[Re]searching for the public

Public experimentation with institutional entrepreneurial collectives to open up the research and innovation system from within

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(RE)SEARCHING FOR THE PUBLIC

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Joshua B. Cohen

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Our society currently confronts complex public problems around food, water, mobility, health, energy and climate. Many policymakers hope that research and innovation will provide answers to these grand challenges. In recent decades, some researchers have noted that research and innovation can deliver responsible solutions only if they engage democratically with the values, needs and expectations of diverse emergent groups of affected citizens (publics). Some scholars have also started to experiment with public participation in research and innovation, but many experiments remain of a temporary nature. Until now, it is unclear how such add-on and ad hoc experimentation can inform structural changes that contribute to a deeper democratization of the research and innovation system.

This thesis addresses this puzzle from a conceptual and action-oriented perspective. Building on insights from pragmatism and new institutionalism it develops a framework and agenda for (action) research into the organization of collectives of institutional entrepreneurs ('institutional entrepreneurial collectives'). The framework is used to analyze experiences with organizing a series of social labs that promoted *Responsible Research and Innovation* in the European science funding system. Analysis of these experiments with help of the framework helped to uncover how institutions of research and innovation can block and potentially enable participation. Furthermore, the thesis shows how public experimentation can support engaged participants to operate as collectives of institutional entrepreneurs. With enough attention to the structural context of the experiment and with support from methods that enhance a sense of agency, participants can thus create diverse pathways toward structural change. The thesis concludes with policy recommendations and practical pointers for future public experimentation that may help to further promote structural participation in the European research and innovation system.

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Faculteit der Maatschappij- en Gedragswetenschappen

Onderzoek alle dingen maar behoud het goede.
– Louk Sandifort

We are survivors of immeasurable events,
Flung upon some reach of land,
Small, wet miracles without instructions,
Only the imperative of change.
– Rebecca Elson, *Evolution*

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Summary

Our society is confronted with complex public problems around food, water, mobility, health, energy and climate. In response, many policymakers have signaled that research and innovation should deliver solutions to these grand challenges. However, new scientific and technological inventions are never neutral solutions, without further consequences. Research and innovation and resulting discoveries and technologies – like pesticides and artificial intelligence – can also impact our ecology and society in unwanted, but lasting ways.

In recent decades, some scholars have come to recognize that research and innovation can support the responsible search for new solutions to the grand challenges of our time *only* if they engage democratically with the values, needs and expectations of diverse emergent groups of affected citizens (*publics*). A selection of these researchers has therefore started to approach such publics as potential partners for *dialogue* and early (*upstream*) *engagement* on the directions that research and innovation ought to take. Under the banner of *Responsible Research and Innovation (RRI)* and other labels like *Open Science, Citizen Science, Mission-oriented Innovation Policy* and *Co-creation*, they have experimented with new ways to promote the participation of diverse publics in research and innovation.

Despite decades of debate and practical efforts, many of the resulting experiments remain of a temporary, add-on and ad hoc nature. Temporary participatory experiments – like so-called *social labs* that bring together different stakeholders to experiment with alternative solutions to complex social challenges – often seem to fail to impact the broader research and innovation (funding) system. Until now, it is unclear how such experimentation can contribute to *structural* changes that open up research and innovation to a diversity of publics and thus contribute to a deeper democratization of the research and innovation system.

With the research presented in this volume I address this puzzle from a pragmatist, new institutionalist and action-oriented perspective. My goal is to leverage insights from these literatures and empirical action research to develop a theoretical framework and practical heuristic to promote more structural public participation in the research and innovation system. I do so by formulating an answer to the following question: *How can experimentation with RRI in social labs support structural change to improve public participation in the European research and innovation system?* With my answer, I seek to contribute to scholarly discussions on RRI and public engagement with science studies. Furthermore, these insights help me to develop policy and practical recommendations for the further institutionalization of public participation in the research and innovation system. I proceed to answer the question in the following way.

In **Chapter 1** I first introduce the topic of this thesis by providing a short overview of past attempts to bring the public into research and innovation. I connect these

developments to the recent rise of the concept of RRI in European academia and policymaking. I formulate the central puzzle, main research question and objectives (see above) and provide an explanation and justification for the pragmatist methodological design of the study that builds on a combination of conceptual desktop research and empirical action research through social labs. I specifically describe the set-up and process for data gathering around the social labs that were organized in the context of the NewHoRRIzon project to promote the uptake of RRI and public engagement in *Horizon 2020*. Horizon 2020 ran from 2014 until 2020 and was at the time the largest (80-billion-euro) European research and innovation funding program. I then end the chapter with a short description of the thesis outline.

In **Chapter 2,** my co-author and I provide the conceptual basis for the development of the framework. We start with unpacking European debates around RRI, critiques on its lack of conceptual clarity, implementation and institutionalization and the recent experimentalist turn in dealing with this.

Adding to these debates, we propose a pragmatist re-conceptualization of collective experimentation with RRI. For this, we draw on John Dewey and his ideas on democracy as an ethical way of life and an experiment. We show how this can be operationalized by allowing publics to engage in processes of *social inquiry* through which they can try to engage with all kinds of challenges around research and innovation. We explain the steps involved in such a process and note that specific attention should be paid to the *social*, *experimental* and especially the *public* character of the accompanying process. The utility of this approach is illustrated by connecting it to a recent call to use social labs to experiment with RRI. This exploration does leave us with the question how one might conduct further (action) research into changing structural conditions so that publics are structurally provided with the possibility to make themselves heard in the research and innovation system.

In **Chapter 3** I take up this challenge by further situating my argument in recent discussions around the impact of systems on public participation with science. I add to this debate by leveraging insights from Deweyan pragmatism and new institutionalism (Lowndes & Roberts, 2013) to develop a conceptual framework. This framework helps (engaged) researchers to untangle the influence of different institutional and material structures and how they interact to form a potential barrier for public engagement with science. To illustrate its utility and yield insights for future experimentation, I apply the framework to data from a report on (the lack of) institutionalization of public engagement in the British research funding context (Hamlyn et al., 2015), arguably the cradle of many debates on public engagement.

Furthermore, to uncover potential avenues for structural change, I combine insights following from the above analysis with insights from literature on *institutional entrepreneurship*. The latter refers to "activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new

institutions or to transform existing ones" (Maguire et al., 2004, p. 657). On the basis of this, I develop a framework and research agenda for (action) research into the organization of collectives of institutional entrepreneurs ('*institutional entrepreneurial collectives*'). I argue that these may support structural changes that improve public engagement in the research and innovation system.

In **Chapter 4**, my co-author and I apply the framework to a case study on four years of involvement in the organization of a social lab that focused on promoting the uptake of RRI and public engagement in the European *Marie Skłodowska-Curie Actions* (MSCA). MSCA is a paradigmatic case as it forms a prestigious part of Horizon 2020 *excellent science* funding that funds (early career) researchers across Europe. Analysis of the case through the lens of the framework shows how specific narratives and rules and incentives of excellence intersect to form a material barrier to public engagement in MSCA practice.

Moreover, our analysis of the social lab and its four resulting interventions confirms that temporary participatory arrangements can indeed support institutional entrepreneurial collectives to work on changing the 'excellent' science system from within. They can do so by inviting stakeholders to reflect on their structural context (rules, practices, narratives and material structure) and to envision alternative futures. Crucially, we find that temporary participatory arrangements may also support these collectives to develop concrete plans for interventions and to anchor such interventions beyond the lifetime of the participatory arrangement. A potential limitation of this application of the framework is that it concerns one social lab experimenting with RRI in a peculiar context of the European research and innovation (funding) system. An open question is whether the by now refined framework can be fruitfully leveraged to draw lessons for experimentation across the (European) research and innovation system.

In **Chapter 5** a group of co-authors and I therefore apply the refined framework to data gathered in a comparative evaluation of 19 social labs that were organized with reference to diverse parts of Horizon 2020. A systematic comparison of the 19 labs and the 59 resulting interventionist actions through the lens of the refined framework further confirms our hypothesis that temporary participatory experiments can support collectives of institutional entrepreneurs to conduct diverse forms of institutional entrepreneurship. With insight into the institutional context, involvement of intrinsically motivated participants and support of the proper methods and management choices to enhance a sense of agency, these collectives will be empowered to develop interventions that promote responsible, open and engaged research funding and practice.

Furthermore, analysis of the empirics in a co-constructive effort with social lab teams and participants, uncovers a continuum of ideal-typical interventions. We find that these can range from capacity building with other change agents, to changing practices, promoting new implementable designs, constructing counter-narratives,

producing communicable output for policymakers and practitioners to changing formal rules and incentives.

In **Chapter 6** I provide an answer to the main question. Building on the results from the previous chapters, I show that participatory experiments such as social labs can support participants to conduct public experimentation with RRI. With enough attention to the structural context and accompanying methods and management choices to enhance a sense of agency, these experiments can support engaged participants to develop into institutional entrepreneurial collectives. These collectives can work together to create diverse pathways toward structural change that improve public participation in the European research and innovation system.

With these insights I **contribute to existing academic debates** around the experimentalist turn in RRI. Together with my co-author I uncover that the greatest potential in this turn lies in it refocusing attention to RRI's underlying democratic agenda. We conclude that, to truly realize this democratic potential, active attention should be paid to the *public* character of experimentation with RRI by involving (bottom-up) citizen communities and networks and communicating the outcomes in an engaging and accessible way. Above insights contribute to the systemic turn in public engagement with science studies too by helping to uncover how 'the system' can be deconstructed into interacting layers of structural constraints. More than that, co-authors and I show empirically that (collectives of) change agents – after being mobilized by a temporary participatory experiment – can conduct diverse forms of institutional entrepreneurship that instigate change within these different structural constraints. As such, they can create diverse pathways, beyond the purely organizational and formal level, toward structural change that increases public engagement in the R&I system.

On the basis of these insights, I also provide concrete **policy recommendations**. Notably, I explicitly call on policymakers and funders to recognize that they have a crucial role in changing the rules and incentives of the research and innovation system to increase space for public participation. I call on them to involve (early career) researchers in the process of changing the rules and incentives, create structural space for policy experimentation and I provide concrete pointers and suggestions for current policy debates that those interested can tap into.

Finally, I end this volume with a set of **practical recommendations** (cp. Cohen & Loeber, 2021) that engaged practitioners and action researchers may leverage to instigate further public experimentation and collective institutional entrepreneurship in the research and innovation system. I hope that this will inspire all types of actors from across the research and innovation system and beyond to work more closely together and tackle persistent problems in ways that truly serve the values, needs and expectations of current and future publics.

Samenvatting

Onze samenleving wordt geconfronteerd met complexe publieke problemen rondom voedsel, water, mobiliteit, gezondheid en het milieu. In reactie daarop hebben veel beleidsmakers aangegeven dat onderzoek en innovatie oplossingen voor deze grote uitdagingen moeten leveren. Nieuwe wetenschappelijke en technologische uitvindingen zijn echter nooit neutrale oplossingen, zonder verdere gevolgen. Onderzoek en innovatie en resulterende ontdekkingen en technologieën – zoals bijvoorbeeld bestrijdingsmiddelen en kunstmatige intelligentie – kunnen namelijk onze ecologie en samenleving op ongewenste, maar blijvende manieren beïnvloeden.

In de afgelopen decennia zijn enkele wetenschappers gaan inzien dat onderzoek en innovatie de verantwoorde zoektocht naar nieuwe oplossingen voor de grote uitdagingen van onze tijd alleen kunnen ondersteunen als zij zich op democratische wijze engageren met de waarden, behoeften en verwachtingen van diverse opkomende groepen betrokken burgers (*publieken*). Sommige van deze onderzoekers zijn dan ook begonnen met het benaderen van dergelijke publieken als potentiële partners voor dialoog en vroegtijdige (*upstream*) betrokkenheid bij discussies over de richtingen die onderzoek en innovatie zouden moeten inslaan. Onder de noemer van *Responsible Research and Innovation* (RRI) en andere labels zoals *Open Science, Citizen Science*, *Missiegedreven Innovatiebeleid* en *Co-creatie*, experimenteren zij al een tijd met het bevorderen van publieke betrokkenheid bij onderzoek en innovatie.

Ondanks decennia van debat en praktische inspanningen blijven veel van de resulterende experimenten van tijdelijke, *add-on* en ad-hoc aard. Tijdelijke participatieve experimenten - zoals zogenaamde *social labs* die verschillende belanghebbenden samenbrengen om te experimenteren met alternatieve oplossingen voor complexe sociale uitdagingen - lijken vaak geen effect te hebben op het bredere onderzoeks- en innovatiesysteem. Tot nu toe is het onduidelijk hoe dergelijke experimenten kunnen bijdragen aan structurele veranderingen die onderzoek en innovatie openstellen voor een diversiteit aan publieken en daarmee leiden tot een diepere democratisering van het onderzoeks- en innovatiesysteem.

Met het onderzoek dat hier wordt gepresenteerd, vlieg ik dit vraagstuk aan vanuit een pragmatisch, neo-institutionalistisch en actiegericht perspectief. Mijn doel is om inzichten uit deze literatuur en origineel empirisch actie-onderzoek te gebruiken om een theoretisch kader en praktische heuristiek te ontwikkelen om meer publieke participatie in het onderzoeks- en innovatiesysteem te bevorderen. Ik doe dit door een antwoord te formuleren op de volgende vraag: *Hoe kan experimenteren met RRI in social labs structurele verandering ondersteunen die publieke participatie in het Europese onderzoeks- en innovatiesysteem bevordert?* Met een antwoord op deze vraag wil ik een bijdrage leveren aan wetenschappelijke discussies over RRI en studies naar publieke betrokkenheid bij wetenschap. Bovendien helpen deze inzichten mij om beleids- en

praktische aanbevelingen te ontwikkelen voor de verdere institutionalisering van publieke participatie in het onderzoeks- en innovatiesysteem. Ik beantwoord de vraag op de volgende wijze.

In **Hoofdstuk 1** introduceer ik eerst het onderwerp van dit proefschrift door een kort overzicht te geven van eerdere pogingen om het publiek bij onderzoek en innovatie te betrekken. Ik verbind deze geschiedenis met de relatief recente opkomst van het RRI-concept in kringen van Europese beleidsmakers en wetenschappers. Ik formuleer de centrale probleemstelling, de onderzoeksvraag en de doelstellingen (zie hierboven) en geef een verklaring en rechtvaardiging voor de pragmatische methodologische opzet van de studie die voortbouwt op een combinatie van conceptueel desktop-onderzoek en empirisch actieonderzoek via *social labs*. Ik beschrijf specifiek de opzet en het proces van dataverzameling van de *social labs* die werden georganiseerd door het *NewHoRRIzon*-project om de opname van RRI en publieke betrokkenheid te bevorderen in verschillende onderdelen van *Horizon 2020*. *Horizon 2020* verdeelde tussen 2014 en 2020 in totaal 80 miljard euro voor onderzoek en innovatie en was daarmee het grootste Europese financieringsprogramma voor onderzoek en innovatie van dat moment. Ik eindig het hoofdstuk met een korte beschrijving van de opzet van het proefschrift.

In **Hoofdstuk 2** ontwikkelen mijn coauteur en ik de conceptuele basis voor de uitwerking van het theoretisch raamwerk. We beginnen met het weergeven van recente Europese debatten rond het RRI-concept, specifiek kritiek op het gebrek aan conceptuele duidelijkheid, implementatie en institutionalisering van RRI en de recente oproep deze uitdagingen op te lossen via collectieve experimenten.

In reactie hierop ontwikkelen we een pragmatische blik op collectief experimenteren met RRI. We bouwen daarbij voort op John Dewey en zijn werk over democratie als een ethische manier van leven en een experiment. We laten specifiek zien hoe dit kan worden geoperationaliseerd door publieken de gelegenheid te bieden om zelf aan de slag te gaan met uitdagingen rondom onderzoek en innovatie via processen van sociaal onderzoek (*social inquiry*). We laten zien welke stappen er bij een dergelijk proces komen kijken en geven aan dat er specifiek aandacht moet zijn voor het sociale, experimentele en vooral het publieke karakter van het proces. Het nut van deze benadering wordt geïllustreerd door deze te verbinden met een recente oproep om met RRI te experimenteren via *social labs*. Deze eerste conceptuele verkenning laat ons echter wel achter met de vraag hoe men verder (actie)onderzoek zou kunnen doen naar het veranderen van structurele condities op zo'n manier dat (potentieel) getroffen publieken ook daadwerkelijk de ruimte krijgen om zichzelf te laten horen in de context van het onderzoeks- en innovatiesysteem.

In **Hoofdstuk 3** ga ik deze uitdaging aan door mijn betoog verder te situeren in recente discussies over de invloed van systemen op publieke betrokkenheid bij wetenschap. Ik draag bij aan dit werk door een conceptueel kader te ontwikkelen op basis van inzichten van Dewey en het neo-institutionalisme (Lowndes & Roberts, 2013). Dit raamwerk

helpt (geëngageerde) onderzoekers om de invloed van verschillende institutionele en materiële structuren te ontwarren en hoe deze samen een potentiële barrière vormen voor publieke betrokkenheid bij onderzoek en innovatie. Om de bruikbaarheid van het kader te illustreren en inzichten voor toekomstige experimenten te ontwikkelen, pas ik het toe op data uit een rapport over (het gebrek aan) institutionalisering van publieke betrokkenheid in de Britse context van onderzoeksfinanciering (Hamlyn et al., 2015). Deze context wordt door sommigen gezien als de bakermat van veel discussies over publieksbetrokkenheid.

Om potentiële mogelijkheden voor structurele verandering bloot te leggen, combineer ik inzichten die volgen uit deze analyse met inzichten uit literatuur over *institutioneel ondernemerschap*. Dit laatste verwijst naar "activiteiten van actoren die belang hebben bij bepaalde institutionele arrangementen en die middelen aanwenden om nieuwe instituties te creëren of bestaande te transformeren" (Maguire et al., 2004, p. 657). Op basis van bijkomende literatuur ontwikkel ik een kader en onderzoeksagenda voor onderzoek naar de organisatie van collectieven van institutionele ondernemers (*institutioneel ondernemende collectieven*). Ik beargumenteer dat deze collectieven actief structurele veranderingen kunnen bewerkstelligen die de publieke betrokkenheid bij het onderzoeks- en innovatiesysteem kunnen verbeteren.

In **Hoofdstuk 4** passen mijn coauteur en ik het kader toe op een *case study* van vier jaar betrokkenheid bij de organisatie van een *social lab* dat zich richtte op het bevorderen van de toepassing van RRI en publieke betrokkenheid in de Europese *Marie Skłodowska-Curie Actions* (MSCA). MSCA is een paradigmatische casus omdat het een prestigieus onderdeel vormt van de financiering van *excellente* wetenschap binnen *Horizon 2020* en (beginnende) onderzoekers financiert die werken aan diverse onderwerpen door heel Europa. Analyse van deze casus door de lens van het raamwerk laat zien hoe specifieke narratieven en regels en incentives van excellente wetenschap elkaar versterken en een materiële barrière vormen voor publieke betrokkenheid in de praktijk.

Bovendien bevestigt onze analyse van het *social lab* en de vier eruit voortvloeiende interventies dat tijdelijke participatieve arrangementen wel degelijk institutioneel ondernemende collectieven kunnen ondersteunen om te werken aan het veranderen van het systeem dat draait om excellente wetenschap. Ze kunnen dit doen door deelnemers uit te nodigen te reflecteren op hun structurele context (regels, praktijken, narratieven en materiële structuur) en hen te helpen om alternatieve toekomsten voor te stellen. Cruciaal daarbij is dat participatieve arrangementen hen ook kunnen ondersteunen om concrete plannen voor interventies te ontwikkelen, deze te implementeren en ze te verankeren na het einde van een participatief arrangement. Een potentiële beperking van deze toepassing van het raamwerk is dat het één *social lab* betreft dat experimenteert met RRI in een bijzondere context van het Europese onderzoek- en innovatiesysteem. Een open vraag is dan ook of het inmiddels verfijnde raamwerk op

een vruchtbare manier kan worden gebruikt om lessen te trekken voor experimenten in andere financieringscontexten.

In **Hoofdstuk 5** passen een groep coauteurs en ik daarom het verfijnde raamwerk toe op data verzameld in een vergelijkende evaluatie van 19 *social labs* die georganiseerd werden in relatie tot diverse onderdelen van *Horizon 2020*. Een systematische vergelijking van deze *labs* en 59 interventionistische acties door de lens van het verfijnde raamwerk bevestigt onze hypothese dat tijdelijke participatieve experimenten collectieven van institutionele ondernemers kunnen ondersteunen bij het uitvoeren van diverse vormen van institutioneel ondernemerschap. Met inzicht in de institutionele context, betrokkenheid van intrinsiek gemotiveerde deelnemers en ondersteuning middels de juiste methoden en managementkeuzes om een gevoel van *agency* te versterken, zullen deze collectieven in staat worden gesteld om interventies te ontwikkelen die een verantwoorde, open en geëngageerde onderzoeksfinanciering en -praktijk bevorderen.

Daarbij ontwikkelen we op basis van de empirie, in een gezamenlijke inspanning met *social lab* teams en deelnemers, een continuüm van ideaaltypische interventies. We ontdekken dat deze kunnen variëren van het ontwikkelen en promoten van vaardigheden bij andere *change agents*, tot het veranderen van praktijken, het promoten van nieuwe implementeerbare ontwerpen, het construeren van tegen-narratieven, het produceren van brochures en beleidsbrieven voor professionals en beleidsmakers tot het veranderen van formele regels en *incentives*.

In **Hoofdstuk 6** geef ik een antwoord op de hoofdvraag. Voortbouwend op de resultaten uit de vorige hoofdstukken, laat ik zien dat tijdelijke participatieve experimenten zoals *social labs* deelnemers kunnen ondersteunen bij het publiek experimenteren met RRI. Met voldoende aandacht voor de structurele context en gebruik van de juiste methoden en managementkeuzes om een gevoel van *agency* te versterken, kunnen deze experimenten geëngageerde deelnemers ondersteunen om zich te ontwikkelen tot institutioneel ondernemende collectieven. Deze collectieven kunnen dan samenwerken om stappen te zetten richting structurele verandering die meer ruimte creëert voor publieke participatie in het Europese onderzoeks- en innovatiesysteem.

Met deze inzichten draag ik bij aan bestaande **academische discussies** over de experimentalistische wending in het RRI-veld. Samen met mijn coauteur laat ik zien dat het grootste potentieel van deze wending ligt in hernieuwde aandacht voor de onderliggende democratische agenda van RRI. We concluderen dat, om dit democratische potentieel werkelijk te realiseren, actiever aandacht moet worden besteed aan het publieke karakter van het experiment door (*bottom-up*) burgergemeenschappen en netwerken te betrekken en de uitkomsten op een boeiende en toegankelijke manier te communiceren aan bredere publieken.

Bovenstaande inzichten dragen ook bij aan de systemische wending in studies naar

publieke betrokkenheid bij wetenschap door bloot te leggen hoe 'het systeem' kan worden gedeconstrueerd in termen van op elkaar inwerkende lagen van structurele beperkingen (regels en incentives, narratieven, praktijken en, waar van toepassing, materiële structuur). Meer dan dat toon ik samen met mijn coauteurs empirisch aan dat (collectieven van) *change agents* - na gemobiliseerd te zijn door een tijdelijk participatief experiment - diverse vormen van institutioneel ondernemerschap kunnen ontplooien die in deze verschillende structurele beperkingen interveniëren. Op die manier kunnen ze, meer dan alleen op het organisatorische en formeel institutionele niveau, verschillende paden creëren voor structurele verandering die de publieke betrokkenheid bij het onderzoeks- en innovatiesysteem vergroot.

Op basis van deze inzichten doe ik ook **concrete beleidsaanbevelingen**. Met name roep ik beleidsmakers en financiers expliciet op om te erkennen dat zij een cruciale rol spelen bij het veranderen van de regels en incentives van het onderzoeks- en innovatiesysteem om de ruimte voor publieksparticipatie te vergroten. Ik roep hen op om (beginnende) onderzoekers te betrekken bij het veranderingsproces, structurele ruimte te creëren voor beleidsexperimenten en biedt hen concrete aanknopingspunten en suggesties voor actuele beleidsdebatten waar zij op aan kunnen haken in hun missie.

