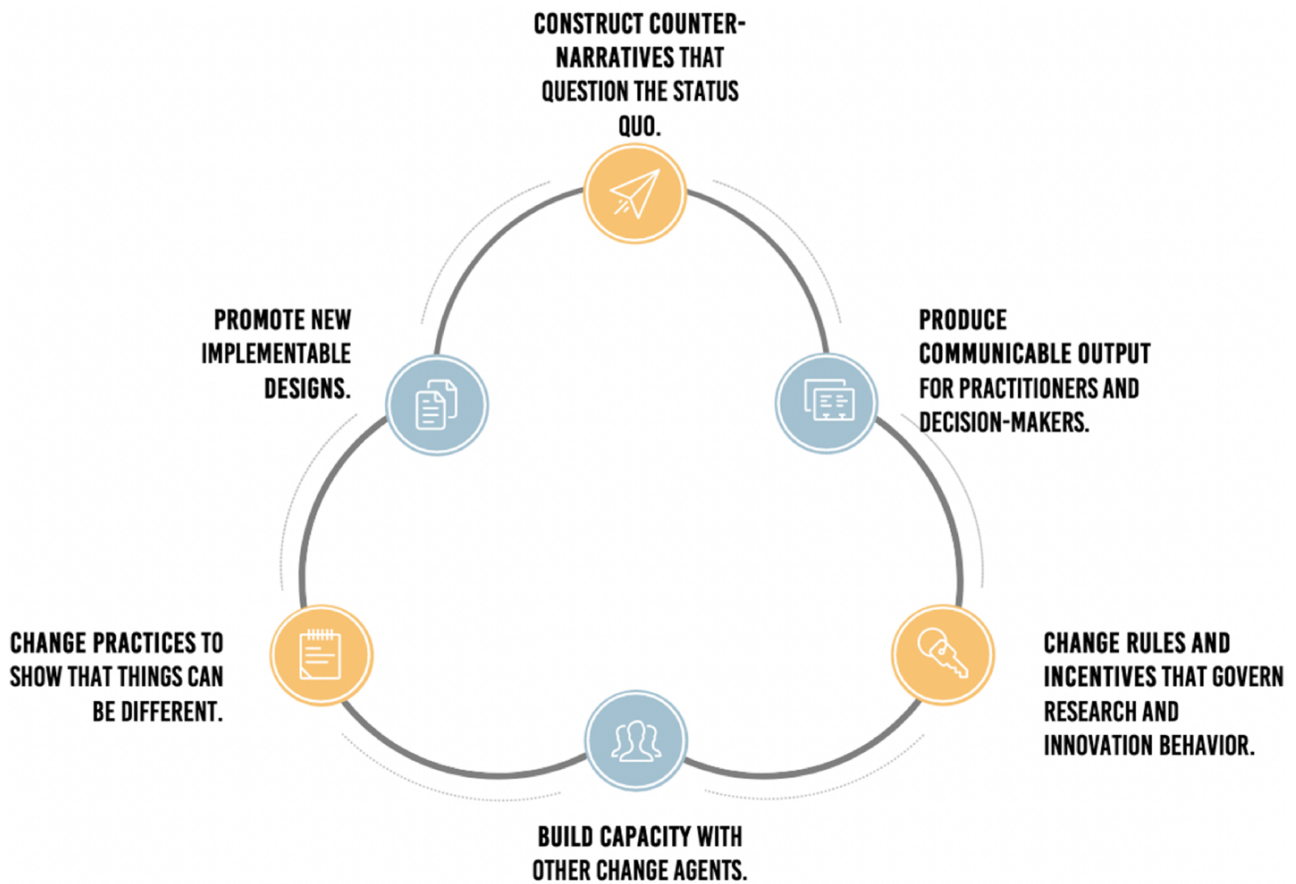
Figure 3. Visualizing the continuum of ideal-typical interventions organized by function in aspiring change [adapted from (Weinlinger in Cohen and Loeber 2022)]. An overview of the diverse ideal-typical interventions that resulted from the Social Labs. This includes interventions that focus on (1) building capacity, (2) changing practices, (3) the promotion of new implementable designs, (4) the construction of counter-narratives, (5) the production of communicable output, and (6) the change of rules and incentives.

Access, and seven concerned R&I Governance. Several addressed associated aspects such as Responsiveness and Privacy. (See the pilot action booklet for a description per pilot: https://newhorrizon.eu/wp-content/uploads/2022/04/NewHoRRIzon-Pilot-Action-Booklet_fin20220412.pdf).

The interventions that were designed can be, applying a new institutionalist perspective, categorized along three ways in which participant agency was exercised: changing practices, constructing counter-narratives, and changing rules and incentives. Inductive analysis of the findings furthermore illuminated a diverse array of six ideal-typical interventions. These included building capacity, changing practices, promoting new implementable designs, constructing counter-narratives, producing communicable output, and changing the rules and incentives (Fig. 3). Two examples of each ideal-typical intervention are discussed in the next subsections.

4.4.1 Building capacity among potential change agents
Many interventions contained an element of capacity building for RRI, informing trainings, and exchanges of knowledge and skills. For example, the network of National Contact Points (NCPs), the main structure to provide guidance, practical information, and assistance on all aspects of participation in European R&I funding in different European countries, provided such trainings and NewHoRRIzon's output added to that. Another intervention focused on capacity

building for stakeholder engagement across a European Research Area Network of funders (ERA-Net). As a result, the ERA-Net revised its second Implementation Plan for the period from 2020 through 2021, and changes came about in a 2019 joint call of the network regarding stakeholder engagement. Capacity building thus was initiated as a vital step toward structural change in participants' institutional contexts.

4.4.2 Changing practices to show that what is considered normal might be different
Quite some interventions sought to change dominant practices. For instance, a group of participants organized a workshop to introduce RRI to see it integrated into three projects near Delft University, the Netherlands. The projects, evaluated after 6 months in a workshop with RRI experts, focused on integrating societal perspectives into their R&I practices. Another example is the intervention, at the Brightland Institute for Smart Services (BISS) in Heerlen, the Netherlands, to invite local experts, policymakers, and organizations to discuss local (ethical) challenges around digitalization and automation of work. This gathering helped catalyze collaborations on the ethical regulation of Artificial Intelligence (AI) between local police and BISS researchers, with subsequent funding applications to further anchor and continue this practice of cooperation.

4.4.3 Promoting new implementable designs

Designs and tools for RRI and public engagement were developed and used in multiple contexts. An example is the inclusion and promotion of a game designed at Ben-Gurion University, Israel, to increase dialogic engagement at the university level between researchers and interested citizens. Likewise, a novel 'thinking tool' aimed at fostering two-way engagement between science and society through a series of co-design workshops was developed and promoted in Barcelona, Spain and Lisbon, Portugal to produce local prototypes for science–society dialogues. The design was made publicly available in the form of a methodological guidebook shared with EC policymakers.

4.4.4 Constructing counter-narratives that question the status quo

More than half of all interventions centered on articulating counter-narratives to raise awareness and energize others to change R&I practices. One intervention involved a survey to gather insights to inform a counter-narrative about how public engagement is necessary (more than just an add-on) for a green transition. Other institutional entrepreneurs navigated the changing policy field around RRI seeing it as an opportunity to develop four alternative scenarios for the future of science and society (Daimer et al. 2021). They applied (to no avail) for funding to further raise awareness on the narratives and anchor their ideas, and saw their efforts result in a declaration (Gerber et al. 2020) and text parts for the consultation of the new European Framework Programme.

4.4.5 Producing communicable output for practitioners and decision-makers

The aforementioned products are among the many curated brochures and policy briefs produced by way of intervention. One group created a brochure of eight RRI stories from across the European Institute of Technology, including a story on the value of public engagement in developing new products and services. The brochure was published online and presented during the funding scheme's main conference in Brussels in autumn 2019. Similarly, a group of early career researchers produced a policy brief in which they called on policymakers to use new insights in evaluation to update the notion of 'excellence' in science, and to better reward responsible and engaged research (Cohen et al. 2019). The policy brief was presented by the head of the Marie Curie Alumni Association (MCAA) at a stakeholder meeting in December 2019 in Brussels, and most issues were included thereafter in the new MSCA funding program.

4.4.6 Changing rules and incentives that govern R&I

A smaller number of interventions focused on formalizing elements of RRI in new rules and incentives governing R&I. For example, RRI principles were used, in one intervention, to update the current European Charter for Open Access, a guiding document for setting up research infrastructures across Europe. In another case, the issue of brain drain was addressed at a Serbian university by institutionalizing RRI in the organization. Their involvement in the Social Lab helped participants to act as change agents, as it provided sufficient weight for the university management to get on board and create institutional initiatives at different departments within the university, including the installation of a dedicated RRI team.