Ten slotte eindig ik deze bundel met een reeks **praktische aanbevelingen** (cp. Cohen & Loeber, 2021) die geëngageerde praktijkmensen en actie-onderzoekers kunnen aanwenden om verdere publieke experimenten en collectief institutioneel ondernemerschap in het onderzoeks- en innovatiesysteem op gang te brengen. Ik hoop dat dit alle soorten actoren uit het onderzoeks- en innovatiesysteem en daarbuiten zal inspireren om nauwer samen te werken en hardnekkige problemen aan te pakken op manieren die daadwerkelijk in dienst zullen staan van de waarden, behoeften en verwachtingen van huidige en toekomstige publieken.

Chapter 1

INTRODUCTION

It was a Friday afternoon, early June 2018, and the air felt like something was brewing. A damp atmosphere, so distinctive of late Dutch spring, filled a small lecture room of the picturesque *Oudemanhuispoort* building of the University of Amsterdam. Arriving here were 21 (early-career) researchers, funding advisors, project coordinators and science communicators from several corners of Europe. Leaving Amsterdam's buzzing canals behind them, they entered an almost hidden alleyway leading into the green courtyard of the building that was once a pensioners' home. Dragging their suitcases and bags past scattered groups of students and up three flights of stairs, they finally found their way into the room to participate in our workshop.

Many of them had not met before, and their faces betrayed a mix of anticipation and excitement. After a shared lunch during which the diverse participants got to know each other better, we briefly introduced the challenge that was center stage: how to promote responsibility in *excellent* science. Next, we invited the group to take part in an exercise on 'responsibility in practice'. Specifically, we asked them to write down and discuss their ideas and questions about individual responsibility, responsibility on the level of shared practices and institutions. Animated discussions ensued, in which interpretations of the word ranged from maintaining the quality and integrity of their research to guaranteeing appropriate career paths for young researchers and monitoring the societal impact and public relevance of their work. Toward the end of the exercise, their initial excitement devolved into tension. A few of the participants admitted feeling a mismatch between their ideas about responsibility and the current institutional set-up of research and innovation (R&I). They conveyed that they wanted to act responsibly, but that 'the system' did not allow them to. Moreover, they shared that they felt in no position to change this system.

In the evening, during a working dinner, we invited them to envision alternative futures and write these down on notecards. The next morning, much to their surprise, we asked them to share their visions and to work together and come up with concrete steps to start realize these in the here and now. Those moments later proved to be the crucial start of our journey in which we collectively discussed and experimented with new ways to structurally change the R&I system from within.

1.1. The impact of the R&I system on society and the ecology

The organization of this workshop took place against the background of broader academic and political discussions on the (potential) societal and ecological impact of the R&I system. As a part of these discussions, scholarly recognition has grown that our society now confronts complex and persistent public problems around food, water, mobility, health, energy and climate, leading to profound environmental turmoil and

societal tension (Grin et al., 2010, p. 5).[1] With terms like *Open Science* and *Mission-oriented Innovation Policy,* some policymakers and scholars have signaled a belief that R&I ought to open up to society and deliver solutions to these *Grand Challenges* so as to help achieve the *Sustainable Development Goals* (Kastrinos & Weber, 2020; Kuhlmann & Rip, 2018; Mazzucato, 2018; Moedas, 2017). Similarly, R&I practitioners have heralded recent advancements in the fields of gene editing, artificial intelligence and smart technology (in the form of phones, homes and entire cities) as the next big gamechangers in the search for new solutions to the complex public problems we face.

However, new scientific and technological inventions are never neutral solutions, without further consequences. Recent history illustrates that a simplistic, solutionist view of science and technology can lead to unintended, broader impacts on nature and society (Morozov, 2013; Scott, 1998).[2] For an example, one need only observe the current disruptions of our ecology caused by the pesticides and microplastics that enable modern agricultural and industrial processes. Or how algorithmic governance made possible by automated decision-making, facial recognition and data extraction tools provides both governments and big tech companies the means to monitor and control large groups of citizens.[3]

In other words, for better or worse, new R&I developments hold immense power to impact citizens around the globe. Interestingly, this power often remains relatively unchecked by these same citizens. To a big extent, this has to do with how we have organized R&I and the system around it. Large parts of the R&I system still seem to value the production of peer-reviewed publications, the filing of profitable patents and top-down implementation of new scientific and technological solutions over conscious social impact and responsiveness (Dijstelbloem et al., 2013; Hessels et al., 2011; Stilgoe et al., 2014). As a result, the increasingly transnational and specialized R&I system remains shielded from productive inputs from and interactions with the affected citizens. This dynamic makes it even harder for many to recognize potential issues and impacts in time, let alone find democratic channels to share their hopes and dreams on the direction R&I might take to serve society and our ecosystems (cp. Genus & Stirling, 2018).

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1   The COVID-19 pandemic and biodiversity crisis provide but two stark reminders of the pressing need for novel solutions that increase prospects for a better future for our species and our planet. What sets these problems apart from normal or structured problems is that they are embedded in existing systems (Loorbach & Rotmans, 2010; Schuitmaker, 2012, p. 1021) and are firmly rooted in our existing institutions and structures. Therefore, partial solutions formulated and implemented in isolation will probably have negative side effects (Bos & Grin, 2008; Schuitmaker, 2012). For example, implementation of new technical solutions to tackle climate change can lead to local contestation with the result that issues of sustainability and governance become further entangled in unproductive ways (cp. Verhoeven et al., 2022).

2   Scott has shown that efforts aimed at modernization coupled with a simplistic view of scientific progress have led to large-scale societal and ecological transformations that fail to take account of local concerns and do more harm than good to the society and environment which they affect (Scott, 1998).

3   Here we can think of the way in which illiberal governments (like in China) fund large tech conglomerates (like *Huawei*) to produce technologies that help to conduct mass surveillance on specific parts of the population (e.g. ethnical Uyghurs). These same tech companies then export these technologies to other (il)liberal regimes. Closer to home, we can think of the recent scandal in which automated decision-making by the Dutch tax agency powered ethnic profiling that ruined many families financially.

Almost a hundred years ago, American pragmatist John Dewey was one of the first to recognize this challenge. In 1927 he noted that inventions and appliances such as the engine and the telephone "revolutionized the conditions under which associated life goes on" (Dewey, 1954, p. 165). The indirect consequences of such inventions institute all kinds of new emerging problems affecting different citizens. In an ideal democracy, citizens would recognize that they were affected by these issues and form collectives (*publics*) around them (Dewey, 1954; cp. Marres, 2007). Through these, they would exercise their democratic capacities to democratically experiment with alternative solutions. But as Dewey recognized, due to the growing complexity of R&I interventions and their indirect consequences, it is difficult for citizens to recognize themselves as part of such publics (Dewey, 1954, p. 126; cp. Dijstelbloem, 2007, p. 66). This is then further exacerbated by existing institutions and incumbent actors that are often incapable or unwilling to provide the means for publics to articulate themselves and make their voices heard (Dewey, 1954, p. 31)

Dewey foresaw that this problematic situation required structural change. Particularly, he underlined the necessity for a democratic and experimentalist renewal of existing institutions, to improve opportunities for publics to make their voices heard (Dewey, 1954). Dewey foresaw the need for conceptual and institutional reconstruction, to change the conditions under which R&I takes place to make citizens better able to recognize themselves as publics to new inventions. Following such a process, citizens would be better equipped to share their ideas and concerns and to reinstate control over functions affecting their daily lives, simultaneously improving institutions' problem-solving capacities (Campbell, 1995, pp. 184–193).[4]

In recent decades, many scholars have come to recognize that R&I can support the responsible and reflexive search for new solutions to the grand challenges of our time *only* if it engages democratically with the values, needs and expectations of the affected publics (Beck, 1992; Pickering et al., 2022; Stilgoe et al., 2013). Engaged scholars have actively leveraged concepts such as *Responsible Research and Innovation* to experiment with alternative forms of public participation in R&I practice (Owen et al., 2012; Owen & Pansera, 2019; Stilgoe et al., 2013; Von Schomberg, 2011). However, despite decades of debate and practical efforts, the European R&I system still struggles to involve diverse publics (Macq et al., 2020). Many scholars now acknowledge that temporary participatory and democratic experiments have remained add-on and ad hoc, failing to impact the broader R&I system and its institutions (Braun & Könninger, 2018). Even now, it is unclear how such experimentation can contribute to *structural* changes that

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4   As we will see, he himself was interested in the democratic and experimentalist reconstruction of existing institutions, so that publics could more easily provide their input into problem-solving processes. He even saw family resemblance between democracy and science, as they could be interpreted as two sides of the same coin of experimentalist forms of human problem solving in a constantly changing world. Ideas like these informed the later development of the policy sciences tradition and its focus on policy science of democracy (Lasswell, 1951).

open up R&I to a diversity of publics and thus contribute to a deeper democratization of the R&I system (cp. Guston, 2004). The research presented in this thesis addresses this issue from a combined pragmatist, new institutionalist and action-oriented perspective.

1.2.   Past efforts to bring the public into R&I

We first need to recognize that many attempts have been undertaken to bring democracy and the public into R&I and that diverse scholars and policymakers have tried to come up with concepts and create the right conditions to achieve this.

During the last century, debates on the possible relationships between science and society, democratic or otherwise, received a further impulse through developments in philosophy and the sociology of science and technology (Bourdieu, 1975; Heidegger, 1977; Kuhn, 1962; Latour, 1990; Winner, 1980). The *Radical Science Movement*, studies on the *Sociology of Scientific Knowledge* (SSK), laboratory studies (Latour, 1987), work on the *Social Construction of Technology* (SCOT) (Bijker et al., 2012), *Actor-Network Theory* (ANT) (Callon, 1986; Latour, 1990) and *Science and Technology Studies* (STS) (Bijker, 2017) showed the world that R&I practices and products are socially constructed and value driven (Suhay & Druckman, 2015). Recognition grew that societal arrangements influence the production of scientific knowledge and technological inventions, whereas the latter intervene in society and the ecology. More and more scholars have acknowledged that science and technology and society co-produce each other in contingent ways (Jasanoff, 2004; Rip & Kemp, 1998; Schot, 1998), placing the issue of politics, or "who gets what, when and how" (Lasswell, 1936), at the core of knowledge production and technological innovation (Asdal et al., 2007, p. 9).

These insights led engaged policymakers and scholars to work actively to increase public reflection on R&I. From the 1960s onwards, in response to rising investments in technology in the space race, policymakers tried to instill democratic reflection on the potential consequences of certain technological developments for society under the banner of *Technology Assessment* (TA) (Grunwald, 2019; Loeber, 2004, pp. 22–23). Governments, such as those in the United States and the Netherlands, set up special offices to assess (potential) technological impacts on society (Smits et al., 1995; Smits & Kuhlmann, 2005; Smits & Leyten, 1988). These broader discussions later informed practical experimentation with the involvement of multiple voices in the control and concrete design of new technologies, under the name of *Constructive, Interactive and Participatory TA* (Durant, 1999; Grin & Hoppe, 1995; Schot & Rip, 1997). Notably, scientists too became interested in early-stage reflection on potential negative impacts of their ground-breaking discoveries. For example, practitioners working in the fields of genomics and nanotechnology called for public reflection on the possible societal consequences of their work, termed as *Ethical, Legal and Social Aspects* (ELSA) or

Implications (ELSI) (Zwart & Nelis, 2009).

The wider context of these diverse efforts was captured in grand theories of sociologists like Ulrich Beck and Anthony Giddens who, in response to the Chernobyl nuclear disaster, theorized that we had entered the age of the *risk society* (Beck, 1992). With this term, they tried to capture the idea that the unintended side effects of modern science (such as environmental pollution) had become the driving forces of recent social history. They too argued that to better deal with these emerging issues, society required *reflexive modernization* (Beck et al., 1994) that entailed institutional reform and a restructuring of existing processes of knowledge production and problem solving (Loeber, 2004, pp. 15–17).[5]

These grand theories provided an impetus to the development of other scholarly movements that began to propose alternatives to scientific business as usual which included more room for the public. For example, in response to persistent environmental problems and the accompanying uncertainty about what counts as fact and what values matter most, some scholars recognized a need for *post-normal science* (Funtowicz & Ravetz, 1993).[6] They specifically called for an extended peer community and involving broader society in academic practice. In similar vein, Gibbons and others described the necessity for researchers to develop an alternative mode to standard academic and detached forms of science (which they coined *Mode 1*). They specifically made the case for more applied, context-oriented, transdisciplinary scientific work with increased attention to social accountability and reflexivity (which they dubbed *Mode 2*) (Gibbons et al., 1994).[7] As such, the call to involve the public in R&I and its quality control slowly but surely swelled.

In the meantime, British scholars had already started to develop their own specific brand of work on the potential relationships between the public and R&I. Back in 1985, the landmark Bodmer report had already spotlighted the importance of *public understanding of science* in a highly technological society (Royal Society, 1985). Initially, the report and communication around it still framed *the public* as the total collection of 'ignorant' non-scientists possessing a 'knowledge deficit' (Irwin, 2014; Simis et al., 2016) that would have to be enlightened by scientists. However, from the 1990s onwards this framing was seriously questioned. Extensive empirical research by critical scholars such as Brian Wynne showed that citizens often had their own complex reflections and contextual knowledge that could contribute to scientific discussions – not least in the

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5   Such side effects may lead actors experiencing them "to self-critical and self-consciousness reflections that may result in attempts at purposefully seeking to change the course of events" (Loeber & Vermeulen, 2016, p. 19). This can inform second-order reflexivity in the form of governance processes aimed "at fundamentally challenging deeply entrenched societal structures and dominant ways of thinking and acting" (Loeber & Vermeulen, 2016, p. 19; cp. Voß et al., 2006)

6   Post-normal in the Kuhnian sense referred to the state beyond the current 'normal' scientific paradigms.

7   The involvement of a broader range of stakeholders was later conceptualized and experimented with under the banner of triple, quadruple and quintuple helix literature (Carayannis et al., 2012; Carayannis & Campbell, 2009; Leydesdorff & Etzkowitz, 1996).

context of complex societal and environmental disasters (1996). Phenomena like the unsatisfactory handling of the BSE crisis in the 1990s and the ensuing House of Lords report (2000) further underlined the importance of public engagement to rebuild trust in science.

Slowly but surely some scholars and policymakers started to disaggregate the one and only public into a diversity of multiple, contextualized *publics* of citizens that could form around different R&I issues. Instead of being seen as 'ignorant', such publics were increasingly perceived as partners for real inclusive *dialogue* and *engagement* in which scientists and citizens could exchange on an equal footing about science and scientific controversies and to the benefit of both. Some scholars also called for increased room for *upstream engagemen*t where publics could be invited to discuss crucial, early phase decisions around science and public policy, when options were still open (Broerse & de Cock Buning, 2012; Wilsdon & Willis, 2004).[8]

1.3. The 'rise' of Responsible Research and Innovation

These discussions spilled over into broader debates on the relationship between science and society on the European continent (Macq et al., 2020). Unease about the lack of uptake of GMOs and nanotechnology informed new policies and expert reports (European Commission, 2002; Felt & Wynne, 2007) and spawned multiple dedicated funding programs for research into *science in society*, *science with society* and *science with and for society.*

In the 2010s, dialogical and upstream views on public engagement gained academic and policy momentum through the emergence of interrelated discourses around *Responsible Innovation (RI)* and *Responsible Research and Innovation (RRI)* (Burget et al., 2017; Owen & Pansera, 2019; Shanley, 2021; Wiarda et al., 2021).[9] One of the first broadly cited definitions of RI was given by Von Schomberg (2011, p. 9) as "[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

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8   Not everyone in the STS domain agrees with the idea that publics should be allowed a seat at the upstream table. As Jasanoff (2017, p. 275) wrote, some scholars (Collins & Evans, 2002, 2007; cp. Wynne, 2003) "stress the crucial importance of knowledge and skills in constituting both good expertise and good politics. Democracy, in their view, demands that citizens should not be treated the same as experts in technical deliberations unless they can contribute valid knowledge to a propositional field rightfully controlled by experts. That analysis, however, fails to attend to a massive critical literature showing that a narrow focus on citizens' technical competence misses the politics that frames the debate […] and narrows the imagination of expertise needed to address complex social concerns".

9   The concept is influenced by past efforts to build ethical reflection on the public character of R&I practices and systems like bioethics, (interactive, constructive or participatory) TA, codes of corporate social responsibility, ELSA/ELSI, risk analysis, the precautionary principle, vision assessment, co-design, value sensitive design, backcasting, foresight exercises, futuring, socio-technical integration approaches (Fisher et al., 2015) and anticipatory governance (Burget et al., 2017).

to allow a proper embedding of scientific and technological advances in our society)". Others, moving away from the European policy context from which this definition grew, offered broader definitions with an interest in the democratic governance of the purposes of R&I and its orientation toward the right impacts (Owen et al., 2012, p. 751).[10] According to them, "[r]esponsible innovation means taking care of the future through collective stewardship of science and innovation in the present" possessing dimensions of anticipation, reflexivity, inclusion and responsiveness (Stilgoe, Owen & Macnaghten, 2013, p. 1,571).

In line with Von Schomberg, the European Union defined RRI as "a process for better aligning R&I with the values, needs and expectations of society. It implies close cooperation between all stakeholders in various strands comprising: science education, definition of research agendas, access to research results and the application of new knowledge in full compliance with gender and ethics considerations" (Italian Presidency of the Council of the European Union, 2014). To operationalize the RRI concept, the European Commission defined six so-called policy keys (public engagement, open access, gender, ethics, science education and governance) and named RRI as a cross-cutting issue in its 80-billion-euro Horizon 2020 R&I funding program (Rip, 2016). [11]

Based on an analysis of the rise of the concept in the Brussels bureaucracy, authors have described RRI as a blanket term offering different actors the space to work on science-society dynamics (De Saille, 2015; Rip, 2016, p. 292).[12] This conclusion is empirically supported by the many different projects that received funding to experiment with and observe RRI and public engagement. Across the European R&I system, projects have been funded to make RRI and public engagement 'more real' in fields as diverse as nanotechnology, neuro-enhancement, synthetic biology, marine science and health and medicine research. They involve different kinds of stakeholders and organizations that normally develop R&I activities with (potential) impact on our society, often beyond the view, let alone control, of ordinary citizens affected by them.[13] These RRI projects can be interpreted as part of a broader wave of experiments in participation that aim to open up R&I practices to the world outside and to experiment

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10 As Owen, Macnaghten and Stilgoe defined it, RRI possesses three distinct features: "The first is an emphasis on the democratic governance of the purposes of research and innovation and their orientation towards the 'right impacts'. The second is responsiveness, emphasising the integration and institutionalisation of established approaches of anticipation, reflection and deliberation in and around research and innovation, influencing the direction of these and associated policy. The third concerns the framing of responsibility itself in the context of research and innovation as collective activities with uncertain and unpredictable consequences" (Owen et al., 2012, p. 751).

11 According to Rip (2016, p. 292) "these RRI keys have more to do with the bureaucracy of maintaining SwafS/RRI as a cross-cutting theme than with the conceptual foundations of RRI".

12 Rip writes how RRI offers a space for further exploration: "Through such interactions and occasional boundary work, this space becomes furbished, further articulated and perhaps settled (stabilized) with the label RRI holding in place a patchwork of interacting dynamics" (idem).

13 These go under acronyms such as GREAT, PRoGReSS, RESPONSIBILITY, NERRI, SYNENERGENE, IRRESISTIBLE, PIER, RRI Tools, RRI Trends, ENGAGE, SATORI, PARRISE, CONSIDER, RESPONSIBLE-INDUSTRY, NanoDiode, RRI-ICT Forum, MoRRI, HEIRRI, Ark of Inquiry, SPARKS, FoTTRIS, NUCLEUS, PROSO, TRUST, RRI-Practice, JERRI, PRISMA, SMART-map, COMPASS and more comprehensive projects like Res-AGora (Res-agora, 2022).

with the democratization of relationships between R&I and its publics (Binder et al., 2015; Gross & Schulte-Römer, 2019; Laurent, 2017; Lezaun et al., 2017; Lhoste, 2020).

1.4. Changing the R&I system from within

A big open issue is how such temporary participatory experimentation can impact the existing R&I system.[14] With Dewey, we can postulate that the existing R&I system and its institutions may form a structural barrier to increased and extensive public engagement. Recent studies seem to confirm this. For example, experimentation with increased reflection on societal responsibility has shown that RRI is far from institutionalized at the organizational and funding level (Christensen et al., 2020; Novitzky et al., 2020). Indeed, the existing R&I system and its institutions may block increased participation of a wide variety of publics in R&I (Braun & Könninger, 2018). These findings and the associated literatures point to the need to change the current R&I system and its institutions if we want R&I to structurally engage with the values, needs and expectations of diverse affected publics.

Here we may ask what is keeping the R&I system from engaging with the public more structurally. From the outset, it appears that existing narratives, practices, rules and incentives of R&I often form a barrier to increased public engagement. For example, many researchers still subscribe to the narrative of *science as an endless frontier* (Bush, 1945) that just requires more public funding to deliver true benefits to society. In narratives about the *social contract* between science and society, science is expected to produce 'reliable' knowledge, which only needs to be communicated to the 'ignorant' public to yield positive change (Gibbons, 1999). The story goes that as long as researchers ensure the integrity and quality of their work in their *Republic of Science,* the state should leave them alone. Any centralized effort to steer researchers toward certain impacts would paralyze cooperation and scientific progress (Polanyi, 2000, pp. 1–3). Furthermore, many researchers subscribe to the general sentiment that scientific decisions ought to be taken in isolation from broader moral implications (Douglas, 2014, p. 86).[15] Such lack of organized attention to public implications is mirrored in the private sector, where a business logic dominates thought and talk about innovation. This narrative stipulates that innovation ought to first and foremost

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14 How to define and delineate the (scientific) 'R&I system' is a matter of extensive debate (Rakas & Hain, 2019; Rip & Van der Meulen, 1996; Suominen et al., 2019). In this thesis I take it to comprise the network of (trans)national R&I performing and funding organizations including intermediary institutions such as standard-setting and self-regulation bodies, regulatory agencies and ethics boards) (Rip & Van der Meulen, 1996; Stewart & Hyysalo, 2008).

15 In the words of Oppenheimer, lead scientist for the infamous Manhattan project: "When you see something that is technically sweet, you go ahead and do it and you argue about what to do about it only after you have had your technical success. That is the way it was with the atomic bomb" (1954, p. 95/266). Later, he recanted this position and became a well-known advocate for the curtailment of nuclear arms.

deliver new marketable technologies and appliances to provide economic value for the company and its shareholders (cp. Randles et al., 2016). Societal desirability, let alone engagement, is at best a corporate afterthought.

These narratives concerning the 'proper' relationship between R&I and its publics seem to have solidified in practices, rules and incentives. Scientific excellence has become increasingly measured and incentivized in numbers of publications in highly ranked peer-reviewed science journals (Moore et al., 2017; Sørensen et al., 2016), with impact measured by the impact factor of the publishing journals (Verma, 2015). Whereas the latter was developed to help librarians discern which journals to buy for their universities, it is now being used for different purposes (Archambault & Larivière, 2009). As a consequence, these incentives have led to a growing volume of research output in the form of articles (Pan et al., 2018) published in vested academic journals that are predominantly read by peers (Suleski & Ibaraki, 2010).[16] Moreover, the effects of these measures on research quality and integrity, the mental well-being of researchers and the inclusivity of the academic system also appear troubling, to say the least (Bonn & Pinxten, 2021; Davies et al., 2021; Gopalakrishna et al., 2021). In parallel, innovation practices are foremost focused on reaping private profits from patents over solving grand challenges.[17]

In any case, these combined dynamics lead to an R&I rules and incentive system that promotes R&I practices leading to the production of PhD theses, peer-reviewed publications, patents and profits instead of R&I practices that take responsibility for engaging with affected publics and their values, needs and expectations (Stilgoe et al., 2013). As such, it leaves little attention for the actual implementation and societal impact of research in practice (Knight et al., 2008) and bypasses fruitful engagement with complex societal and environmental challenges (Fazey et al., 2020; Kok et al., 2019). If R&I practices and systems are to become more responsive to diverse publics and their values, needs and expectations, a democratic renewal of R&I institutions in the Deweyan sense is arguably required.

At the level of individual agents, changing the situation calls for a change in R&I practices. Schatzki and Reckwitz defined a practice as "a routinized way in which bodies are moved, objects are handled, subjects are treated, things are described and the world is understood" (Reckwitz, 2002, p. 250). Individual actors may be regarded as the "carriers of a practice" (idem) who, in principle, possess agency as "the capacity to do otherwise" (Giddens & Pierson, 1998, p. 84). The current situation calls for a *de-routinization* of such practices (Schatzki et al., 2001), by which individual R&I actors

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16 In the words of Bartels et al. (2020, p. 397) "The consequences are the proliferation of inconsequential research and publications that few care about but that count toward academic promotion, salary improvements, and institutional rankings".