To further anchor their efforts, the change agents managed to acquire funding for two dedicated projects to institutionalize RRI in their own university and the wider Western Balkan R&I system.

The fact that so many interventionist actions were designed and implemented is itself a promising sign. But how to interpret such a result: how did the nineteen Social Lab designs and their participants' efforts lead to pathways to structural change that open R&I to a diversity of publics?

5. Analysis and reflection

There was room for improvement from an RRI perspective, the project's initial queries showed. The desk-study assessment indicated that, with a few exceptions, there was little evidence of a broad or deep institutionalization of RRI in different parts of H2020 (Novitzky et al. 2020). With the notable exception of new developments in several funding programs on public health, food, and the JRC, public involvement in R&I was mostly practiced and incentivized from a deficit perspective in which citizens are reduced to either users or ignorant members of the general public.

It was against this institutional backdrop that nineteen Social Labs were organized to explore opportunities to structurally change R&I toward more public engagement. Even though the institutional setting was not always as conducive to RRI and public engagement, and even though recruitment and retention of participants to the Social Labs was not always frictionless, they still managed to support the development of fifty-nine interventionist actions. How did they manage to do this and how did the Social Labs make this possible?

Looking at the empirical material through the lens of our framework shows us several mechanisms that supported the development of successful interventions. First, all Social Lab teams presented their diagnosis of the institutional context to participants during the first workshop. This allowed in-depth discussions on both institutional enablers and barriers for RRI and provided participants with a concrete foothold from which to operationalize ideas for alternative courses of action. As such, it provided an x-ray image of their part of 'the system' and how it formed a barrier but also provided leverage points for structural change.

Second, all Social Lab teams managed to mobilize and retain participants from different parts of H2020 around the RRI narrative. Although some stakeholder groups were easier to mobilize than others, organizers generally managed to get motivated people with experience in diverse institutional contexts of European R&I in one room. For participants to then be in the presence of other motivated and engaged individuals from across Europe helped to galvanize discussions on RRI, public engagement and concrete interventions to promote it. In the words of an MSCA participant, the group discussions and collaborations gave them the sense that 'We are one of the innovators which can institute a change in research culture'. This did require collaboration with people both inside the Social Lab and outside, and continued support by Social Lab teams, to make sure that interventions did not purely rest on the shoulders of one specific individual.

Third, the design of the Social Labs provided the canvas on which potential institutional entrepreneurs could further envision, sketch, and implement alternatives to current R&I structures. Even though some participants felt some unease

about the open-ended and experimental nature of the Social Lab process, others made the most out of it and used the format to exercise their agentic capacities. In the words of the HEALTH social lab team: 'Those happier to make it up as they go along, together with the group, were perhaps more creative in coming up with ideas and seizing the opportunities the Social Lab offered.'

In the evaluation during the third workshop, participants commended that it was paramount to clarify the ideas behind the project and to emphasize that a Social Lab is what you make of it. They particularly valued the opportunity to reflect on their own interpretations of RRI and responsibility and the visioning exercises to come up with alternatives for R&I structures and practices. Those Social Labs that helped participants to create clear visions, which informed the selection of clear intervention ideas with dedicated owners and concrete designs and action plans, generally had an easier experience with keeping participants engaged and motivated to work on change. By inviting participants during online calls and a follow-up workshop to tailor their interventions to their own work and practices, networks, and institutions, teams could further support the implementation of interventions.

Fourth, the existing institutional context did indeed matter a lot for whether or not the Social Labs could spread or anchor their interventions. Especially the Social Labs organized with cooperation from funding actors (e.g. JRC) or existing transnational networks (e.g. MSCA and FOOD) had an easier time in organizing and anchoring interventions than Labs like, for example, in a business context. Also, many participants recognized the challenge of scaling up results or anchoring interventions beyond the lifetime of the project. As someone involved with the HEALTH Social Lab aptly summarized: 'changing the system is a huge effort and challenge [so] expect frustrations. Small changes are also a success.'

Finally, looking at the results through our lens shows many different interventions and anchoring attempts. For example, participants produced and shared policy briefs and methodology booklets in their local context and transnational networks. With the support of the Social Lab teams, they organized further capacity-building sessions, webinars, integrated tools in new projects, and new funding applications and thus worked on planting seeds for and developing pathways toward structural change.

We use the word pathways here with caution as it is not possible to ascertain longer-term impacts so quickly after the project's ending. Moreover, the interventions did not exist in a vacuum: they were informed by, and mutually reinforced related developments (and each other), weaving into the larger tapestry of instigating structural change. Such a process of mutual simultaneous shaping makes it hard to ascertain a strict causal link between different elements in the Social Labs and outcomes in the broader R&I system of which they formed a part (see Guba and Lincoln 1982). Instead of claiming straightforward causality, with the risk of overstating claims, we here follow Guba and Lincoln who see actions and cause and effect as processes of mutual simultaneous shaping. In their own words: 'An action may be explainable in terms of multiple interacting factors, events, and processes that shape it and are part of it; inquirers can, at best, establish plausible inferences about the patterns and webs of such shaping in any given case' (Guba and Lincoln 1982: 368). What can be said is that the involvement of participants in the Social Labs enabled them to engage with other change agents within their specific institutional context and actively link up their efforts to wider forums and dynamics that might coproduce the aspired goals in the longer run.

6. Discussion and conclusion

We started this paper by identifying that the relation between temporary participatory experiments and structural change in R&I remains empirically underexplored (see Braun and Könninger 2018; Cohen 2022). We aimed to address this gap by exploring how temporary participatory experiments, such as Social Labs, may create conditions for more structural public involvement in R&I. We were particularly interested to uncover how the experiment's design and characteristics could support participants to turn into institutional entrepreneurs and develop pathways to open up R&I to a diversity of publics.

Sharing with the H2020 SWAFS program the assumption that research funding offers a pathway to influencing R&I, first, we set out to find how rules and incentives, dominant narratives, and standing practices related to the H2020 funding scheme currently form a barrier to public engagement in R&I and how insight into this enabled experimentation toward change. We found striking similarities between the different sections of the funding scheme related to public engagement, in spite of wide differences in their outlook and purpose. Even within subprograms aimed at tackling societal challenges, public engagement was often practiced and incentivized from a deficit perspective (see Simis et al. 2016). Moreover, we found that presenting our diagnosis of the different institutional contexts to participants of the Social Labs provided them with insight into enablers and barriers for change to leverage later on in the participatory experiment.

Our findings support earlier discussions that there was little evidence of a genuine uptake of RRI and public engagement in the European R&I system (Randles 2016; Braun and Könninger 2018; Mejlgaard, Bloch and Madsen 2019; Christensen et al. 2020). Adding to this, our new institutionalist lens (Lowndes and Roberts 2013) helped to uncover that the differences between various parts of the H2020 funding scheme in the uptake of RRI and public involvement in R&I were related to particular context-specific narratives, practices, and rules and incentives of *scientific excellence* and innovation (see Scholten et al. 2021). Our findings furthermore endorse scholarly work that shows how narratives and incentives of excellent science, profit-oriented innovation, and top-down tackling of global challenges reduce citizens and public to users or ignorant members of the general public (see Randles et al. 2016; Simis et al. 2016; Åm 2019; Schuijff and Dijkstra 2020; Ludwig et al. 2021). A nuanced understanding of the specific institutional contexts in which the various funding schemes of H2020 take shape helped to make better sense of potential structural barriers and enablers for public engagement across the R&I system (Cohen 2022).

Second, we were interested to uncover how organizers of the Social Labs selected and involved particular groups of stakeholders and how they overcame challenges in recruitment and retained participants during the process. Recruitment and retention of participants were not always easy, especially with business actors, policymakers, and CSOs. The mobilization of stakeholders was more successful if there

was support from funding actors (SWAFS) or host organizations (JRC). However, without the direct cooperation of funders, bottom-up networks of researchers and funding advisors (such as the MCAA and many NCP networks) also helped recruitment and retention. Generally speaking, these results point to the importance of involving boundary-spanning and intermediary actors (see Mignon and Kanda 2018; Van Meerkerk and Edelenbos 2018) while putting extra effort into the recruitment and retainment of particular groups (policymakers, CSOs, and businesses).

Third, we intended to uncover which methods and design ploys organizers adopted to enhance a sense of agency among participants so that they could develop themselves into genuine institutional entrepreneurs. In our research, we found that there are ways in which the embedded agent (Garud, Hardy, and Maguire 2007) can be supported by specific design characteristics and methods to develop into a change agent, in spite of limiting institutional conditions. Methods that invited participants to reflect on their personal sense of responsibility, develop visions of an alternative (RRI-imbued) future (see Hajer and Pelzer 2018), and relate these to their context in a practical manner (see Quist and Vergragt 2006) were particularly instrumental in furthering a sense of agency with participants (see Emirbayer and Mische 1998). Our findings furthermore show that continued support by organizing teams, including follow-up digital meetings and workshops with further reflection, capacity-building, and planning exercises, was crucial to reaffirm agency despite lacking time and resources.