17 As Stilgoe (2013, p. xii) bluntly put it, "There are reasons why the world's combined innovative capacity has spewed forth iPhones and space shuttles but not yet managed to produce clean energy or universal access to clean water".

are invited to exercise their capacity to think and do otherwise and include publics in their practices. This can be promoted by enlarging (second-order) reflexivity and interpersonal trust within groups of individual R&I actors and inviting these actors to experimental reflective workshops to challenge deeply entrenched societal structures and dominant ways of thinking and acting in order to change them (Grin et al., 2004; Koole, 2020; Loeber & Vermeulen, 2016; Voß et al., 2006). However, fundamentally changing the R&I system is about more than the level of individual R&I agents, for many of these individuals are already experimenting at the practical level.

The puzzle also involves how experimentation in temporary workshops might lead to structural changes. Specifically, it becomes central to find out how such experiments can support participants to not just think of alternatives but also to invite others to adopt new practices on a structural basis, thus promoting structural changes (Garud et al., 2007, p. 961; Seo & Creed, 2002)[18] to democratically modify the R&I system from within.

1.5. Research question and objectives

With this research, I aim to contribute to the conceptual, empirical and methodological puzzles around the democratization of R&I from a pragmatist, new institutionalist and action-oriented perspective. In particular, my goal is to leverage insights from these literatures and empirical action research to develop a theoretical framework and practical heuristic that will help to promote structural public participation in the R&I system.

To further operationalize this general aim, my first objective is to explore what recent scholarly and policy debates on RRI can learn from Dewey's conceptualization of democratic experimentation. My second objective is to contribute to the systemic turn in public engagement with science, by developing a pragmatist and new institutionalist framework for promoting the institutionalization of public engagement through temporary participatory formats for action research. My third objective is to refine the framework on the basis of empirical work and make it practically salient. To that end, I will analyze a temporary participatory arrangement (a so-called 'social lab') that was set up in the context of the NewHoRRIzon project (Box 1) to promote RRI in the *Marie Skłodowska-Curie Actions* (MSCA) funding program. My fourth objective is to conduct a comparative analysis through the lens of the refined framework on all 19 social labs organized in the context of NewHoRRIzon.

The central question of this research therefore reads:

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18 Scholars have elsewhere described this as the paradox of embedded agency. The theoretical puzzle is as follows: "if actors are embedded in an institutional field and subject to regulative, normative and cognitive processes that structure their cognitions, define their interests and produce their identities (Clemens & Cook, 1999; Friedland & Alford, 1991), how are they able to envision new practices and then subsequently get others to adopt them?" (Garud et al., 2007, p. 961).

How can experimentation with RRI in social labs support structural change to improve public participation in the European research and innovation system?

With an answer to this question, I intend to provide conceptual and empirical insight into the ways in which experimentation with RRI in social labs can support structural change to improve public participation in the European R&I system. With these insights I seek to contribute to scholarly discussions on RRI and the systemic turn in public engagement with science studies. Furthermore, these insights will help me to develop policy and practical recommendations for the further institutionalization of public participation in the R&I system. The promotion of such participation may help to bolster trust in R&I, improve the quality of R&I itself and may help to democratize the R&I system (Stirling, 2008) so that it truly pays attention to the values, needs and expectations of society (Stilgoe et al., 2013) and thus becomes better fit to tackle the persistent societal and ecological challenges of our time.

1.6. A pragmatist and action-oriented research design

The research approach to answer the main question is grounded in a pragmatist epistemology, combining conceptual work with empirical action research. Pragmatism is a philosophical school that has its origins in the work of the nineteenth century American philosopher Charles S. Peirce. His ideas about the direct link between meaning and action were further taken up by thinkers such as William James, Mary Parker-Follett and John Dewey.[19] Pragmatists developed a theory of meaning and of truth grounded in experience and the quest for an adequate human existence (Campbell, 1995, p. 14). Instead of (merely) focusing on the validation of truth claims or the development of all-encompassing theories, pragmatism focuses on what works to enrich experience and improve the quality of life of people. This means that pragmatists such as Dewey aim to overcome recurring philosophical (epistemological, ontological and political) debates by shifting focus to consider the extent to which the organization of practical processes of (social) inquiry helps to overcome existing (social) problems and instigate concrete progressive change.

This does not mean that they see no value in conceptual development. Pragmatists like Dewey were big proponents of conceptual reconstruction, in which historically grown interpretations of certain concepts are closely scrutinized and updated to enlarge their potential value in solving new societal problems (cp. Campbell, 1995,

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19 This philosophical pragmatism is to be distinguished from two different interpretations of the word that can pejoratively refer to anti-intellectualism or economical/political opportunism (Campbell, 1995, p. 14).

pp. 151–157). Expressing the value of this exercise, the father of action research, Kurt Lewin, once remarked that there is "nothing more practical than a good theory" (1952, p. 169). According to Vansteenkiste and Sheldon (2006, p. 63), the message here is twofold. First, the goal of theorists is to provide new ideas and concepts to support the understanding and conceptualization of problematic situations, in order to uncover potential fruitful avenues to pursue in response. Second, an application of theories may yield information which, once further conceptualized, can help to further solve practical social problems.

In line with the above, the research design follows an iterative structure with the first half of the research focusing on conceptual work that supports a better understanding of the issues at play and the development of a conceptual framework. The latter half focuses on applying the resulting conceptual framework to empirical material gathered through action research and refining it to draw lessons for future experimentation that may contribute to structural change that improves public participation in the R&I system.[20]

My first step in this process was to connect insights from desktop research into Deweyan pragmatism to debates around the lack of implementation of RRI. These debates offer an interesting 'case' for conceptual study, as they go to the heart of why broader public involvement in R&I is not yet the institutional norm. Via desktop research on literature on the lack of mainstreaming of RRI (Christensen et al., 2020; Novitzky et al., 2020) and the recent experimentalist turn in dealing with this challenge (Nordmann, 2018; Timmermans et al., 2020), my co-author and I sought to clarify the issues that confront RRI and its attempt to bring science closer to society. I specifically sought to uncover what Dewey's conceptualization of democracy as an experiment and social inquiring publics might add and thus discover pointers for further conceptual and empirical exploration. One of the resulting findings was that the relationship between publics and institutions required further exploration.

As a follow-up, I therefore continued my conceptual exploration by bringing Dewey's (1954) pragmatist insights on publics and institutions and new institutionalism (Lowndes & Roberts, 2013) in conversation with recent work on the lack of institutionalization of public engagement in the R&I system (Braun & Könninger, 2018). This next step of desktop research helped me to develop an operationalizable conceptual framework to support an analysis of the institutionalization of public engagement in the R&I system. For initial development of the framework, I analyzed existing empirical material (Hamlyn et al., 2015) on the institutionalization of public engagement in the British research funding context. The detour to British research funding provides an interesting case to relate to since it is arguably the cradle of many debates on the role

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20 See *Appendix A – Data Acquisition and Sources* for a further elaboration of the approach to data gathering and an overview of used sources.

of the public in R&I. Despite policies promoting the importance of participation and engagement, institutionalization of dialogic and upstream public engagement in British R&I still seems lacking (Hamlyn et al., 2015). Developing the framework with reference to this context yielded insights that could then be used to further develop the framework for later application to a case study of (a) social lab(s) on RRI in a European context.

As said, the second half of this research builds on empirical material gathered through action research. Action research is defined as a "participatory process concerned with developing practical knowing in the pursuit of worthwhile human purposes. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities" (Reason & Bradbury, 2008, p. 4). Building on pragmatism, among other notions,[21] action research is not focused on the accumulation of abstract knowledge. Instead, it focuses on jointly producing actionable knowledge and breakthroughs with research participants by acting on the world (Chatterton et al., 2007, p. 218; Forester et al., 2019; Kuitenbrouwer, 2021). In the process of creating actionable knowledge, it is both critical of the status quo and relational (Bartels & Wittmayer, 2018; Wittmayer et al., 2021).[22] Moreover, it is explicitly value oriented. As MacDonald (2012, p. 36) explained, the "ontological commitments that underpin action research encompass action being value laden and morally committed" (ibid.). Instead of viewing this as a problem, the guiding role of morals and values (like instantiations of RRI) is recognized and seen as productive for the instigation of action. Indeed, a focus on values is not necessarily problematic for the validity of case study research, as science is inherently value laden (Montuschi, 2014, p. 129). The important thing is that values are open to

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21 Action research builds on many different philosophical traditions. Informed by the Aristotelian notion of praxis (Susman & Evered, 1978, p. 594) it is explicitly oriented toward acting upon the world in order to change it. Next to that, its hermeneutic underpinnings show that the researcher's "interpretation of a social system will never be exactly the same as that held by the members of the social system" (ibid.). This may lead to mutual benefits, for both the researcher as well as the practitioners involved: the research subjects may inform and scrutinize the action research process with their practical knowledge. Richer knowledge then ultimately may lead to better-informed action. Furthermore, it is based on notions of existentialism in which "the importance of human choice and human values" (ibid.) is emphasized. The key contribution in that sense is that existentialist philosophy is focused on "the theme that behind every action, individual choice is based on human interest. The possibility of choice is central to taking action, and the necessity to choose is central to human development" (ibid., p. 596). As we have already seen, one of the crucial aspects of (participatory) action research is that subjects can operate as co-researchers and in that role are allowed to make use of this possibility of choice. The fourth philosophical aspect is that of pragmatism, in which a scientist is viewed as "actor within the world rather than a spectator of it" (ibid.). Finally, action research is underpinned by process philosophy, in which every social system is seen as an ongoing process, and phenomenology (ibid.).

22 Critical in that "co-inquiry surfaces and deconstructs taken-for-granted assumptions and interpretations to cultivate communities of inquiry and redistribute power" (Bartels & Wittmayer, 2018, pp. 5–6). Furthermore, it attempts to challenge "dominant conceptions of knowledge and social research engrained in mainstream academic disciplines, values and practices" (ibid., p. 6). Relational in that it embraces "a relational worldview where all living and non-living entities form webs of connection with each other. […] The world – and our understanding of it – is not individual or fixed but a dynamic, evolving, open-ended process of ongoing collaborative sense-making about, and negotiating of different interpretations, meanings, and courses of action" (ibid., pp. 6–7). In sum, it "(1) generates actionable knowledge, (2) recognises, works with, and strengthens relationships, and (3) critically and constructively transforms hegemonic systems" (ibid., p. 1).

investigation and probing (Montuschi, 2014, p. 133), which as we will see, is at the core of the set-up and evaluation of the social lab(s).

To further refine the conceptual framework I applied it to a case study (Yin, 2003) of experiences in engaging with action research in a social lab focused on the *excellent science* context of the *Marie Skłodowska-Curie Actions* (MSCA) funding program. MSCA stands for excellence and prestige in European science. The program provided €6.1 billion in funding between 2014 and 2020 to support early-career researchers to develop their professional skills through enhanced mobility. MSCA is an interesting case as it is one of the Horizon 2020 programs (see below) focusing on the transnational promotion of certain forms of excellence in science among early-career researchers. As such, it provides a window into how scientific excellence is understood, practiced and incentivized (institutionalized) across the European R&I system and how this affects public engagement.

Data gathering for the MSCA action research component consisted of semi-structured diagnostic interviews and desktop research to gauge the state of RRI in the current MSCA program. Moreover, a total of three workshops were organized during which written materials produced by participants were collected. Together with notes on online calls with participants, these inputs were collected via specifically designed reflection and reporting templates and exercises. These materials were then analyzed through the lens of our framework to make sense of the case, draw lessons and refine it for further experimentation (cp. Appendix A).

Finally, to draw lessons for future experimentation with ways to improve public participation in the European R&I system, the refined framework was applied to a comparative case study (Yin, 2003) encompassing 19 NewHoRRIzon social labs organized with reference to the Horizon 2020 framework program. Since 1983 the European Commission has created a total of eight so-called framework programs to fund research and technological development. Horizon 2020 (H2020) was in effect from 2013 to 2020, providing €80 billion for programs with the goal to fund science and technology that drives economic growth. Funding was divided into three pillars: *Excellent Science*, *Industrial Leadership* and *Societal Challenges*, alongside some cross-cutting issues. The first pillar, *Excellent Science*, was set up to promote bottom-up funding and transnational collaboration. With a total budget of €24.4 billion, it funded the *European Research Council* (ERC) and MSCA, among others. The second pillar, *Industrial Leadership*, aimed at bolstering competitiveness and economic development on the topics of leadership in enabling industrial technologies, risk finance and small and medium enterprises (SMEs). With a public budget of €17 billion, initiatives and research approaches were selected and developed jointly by the European Commission and industrial partners applying for a grant. The third pillar, *Societal Challenges*, provided a budget of €29.7 billion for R&I impacting a range of top-down EU defined challenges. Finally, there were some cross-cutting program lines, like *Science with and*

for Society (SwafS), worth a total of €7.5 billion. The social labs provide interesting material to apply the framework since they can be seen as organized in relation to a broad cross-section of funding programs across Europe.

Empirical materials were gathered in a specially designed evaluation process (Loeber & Cohen, 2018) in which social lab teams and participants were asked to provide narrative reflections and lessons during interviews guided by reflection templates. These inputs were reworked into running narratives, which were fed into narrative reflection interviews with the teams as well as a final narrative reflection exercise in which participants could provide inputs on the constructed narratives pertaining to their own experiences and lessons learned.

This part of the research design was inspired by insights from narrative and responsive evaluation (Constant & Roberts, 2017; Guba & Lincoln, 1989), the learning histories approach (Roth & Kleiner, 1998) and reflexive and practice-based approaches to evaluation (Arkesteijn, Van Mierlo & Leeuwis, 2015; Ivaldi, Scaratti & Nuti, 2015; Van Mierlo et al., 2010). The latter considers the evaluation of practices (such as those related to the social labs) as an unfolding process whereby "evaluative methods and tools are context dependent and subject to social, dynamic and contested mobilization of knowledge" (Ivaldi et al., 2015, p. 497). The choice for this design was informed by multiple reasons. First, it allowed respondents (i.e., the involved social lab teams and participants) to 'talk back' and share their claims, concerns and issues (Guba & Lincoln, 1989), creating a responsive and reflexive space for discussion of issues that might otherwise remain 'below the surface'. Secondly, the design allowed the knowledge gained to be enriched with participants' practical knowledge, rendering the insights more actionable. Finally, as opposed to a one-dimensional best practices approach, the research design enabled a proper transfer of knowledge, as it allowed for so-called vicarious learning (Grin et al., 1997; Guba & Lincoln, 1989; Loeber & Laws, 2017).

The materials that were produced in the context of this evaluation were coded, with the codes inspired by our developing framework and empirical work on the social labs. Taking all this together, the evaluation thus provided an impetus for participants to engage in collective reflection and led to outputs in the form of a comparative project assessment, inputs for this thesis and, in pragmatist vein, a *Guide to Good Practices* (Cohen & Loeber, 2021).

1.7. Thesis outline

Following this introduction, the argument in this thesis is iteratively developed in two conceptual chapters and two empirical chapters based on cooperative work with several authors. These have also been submitted and/or accepted for publication in different academic venues.[23]

Chapter 2 provides the normative and conceptual basis for the development of our framework. It explicates the current European debate around RRI as an ethical assessment framework that arose a decade ago in response to growing ethical and societal concern about the impacts of science and technological innovations. It presents current critiques of the RRI concept, such as its lack of conceptual clarity, its missing real-world implementation and lacking institutionalization and mainstreaming. Engaging with the recent experimentalist turn in dealing with these issues, the chapter proposes a re-conceptualization of collective experimentation with RRI, answering the following question:

> *What is, from a pragmatist perspective, a proper way to conceptualize and understand collective democratic experimentation with RRI in social labs?*

To answer this question the chapter provides a pragmatist conceptualization of collective experimentation with RRI, inspired by John Dewey (1954) and his work on democracy as an ethical way of life and an experiment. Furthermore, the chapter unpacks the relevance of Dewey's interest in social inquiring publics as an apt foothold from which to operationalize collective democratic experimentation with RRI. The prospective utility of this approach is illustrated by connecting it to the recent call to use social labs to experiment with RRI. This initial conceptual exploration raises the question of how we might conduct further (action) research on the role of institutional conditions and enlarge participants' room for maneuver (Krabbenborg, 2016, p. 918) in implementing RRI and public engagement in existing institutions.

Chapter 3 zooms in on this challenge and the lack of institutionalization of public engagement in the R&I system from a pragmatist and new institutionalist perspective. It situates the argument further in the recent systemic turn in participation in science studies (Braun & Könninger, 2018). It argues that what we need and is still missing from this 'systemic turn' in public engagement research is a clear framework that can support (action) researchers to contribute to structural change towards public engagement in the R&I system. The chapter seeks to fill this gap by answering the following question:

> *How can we conceptualize and analyze the relationship between publics*

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23 See *Appendix C - List of Publications* for an overview of these publications and the authors involved.

> *and R&I institutions to support structural changes towards more extensive*
> *public engagement in the R&I system?*

The chapter develops a pragmatist and new institutionalist framework to untangle the influence of existing formal and informal institutions and material structures on public engagement with R&I. To illustrate its utility, the framework is tentatively applied to engagement in the British research funding context. This application informs further development of the framework, including recommendations for (action) research that may support further institutionalization of public engagement in the R&I system.

Chapter 4 applies the framework to a case study pertaining to the organization of a social lab on RRI in a transnational European research funding program focused on *excellent science,* answering the following question:

> *How can a temporary participatory arrangement contribute to structural*
> *change that opens up the 'excellent science' system to a diversity of publics?*

The chapter analyzes data on and experiences with organizing a social lab on RRI in the context of the MSCA funding program. This is a paradigmatic case, as the MSCA is a prestigious program representing excellence in European science. It supports early-career researchers in developing their professional skills through enhanced mobility. A potential limitation of this application of the framework is that it concerns one particular social lab experimenting with RRI in a specific context of the European R&I (funding) system. An open question is whether the framework can be fruitfully leveraged to draw lessons for experimentation in different funding contexts.

Chapter 5 therefore offers an extended application of the refined framework to data from 19 social labs organized with reference to the broader European R&I funding system, answering the following question:

> *How can temporary participatory experiments contribute to structural*
> *change that opens up the R&I system to a diversity of publics?*

Here the framework provides a basis for comparing how different social labs, organized with reference to different structural funding contexts (rules, practices and narratives), used different stakeholder engagement choices, methods and management to enhance a sense of agency among participants – leading to a host of different interventionist actions and ripple effects. The framework is then leveraged to draw lessons for future experimentation with the democratization of R&I.

Chapter 6 brings together the results from the different chapters in a conclusion, returning to the main research question:

How can experimentation with RRI in social labs support structural change to improve public participation in the European research and innovation system?

This chapter reflects on the relevance of the conceptual work and empirical results to current academic debates on RRI and public engagement in science studies, while also providing recommendations for R&I policymakers. Furthermore, the insights gained are used to formulate practical pointers for future experimentation. With these I hope to inspire and support other interested practitioners and (action) researchers in their quest to contribute to the institutionalization of public engagement and overall democratization of the R&I system.

Chapter 2

DEMOCRATIC EXPERIMENTATION WITH RESPONSIBILITY
A Pragmatist Approach to Responsible Research and Innovation

2

Abstract

Disruptive societal changes following from emerging science and technology have recently led to a growing interest in developing ethical frameworks. Responsible Research and Innovation (RRI) is such a framework that aims to improve the relationship between science and society. Now a decade after its conceptualization, it still seems to suffer from conceptual unclarity and lack of implementation. Since responsibility in research and innovation practice remains as important as ever, we propose to revive the normative potential of RRI by approaching it as a matter of collective democratic experimentation. To further develop this approach, we propose a pragmatist conceptualization inspired by John Dewey, his work on democracy as an ethical way of life and his attention to the contextual nature of responsibility. Furthermore, we show how his interest in social inquiring publics provides a particularly apt foothold from which to operationalize collective democratic experimentation with RRI. We will illustrate the utility of this approach, with specific attention to the social, experimental and public character of social inquiry, by connecting it to the recent call to use social labs methodology to experiment with RRI. From this we draw lessons for future collective democratic experimentation with responsibility in research and innovation practice.

Key words
Pragmatism, Democracy, Responsible Research and Innovation (RRI), Experimentation, Publics

2.1. Introduction

Socio-technical innovations and new and emerging technologies constantly generate new challenges and opportunities for our societies. From Artificial Intelligence (AI) to robotics and from mobile devices to smart cities, the growing development and broader impact of science and technology on society require measures to make sure that its resulting processes and products are ethically acceptable, socially desirable and sustainable. The recently adopted European framework of Responsible Research and Innovation (RRI) aims at offering a framework to address these challenges and thus improve the relationship between science and society.

However, there is a growing understanding that RRI suffers from a lack of conceptual clarity, that it misses real-world implementation (Ribeiro et al., 2017), and that it lacks in terms of institutionalization and mainstreaming (Christensen et al., 2020; Novitzky et al., 2020). This combination has arguably led to a waning policy relevance (Fisher, 2020). Against the grain of these developments, authors have recently suggested exploring a different approach to RRI. Notably, Nordmann (2018) has argued for treating RRI as a collective experimentation strategy with attention to how the framework may inform experimental processes of social learning around responsibility in concrete R&I practices. Timmermans and others (2020) have proposed to use a social lab methodology to experiment with bringing RRI into practice. Treating RRI as a collective experimentation strategy may increase its prospects for practical implementation and thereby provide a practice-oriented pathway out of the current conceptual-, implementation- and policy deadlock.

Even though said authors provide us with some guidance in terms of salvaging RRI from its own shortcomings, it is unclear how especially the *democratic* character of experimentation with RRI may be further philosophically grounded and operationalized for concrete R&I practice. In this chapter, we will argue that the pragmatism of John Dewey can provide the necessary philosophical and conceptual grounding for collective democratic experimentation with RRI. The aim of this chapter is thus to provide a normative and conceptual contribution for readers interested in democratic experimentation with RRI by answering the following research question:

> *What is, from a pragmatist perspective, a proper way to conceptualize and understand collective democratic experimentation with RRI in social labs?*

We will start the chapter by highlighting the challenges of R&I and the frameworks that have been introduced in response to this, including RRI. We will describe some current shortcomings of RRI and the formulation of RRI as a collective experimentation strategy as a promising solution to these issues. We will argue that the significance of this strategy for a responsible approach to R&I especially lies in its implicit democratic

character. Furthermore, we will argue that particularly the pragmatism of John Dewey and his understanding of democracy as an ethical way of life together with the central role of social inquiry provides a fruitful way forward in further conceptualizing and operationalizing RRI as a collective democratic experimentation strategy. Finally, we will connect these insights to the recent call to use social labs methodology to bring RRI into practice (Timmermans et al., 2020). To conclude, we will end our analysis with some insights on future democratic experimentation with RRI and other related concepts.

2.2.   Complex and disruptive changes

It would be difficult to deny and hazardous to underestimate the growing influence that R&I and resulting technological developments exert on our societies and their functioning.[24] Although the increasing impact of technique (technology) has been a recurring topic of philosophical debate for a long time (Feenberg, 1991; Heidegger, 1977; Marcuse, 2003) it seems evident that its influence is accelerating more than ever.

For one, newly emerging information and communication technologies are redrawing communicative relationships between humans and communities (Floridi, 2014). Innovation in the digital age is leading to radical changes in societal relationships including those between labor and capital (Stiegler, 2016). On a more radical plane, technology is redrawing individuals' relationships with the material dimensions of existence. To be precise, debates on AI, robotics and human enhancement are questioning the main ontological and anthropological assumptions underlying the relationship between humans and nature. Such radical developments entail an enormous impact not only on individuals as laborers, end-users or consumers, but also as citizens of modern society (Schradie, 2018; Sunstein, 2017).

From a moral perspective, the effects that innovative products and technologies can have on society in terms of inequalities and potential threats to individual freedom call for an integration of broader values and accompanying criteria of assessment into R&I practices (Davis & Laas, 2014; Jasanoff, 2016). From an epistemic point of view, the complex impact that these processes generate for individuals' lives and broader society requires an understanding and competence that is challenging for any single actor. The profound questions raised by certain innovations like AI and their permeability to different sectors, suggests that potential answers will not be easily found in a single domains' technical expertise. Rather, they are bound to emerge from newer forms of interaction between different spheres of society. This may include attention to the role

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24   In this chapter we will use the terms science, technology, research and innovation indistinctly although we are aware of their differences. The scope of the chapter is to highlight the politics of science, which invests all these different domains despite their supposed different logic. Therefore, we do not see an evident issue in not distinguishing them adequately for the purposes of this chapter.

of values at earlier stages of scientific and technological design (Van den Hoven, 2013).

From a political point of view finally, the above developments require better institutional frameworks to deal with questions of who gets what, when and how (Lasswell, 1936) through R&I in a democratic and accountable way. There is a growing acknowledgement that the complex and disruptive nature of changes resulting from science and technology, together with their increasing impact, requires a multilevel framework which is able to adequately consider the above moral, epistemic and political dimensions. Accordingly, the governance of R&I should acknowledge the inherent complexity of socio-technical changes and implement holistic measures to address the uncertainty (Nowotny, 2015) or indeterminacy (Gorgoni, 2018) stemming from R&I and its technological products.

2.3. Ethical assessment frameworks and RRI

If different countries in Europe had started to implement ethical assessment schemes since the 1970s (Jasanoff, 2016), it is mainly with the beginning of the twenty-first century that we encounter concrete institutional measures adopted at the European level. With the inauguration of the European R&I investment Framework Program 5 (FP5), the European Commission (EC) has introduced the question of stakeholder involvement and societal acceptability in research. In the early 2000s (European Commission, 2002), the EC started to solicit the engagement of civil society in the design of research processes, opening the path to concrete measures. Since then, we have seen framework programs with a special focus on *Science in Society* (FP6), *Science with Society* (FP7), and *Science with and for Society* (FP8, also known as Horizon 2020).

Furthermore, since 2011 the notion of RRI has been gaining momentum in academic and policy circles (Owen et al., 2012; Stilgoe et al., 2013; Sutcliffe, 2011; Von Schomberg, 2013; Wickson & Carew, 2014). One of the first broadly cited definitions of RRI was given by Von Schomberg who sees it as "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, 2011, p. 9). Others focused on the process dimensions interpreting that "Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present" with attention to dimensions of anticipation, reflexivity, inclusion and responsiveness in R&I processes (Stilgoe et al., 2013, p. 1571).[25]

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25 We recognize that Responsible Research and Innovation and Responsible Innovation can be seen as separate but interlinked discourses with specific antecedents (Owen & Pansera, 2019). As the scope of this chapter is to provide a pragmatist perspective on (R)RI we will from now on use the abbreviation of RRI to refer to both.

The fact that the EU has adopted RRI as a cross-cutting issue for Horizon 2020 (H2020), can be seen as the result of an increasing awareness about changes and challenges resulting from science and technology even at the European policy level (European Commission, 2012). Exemplary of this attention is the uptake of six keys that are meant to operationalize RRI: public engagement, gender equality, open access, science education, ethics and governance.[26]

Surely there has not been a shortage of attempts to bring the possible impacts of research, technology and innovation within the grasp of governance arrangements. In order to evaluate its novelty and peculiarities, many commentators have compared the current adoption of RRI to previous or concomitant frameworks and approaches. Several scholars have noted the continuity and discontinuity with (*Participatory and/ or Constructive*) *Technology Assessment* (PTA/CTA) (Grunwald, 2011; Rip, 2014), the *Ethical, Legal and Social Aspects* (ELSA) approach (Salvini et al., 2019; Zwart et al., 2014) and *Corporate Social Responsibility* (CSR) (Pavie et al., 2014). Others (Burget et al., 2017) have noted the family resemblance to concepts like *Bioethics, Risk Analysis, the Precautionary principle, Vision assessment, Co-design, Value Sensitive Design, Backcasting, Foresight exercises, Futuring, Socio-Technical Integration* approaches and *Anticipatory governance*.

Although it might be difficult to do justice to the different models and their implementation in different contexts, the main differences in all these frameworks stands in the lower or greater extent of societal inclusion that they propose (Jasanoff, 2016). Accordingly, we understand that RRI can be conceived as one of the latest moments of a process of inclusionary transition of innovation management in Europe, which passed from a clear division of roles to being "inclusively contingent" (Eizagirre et al., 2017, p. 29).[27]

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26   For an exhaustive overview of EC expenditures in this sense, together with the development of RRI, see https:// newhorrizon.eu/wp-content/uploads/2019/02/D-1.3-Current-Status-of-RRI-.pdf

27   In other words, the "RRI approach therefore calls for the phenomenon of innovation to be reformulated as *inclusively contingent*, namely, as something that demands to be constituted heterogeneously in all its dimensions (i.e., including normative issues, and not only organizational or procedural issues). Responsibility consequentially becomes a function of the degree to which it integrates, accommodates and institutionalizes the diversity of values, interests, and knowledge dynamizing and constituting innovations. In other words, responsibility is politicized as a problem, and relates directly to capabilities to decide collectively what kind of innovations we want as a society" (Eizagirre et al., 2017, p. 29).

2.4. Reframing RRI as a strategy for collective democratic experimentation

Despite the number of resources invested in the last ten years, RRI has not yet found a clear conceptualization that is broadly accepted by all those involved with it and affected by it. It might be argued that amongst all the different understandings of RRI, it is possible to identify a common agreement only with regard to its encouragement to engage a broader public in the development of R&I. Other than that, debates are bogged down into divisions about the right framing, the procedures to be followed (Klaassen et al., 2018) and the relationship of RRI to concepts such as social justice and sustainability (Expert Group on Policy Indicators for Responsible R&I, 2015; Von Schomberg, 2013).

On the practical side of things, some authors have highlighted that operationalization of the RRI concept is still under development (Fraaije & Flipse, 2020; Ribeiro et al., 2017, p. 12). Notably, recent reports on real-world experiences that do exist, paint a stark picture on the actual implementation of RRI. For example, a recent diagnosis of the H2020 framework program has shown that the integration of RRI and implementation in European research funding and practice is lacking in terms of consistency and depth (Novitzky et al., 2020). Many R&I actors still seem unfamiliar with RRI and there is a general sparseness of institutionalization in research organizations (Christensen et al., 2020). In the private sector, evidence shows even less of an interest in issues of responsibility (Lubberink et al., 2017). Finally, this combination of persistent misalignment of conceptual debates, different proposals and suggestions to implement RRI and a lack of integration in practice has most probably contributed to a loss of relevance at the European policy level (Fisher, 2020).

 Despite the apparent loss of policy relevance, responsibility in R&I practice remains unequivocally important. Therefore, in response to the above issues several authors from different backgrounds are meticulously working on "recalibrating both the broader framings that underpin responsible innovation and the practical understandings that will guide its implementation" (Fisher, 2020, p. 2). Strikingly, Nordmann has recently suggested that we should start to embrace RRI as a collective experimentation strategy (Nordmann, 2018) with specific attention to using RRI to instigate experimental processes of social learning in practice. Similarly, Timmermans and others (2020) have recently argued for the relevance of bringing RRI into practice through experimental action research by means of a social lab methodology. The perspectives adopted by these authors have the advantage to defend RRI as an open-ended experimental framework from instrumental, conservative and often technocratic stances (Klaassen et al., 2018).

Beyond the valuable call to experimentation, we argue that its greatest potential lies in refocusing the attention to RRI's underlying *democratic* agenda for inquiry into responsibility in R&I (Owen et al., 2012, p. 754). Building on the above developments, we therefore argue that in particular a *collective democratic experimentation* perspective

may provide a promising way out of the current problematic situation of the lacking integration and implementation of responsibility in R&I practice. We claim that there is still untapped potential in RRI in that it may provide a diversity of individuals and groups the possibility to exercise their personal freedom and responsibility in a democratic and participatory process of experimentation and learning. We will argue that integrating all kinds of actors, including citizens, in such a process will not only improve the robustness of the adopted strategy but can also contribute to the empowerment of individuals as social agents by allowing them to develop and give life to their own conceptualizations of responsibility in practice.

Even though Nordmann, Timmermans and others provide us with an interesting conceptualization and operationalization of RRI as a collective experimentation strategy, it remains unclear how its *democratic* character could both be philosophically grounded and operationalized in concrete R&I contexts. To fill this gap, we propose that we can make good use of the conceptual and methodological tools developed by the American pragmatists. We argue that the work of John Dewey provides a fruitful way to further think of the public operationalization of the project of RRI through strategies of collective democratic experimentation, since the core of his work revolves around creating more productive links between ethics, science and democracy. In the following sections, we will show that especially his understanding of democracy as an ethical way of life, his attention to the contextual nature of responsibility, together with his focus on publics and social inquiry provide a fruitful way to further conceptualize and operationalize the collective democratic experimentation agenda for RRI.

2.5. Learning from pragmatism and democracy as a way of life

To understand what is meant by democracy as a way of life, we first need to understand a bit more about the central ideas of American pragmatism. In short, American pragmatism is an action-oriented philosophy that is interested in concrete progressive change in the lives of people. The fundamental idea of pragmatism, as Dewey writes is that "action and opportunity justify themselves only to the degree in which they render life more reasonable and increase its value" (1990, bk. 2, p. 19).[28]

Despite some differences in their philosophies, the American pragmatists are united in that they share an interest in the following six interconnected themes. First of all, pragmatists share an *anti-foundationalist* understanding of knowledge, in which knowledge develops from experience, preferably through an iterative process of inquiry "as a self-correcting enterprise that has no fixed absolute beginning or absolute end

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28   For an in-depth understanding of Dewey and insight into crucial passages of his work we, amongst others, build on and are deeply indebted to the great work by Dewey-scholar James Campbell (1995).

point" (Bernstein, 2015, p. 31). Second, pragmatists embrace the *fallible* nature of inquiry by supporting the thought that everything can be questioned and that what we conceive to be true now can change tomorrow. Third, to still provide inquirers with a foothold from which to organize inquiry, pragmatists put the *community of inquirers* and *sociality of practices* in center focus (Bernstein, 2015, p. 32). Through the intersubjective and the social character of the latter two can we work towards knowledge, understanding and action that increases the substantive value of the lives of the community. Fourth, a consequence of this posture is that pragmatist philosophers recognize the *necessary existence of a pluralism of perspectives*. This requires an openness to listen to diverse viewpoints so as "to cultivate those habits and virtues that can prepare us for unexpected contingencies and conflicts" (idem, p. 34). Fifth, following from this that we need to embrace the *perspective of agents* and work with both *theory and practice* meaning that knowledge should be gained through "active experimentation and problem solving" in conjunction with other inquirers in practice (idem).

Finally, informed by all previous themes, pragmatists, and especially John Dewey, have an interest in *democracy as an experimental process of social inquiry* in itself. Dewey sees democracy not as a particular form of parliamentary government or as a collection of historically grown practices and institutions but as an "ethical way of life [...] in which all contribute and participate" (idem, p.35). Instead of reducing democracy to elections once every couple of years, Dewey sees it as a cooperative experiment (Campbell, 1995, p. 200) which provides human beings the room to meaningfully engage with one another and participate in different social fields to contribute to the formation of values that regulate their lives (Dewey, 1990, bk. 11, p.217). Accordingly, Dewey interprets democracy from a moral perspective describing it as "the idea of community life itself" (Dewey, 1990, bk. 2, p.328).

For him, the fundamental principle of democracy, is that "the ends of freedom and individuality for all can be attained only by the means which accord with those ends" (Dewey, 1990, bk. 11, p.298). All citizens should in other words be encouraged to actively partake in social associations and collectively exercise their powers of communication, deliberation and experimentation to further their individual growth and therewith the growth of society. Dewey believes that an introduction of forms of democratic experimental inquiry in daily practices would improve the cooperative capacities and awareness of societal issues of the individual experts and citizens involved (Dewey, 1954). This could in turn generate a greater circular movement that would bolster the democratization of diverse practices and institutions allowing more members of society to participate, to develop themselves and to exercise their own responsibility as members of a social community.

2.6. Sociality of practices and contextual nature of responsibility

These insights are tightly related to two other aspects of Dewey's pragmatist thought that are of high relevance to our discussion on RRI: the ontological understanding of the social embeddedness of individuals in practices and the relationship to the contextual nature of responsibility. Let us start with a discussion of the former.

Individuals, in Dewey's understanding, are never given but always "created under the influences of associated life" (Dewey, 1983, bk. 12, p.193), mediated by the sociality of practices. Basing himself on insights from sociology and evolutionary biology and aware of the physical embodiment of human beings as living organisms in a particular environment, Dewey notes that "association in the sense of connection and combination is a 'law' of everything known to exist" (Dewey, 1990, bk. 2, p.250). However, he notes that there is a crucial difference between biological forms of association and the social conscious sharing of practices.[29] This difference resides in the fact that the latter also requires shared action and communication to develop shared values and act accordingly in tackling societal ills (Campbell, 1995, pp. 174–175).

If the social and the individual are intricately connected to one another, we could say that Dewey uses responsibility as a principle that expresses their interdependence. Already in the 1920s, he recurrently analyzed the concept of responsibility as a crucial guidance for action. He was well aware of the existing skepticism around moral responsibility as it is often reduced to judgement on individual action and in terms of moral blame (Dewey, 1983, bk. 14, p.220). Dewey too loathed archaic, moralistic conceptions of responsibility because he thought that they would form an obstacle to the development of competent methods for collectively dealing with social subject matter (Dewey, 1990, bk. 12, p.489) and adequate social responses to new situations (Campbell 1995, p.156). He lamented how such a fixed posture does not open the possibilities for inquiry, but rather closes them (Dewey, 1983, bk. 12, p.188).

Instead, Dewey thinks that principles and concepts must always be revised, adapted, expanded and altered when new conditions emerge so that certain principles will be more effective instruments in judging new cases (Dewey, 1983, bk. 14, p.165). In other words, pragmatists like Dewey emphasize "the importance of novel constructs and hypotheses with which emergent problems can be tackled" (Keulartz et al., 2004, p. 18). The idea of responsibility and specific operationalizations are then to be regarded as a hypothesis "to be employed in observation and ordering of phenomena, and hence to be tested by the consequences produced by acting upon them" and not "as truths already established and therefore unquestionable" (Dewey, 1990, bk. 12, p.499). A

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29 In prose that one does not find often in contemporary scientific analyses, he notes that "assemblies of electrons, unions of trees in forests, swarms of insects, herds of sheep, and constellations of stars" (Dewey, 1990, bk. 2, p.250) are both marvels and important facts of life but that "the social, in its human sense, is the richest, fullest and most delicately subtle of any mode [of association] actually experienced" (Dewey, 1990, bk. 3, p.44).

reconstruction (Campbell, 1995, p. 151) of our conceptualization of responsibility may thus inform the reconstruction of people's practices and institutions (Campbell, 1995, pp. 184–192).

Rather than focusing on the justification of absolute moral principles, Dewey is more interested in active inquiry into morally problematic situations (Kupper & De Cock Buning, 2011, p. 435). From an action-oriented perspective, this signifies that morality for Dewey "is a continuing process and not a fixed achievement" (Dewey, 1983, bk. 14, p.194) meaning that ethical values, just like empirical facts, can be the subject of ongoing inquiry (Norton, 1999). Instead of artificially attempting to separate questions on social ills, science and values, he is convinced that the method of inquiry could also be applied to matters of moral valuation and societal issues so as to increase the problem-solving capacity of a society.

Moreover, what is becoming clear throughout Dewey's work, is that the adoption of new conceptualizations, practices and institutions of responsibility with better consequences for those involved and affected, is only possible when a corresponding freedom of cooperative experimentation is guaranteed and promoted in social practices (cp. Gianni, 2016). Without this freedom of cooperative experimentation "moral progress can occur only accidentally and by stealth" (Dewey, 1990, bk. 7, p.231). This positive freedom to participate (Campbell, 1995, p. 169) then, can be truly exerted only if individuals are provided with the conditions and means to cooperate with others in future-oriented (Dewey, 1983, bk. 14, p.215), experimental processes of participation.[30] In other words, without providing the appropriate practical and institutional conditions for participation, individuals cannot grow and therefore cannot realize their full capacity for intelligent judgement and action on which a democratic society thrives (Dewey, 1990, bk. 14, p.227). Social responsibility can therefore only be understood and exercised appropriately if individuals are provided with the right conditions to take part in the "experimental and personal participation in common affairs" (Dewey, 1983, bk. 11, p.57).

This Deweyan take on responsibility forms an interesting contrast with current approaches to RRI. Until now, the academic and policy debate on RRI often focus on soliciting responsible approaches by individual researchers and innovators and/ or attempts to mainstream the earlier mentioned substantive or procedural ethical frameworks. However, once such frameworks hit the shop floors of R&I, individual researchers and innovators find themselves uncertain on how to act responsibly in their existing daily practices and institutions (Sigl et al., 2020). Confronted by this

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30 It is important to underline that the kind of freedom Dewey refers to goes beyond negative, liberal perceptions of freedom that conceive it as individual protection from hindrances (Berlin, 1969; Frega, 2019). For Dewey it is about the distribution of power in a particular time and society (Dewey, 1990, bk. 11, p.361). Put differently, his goal is no less than the creation of the right conditions in which "the power of individuals shall not be merely released from mechanical external constraint but shall be fed, sustained and directed" (Dewey, 1990, bk. 11, p.25).

problem, they then may choose to accommodate RRI policies rather than really engage with their spirit in practice (Åm, 2019). The risk is that calls to act responsibly in R&I will then amount to nothing more than a mere slogan (Gianni et al., 2018) continuing the interrelated issue of conceptual unclarity and lack of implementation in practice.

Following Dewey, such problems and risks may be overcome by reconceptualizing RRI as a collective *democratic* experimentation strategy that has the potential to bring democracy as an ethical way of life into R&I practices. To achieve this, individuals should be provided with the space to democratically experiment with new conceptualizations of responsibility in diverse social practices. From a pragmatist perspective, this aspect is crucial for an ethical and democratic development of responsibility in R&I and can only be attained as long as we create the necessary conditions in practice.

2.7.   Publics and democratic experimentation through social inquiry

Noting the necessity of collective democratic experimentation with RRI is one thing, but operationalizing it in practice is another. In other words: how can scholars and practitioners operationalize such processes of democratic experimental inquiry in complex modern societies? Who should be involved, what are the required steps and their most important qualities to attend to? For an answer to these questions, we argue that Dewey's understanding of publics and social inquiry provides a helpful framework. Let us start with the former.

Dewey's most thought-provoking contributions to democratic theory, first summarized in *The Public and its Problems,* came in 1927 as an answer to some of his contemporaries, skeptical about the will and capacity of the public to participate in modern, highly complex societies (Lippmann, 1993). The 'omnicompetent citizen', capable and willing to engage in any process was considered to be diverging from actual reality, not to say simply utopian. Like Lippmann, Dewey too recognized the growing complexity of modern societies (Dewey, 1954, p. 165). He noted how the indirect consequences of modern inventions instituted a multitude of new publics (Dewey, 1954, pp. 15-16/41).[31] He also recognized that political or institutional forms did not automatically co-evolve with fast-paced developments in science and technology and that new publics indeed had a hard time taking care of new issues following such developments.[32] However, whereas a realist philosopher like Lippmann believed in

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31   He noticed how in determining indirect consequences, these inventions instituted what he called "publics with different interests" (Dewey, 1954, p. 44). He defined these publics as consisting "of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for" (Dewey, 1954, pp. 15–16)

32   This led to the problematic situation that such newly emerging publics could not inherit political agencies (Dewey, 1954, p. 31) and adequately take care of their issues. What is more, the technological transformations led to an eclipse of the public which meant that members of publics affected by the new machine age did not even recognize themselves as such (Dewey, 1954, p. 126). Dewey saw this as a problem because in a functioning

technocratic control over a growingly complex society (Dewey, 1990, bk. 7, p.353), Dewey believes that "the cure of ailments of democracy is more democracy" (Dewey, 1954, p. 147).

To him, the increasing role of science and technology and the growing complexity of our societies actually requires active experimentation with more refined instruments of democracy. Not merely for the sake of experimentation as such, but to support the fruitful emergence and participation of a diversity of publics. He wants to achieve this through a double movement, by making democracy more like science (as a form of inquiry) while democratizing science itself (by making the techniques of science available to all kinds of publics) (Bohman, 1999). Recognizing the intrinsic kinship between democracy and scientific experimental methods (Dewey, 1990, bk. 15, p.254/274) he advocates for the spread of the laboratory culture of inquiry into society to encourage the creation of new forms of communication and participation (Sabel, 2012, p. 38).

In his later works he further operationalizes this democratic experimentalist agenda by calling for the active organization of cooperative processes of social inquiry (Dewey, 1990, bk. 12, p.481). For him, *social inquiry* is the application of a process of transformation to complex social problems.[33] Just like all forms of inquiry, it takes place inside a cultural matrix of existing practices (Campbell 1995, p.194) and consists of the following five steps (Figure 1).[34]

The first step always starts with a situation of perplexity or confusion in which we are *confronted with an indeterminate situation* which makes us stand still and question our usual habits. Things are not working as they should and we are taken aback because our usual practices and routines do not suffice. Existing institutions cannot seem to accommodate the newly emerging issue (Marres, 2007, p. 769). On the level of social inquiry, it means that certain social problems are recognized by multiple people and publics form around these issues. The result is a situation of indeterminacy and uncertainty: what do we do now?

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democratic society, those publics and their individual members and representatives would be the ones who should participate in the formation of society and attend to the growth of its members. If publics were eclipsed and could not recognize themselves as such, they could not effectively participate and therefore not efficiently take care of the consequences of technology and innovation for society.

33 Inquiry, Dewey defines as "the controlled or directed transformation of an indeterminate situation in one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation in a unified whole" (Dewey, 1990, bk. 12, p.108). With an indeterminate situation he means a situation which is deemed problematic by the observer.

34 Or four phases if one sees the confrontation with an indeterminate situation as a separate occasion (Krabbenborg, 2016, p. 910).
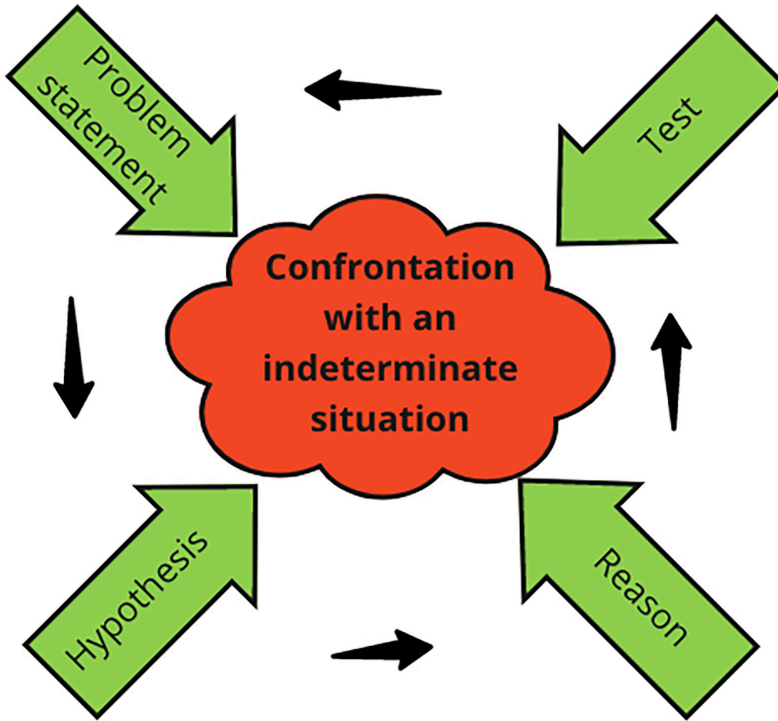
FIGURE 1 – Five steps of social inquiry (source: author)

The second step in an inquiry is that a public needs to work through this doubt and slowly but surely *transform the situation into a problem statement*. This means it needs to think the situation through and reflect. Social inquiring publics may confront themselves: what could be the cause of this social ill? This requires a suspense of immediate judgement and the cognitive ability to entertain multiple problem statements at once before selecting one. Without such an understanding "there is a blind groping in the dark" (Dewey, 1990, bk. 12, p.112).

The third step consists of the *formulation of ideas and the postulation of hypotheses about possible solutions to the problem*. Such solutions are of course shaped by the diagnosis of the problem (Dewey, 1990, bk. 8, p.203) and may be elaborated with support of forecasting, backcasting, and imagining the future consequences of a concrete line of action (Krabbenborg, 2016, p. 910). To find a solution to experienced social problems, publics may propose a new pilot, policy agenda and/or the reconstruction of existing practices and institutions.

Fourth, a public then needs to *reason about these solutions* so as to sharpen them in the mind. How detailed and elaborate such analyses may be depends on personal and social resources: past experience and education, the contemporary culture and level of

technology (Campbell, 1995, p. 50). Finally, the public needs to *test hypotheses in real life* i.e. implementing pilots, changing practices or institutional set-ups and subsequently *collectively evaluate the consequences of the actions* that follow from this.