Fourth, we wanted to know what interventionist actions were designed and implemented in the participatory experiments and which anchoring efforts could be observed as signs of institutional entrepreneurship. Interestingly, only ten of the fifty-nine interventionist actions that the participants in the Social Labs designed explicitly focused on changing formal rules and incentives. However, we contend that the interventions that focused on capacity building, changing standing practices, creating implementable designs, as well as constructing counter-narratives, and creating communicable output all provided ways to overcome the barriers to public engagement identified in the institutional diagnosis. Especially the fact that many participants took it upon themselves to share policy briefs and methodology booklets in their local context and transnational networks and the fact that they organized further capacity-building sessions, webinars, and integrated tools in new projects shows that anchoring efforts were undertaken to instigate pathways toward change. This insight helps to overcome the limitations implied in traditional framings of possible contributions of participatory experiments that mostly focus on changes in formal policy and organizations (see Loeber, Griessler, and Versteeg 2011; Owen et al. 2021).

We conclude that the experiments did foster the development of institutional entrepreneurs among their participants. The participatory experiments, in other words, supported collectives of change agents to go beyond mere reflection and deliberation and engage in institutional entrepreneurship that promoted RRI and public engagement in their R&I contexts. Judging the output of fifty-nine interventions, the Social Labs thus allowed participants to temporarily imagine themselves 'as if outside of the structures which bind, and critically look back into those structures' (Randles 2016: 7). Bringing them

together with other potential change agents, presenting them with a diagnosis of their institutional context, and allowing them to develop alternative future visions helped them to come up with alternatives and implement them in existing structures.

These conclusions tally with insights into institutional entrepreneurship within R&I (Owen et al. 2021) that identifies local leadership as crucial in influencing the modification of seemingly engrained R&I behavior and institutionalization of RRI. The authors underline that these influences are particularly effective 'when combined with an approach that opens up creative, collaborative spaces for reflection, anticipation and engagement' (Owen et al. 2021: 9). Our findings provide empirical backing to this assertion by showing how temporary participatory experiments supported the change agents to conduct institutional entrepreneurship in many different institutional contexts. More than that, our findings show that timely reflection on the existing institutional context and anchoring of their interventions is crucial if one wants to induce change beyond a particular project (Loeber 2003; Elzen, Van Mierlo, and Leeuwis 2012).

This implies, furthermore, that research based on the hypothesis that temporary participatory experiments can support participants to develop into institutional entrepreneurs may help bridge the gap between literature on lacking institutional impact of temporary participatory experiments (Lezaun, Marres, and Tironi 2017; Braun and Könninger 2018; Schäpke et al. 2018; Potjer 2019; Grin 2020; see Ghosh et al. 2021) and literature on institutional entrepreneurship (Garud, Hardy, and Maguire 2007) in R&I (Owen et al. 2021; Reale 2022). To what extent the findings of this research can be extrapolated to participatory experiments other than Social Labs, and institutional contexts other than European R&I funding, is a question that warrants further research. However, the diverse ways in which these participatory experiments were operationalized, and the diverse contexts in which they were set up, suggest that the framework (Fig. 1) and its typology of ideal-typical interventions (Fig. 2) may be leveraged by organizers of different temporary (participatory) experiments.

Finally, we call on policymakers and funders to become more engaged with participatory experiments that aim to open up R&I to diverse publics. The finding that the recruitment of participants and anchoring of interventions became easier with direct support from policymakers and funders implies specifically that the latter ought to reserve and maintain institutional space (i.e. reserve resources and time) for participation in participatory experiments (see also Bendiscioli et al. 2021). By enabling a wide set of potentially interested and engaged actors to identify and create linkages between such temporary experiments with the policy themes at hand, their own interests, and motivations, as well as with their networks and associations, goal attainment may be considerably enhanced. To understand how policy plans and ambitions make sense from a 'shop floor' perspective, policymakers do well to not only enable such experiments to be set up but also to participate in these. Had more policy actors taken part in the Social Labs, they might have observed that, regardless of the exact policy agenda or label used, the idea of articulating responsibility in R&I in new ways contributed to the creation of pathways to structurally open up R&I to the participation of diverse publics.

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Supplementary data

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