Moreover, for democratic experimentation through social inquiry and following solutions, the quality hangs tightly together with their *social*, *experimental* and *public* character (Figure 2). Starting with the *social*, Dewey recognizes that the rationality of solutions depends on whether all those who are affected are actively involved in the research process (Honneth & Farrell, 1998, p. 775). The willingness to listen to diverse viewpoints is therefore central in its success (Campbell, 1995, p. 199). Experts are not disregarded as they can provide useful epistemic guidance to map the terms of a problem and lay-out possible alternatives. However, Dewey believed that to construct a path towards situated solutions, a cooperative judgment should also attend to the ideas and narratives of publics affected by the social problem and subsequent social inquiry. This in turn requires communication and deliberation between experts and citizens from different backgrounds to evaluate the different perspectives, to integrate potential conflict (Follett, 2003) to enrich the available epistemic toolbox and prevent absolutism. Furthermore, one should pay crucial attention to the perspective of minorities (Frega, 2015).

Second, the value of social inquiry lies in its inherently *experimental* nature. To be sure, to experiment is not about "just messing around nor doing a little of this and a little of that in the hope that things will improve" (Dewey, 1990, bk. 11, pp. 292–293). Neither is it based on a positivistic, verificationist idea of a randomized controlled experiment (Ansell, 2012) in which one tries to control the environment as much as possible. No, the experimental character lies in the idea that hypotheses are methodically formulated and tested and evaluated on their results in concrete practices. In other words, the experimental aspect refers to the fact that social inquiry is about trying out different ideas with reference to real life social contexts. Thus, social inquiry, when appropriately and methodically applied, can invite participants to learn from failure so as to lead to better insights into the problematic state and/or future improved hypotheses and solutions for societal problems in reality.

Third, just as in ideal scientific inquiry, the *public* character of the democratic experiment is of prime importance (Campbell, 1995, p. 103). This means that both the process as well as the results of social inquiry should be made as public and intelligible as possible, including for those who did not directly participate in the process (Dewey, 1954, pp. 176–178). Dewey especially emphasizes the role of art and (local) communication in guaranteeing this aspect (Dewey, 1954, p. 184; cp. Fraaije et al., forthcoming; Roeser et al., 2018). The resulting publicity could then help to assess the acceptability of the adopted solution on a larger scale and inspire further future social inquiries.

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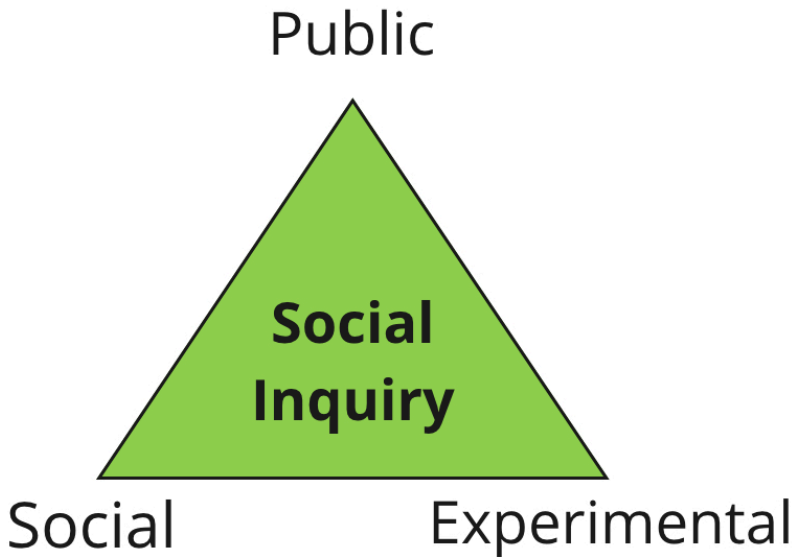
FIGURE 2 – Characteristics of social inquiry (source: author)

By following these steps, and with specific attention to its experimental, social and public character, social inquiry can help publics to become acquainted with an 'intelligent' democratic way of addressing problems in different fields. Thus citizens, as members of diverse publics, may become motivated to participate in the social and political formation of technological society and meaningfully take part in a process where their input is valued (Honneth & Farrell, 1998). As a result, the process of social inquiry can then become a virtuous circle with experts, policymakers and a diversity of publics ideally being able to establish recurrent democratic dialogue and action on societal problems. The "end in view" is then to make such processes of social inquiry a normative element in citizens' habits and institutions (Honneth & Farrell, 1998).

2.8. Toward collective democratic experimentation with RRI in social labs

To show the concrete value of this Deweyan view on democratic experimentation for RRI through social inquiry, we will now finally connect above insights to the recent call to operationalize RRI through social labs (Timmermans et al., 2020).

In response to the dual issue of conceptual unclarity and lacking practical implementation of RRI, Timmermans and others recently proposed to use a social labs methodology (idem). Originally coined by Hassan, social labs are platforms that aim

to address complex social challenges in a social, experimental and systemic fashion (Hassan, 2014, p. 3). Timmermans and others (2020) have provided a further theoretical underpinning of social labs by (re)conceptualizing them as a form of participatory action research (Reason & Bradbury, 2008). They posit that social labs are well fit to experiment with RRI since they understand RRI as an emerging social phenomenon of which the properties gradually come into existence during and resulting from the interaction of different actors involved with theorizing and implementing RRI (Timmermans et al., 2020).

Furthermore, in laying the connection between RRI and social labs and providing the necessary theoretical and methodological grounding, Timmermans and others discern six features of social labs. First, they point at their experimental nature, meaning that social labs provide room for concrete action and the development of prototypes and interventions. Second, they are intently part of the real world by developing and testing solutions in a social context (Timmermans et al., 2020, p. 5). Third, they require the active participation of a wide range of societal stakeholders such as policymakers, businesses, government and civil society. Fourth, they involve experts from a wide range of expertise and backgrounds (ibid.). Fifth, instead of merely focusing on the symptoms of certain social problems, they aim to achieve systemic change. Sixth and finally, they are an inherently iterative and agile approach. By making many iterations and closely monitoring the process, social labs can take in emerging information and work with unplanned events to allow the evolution of solutions to complex social challenges over time (Timmermans et al., 2020, p. 6). To increase the relevance and uptake of this process, the empowerment of social lab participants through processes of experiential learning (Kolb, 1984; Moon, 2004) is deemed crucial.

Timmermans and others thus provide an interesting first grounding of the social lab methodology and its connection to RRI on which others can profitably build. It is clear that their understanding of social labs as socially embedded platforms that can experiment in real life may indeed provide a way out of the current RRI deadlock. Also, all six features seem to fit naturally with a Deweyan emphasis on building up knowledge through recurrent, experimental processes of social inquiry in concrete contexts. However, if social lab organizers wish to use such platforms as a vehicle to promote collective *democratic* experimentation with responsibility in R&I practices, we think it is apt to emphasize that they pay attention to the following (complementary) Deweyan insights.

In line with Dewey's understanding of democracy as an ethical way of life, taking note of the inherent social embeddedness of individuals in practices and the contextual nature of responsibility, collective *democratic* experimentation with responsibility ought to be organized as a process of *social inquiry* with the involvement of diverse *publics*. Publics affected by and recognizing certain morally problematic situations around R&I should be allowed to democratically experiment with ways to deal with

such issues. Concretely, this means social labs should provide support to diverse groups of people to use the principle of RRI to alleviate experienced problematic situations in concrete R&I practices and institutions.

This process requires specific attention to the social, experimental and public dimensions of social inquiry. Its *social* character should allow all those affected by the issues to deliberate and cooperate with experts. This includes listening to diverse viewpoints, including those of minorities in a certain context, since what may be experienced as responsible R&I by one stakeholder group in one context may differ from other experiences. By remaining open to different interpretations of responsibility as they arise from the midst of diverse stakeholders affected by an issue, social labs can thus provide a venue for them to co-create their own, new contextualized understandings of responsibility in R&I, fit for practice.

Its *experimental* and fallible nature should be guaranteed by testing the consequences of particular hypotheses in concrete practices and remaining open to learn from failure. In other words, experimentation with RRI in social labs should provide a way for diverse publics embedded in and affected by certain R&I practices to bring their own interpretations of responsibility into practice. This entails providing them with the right methodological support, for example by discussing a diagnosis of problematic situations related to their own R&I practices with them. Consequently, it should also provide them with the support and means to formulate concrete problem statements and possible responsible solutions as hypotheses through processes of backcasting and imagining future consequences of discrete lines of action. They should be provided the support to test and evaluate such pilot solutions with reference to their concrete results in practice. This also means that space should be provided for specific normative outcomes per context.

Finally, the experimentation with RRI in social labs should be organized as *public* as possible. This last aspect is as yet relatively underexplored in the social labs literature, but crucial if one wants to realize the *democratic* potential of collective experimentation with RRI in social labs. Concretely, it means that social lab organizers should attend to the publicness of both the social lab process as well as the publicity of its outcomes. Organizing a public social lab process may entail informing and involving (representatives of) diverse groups of actors affected by a certain RRI issue, preferably beyond those representing vested interests and from the start. One can publicize the social lab process by connecting to existing (bottom-up) citizen communities and networks during the process. The important criterion to focus on is that it provides (representatives) of groups of people who can reasonably be expected to be affected by a certain issue of RRI in practice, the possibility to provide their input into the process and resulting solutions.

To further spur this development beyond the direct social lab process, social lab organizers can also attend to the publicity of the outcomes of the process. This means

translating the findings and insights with an eye to re-usability and communicability. In particular, it is of interest to experiment with the creation of communicable narratives (Constant & Roberts, 2017) about social lab experiences and outcomes to increase the chances that insights may find their way into existing practices and institutions. With the right attention to publicness and publicity during and after the process, collective democratic experimentation with RRI in social labs may thus inspire future iterative processes of social inquiry that can contribute to responsibility in R&I practice.

2.9. Conclusion

We started this chapter by highlighting the salient challenges of R&I and the frameworks that have been introduced in response to this, including RRI. Although we recognized some of the main current shortcomings of RRI, like conceptual unclarity, problems of implementation and institutionalization and accompanying waning policy relevance, we believe that it would be a mistake to dismiss the ethical and democratic spirit characterizing the RRI agenda. Therefore, we sided with Nordmann (2018) in his call to (re)conceptualize RRI as a collective experimentation strategy. As existing literature in the field does not seem to address sufficiently the implicit *democratic* character of such a reconceptualization of the project of RRI, we noted that John Dewey's pragmatist philosophy could provide those interested in collective democratic experimentation with RRI a fruitful toolkit and way forward. To explore this further on a conceptual and normative level, especially in connection to recent calls to use social labs for RRI, we asked the following research question:

> *What is, from a pragmatist perspective, a proper way to conceptualize and understand collective democratic experimentation with RRI in social labs?*

To answer this question, we delved into the central tenets of pragmatist philosophy. Specifically, we noted how Dewey understood democracy not as a separate governmental form, but rather conceived it as an ethical way of life in which members of communities are able to develop their potentiality through cooperative processes of experimental social inquiry embedded in social practices.

Basing ourselves on Dewey's insights, we suggested that democratic experimentation with RRI should be organized as a process of *social inquiry* involving a diversity of *publics*. Concretely, this entails that the concept of RRI and/or the principle of responsibility in R&I should be used to support the alleviation of problematic situations around R&I in concrete practices and institutions. This means it should support publics to formulate concrete problem statements and possible solutions as hypotheses to be tested and evaluated by reference to their concrete results in practice. Specifically,

attention should be paid to guaranteeing the *social*, *experimental* and *public* nature of such a process by, respectively, involving citizens and experts in a cooperative process from the start, experimenting methodically and making both the process as well as the results as public as possible. The latter is deemed especially important to increase the chance that insights may find their way into existing practices and institutions and may in a circular fashion inspire future democratic and experimental forms of social inquiry in different contexts.

To further show the value of this pragmatist democratic experimentation agenda for RRI, we connected Dewey's ideas to the current call for experimentation with RRI through social labs. From this, we learned that experimentation with RRI in concrete practices by means of a social labs methodology provides a platform to integrate democracy as an ethical way of life into R&I practices. Especially with enough attention to the publicness of the process (i.e. by connecting to existing (bottom-up) citizen communities and networks), and publicity of the outcomes (i.e. by communicating the insights and outcomes in an accessible and engaging way), democratic experimentation with RRI in social labs may contribute to integration of RRI in practice.

Still, if we want to integrate RRI sustainably, we also need to pay further attention to the role of institutional conditions and to enlarging the room for maneuver (Krabbenborg, 2016, p. 918) that participants possess in implementing RRI insights in existing institutions. Given their systemic ambition (Timmermans et al., 2020, p. 6), we believe that it would be fruitful to conduct further research into the role that action research platforms such as social labs and their respective publics can play in changing institutional conditions. Future research should specifically pay attention to further developing the conceptual and methodological toolkit and empirical arguments as to how such venues for social inquiry may transform existing institutions in the R&I system (Van Oudheusden, 2014).

Furthermore, we believe that the democratic experimentalist reading of social inquiry through social labs could profitably be taken up by proponents of *Open Science*, *Citizen Science*, *Open Innovation* and *Co-creation* paradigms to foster inclusion of a diversity of publics and aid the democratization of science and innovation. Such research should be open to learn from engaging with concrete practices, communities and their issues and challenges. For, in line with Dewey, we think it is better for research and philosophy "to err in active participation in the living struggles and issues of its own age and times, than to maintain an immune monastic impeccability, without relevancy and bearing in the generating ideas of its contemporary present" (Dewey, 1983, bk. 4, p.142).

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Chapter 3

INSTITUTIONALIZING PUBLIC ENGAGEMENT IN RESEARCH AND INNOVATION
Toward the Construction of Institutional Entrepreneurial Collectives

Abstract

In the past decades we have seen increased policy discourse around public engagement with research and innovation. Despite this attention, the institutionalization of public engagement practices still appears rather limited, leading to a recent systemic turn in public engagement with science studies. Still missing in this systemic turn is a pragmatist and new institutionalist framework that can support research into how public engagement practices may enact or transform the research and innovation system. This chapter presents such a framework to help untangle how existing (in)formal institutions and materialities influence public engagement with research and innovation. To illustrate its utility, the framework is tentatively applied to engagement in the British research funding context. This application informs further development of the framework, including recommendations for (action) research into the construction of collectives of institutional entrepreneurs (institutional entrepreneurial collectives) that may support further institutionalization of public engagement in the research and innovation system.

Key words
Public engagement with science, publics, new institutionalism, pragmatism, systemic turn, institutional entrepreneurship

3.1. Introduction

The R&I system has the potential to impact society and the ecology in many different ways (D'Este et al., 2018; Hekkert et al., 2007; Smit & Hessels, 2021). Research on climate change and pandemics or innovations involving AI and human gene editing provide but a few illustrations of how resulting practices and products play an increasingly important role in our lives and thereby affect many different publics. Recognition of the (potential) effects of R&I has led scholars from different backgrounds to call for public discussion on the values underlying R&I practices, processes and policymaking (Beck et al., 2003, p. 21; Bozeman & Sarewitz, 2011; Dewey, 1954; Stirling, 2008).

Policy discourse on public engagement with R&I also appears to be booming. In the European Union, policy debates have intensified since the launch of the *Science and Society* action plan (European Commission, 2002) and high-level policy endorsement of public engagement for tackling societal challenges through RRI (Kuhlmann & Rip, 2018; Owen et al., 2012; Stahl et al., 2017). In the United Kingdom (UK), policy discourse has shifted from increasing the public understanding of science to promoting public dialogue and upstream engagement (Wilsdon & Willis, 2004). Across the ocean efforts are undertaken to involve the public in anticipatory governance of technology (Lehoux et al., 2020) while worldwide, there is a surging interest in opening up R&I under the banner of Open Science (Fecher & Friesike, 2014), Citizen Science (Strasser et al., 2019), co-production and co-creation (Trencher et al., 2014; Voorberg et al., 2015).

However, calls for more extensive involvement of publics in R&I have been heard for over 40 years (Wilsdon & Willis, 2004). Despite these discursive developments, the R&I system and its institutions still appear to be resistant to structural change (Macq et al., 2020). Observing twenty years of work on public engagement with science studies, scholars have noted that many "mini-publics […] typically brought together for dialogue exercises look microscopic against the backdrop of global science and its governance" (Stilgoe et al., 2014, p. 11). In other words, recognition is growing that engagement exercises do not sufficiently challenge incumbent power structures, lack in institutional uptake (Escobar, 2014; Van Oudheusden, 2014) and thus mostly remain an add-on to mainstream practices (Braun & Könninger, 2018, p. 676).

In response to this lack of structural change, public engagement with science studies has recently seen a shift towards systemic perspectives on engagement (Braun & Könninger, 2018). Instead of focusing on one-off, add-on case studies, scholars from different backgrounds express an interest in studying participation in relation to the R&I system. Specifically, this includes increased attention to studying how public engagement practices may enact and/or transform existing institutions (Braun & Könninger, 2018, p. 683/684).

What is needed and still missing in this *systemic turn* in public engagement research is a clear pragmatist and new institutionalist framework that may support (action) research into

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the latter (Braun & Könninger, 2018, p. 685). This chapter seeks to fill this gap in the current literature on public engagement with science studies by developing a framework which may help further analysis and experimentation with the structural institutionalization of public engagement in the R&I system. It does so by answering the following question:

> *How can we conceptualize and analyze the relationship between publics and R&I institutions to support structural changes towards more extensive public engagement in the R&I system?*

Answering Biegelbauers and Hansens (2011, p. 589) call to increase the interaction between political science theories on (democratic) institutions and STS work on public participation, I will merge insights from John Dewey's pragmatist (1954) conceptualization of the relationship between publics and institutions with insights from third phase new institutionalism (Lowndes & Roberts, 2013) and research on the importance of materiality in structural change. I will illustrate the utility of the resulting framework by drawing upon an empirical referent: the (lack of) institutionalization of public engagement in the context of British research funding (Hamlyn et al., 2015).

On the basis of this tentative illustration and work on institutional entrepreneurship (Maguire et al., 2004), I will further develop the framework to include avenues for future (action) research into the construction of collectives of institutional entrepreneurs ('institutional entrepreneurial collectives') in the R&I system. The total resulting framework provides a conceptual, analytical and action-oriented contribution to the systemic turn in public engagement with science studies. By providing concrete insight into ways in which participatory practices not only enact but also have the potential to transform existing R&I structures, it may inspire (engaged) researchers, practitioners and policymakers to analyze and/or further support the structural institutionalization and consolidation of public engagement in the R&I system.

3.2.   Emergent publics and the systemic turn

In his 1927 seminal work *The Public and Its Problems*, Dewey was one of the first scholars to define the notion of 'publics'. Analyzing the relationship between states and publics across history and in the modern age, he defined a public as consisting of "all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for" (Dewey, 1954, p. 15/16). With this definition he accounted for diverse publics that were affected and would emerge around the indirect consequences of any conduct – including R&I (Grunwald, 2019).

In the past few decades, interest in the relationship between publics and R&I has surged. Scholars and policymakers have constructed narratives about 'the public'

depicting it initially as a monolith possessing a "knowledge deficit" (Simis et al., 2016). In recent years, discourse has shifted as the public has been disaggregated into different publics who are seen as partners for dialogue and upstream engagement on crucial decisions around R&I (Wilsdon & Willis, 2004).

Recently, agonistic scholars have also critiqued earlier work on deliberative, democratic mini-publics (Goodin & Dryzek, 2006, p. 220) by showing the importance of remaining open to uninvited publics that arise in response to issues that current institutional structures cannot tackle (Marres 2007 p. 769; De Saille 2015; Welsh & Wynne 2013). Some scholars have specifically foregrounded the role of construction (Braun & Schultz, 2010), materiality (Korn et al. 2019; Marres & Lezaun 2011) and imagination (Barnett et al., 2012, p. 46; Rodhouse et al., 2021) to show that publics are not stable entities simply found 'out there' but always mediated by processes and objects of engagement (Rommetveit & Wynne, 2017, p. 143).

In this body of work, a shared understanding has developed that publics and the practices in which they are engaged are emergent and relational (Chilvers & Longhurst, 2016).[35] With this recent insight, scholars re-position themselves in the pragmatist, Deweyan tradition, with some concluding that publics are inherently elusive (Beumer, 2019). This means that the task for R&I practitioners and policymakers is not to identify a "singular public opinion once and for all" but to develop the capacity "to identify multiple publics in an ongoing process" (Beumer, 2019, p. 510), recognizing their inherent heterogeneity (Wickson et al., 2010).

However, in spite of the growing scholarly emphasis on emergent publics, public engagement still appears to remain rather limited in R&I policymaking and practice. For example, in the UK, Wynne argued that institutions mostly still imagined the public as characterized by a knowledge deficit and that established institutional routines remained surprisingly resistant (2006, p. 213).[36] In the past few years, authors have noted the recurring dominance of the deficit model amongst scientists and other R&I practitioners (Bauer, 2016; Bucchi, 2008). Researchers working in different (trans)national contexts thereby underline the importance of existing institutions in foreclosing dialogic or upstream public engagement (Bauer, 2016; Cook, 2014; Escobar, 2014; Krabbenborg & Mulder, 2015; Loeber et al., 2011; Pieczka & Escobar, 2013; Simis et al., 2016).

The growing awareness of the enduring deficit model, the ad hoc, add-on and constrained nature of many participatory arrangements, and their disconnection from techno-scientific governance recently led scholars from different fields towards the

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35 This implies that "publics and engagement practices are actively constructed and shaped by - and in turn shape - the various material settings, technologies, infrastructures, issues, participatory procedures and political philosophies with which they are associated" (Chilvers & Pallett, 2018, p. 4).

36 Whether or not this is due to particular, ambivalent uses of the term public engagement in the UK is a topic for further discussion (Davies 2013; van Est 2011; cp. Felt & Fochler 2008). In any case, a longitudinal study of diverse UK engagement initiatives by Pallett and Chilvers (2013) concurred that institutional learning on publics was lacking.

aforementioned systemic critiques on public engagement in R&I (Braun & Könninger, 2018, p. 676/677). In that light, Braun and Könninger notably call for studying engagement in the larger context of institutions of R&I in particular to find out "how participatory practices may reflect, stabilize or enact powerful institutional imperatives and/or modify, challenge or transform them" (2018, p. 684).

How to do this from a pragmatist and new institutionalist perspective remains as yet underexplored (Braun & Könninger, 2018, p. 685). To further study ways in which participatory practices enact existing R&I institutions and to support possible transformations, I will show that we can still learn a lot from Dewey's pragmatist take on the relationship between publics and institutions in combination with insights from recent ('new') institutionalism.

3.3. Conceptualizing the relationship between emergent publics and institutions from a pragmatist perspective

As we saw, Dewey recognized that citizens are constantly affected by the (in)direct consequences of new scientific and technological innovations and their reordering effects on associated behavior and form publics around them (Dewey, 1954, p. 30).[37] Moreover, he saw how incumbent actors that produced new scientific and technological innovations were usually not keen on sharing their power and resources with affected citizens and would often devise institutions to keep the status quo intact (Dewey, 1954, p. 30). He noted that, as a result, institutions and "political forms, once established, persist of their own momentum" and thereby obstruct the proper emergence of publics and their issues (Dewey, 1954, p. 30/31). Dewey thought that such situations call for institutional reconstruction (Campbell, 1995, p. 184) and that "to form itself, the public has to break existing political forms" (Dewey, 1954, p. 31).

Following Dewey's pragmatist ideas, we can conceptualize the relationship between publics and institutions in R&I as dialectical (cp. Marsh, 2010). Whether we are talking about research on climate change adaptation and mitigation or Artificial Intelligence and gene editing, many scientific findings and innovations may inform a reordering of society and the ecology. Thus, they may cause different ethical, societal and/or environmental issues to arise which affect different publics. The problem is that members of affected publics have a hard time fruitfully emerging and/or engaging with R&I institutions to address such issues (Figure 3). In order to improve this situation, R&I institutions must become more open to take in diverse claims, concerns and

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37   As noted, he also recognized that citizens often had a hard time recognizing themselves as members of publics to innovations. Therefore they found it difficult to organize themselves in response, which according to Dewey formed a problem for the democratic renewal of existing institutions and their problem-solving capacities (Dewey, 1954, p. 167; Dijstelbloem, 2007, p. 66).

issues (CCI) of affected publics (cp. Guba & Lincoln, 1989) and be open to change their momentum accordingly (cp. Hughes, 1994).
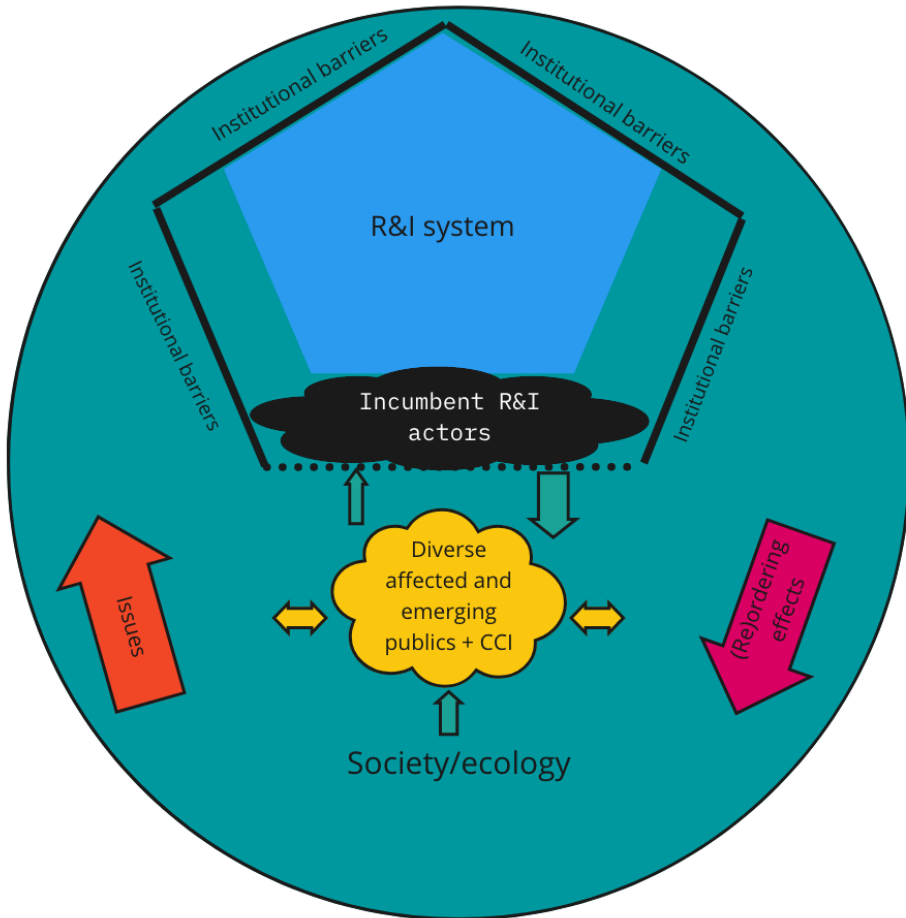
FIGURE 3 – Conceptualizing the relationship between affected and emerging publics and R&I institutions (source: author)

Although Dewey provides us with a clear way to conceptualize the (possible) relationships between publics and R&I institutions, his reading of the latter as "organized modes of action" (Dewey, 1972, bk. 3, p. 347) is impractically broad. Moreover, since his time of writing (and as a testament to his evolutionary take), the complexity of the institutional landscape has increased (Laws & Hajer, 2006). Where in Dewey's time the nation state was central, we now have complex (trans)national, overlapping formal and informal

(R&I) institutions (Hooghe & Marks, 2003). Processes of decentralization, deregulation and privatization (Marres, 2005) have led to an institutional void with no central steering organizations or "generally accepted rules and norms" (Hajer 2003 p. 175). Can we then still use Dewey's pragmatist dialectical take in analyzing the relationship between publics and R&I institutions of the twenty first century, especially since the institutional landscape has become so differentiated?

I argue we can, if we draw on a new institutionalist perspective. Building on Lowndes and Roberts' (2013) synthesis of new institutionalist literature, and adding an interest in material structure, I will show how this combined understanding of structures provides a concrete foothold from which to operationalize Dewey's dialectical take. Subsequently I will illustrate how this provides us with a nuanced way to conduct (action) research into possibilities for structural change towards more extensive public engagement.

3.4. Developing a framework for analyzing structural barriers and enablers of public engagement in R&I

Lowndes and Roberts (2013) posit that since the 2000s, different strands of new institutionalism started to converge on the understanding that institutions shape actors' behavior through differentiated and interacting, formal and informal means. What is more, new institutionalists concur that institutions dynamically distribute power and "are mutually constitutive with the political actors whom they influence, and by whom they are influenced" (Lowndes & Roberts, 2013, p. 45). In line with Dewey's earlier analysis, the new institutionalists recognize that institutions are "Janus faced" in that they both constrain and enable agency (Lowndes & Roberts, 2013, pp. 77; 130). They also underline that the stability of institutions "has to be constantly worked at, as individual and collective agents act out rules, practices and narratives" (Lowndes & Roberts, 2013, pp. 130; 41). We will now take a look at these three modes of institutional constraint and how they can be used to analyze specific R&I contexts.

First, *rules* are the formally constructed and recorded regulations to be found in laws, decision rules and policy documents. Rules impact actors because they internalize them, since they are formally sanctioned through *(dis)incentivizing* processes of reward and punishments (Lowndes & Roberts, 2013, p. 53). We can take further inspiration from Staeheli, Mitchell and Nagel (2009, p. 633) who specifically identify so-called *regimes of publicity* as the prevailing rules and laws that condition the quality of publics.

As an object of (action) research, analysts can focus on formal regulations, evaluation criteria and accompanying incentive structures by which it is determined who gets what when and how in R&I. Concretely, observers may focus their attention on criteria for promotion and career progression at the individual, departmental and/or organizational level, or at specific funding policies and accompanying evaluation

criteria that are used in a particular R&I (trans)national funding context to incentivize R&I behavior, specifically in relation to publics. Here we can take inspiration from current debates on the impact of formalized metrics, rankings and other performance indicators that incentivize R&I behavior in relation to publics (Wilsdon et al., 2015). These are interesting as recognition is growing that they often affect actors across the R&I system (Curry et al., 2020, p. 20).[38]

Second, *narratives* are of interest to the new institutionalist analyst. A narrative can be defined as "a sequence of events, experiences, or actions with a plot that ties together different parts into a meaningful whole" (Feldman et al., 2004, p. 148). Narratives are expressed through spoken and written words and link together ideas into explanation and persuasion. They impact actors and their conduct by "hearing familiar stories and recognizing shared understandings to the point where the normative implications are taken for granted" (Lowndes & Roberts, 2013, p. 52). Narratives, like the folk tales of old, "tell new entrants how they are expected to conduct themselves and relate to others" and so function to legitimize practices (Lowndes & Roberts, 2013, pp. 99; 94). Sanctioning ranges from not comprehending or ridiculing alternative narratives to undermining the credibility of people that question them. We can take further inspiration from what Felt (2018, p. 8) dubs *narrative infrastructures of R&I* as "a network of temporally stabilized narratives through which meanings and values of academic knowledge/work and its relation to society can be articulated [and] circulated" (idem).

As an object of research, researchers may focus on often shared narratives of proper behavior in R&I, particularly those narratives that stipulate what it means to properly engage with society and the public (cp. Randles et al., 2016). Concretely, from analyzing policies, media outings and transcripts of interviews with R&I actors related to specific institutional contexts, it is possible to deduce whether there are certain shared narratives. On the basis of these narratives, the role of R&I in relation to society and different publics can be reconstructed. An interesting research angle is to study how these narratives on R&I construct understandings of the role of the public in R&I. Are publics for example seen as possessing a knowledge deficit, partners for dialogue or upstream engagement?

This analytic angle brings us to a third type of institutional mode of constraint that we can study in order to understand the role of publics in R&I: *practices*. Practices are illusive entities that are enacted by actors through "the consistent rehearsal of 'the ways in which we do things around here'" (Lowndes & Roberts, 2013, p. 52) and informally demonstrated through conduct in a concrete setting. Practices present themselves in

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38 In Lowndes' and Roberts' synthesis of new institutionalist theory, they are agnostic to the question what counts as the prime form of institution. In their own words: "Rather than trying to win an argument about what counts most, our argument is that institutions work through three modes of constraint – rules, practices and narratives. The real agenda for institutionalism is to better understand how these distinctive modes of constraint interrelate in practice, and to establish what this means for ongoing processes of institutional change and prospects for institutional resistance and reform" (2013, p. 50)

the routinized actions of members of a group. By slowly but surely recreating them correctly, outsiders may become a member as practices are sanctioned by displays of (dis)approval, social isolation or even threats of violence (Lowndes & Roberts, 2013, p. 62). To get an idea of how practices and publics relate to each other, it is useful to take note of the concept of *public practices* defined as actions "that involve an understanding […] that something is of common concern" (Best & Gheciu, 2014, p. 33).

A focus on practices directs the researcher's gaze at informal conduct of R&I practitioners and other supporting personnel. Objects of observation may include publication, dissemination and engagement patterns through which R&I actors engage with diverse publics in the R&I system. Do R&I practitioners for example solely focus on writing journal publications? Do they include in their dissemination efforts newspaper articles or social media posts and videos? Or do they seek to also actively engage with non-specialist publics by organizing two-way engagement? At which stages in the R&I process?

Fourth, in addition to Lowndes and Roberts' take on institutions, recent scholarly research underscores earlier STS insights that *material structures* are equally important when theorizing change (Grin, 2020; Hoffman, 2013; Kok et al., 2021). R&I not only create new materials and technologies which have an ordering effect on society and the ecology, they are also constrained and mediated through material configurations. Adding to the conceptualization of Lowndes and Roberts, I therefore argue that we should also pay attention to the role of *materialities of mediation* in R&I. We can take our analytical cue from Porter who describes how the material architectures of new media and platforms are crucial for the extent to which new publics can be sustained (Porter, 2014).

As an object of research, this angle urges us to look at the material collaboration and communication infrastructures and technologies that structure the involvement of different publics in R&I. As the units of observation in such research serve e.g. the organization of material access to research infrastructures, online databases and biobanks, paid (online) conferences, publication venues, communication platforms and (social) media. Such a focus enables us to study how and under which conditions processes of R&I, publications and results are materially made (in)accessible to publics outside of the R&I community.

Interesting in the new institutionalist synthesis of Lowndes and Roberts is their observation that different institutional constraints often work in conjunction with one another to shape behavior and that studying the "prospects for resistance and reform" (2013, p. 50) implies *untangling how constraints interact in specific contexts in practice*. This is the type of research we find in critical, interpretive practice-oriented and/or discourse analytic work (e.g. Åm, 2019; Souto-Manning, 2014; Yanow, 2007). An analysis of concrete structural R&I (funding) contexts and programs may show how these structures interact to open up or close down possibilities for public engagement in R&I (Figure 4).
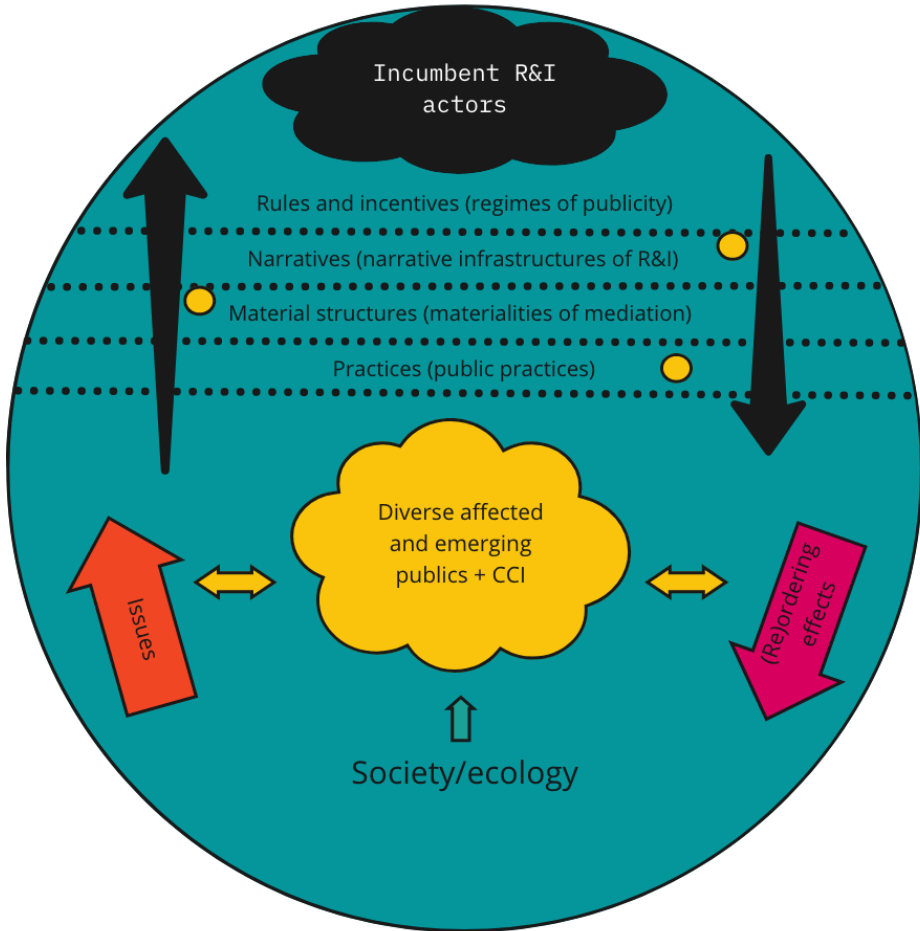
FIGURE 4 – Zooming in on structural barriers/enablers for public engagement in R&I (source: author)

3.5. Untangling the structural barbed wire of UK research funding

To illustrate the analytical value of the above framework, I will tentatively apply it to the Hamlyn et al. (2015) report *Factors affecting public engagement by researchers*. The UK report is based on a multi-stage qualitative and quantitative study on behalf of a Consortium of British public research funders. It shows that there is still much uncertainty over the role and place of public engagement in institutional structures (Hamlyn et al., 2015, pp. 5–7). The result is that the engagement that does take place is mostly of a knowledge deficit nature focusing on one-way dissemination of scientific findings through public lectures and (social) media to a generalized public. Fewer than half of the interviewed researchers emphasized experience with and knowledge of

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interactive and dialogic forms (Hamlyn et al., 2015, p. 8).

The last chapter of the report (Hamlyn et al., 2015, pp. 52–62) already classifies barriers for public engagement into three types: "job-related barriers (such time, money, training); attitudinal barriers (for example researchers feeling that their research is too specialized); and structural barriers which refer to institution-level factors affecting participation" (Hamlyn et al., 2015, p. 52). Furthermore, they note that specific institutional changes may provide ways to increase public engagement (Hamlyn et al., 2015, pp. 60–61). In particular, they call for a greater embedding of reward and recognition for public engagement within institutions and the development of better understanding of the structures within higher education institutes that best support public engagement (Hamlyn et al., 2015, p. 8).

Our framework allows us to reinterpret the data from the report from a new institutionalist and materialist perspective (Table 1) and thus already gives us a better understanding of the structures within the UK context and how they foreclose more extensive public engagement. First, looking at quotes from the report through the lens of rules and incentives (regimes of publicity) indeed underscores the importance of recognition and rewards for public engagement. The framework specifically helps to untangle the different levels on which this could be integrated: on the level of careers and personal promotion within universities and on the national level of reward criteria for funding grants.

Second, looking at different quotes from the report also allows us to discern particular narratives (narrative infrastructures) around public engagement. Most interviewed researchers appear to support the idea that public engagement is the dissemination of information. The quote "My advice to a young academic would be… great if you want to [do public engagement] but don't feel it will benefit you in the short term" in particular illustrates the relevance of informal narratives in guarding the status quo. A few different counter-narratives (Delgado, 1989) on public engagement may slip through the cracks as exemplified by the quote "Engagement isn't just about telling people", but the question remains to which extent they find resonance in an environment structurally dominated by knowledge deficit narrative infrastructures.

Third, looking at the material dimension (materialities of mediation) helps to showcase the importance of creating the right material infrastructures for public engagement. This ranges from the noted lack of general infrastructure for the organization of public events and dialogues to providing the funds and technological means to publish results in venues that are openly accessible to the public. There is also the recognition that technological advances (i.e. new social media platforms) provide an opportunity to develop new forms of public engagement. The question remains whether the usage of social media platforms will lead to two-way engagement (Côté & Darling, 2018).

TABLE 1 – Application of the framework to the UK research (funding) context
(direct quotes from Hamlyn et al., 2015)

Structures	Object of research and observation	Barriers/enablers for public engagement (PE)
Rules and incentives: regimes of publicity	Formal regulations, evaluation criteria and rewards/sanctions - Criteria for promotion/career progression, criteria for funding excellent R&I, institutional metrics/rankings and other financial incentives	"[...] It's something that I do out of good will, there's no incentive career wise, no financial incentive, no professional incentive." (p.60) "The support offered is very lip service tokenistic – it's just a pat on the back." (p.60) "There needs to be more recognition of [PE] by universities, e.g. when you're going for promotion." (p. 59) "If the national research councils require it as one of the criteria for making awards for research, then in a sense they are supporting it. [...] A national fund that provided money for innovative forms of engagement [...] would be welcomed." (p.50)
Narratives: narrative infrastructures of R&I	Often repeated stories informed by background understandings - Shared narratives of proper R&I and its relationship to publics	"[PE is] dissemination of research findings to people not in academia." (p.30) "My advice to a young academic would be... great if you want to [do PE] but don't feel it will benefit you in the short term." (p.60) "Engagement isn't just about telling people, it's about a proper dialogue where public have the opportunity to feed back."(p.34)
Material structures: materialities of mediation	Material network and collaboration environment - Access to R&I infrastructures and technologies for public engagement	"If the university wanted to support more, there could be far better infrastructure [...]" (p.50) "[...] you're supposed to make all publications open, but that costs a lot of money." (p.60) "I'm sure that [as] social media develops, the various ways we can engage with the public will proliferate." (p.62)
Practices: public practices	Informal conduct - Recurring engagement patterns, patterns of R&I interaction with diverse publics	"Over 30 years [I've] seen peaks and troughs in the importance attributed to [PE], but over the long-term trend not much has changed and [I don't think] much is set to change." (p.51) "Senior management in universities always say PE is important but the reality is that it's all about journal papers, everything else is froth and box-ticking." (p.61) "Unless it's actually built into the research you don't say – 'I think what I'll do today is engage the public.'" (p.58)

Fourth, the framework shifts our gaze to the level of practices (that is public practices) where all dimensions come together. The first quote shows the difference that R&I practitioners experience between changing narratives and unchanging practices. Another researcher further illustrates this point when lamenting that senior academic management nominally supports public engagement but that in reality most academic practice focuses on writing journal publications and "all else is froth and box-ticking". The final quote underscores clearly that integration in daily practice is the only way in which publics may be engaged more structurally.

Applying the framework thus helps to showcase how current participatory practices reflect existing structural features of the British research funding and higher education system. Application of the framework shows how regimes of publicity that value 'classic' research output, in combination with narrative infrastructures that understand

engagement as a dissemination of results, and a lack of material support infrastructures nudges researchers to prioritize the practice of writing journal publications for their fellow peers over dialogic or upstream engagement. Whatever (potential) emergent and affected R&I publics there may be in practice, the interaction of current institutional imperatives under conditions of limited time and resources serves as an invisible structural barbed wire fence that closes off research practice from the possibility of extensive, and dialogic public engagement.

Our framework thus helps to showcase the importance of looking for structural barriers for public engagement beyond just those in the form of formal institutions (rules and incentives). It shows the importance of taking informal narratives and materialities into account and how they operate in conjunction with formal rules and incentives to foreclose more dialogic and upstream public engagement on the level of practices.

Finally, the upshot of applying the framework is that it also provides insight into multiple possibilities for structural change. The analysis confirms what the report mentions, namely that changing rules and incentives may spur researchers to consider more diverse and extensive ways of engaging with the public (Hamlyn et al., 2015, p. 8). However, it also shows that a mere focus on top-down isolated changes in narratives or rules and incentives risks leaving untouched circulating dominant knowledge deficit narratives of public engagement as they legitimate certain research behavior on the level of practices. Furthermore, it demonstrates the risk that R&I practitioners will merely resort to box-ticking behavior (talking the talk) instead of actually adapting their daily research practice (walking the walk) towards more extensive, dialogic engagement with diverse publics (cp. Åm, 2019).

In other words, analysis through the framework strongly invites us to think of structural change in multifaceted ways, including altering the rules and incentives, the circulation of counter-narratives around public engagement, the design of supportive material infrastructures and altering concrete practices that underpin the relationship between researchers and possible affected and emerging publics.

A remaining question is then how such structural changes may be supported by (action) research, especially since "longer term effort is required" (Hamlyn et al., 2015, p. 5). More broadly speaking, how may (engaged) public engagement scholars move beyond critique (cp. Latour 2004) and actively support participatory practices to transform current institutional imperatives (Braun & Könninger, 2018) from a pragmatist and new institutionalist perspective?

3.6. From new institutional and materialist analysis toward collective institutional entrepreneurship

In 1927 Dewey noted that structural change is hard precisely because status quo institutions are often the very means through which change is achieved and blocked (Dewey, 1954, p. 31). Today, new institutionalists also recognize that "institutions are in essence mechanisms that sustain power differentials between the advantaged and disadvantaged" (Lowndes & Roberts, 2013, p. 77/78) leading to structural inequalities because some actors benefit from an uneven playing field (Lowndes & Roberts, 2013, p. 89). The ubiquity of so-called *Matthew Effects* by which "the rich get richer and the poor get poorer" (Bol et al., 2018; Merton, 1968; Perc, 2014), increasing academic stratification (Hoenig, 2018; Kwiek, 2018) and market concentration amongst tech giants (Dolata, 2017) seem to validate that the R&I system suffers from comparable issues.

How can (engaged) scholars analyze and/or support structural changes in the R&I system given the uneven playing field? As we saw, Dewey pointed out that situations like these require institutional reconstruction and that "to form itself, the public has to break existing political forms" (Dewey, 1954, p. 31). New institutionalists point out that studying cracks and fissures in and between institutions can '"generate strategies for resistance and reform, designed to prioritize new interests and values" (Lowndes & Roberts, 2013, p. 50).

Most importantly, they note that *agency* plays a central role in change (Lowndes & Roberts, 2013, p. 138). Here we may build on Emirbayer and Mische, who authoritatively define agency as "a temporally embedded process of social engagement, informed by the past (in its habitual aspect), but also oriented toward the future (as a capacity to imagine alternative possibilities) and toward the present (as a capacity to contextualize past habits and future projects within the contingencies of the moment)" (Emirbayer & Mische, 1998, p. 964).

How can we further operationalize this to analyze and/or actively support structural change towards more public engagement in the R&I system? Lowndes and Roberts posit that structural change may come from both inside and outside of institutions, and that small changes might have large transformative effects in the long run (Lowndes and Roberts, 2013: 130; cp. Huitzing et al., 2020).

To spur such processes, in line with recent work (Owen, Pansera, et al., 2021), I argue that we can build in our analysis and/or experimentation on processes of institutional entrepreneurship. Institutional entrepreneurship refers to the "activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones" (Maguire et al., 2004, p. 657). Institutional entrepreneurs are defined "as change agents who, whether or not they initially intended to change their institutional environment, initiate, and actively participate in the implementation of, changes that diverge from existing institutions"

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(Battilana et al., 2009, p. 70). They try to break "with existing rules and practices associated with the dominant institutional logic(s) and institutionalize the alternative rules, practices or logics they are championing" (Garud et al., 2007, p. 962).

To do so, institutional entrepreneurs must be able to imagine alternative futures and contextualize their actions in contingent contexts (Garud et al., 2007, p. 962). Since their imagining and actions will not go uncontested, institutional entrepreneurs must further be able to skillfully draw on existing ideas and materials to narrate and theorize change so that others want to cooperate. By framing their efforts strategically, they can try to mobilize diverse constituencies to secure support for their proposed institutional change (Garud et al., 2007, p. 962). The latter point is important, since institutional entrepreneurs may especially be effective when collectively exercising their agency (Hoogstraaten et al., 2020; Lowndes & Roberts, 2013, p. 106; Randles, 2016; Weik, 2011).

3.7. A framework for (action) research into institutional entrepreneurial collectives that can promote public engagement in the R&I system

If we then take the current structural constraints on public engagement in R&I as a given, collective institutional entrepreneurship may play a role in opening up R&I to increase prospects for more dialogic, extensive public engagement. More precisely, opening up R&I for a diversity of publics, requires (action) research into the organization of *institutional entrepreneurial collectives that can promote public engagement in the R&I system.*

On the basis of above literature, we understand the latter to be actively forged, intervention-oriented collectives of institutional entrepreneurs that mobilize diverse stakeholders in specific contexts of the R&I system on the basis of alternative visions and narratives. Supported by methods and management choices that enhance their agentic capacity, such collectives can attempt to leverage existing resources and institutions to implement interventions for structural change towards broader and deeper public engagement in R&I. Such collectives of institutional entrepreneurs, of which members may be hypothesized to be recruited from within and on the periphery of dominant R&I structures, may play the role of crowbars that target structural barriers to public engagement in R&I policymaking and practice.

In order to further the institutionalization of public engagement in R&I, future (action) research (Reason & Bradbury, 2008) needs to focus on the construction of such collectives of institutional entrepreneurs in the R&I system. Especially the organization of such collectives through social labs (Timmermans et al., 2020), living labs (Følstad, 2008), policy labs (Olejniczak et al., 2019) and other venues for social inquiry provides a fruitful avenue for further investigation.

Figure 5 below distinguishes between different stadia of (action) research into such

collectives in specific R&I contexts. A first step, illustrated above conceptually (Figure 4) and applied for illustrative purposes in the context of British research funding (Table 1), is to *analyze the existing structural set-up of a particular R&I context* and ask questions on how existing rules and incentives (regimes of publicity), narratives (narrative infrastructures of R&I), material structures (materialities of mediation) and practices (public practices) interact to enable or constrain interaction between R&I and diverse publics.

Second, after such a diagnosis, (action) researchers can focus on the study and/or active organization of collectives of institutional entrepreneurs through action-oriented research formats such as social labs. An initial concrete step in this process is that analysts focus on *processes of mobilization*, asking questions like: how does one select and involve stakeholders in specific contexts of the R&I system on the basis of which criteria? How do organizers narrate and theorize change? How does this contribute to building coalitions for cooperative action?

Third, as agency is central in structural change, following Emirbayer and Mische's (1998) definition of agency, (action) researchers can specifically focus on *processes that enhance the agentic capacity* of collectives through methods of reflection on the past, imagining alternative futures and concrete planning and action for the present (i.e. Hajer & Pelzer 2018).

Fourth, to gauge how such collectives actually conduct institutional *entrepreneurship*, (action) researchers may ask questions on how institutional entrepreneurial publics *engage with the context.* How do institutional entrepreneurial collectives leverage resources and institutions to achieve institutional change towards broader and deeper engagement of different publics? How do they contextualize their efforts within existing contexts? For example, (engaged) researchers ought to focus on the ways in which collectives make use of (temporary) projects and accompanying seeding funding to realize their goals to change the R&I system. Alternatively, a focus may be on how they tap into existing problems in R&I (e.g. problems related to broader discussions on enhancing the R&I system and research culture) and present their alternatives as possible answers to such challenges (cp. Kingdon, 1984).

Fifth, (action) research can focus on the concrete operationalization of such entrepreneurship through the *implementation of interventions.* (Engaged) researchers may pay attention to how collectives of institutional entrepreneurs attempt to change rules and incentives that structure involvement of diverse publics in R&I. Of relevance are current debates around responsible metrics and assessment (Curry et al., 2020; Wilsdon et al., 2015). As often the case for changing rules is made in narrative form (Lowndes & Roberts, 2013, p. 53), (action) researchers can also focus on the spread of counter-narratives that question the knowledge deficit model such as R(R)I (Owen & Pansera, 2019), Open Science (Fecher & Friesike, 2014) or Citizen Science (Strasser et al., 2019).

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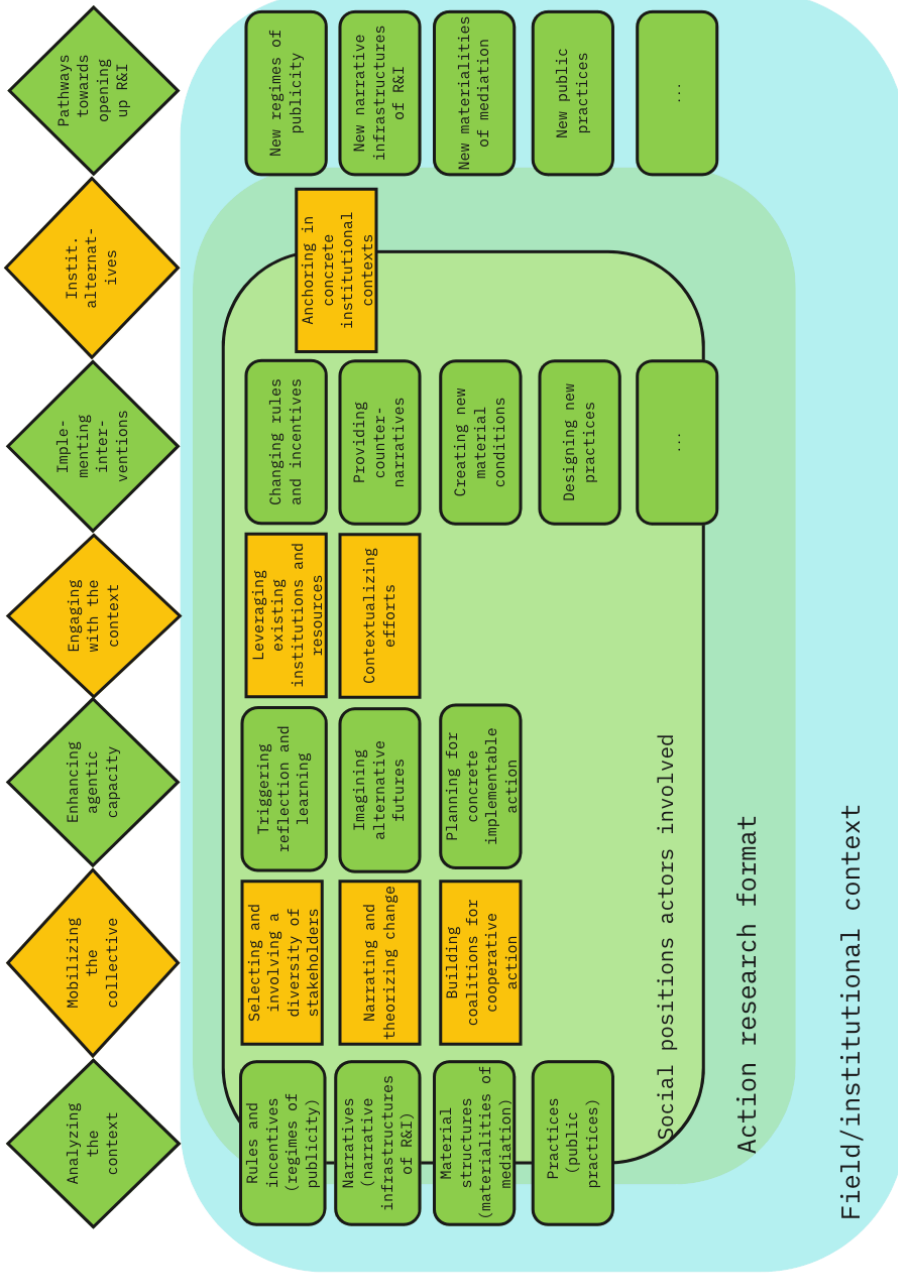
FIGURE 5 – Visualizing the construction of institutional entrepreneurial collectives for public engagement in the R&I system (source: author)

Future research may also focus on changing material conditions. Special attention can be paid to the co-design (McGann et al., 2018) and implementation of new engagement formats ranging from new neighborhood level R&I engagement tools to new (trans) national platforms and infrastructures for exchange such as the European Open Science Cloud (EOSC Executive Board, 2020). Finally, as practices in particular can "be a resource for institutional design" (Lowndes & Roberts, 2013, p. 58) (action) research can focus on experimentation with new co-creation and co-production (Voorberg et al., 2015) practices in specific R&I contexts.

Sixth, it will be of interest to uncover if and how institutional entrepreneurial collectives subsequently (attempt to) *institutionalize alternatives within the R&I system.* It will be especially interesting to study if and how they attempt to anchor new rules and incentives, counter-narratives and consolidate new material conditions, designs and practices for the longer term in existing R&I contexts (cp. Elzen et al. 2012). Finally, future analysis and experimentation should pay attention to how processes are mediated by the social position of actors involved, the characteristics of action research formats and the field and the context in which collectives of institutional entrepreneurs are organized (Battilana et al., 2009). We may analyze how resulting new regimes of publicity, new narrative infrastructures of R&I, new materialities of mediation and new public practices may provide *pathways to open up the R&I system* for a diversity of publics and their claims, concerns and issues. We can then see if and how they open up the R&I system and associated institutions to structurally increase two-way engagement between R&I policymakers, practitioners and emerging and affected R&I publics and thus enlarge overall engagement in and with the R&I system (Figure 6).

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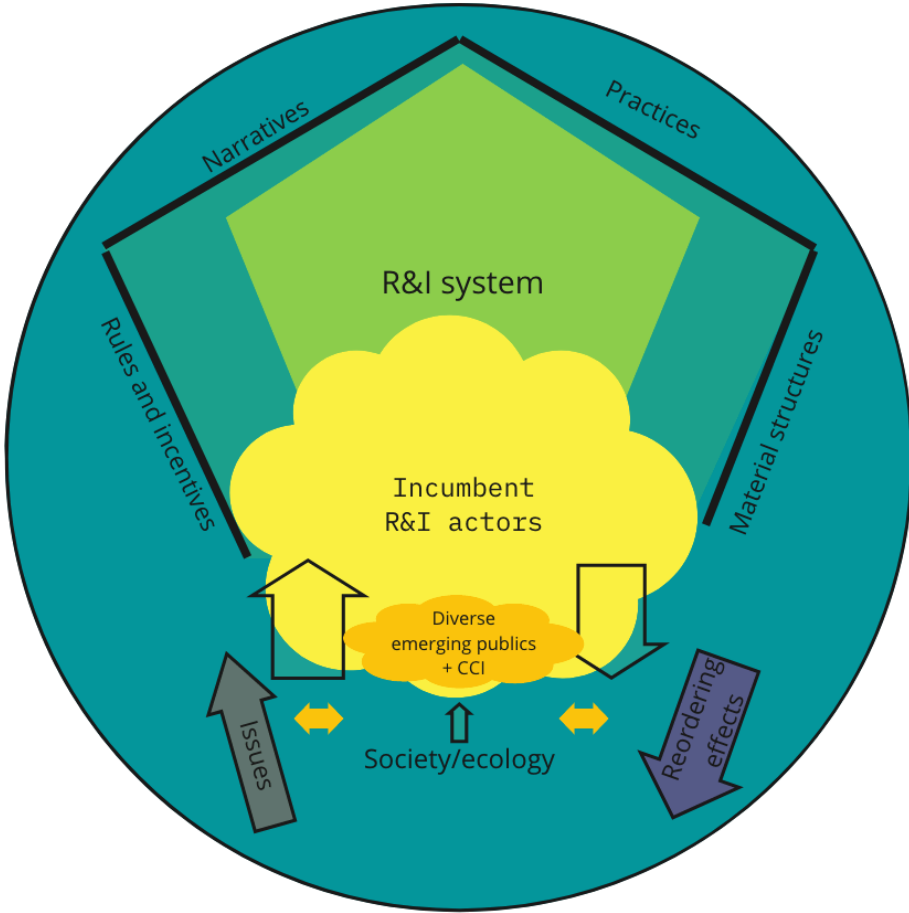
FIGURE 6 – Opening up the R&I system to emerging publics (source: author)

3.8.   Conclusion

This chapter started out by recognizing that growing scholarly and policy discourse around public engagement in R&I has, as yet, not led to its extensive institutionalization. This disappointing observation has recently led to a systemic turn in public engagement with science studies. Still missing in this systemic turn is a new institutionalist framework that may help to conduct (action) research into the institutionalization and consolidation of public engagement in the R&I system (Braun & Könninger, 2018). To fill this conceptual gap and provide an actionable way forward, this chapter's central research question read:

> *How can we conceptualize and analyze the relationship between publics and R&I institutions to support structural changes towards more extensive public engagement in the R&I system?*

Dewey's (1954) pragmatist understanding that publics are affected by R&I developments and that existing institutions may hamper their fruitful emergence provided the occasion to further conceptualize the relationship between publics and institutions as dialectical (Figure 3). Furthermore, by wedding Dewey's insights to more recent work on new institutionalism (Lowndes & Roberts, 2013) and the material dimension of structural change I formulated a framework that helps to clarify how specific structures may enable and preclude engagement with diverse publics in specific R&I contexts (Figure 4).

To illustrate its analytic utility, I used the framework to untangle the invisible barbed wire fence of structures that constrain more extensive public engagement with research in the British research funding context (Table 1) (Hamlyn et al., 2015). The upshot of this exercise was twofold. First, it illustrated the importance of paying attention to the interaction of formal institutions (rules and incentives), informal institutions (narratives and practices) and the role of material structures in analyzing barriers and enablers for public engagement in R&I. Second, analysis with help of the framework provided multiple prospects for structural change towards extensive dialogic engagement in R&I practice.

To further operationalize this, the framework was complemented by new institutionalist insights that agency is central in structural change and that studying cracks and fissures in and between institutions can generate strategies for resistance and reform. In the process of operationalizing these insights, I found that especially collective institutional entrepreneurship can contribute to the institutionalization and consolidation of public engagement (Garud et al., 2007; Maguire et al., 2004). This led me to further elaborate the framework and an agenda for (action) research into the organization of institutional entrepreneurial collectives (Figure 5) that can promote

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public engagement in the R&I system (Figure 6).

In order to further develop the framework and thus support collective institutional entrepreneurship in the R&I system, future research and participatory experimentation (Lezaun et al., 2017) – e.g. through social labs (Timmermans et al., 2020) and other action-oriented research platforms (Bartels et al., 2020; Ercan et al., 2020) – needs to concentrate on processes of mobilization, enhancing the agentic capacity of those involved so that they can implement and anchor their interventions in existing structural R&I contexts (Elzen et al., 2012). Equally, it will be important to pay attention to new closure effects in the organization of such collectives, specifically problems of instrumentalization and domination. Future empirical research and experimentation – for example by communities working on alternative R&I structures under the banner of RRI (Owen & Pansera, 2019), Open Science (Armeni et al., 2021), Citizen Science (Strasser et al., 2019) or transformative sustainability research (Care et al., 2021) – may leverage insights from the framework to open up the R&I system to increased public participation.

Research on and with collectives of institutional entrepreneurs in the R&I system may especially be of relevance with reference to different (trans)national (excellent) science funding contexts (Scholten et al., 2021) as R&I funding policymakers are crucial actors for any attempts at system change (Curry et al., 2020, p. 20). With attention to the above elements and involvement of R&I practitioners and/or policymakers, it may contribute to further reforms of the R&I system, structurally opening it up to a diversity of affected and emerging publics.

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Chapter 4

EXCELLENT ENGAGEMENT
Sparking Institutional Entrepreneurial Collectives to Promote Public Engagement in 'Excellent' Science

Abstract

While policy discourse around public engagement in science is booming, and scholars individually seem often interested in organizing participatory arrangements, the science system does not structurally enable and incentivize dialogue between researchers and publics. Using a framework that combines a 'third phase' new institutionalist perspective with insights from pragmatism, this chapter investigates the way in which temporary formats for participation can challenge and impact the research (funding) system to provide room for structural public participation. It hypothesizes that temporary participatory arrangements may support the emergence of collectives of institutional entrepreneurs who engage in action-research aimed at transforming scientific institutions towards diverse engagement. Taking this hypothesis as a starting point, the chapter analyzes data on a social lab that was set up to discuss and promote RRI within the European *Marie Skłodowska-Curie Actions excellent science* funding context. Our analysis shows that with enough attention to the institutional context, stakeholder engagement, methods and management choices that enhance a sense of agency and anchoring of resulting interventions, temporary participatory arrangements can promote collective institutional entrepreneurship in the excellent science system. On the basis of this analysis, we end with concrete recommendations for future transformative (action) research that may support collective institutional entrepreneurship that promotes public engagement in the broader research and innovation system and beyond.

Key words
Public engagement, research funding, excellent science, pragmatism, new institutionalism, institutional entrepreneurship

4.1. Introduction

Attention for public participation in science entered the discourse on research policy in the European community in the 1990s (Macq et al., 2020). Over the years, the emphasis gradually shifted from understanding publics merely as audiences to scientific communication in need of education, to seeking their active involvement (Conceição et al., 2020). Such views on public engagement eventually culminated in the idea that "societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society" (European Commission, 2012). The latter line of reasoning was captured in H2020 with the RRI label. RRI was made a cross-cutting issue in the program, which ran from 2014 to 2020 and a dedicated unit was endowed with 0.6% of the total R&D budget to further RRI ambitions.

With this development, some authors describe public engagement in European science discourse and research policy as consolidated (Conceição et al., 2020) or institutionalized (Macq et al., 2020). Surveilling the field, Braun and Könninger (2018, p. 677) however posit that "the dominant institutional patterns … remain unchallenged." Simis and others (Simis et al., 2016) report too that many policymakers and scientists still consider the public as ignorant and characterized by a knowledge deficit. Apparently, the promotion of RRI did not imply an embedding of the idea of public engagement in science (funding) practice as recent research has shown RRI's uptake to be scattered and mostly remaining on the level of policy documents (Christensen et al., 2020; Mejlgaard et al., 2019; Novitzky et al., 2020).[39]

These findings can be better understood by relating them to the rise of another prominent science policy term: the notion of *excellence in science* (Flink & Peter, 2018; Jong et al., 2021). While its exact meaning remains contested (Ferretti et al., 2018), the term is omnipresent in European research funding discourse and has been supported by rankings and incentive structures that put a bonus on amount of publications, citations and external grants received (Hammarfelt et al., 2017). Scholten et al (2021) have recently shown that many researchers now design their work in anticipation of acquiring funding that is labelled 'excellent'. As a result, current rules and incentives focusing on narrow understandings of research excellence nudge (early career) researchers to think that they are "primarily paid for publishing" (Sigl et al., 2020, p. 1590). Confronted with limited resources and time, this has the potential effect of diminishing attention to interdisciplinary cooperation, societal relevance and public involvement in research (Burns et al., 2021; De Rijcke et al., 2016; Fochler et al., 2016; Moore et al., 2017; Müller & De Rijcke, 2017, p. 157; Rafols et al., 2012; Sørensen et al.,

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39 This may not be surprising. RRI diffusion arguably also encountered resistance because it went directly against the pre-supposed political neutrality of science (Papaioannou, 2020; Van Oudheusden, 2014).

2016). In that sense it is no wonder that public engagement still mostly takes shape via ad-hoc, short-term arrangements set up by public engagement experts within the confines of specific science-society oriented research projects (cp. Soneryd, 2016)

What did change over the years are the designs of these temporary arrangements. Formats are nowadays broadened to accommodate the inclusion of a wide range of topics, methods and participants, and go under such labels as living labs (Følstad, 2008), social labs (Cohen & Gianni, forthcoming; Hassan, 2014; Timmermans et al., 2020), and other real-world labs (Schäpke et al., 2018). The loosely defined logic to such designs seem to offer a solution to the methodological and normative debates about which publics and what forms of engagement to include, that dominated the field for decades (Chilvers & Kearnes, 2016; Felt & Fochler, 2010; Stilgoe et al., 2014; Stirling, 2008; Wilsdon & Willis, 2004). As an even more fundamental scholarly shift, recently Braun and Könninger (2018) have observed a systemic turn in public engagement with science studies which includes a growing interest in exploring the potential for these arrangements to structurally impact and change the (excellent) science system and its institutions.

This chapter aims to provide a conceptual, methodological and empirical contribution to these shifts in the literature on public engagement with science. Building on previous conceptual work (Cohen, 2022), we venture the hypothesis that such temporary arrangements may contribute to opening the (excellent) science system to structurally include the involvement of a diversity of publics. We hypothesize that they can do so if they support individual participants to develop into collectives of institutional entrepreneurs. Institutional entrepreneurs we take, in line with Battilana and others (2009, p. 72), to be change agents who, either intentionally or not, "initiate, and actively participate in the implementation of, changes that diverge from existing institutions." As we will try to show below, some literature shows that such entrepreneurs may be especially effective if they operate collectively, exercising collective agency (cp. Hoogstraaten et al., 2020).

To elaborate insights in view of this hypothesis, we will draw on our experiences with organizing a social lab on RRI within the *Marie Skłodowska-Curie Actions* (MSCA) funding scheme. This funding scheme is among four schemes that together comprised the EC's *Excellent Science* funding pillar in the H2020 framework program. MSCA specifically seeks to contribute to enhancing the competitive position of Europe by supporting early career researchers in developing their professional skills through stimulating their transnational mobility, enabling them to move between positions in European research institutes and beyond. To make sense of the experiences, we use a framework inspired by pragmatism (Dewey, 1954) in combination with insights from a relational perspective in new institutionalism (Lowndes & Roberts, 2013). Below, we will first present the conceptual framework with the aid of which, after a discussion of our methods, we will describe in some detail the design of and experiences with the

social lab. Finally, we will discuss the findings, based on which we consider the extent to which our hypothesis is confirmed.

4.2.   The challenges in provoking structural change

In 1927 the pragmatist John Dewey posited that collectives of actors who identify some shared issue or concern and organize themselves in the face of it (*publics*), are at the basis of democratic institutional renewal. Interestingly, Dewey argued that once established, "political forms … persist of their own momentum" (Dewey, 1954, p. 30/31) thereby obstructing new publics to form and articulate themselves in view of new issues. Current structures in the academic system can be understood as presenting such institutionalized forms that obstruct the emergence of new publics. As observed above, they preclude, by and large, meaningful public engagement (Braun & Könninger, 2018). As a result, the realm of science is *de facto* shielded from democratic renewal. In order to "spark into being" (cp. Marres, 2005) potential publics in view of issues that emerge in response to activities from within the academic system, there is a need for support (cp. Krabbenborg, 2020). However, according to Dewey, often, mere support will not suffice since "to form itself, the public has to break existing political forms" (1954, p. 31).

In other words, dedicated action towards structural change is necessary if one wants to increase the prospects that the current academic system engages more with diverse publics. Recent, *third phase* new institutionalists such as Lowndes and Roberts (2013) problematize structural change as a dynamic that may come from within and outside of institutions. They specifically make the case for studying "prospects for resistance and reform" (2013, p. 50) by untangling how different institutional dimensions interact in specific contexts in practice. Furthermore, they argue that small changes might have huge transformative effects in the longer run (2013, p. 130).

Lowndes and Roberts posit that institutions are more than formal rules and regulations. Building on recent developments in a broad range of new institutionalist literature, they argue, that analysts can discern three interacting structural dimensions that influence actors' behavior: a) rules, standards and regulations that are formally recorded, incentivized and sanctioned, b) informal practices that develop in situated settings, e.g. as a result of actors attempting to adapt rules to fit their context, and c) narratives, which are seen as "a sequence of events, experiences, or actions with a plot that ties together different parts into a meaningful whole" (Feldman et al., 2004, p. 148). These dimensions can be empirically studied to observe dynamics of structural change. Grin (2020) critically notes that in order to do so, in addition to the three structural dimensions outlined by Lowndes and Roberts, also material structure should be taken into consideration. In Table 2, the dimensions of structure are visualized together.

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However, changing such structures, even if attempting to make only small changes, is challenging for reasons of what Garud et al. (2007) call "embedded agency". Actors who are fully embedded in such structures are bound to find it hard to challenge these, as they themselves are subject to "regulative, normative and cognitive processes that structure their cognitions, define their interests and produce their identities" (Garud et al., 2007, p. 961). What they need in order to make a change is develop an enhanced sense of agency, as the ability to reflect on the past, imagine alternative futures to what to them appears as 'self-evident' and relate this to taking action in the here and now (cp. Emirbayer & Mische, 1998).

TABLE 2 – Framework for analyzing structures in the science system

Structures	Specification	Unit of analysis	Foci in empirical observation
Rules and incentives	*Regimes of publicity* (cp. Staeheli, Mitchell, and Nagel 2009)	Formal regulations, evaluation criteria and rewards/sanctions	Criteria for promotion/career progression, criteria for funding excellent science, institutional metrics/rankings and other financial incentives
Practices	*Public practices* (cp. Best and Gheciu 2014)	Informal conduct	Recurring engagement patterns, patterns of science interaction with diverse publics
Narratives	*Narrative infrastructures of science* (cp. Felt 2018)	Often repeated stories informed by background understandings	Shared narratives of proper science and its relationship to publics
Materiality	*Materialities of mediation* (cp. Porter 2014)	Material setting that serves as network and collaboration environment	Access to science infrastructures and technologies for public engagement

Furthermore, they need to be able to secure support for their envisioned futures and contextualize them in existing institutional contexts (Garud et al., 2007, p. 962). Only then they can move beyond merely breaking with existing rules and practices to "institutionalize the alternative rules, practices or logics they are championing" (idem). If they manage to do so, these individuals will be acting as what in the new institutionalist literature are called institutional entrepreneurs (Lowndes & Roberts, 2013, p. 138). Institutional entrepreneurship refers to "activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones" (Maguire et al., 2004, p. 657). Such actors may especially be effective operating as a collective (Hoogstraaten et al., 2020; Lowndes & Roberts, 2013, p. 106; Randles, 2016; Weik, 2011)

Considering this line of reasoning, we posit that temporary arrangements can play a role in opening the science (funding) system to a broader range of publics. To work towards change in the structures that limit a systematic inclusion of public engagement, such temporary arrangements can support participants to develop into collectives

of institutional entrepreneurs who take this upon themselves. To elaborate this from an empirical perspective, we use the framework that Cohen (2022) in earlier work constructed conceptually, combining pragmatist and new, third phase, institutionalist insights in the above issues (Figure 7).

This lens draws attention to the role of organizers of such temporary settings and how they select participants. In setting up the arrangements, organizers will likely themselves theorize change and articulate alternative narratives. In their efforts to find and spark support, they are bound to make certain choices in methods and management styles to enhance a sense of agency. Attention too concerns the participants, how they leverage resources and mobilize structures. Furthermore, the framework draws the observer's gaze to the concrete actions participants and organizer undertake, and their attempts to *anchor* (Elzen et al., 2012; Loeber, 2003) new rules, incentives, practices and the counter-narratives (Delgado, 1989) they have articulated in the temporary setting. It is an empirical question if and how these efforts inform pathways towards opening the science system for diverse publics, as Dewey would have it, and how such processes of change are mediated by the characteristics of the participants, the participatory (action research) format that is chosen, and the characteristics of the institutional context in which the efforts as well as the participants are situated.

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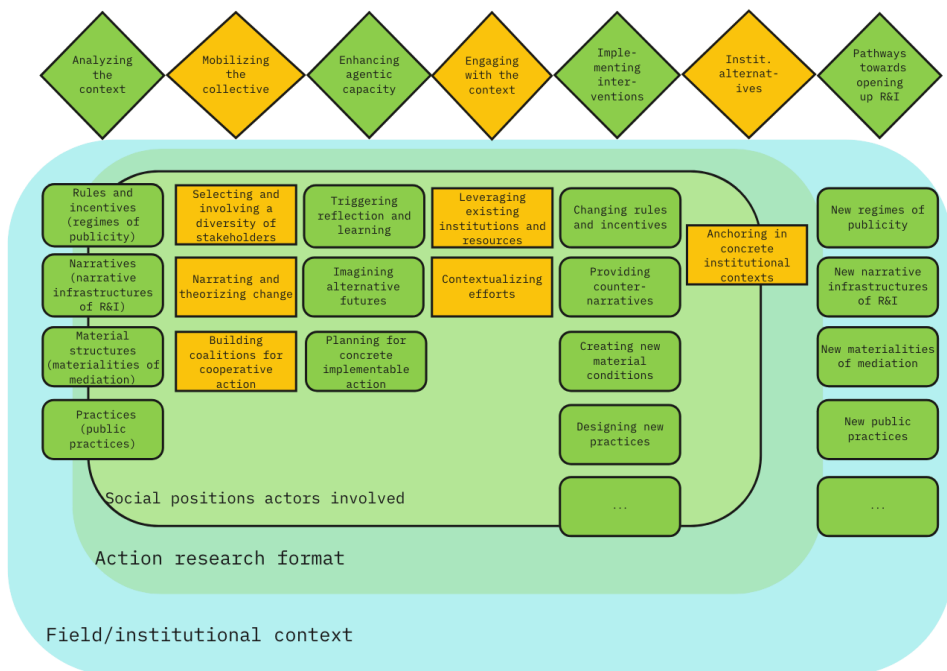
FIGURE 7 – Framework to analyze temporary participatory arrangements that promote collective institutional entrepreneurship (source: author)

4.3. Methodology

We elaborate insights in view of our hypothesis by drawing on a case study (Yin, 2003) of a social lab on RRI in the MSCA excellent science funding scheme that we ourselves organized. Social labs are defined as temporary, participatory, experimental and systemic spaces for action research on a complex societal challenge (Hassan, 2014; Timmermans et al., 2020). Ours was organized in the context of a research project funded by the EC Unit in charge of furthering RRI and ran from 2018 to 2022. The social lab was one out of a total of 19 such arrangements set up to engage stakeholders in European R&I funding in reflections on RRI, and to experiment with designing dedicated actions to promote the uptake of RRI across the €80 billion H2020 program. As the project allowed much room for adaptation to the institutional context, we reinterpreted our MSCA social lab as a reflexive arrangement (Loeber & Vermeulen, 2016), that is as a setting that spurs reflection on standing rules, practices and narratives, and enables the design and implementation of actions that contribute to a transformation of these.

To initiate the social lab process, we conducted a diagnosis of the state of RRI in MSCA through a document review of a representative selection of MSCA policy documents (including work program and call documents, a scoping paper, evaluation guidelines, proposal templates and EU websites on MSCA from 2014 to 2018). This was complemented with 12 semi-structured interviews with MSCA stakeholders, among them a high-ranking member of the responsible MSCA EC Unit, (former) representatives of the MSCA related alumni association, funding advisors such as National Contact Points (NCPs), MSCA-knowledgeable Open Science experts and an evaluator. The data were analyzed in a computer-assisted qualitative content analysis using as codes key themes related to RRI and Open Science (European Commission, 2012; Moedas, 2017; Stilgoe et al., 2013; Von Schomberg, 2013). The findings were fed back to participants in the first social lab workshop, by way of member check (Cohen & Loeber, 2018).

In three two-day workshops, data were collected in the form of written material produced by participants (flip overs and sticky notes). This and our organizers' notes as well as those on online calls with participants in-between workshops and on associated events informed social lab reporting (Loeber & Cohen, 2018). Resulting narratives on the institutional context, social lab process and interventionist actions ("pilot actions") were discussed with participants (member check) to jointly draw lessons from their experiences (cp. Roth & Kleiner, 1998). We draw on these materials to elaborate the hypothesized possibility of temporary arrangements to support participants to start acting like (collectives of) institutional entrepreneurs and work towards opening the science (funding) system to a wide range of publics.

4.4.   Instigating collective institutional entrepreneurship

In place since 1996, the MSCA have been part of the European Union's Excellent Science funding since the fourth Framework Program. Between 2014 and 2020 the scheme involved a total of €6.1 billion euros. MSCA's main objective is "to invest in the people who drive research and innovation in Europe, to enhance the skills and competences of the researchers and to deliver on innovation, growth and competitiveness" (European Commission, 2017a, p. 133). By encouraging transnational, intersectoral and interdisciplinary mobility the highly competitive funding program aimed to increase 'excellent' research in any field. At the time, MSCA comprised several actions that fund opportunities for promising post-docs (*Individual Fellowships*, IF), networks of organizations training doctoral students (*Innovative Training Networks*, ITN) and Research and Innovation staff exchanges (RISE). In addition, it provides co-funding of regional, national, or international programs (COFUND). By funding the *European Researchers' Night* (NIGHT) it seeks to show European citizens the positive impact of European science on their lives and to entice younger citizens to take up a scientific career. Responsible for MSCA policymaking is a Unit within the EC's Directorate-General for *Education, Youth, Sport and Culture,* on *Innovation, International Cooperation and Sport* while the *Research Executive Agency* (REA) is responsible for overseeing its implementation.

4.4.1.   Analyzing the MSCA context

Our diagnosis revealed that RRI had been present in MSCA on work program level from 2016 onwards, and that those responsible for MSCA on EC level were generally supportive of RRI. This contrasted with (former) grantees that were hardly aware of the concept yet were interested in *de facto* narratives and practices of responsibility (cp. Randles et al., 2016). Public engagement in MSCA evaluation criteria was interpreted in terms of a dissemination of results: "we researchers know, and we will let you, the public, know" (Interviewee 2). This was linked to a particular narrative of excellence in which potential novelty and impact were often narrowly reduced to the assessment whether or not the research in question would lead to publications in high impact factor journals. Multiple interviewees confided to us that in practice, evaluators and supervisors predominantly rewarded and trained early career researchers for writing journal publications. Such behavior appeared to be legitimized with reference to above narratives and aided and abetted by the current formulation of MSCA rules and incentives. At the same time, we noticed that amongst early career researchers and Open Science experts there seemed to be a growing interest in counter-narratives and some experimentation with counter-practices of responsibility and public engagement (Table 3).

TABLE 3 – Diagnosis of the MSCA structural context

Structures	Findings
Rules and incentives	- MSCA proposals rewarded for 'Excellence' (50%): Originality, contribution to the development of the researcher and/or institutions and (where apt) intersectoral mobility, interdisciplinarity and gender. - MSCA proposals rewarded for 'Impact' (25%): Rewarded in terms of (proposed) dissemination of research results through publications, patents. Public engagement criteria focusing on informing the general public about (implications of) results (IF/ITN) and/or improving their attitude (especially young members of the public) towards science, scientific careers and European science funding (IF/ITN/NIGHT); - Underscored by academic organizational promotion regulations, career evaluation systems and rankings that focus on number of publications, citations and prestigious funding grants gathered.
Practices	*Dominant practices:* - Many ITN supervisors focus on training early career researchers to produce output in terms of publications in journals with a high impact factor over teaching and engagement; - IF evaluators focus on amount of (proposed) journal publications; - Public engagement (even in NIGHT) practiced mostly in terms of one-way dissemination events and popular science publications. *Counter-practices:* - Some researchers already engage in two-way public engagement and alumni association that focuses on other *de facto rri* practices.
Narratives	*Dominant narrative:* - "*Excellent science*": science is excellent when it produces scientifically ground breaking, highly cited academic publications; - "*Unidirectional public engagement*": public engagement should focus on one-way dissemination of results or enticing (young) people to engage in a science career. *Counter-narratives:* - Responsibility of scientists for research integrity; - Responsibility of funders / hosts towards grantees; - Responsibility of scientists for society (at times labeled RRI).
Materiality	*Dominant materiality:* - Access to research institutions and infrastructures through funding; - Research results and publications behind paywalls. *Counter-materiality:* - Research institutes open once a year on researchers' night; - Request to opt-in for open access publications.

4.4.2. Mobilizing a collective of potential institutional entrepreneurs

MSCA grants are highly prestigious, and competition is notoriously tough so those who manage to serve as 'Marie-Curie-fellow' are deemed to be the most excellent in their fields. Geographically and substantively however, these researchers and their topics vary widely, which presented a first challenge in setting up the social lab. The lab was to comprise about 20 participants, while over 4500 projects got MSCA funding between 2014 and 2016. Other stakeholders furthermore include those researchers that do not get funding even if they pass the threshold of excellence, as well as universities and other 'hosts' where Marie-Curie fellows work, plus those who are potentially affected by the research that is financially supported with the program (i.e. one of the 500 million EU citizens). Among the 20-odd participants we recruited with the help

of project analysis,[40] interviews, and snowballing were notably MSCA grantees and alumni, covering all actions except for RISE and representatives of the at the time 11,000 member Marie Curie Alumni Association (MCAA). Moreover, we selected NCPs from different countries as they play a crucial role in connecting the EC, researchers, evaluators, and host institutions (Table 4).[41]

TABLE 4 – Workshop participants

Workshop	Participants								
	Gender		Stakeholder group						Total
	Male	Female	Academia	Business	Policy	Independent	Funding	Education	
1: June 2018, Amsterdam	8	13	15	0	0	1	5	0	21
2: May 2019, Amsterdam	7	10	12	0	0	0	4	1	17
3: February 2020, Amsterdam	7	14	12	1	2	2	4	0	21

Almost all of the participants of the first workshop, held in Amsterdam in June 2018, came with questions about RRI, for the more experienced just a new kid on the block of a train of EC abbreviations. Motivations for joining included notably the wish to learn more about the RRI concept, to improve chances of getting research funding, or of informing early career researchers on the subject.

On the afternoon of day one of the first workshop, many also brought along and voiced frustrations in response to questions that we raised in a first *world café* session (Donovan et al., 2005) designed to discuss responsibility in view of participants' professional practice, 'untouched' by EC RRI terminology. During the session, many freely shared their thoughts on the mismatch they experienced between their personal sense of responsibility and the setting in which they had to operate on a daily basis as researcher, public engagement professional or funding advisor. In the words of one of our participants: "When I noticed that […], I felt that was not correct, and really we should do something about it. But you know, it is not up to us [researchers]" (personal communication, WS1). Interestingly, by the end of the next day, this perception of disempowerment had changed radically. While on day one, participants referred

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40 Project partner CWTS of Leiden University ran an assessment of EC-funded projects based on RRI-related keywords, to identify those proposals that included related themes and issues.

41 Not writing this without a sense of irony, we had a hard time at coming up with proper ways to engage non-science-associated citizens in our social lab. We did not want to arbitrarily 'pluck' a random non-scientist citizen off the street to burden them with representing 'the' citizen perspective on MSCA without a clear proposition on how it would benefit them and were mindful of the constructions involved in such a move. To our relief, the challenge was partly overcome when one of the interventions resulting from the first workshop focused directly on ways to improve dialogue between scientists and non-science-affiliated citizens in the MSCA context.

literally to "the system" (personal communication, WS1) as the set of ominous structures not allowing them to exercise their personal ideas on responsibility, by the time the workshop came to an end, four energetic groups of protagonists of very practical ideas enthusiastically presented their plans for RRI-informed action to change that very 'system'.

Reasons for this change, we saw in hindsight, were multiple. First of all, after the world café exercise, we presented an initial analysis of our diagnosis results which appeared to provide participants some concrete insights into what their system concretely looked like. We also introduced the EC's reading of RRI in a '*Science in the city' walkshop* (Wickson et al., 2015) that we prepared. Along our way across the old city center of Amsterdam, we linked the 6 key elements of the RRI concept each to a historical (university) building, as a basis for discussion and informal exchanges. Furthermore, during dinner that first evening we asked those at the table to describe on a postcard what their daily work would look like in 2027 – if RRI was fully implemented and integrated in day-to-day activities. Many participants took the liberty to come up with very interesting future visions that formed quite the opposite of the current MSCA status quo. One such card for instance read: "I have published 5 articles this year. Now I am worried about my contract, as I have not worked on public engagement at all" (personal communication, WS1).

What at that moment seemed a playful activity, actually formed a crucial starting point of the second day of the workshop. On returning to the venue, participants found their postcards on the floor, for them to read out aloud. Taking stock of the ideas and themes that were articulated in the ensuing discussion, the session ended up with a range of RRI-related preferred situations. To help participants translate their visions to the here and now we made use of a *backcasting* approach (Quist & Vergragt, 2006). We invited them to come up with a list of changes, written down on a sticky note, that should be in place to see these become reality 10 years on. Next, participants were invited to place the sticky notes on the wall, categorized by year, reasoning back from 2027 via 2022 to 2019. This resulted in a list of very concrete steps and participants developing a shared sense that they did hold the capacity to instigate changes in the here and now.

Still, it was not an easy run. Discussions on the shortlist of possible ideas led to some friction as participants argued they shouldn't "set the bar too high" given that the design of MSCA was the territory of policy makers (personal communication, WS1). In response, we chose to share our findings on the counter-practices and counter-narratives around responsibility that we considered enablers for the implementation of RRI in MSCA. In addition, we engaged participants in an interactive discussion about their own roles and relationships, triggering them to move away from an unproductive normative discussion to one on their day-to-day reality within the MSCA funding context. On their recommendation, the group also jointly developed criteria for a

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'successful' pilot action. Using these, the participants selected specific (aggregated) ideas and worked together in groups using specifically designed forms to sketch a plan, detailing who was to do what, why and how.

Among the plans was the idea to develop a system for enabling a citizens and researchers to enter into an actual dialogue with one another. It was envisaged as a low threshold setting enabling scientists to discuss their work with citizens for instance in a shopping mall. This *Research Kiosk* was to serve as a solution to the lack of opportunities for two-way dialogue between researchers and citizens. Another idea was to challenge the incentive system in academic research. The associated group, including some MCAA representatives, took a report from the Working Group on Rewards under Open Science on an *Open Science-Career Assessment Matrix* (CAM) as a point of departure to develop an *RRI CAM* (Working Group on Rewards under Open Science, 2017). A third idea was to deal with the lack of knowledge on RRI which led a diverse collective of grantees and funding advisors to sketch plans for an *RRI Training*. MCAA representatives and an expert on Open Science also banded together to develop ideas for an *RRI Manifesto*. They deemed it crucial to inspire early career researchers to genuinely embrace and develop their own understanding of RRI rather than merely write it in project proposals as "alibi content for the EC" (Personal communication, 2019).

4.4.3. Engaging with the context and developing interventions

After the workshop, the Kiosk group continued by asking citizens visiting the European Researchers' Nights in four European cities in September 2018 via questionnaires whether they preferred online or face-to-face communications. It turned out a majority chose the latter. A PhD candidate with expertise in design thinking thereupon got involved to create a series of workshops to enable citizens and scientists to themselves come up with designs for communication between both groups. The RRI CAM group was also quite proactive and organized a well-attended plenary session on the relationship between RRI and career assessment at the yearly MCAA *General Assembly and Conference* in February 2019 in Vienna, Austria. One of us authors was included in the panel to stir discussion on RRI. In tandem, one of the group members organized a participatory workshop at the conference to solicit the input of conference attendants on research quality criteria that fit MSCA.

The group that had formulated ideas on a training on RRI were less inclined to develop plans further. Notably, a freelance professional trainer shared that she could only participate if she could get *Intellectual Property Rights* over the output. A training yet was given shape after all when the social lab team received a request to that end in December 2018 from the MSCA NCP network. One of us, authors, developed a training session, held in Bern, Switzerland, the materials of which landed in a report with recommendations on RRI for the NCP network. Plans for an RRI Manifesto were elaborated during online calls. The idea to record researchers during the MCAA

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Conference talking about the relevance of RRI for their research stranded because of technical issues. Yet when the group linked the RRI notion to the idea that it could contribute to the development of *transferable skills*, a hot topic in early career researcher circles because many researchers cannot find opportunities to move forward, it was back on the table.

4.4.4 Renewing the collaborative spirit & enhancing agentic capacity

A few of the original participants had dropped out by the time the second workshop took place in May 2019 in Amsterdam. In close consultation with the group, we recruited new people who identified as having a stake in the concrete plans. To renew the sense of agency, we asked the groups to present to each other what they had done since the last meeting. Thereafter, before engaging in a *diner pensant*, for inspiration, we visited the *Amsterdam Law Hub*, an inspiring setting within the University of Amsterdam where legal researchers and students work together with stakeholders to address societal challenges. The next morning, we supported them with exercises to fine-tune the planned interventions. To keep concrete plans in line with underlying images of alternative futures, we asked them to explicate the Theory of Change implied in their interventions and explicate these in in-group and alternating group discussions. A presentation on the progress made in the wider NewHoRRIzon project also invited them to think of the relation between what they were developing and the broader institutional context to thus enhance a sense of agency. Thereafter participants set out to specify strategies and associated next steps. While these activities produced overall a co-creative atmosphere, the explicit articulation of the plans brought to light differences in views. Notably, the RRI CAM group found it hard to reconcile divergent interpretations of how an RRI-imbued assessment of excellent science might be operationalized (i.e. through indicators or narratives).

In the workshop's aftermath, efforts were made by participants to leverage further support for the plans in relevant institutional contexts and to anchor the envisaged interventions there. Organizations in Barcelona and Lisbon, employers of three members of the Research Kiosk group respectively, welcomed a series of design thinking workshops between May 2019 and January 2020 as part of an experimental run of the Kiosk, set up with the aid of some of the social lab's seed money. The first workshop was with only citizens, the second with scientists and the third in a mixed group to co-design prototypes for enabling a dialogue between citizens and scientists. Citizens' ideas on engagement formed thus the point of departure. The invitation to "think with their hands" (personal communication, WS3) triggered their enthusiasm, as it did among scientists. The process resulted in two localized prototypes for citizen-scientist dialogue, and a handbook for organizing a Kiosk process (Guasch, 2021). The enthusiasm formed an interesting contrast with the response from the head of the communications unit of one of the organizing institutes, who told the Kiosk protagonist

that "this is not the way we work" (personal communication, WS3).

Work on the RRI CAM that had reached a deadlock was rekindled when a group member noted that an upcoming MSCA Stakeholders' Conference presented a final opportunity to provide input in plans for the next funding program. A policy brief was produced, with the pro-active support of the social lab team, that listed arguments and on-going efforts to modernize the notion of excellence in academia. The brief included a call to broaden current evaluation criteria in MSCA calls. In December 2019, the Chair of the MCAA presented the policy brief to MSCA policymakers and stakeholders at the conference. EC representatives especially valued the practical nature of its recommendations and resources which led to it being mentioned in an official conference report. The online version was later on also shared online and in multiple policy conferences on research assessment (Cohen et al. 2019). The focus on training in the social lab was continued too when, with the support of the MCAA and grantees of MSCA projects, material from the RRI training was translated by a member of the social lab team into a webinar for prospective MSCA applicants. In the meantime, development on the Manifesto appeared to be slow. Still, in June 2019, contacts were made with other people to propose a session during the largest European science policy conference, ESOF2020, on the relevance of RRI and Open Science for transferable skills training for early career researchers.

4.4.5   Anchoring: taking the interventions beyond the social lab

By the time that the social lab reconvened for the third and final time, in February 2020, participants were keen on seeing their plans take shape beyond the lab. Indeed, the meeting's central focus was on the anchoring of the interventions. New stakeholders were invited who might be of help in implementing the plans. In that context, we had gone to great lengths to involve a representative from the EC, but to no avail. Presentations on the groups' past months' experiences were alternated with presentations from outsider experts that could provide information relevant for anchoring the interventions.

The social lab's final day was dedicated to reflections in hindsight, on the lab's trajectory, and to forward-looking efforts. To support the Kiosk group, we invited a professor specialized in system innovation to identify ways to anchor the Kiosk beyond the project. Ideas included a journal publication, a contribution to the MCAA newsletter, and sharing the Kiosk experiences with EC policymakers. In the months to follow, the pandemic would lead the group to redesign elements of the Kiosk for application in an online environment, now dubbed more inclusively *Knowledge Kiosk*. With support from the lab team, contacts were established with policymakers responsible for citizen engagement at the MSCA Unit to share insights and explore further options for mainstreaming the Kiosk's co-creative logic.[42]

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42   At the time of writing, February 2022, the meeting with EC policy actors has taken place. Insights and lessons

To elaborate the RRI Manifesto into a concrete product on the final day of the lab, we had also hired an expert in social design who used her skills as an artist to help the group articulate their ideas. Under her guidance, the group co-created a comic, depicting *Marie*, an early career researcher who experiences all kinds of problems related to RRI, and looks for ways to resolve them. The eventual RRI Manifesto, finalized by the expert in the weeks after the workshop included the possibility to gather statements from interested readers at in-person conferences, although the COVID-19 pandemic brought these plans to a full stop.

Nonetheless, a policymaker from the MSCA EC Unit publicly spoke, in September 2020 at the largest online European science policy conference, ESOF, about the MSCA having a task in preparing researchers for the future. In his talk, he touched on many of themes that had been on the table in the social lab. Among these were not only attention to the role of RRI and Open Science in transferable skills training, but also the recognition that institutional changes, particularly in research assessment criteria and funding incentives were necessary to prepare early career researchers for a life beyond the PhD and post-doc.

4.5. Discussion and conclusion

The echo between the topics addressed in the social lab and in its context is not surprising. The individuals that participated in the lab carried with them the ideas, narratives as well as knowledge of practices and rules valid in their professional context. The hypothesis ventured in this chapter suggests that their involvement with the lab in turn could help them contribute to transformative change required for opening the science system against the grain of 'excellent science' to more structurally include public engagement. Looking at the dynamics that unfolded between participants, the lab design, and their context through the lens of the conceptual framework (Cohen, 2022) (Figure 7) suggests that the social lab as a temporary arrangement indeed supported participants to do so in several ways.

Our diagnosis showed that despite the presence of some incipient counternarratives and -practices, participants were embedded in a structural context ('the system') where relationships between academics and citizens were predominantly narrated, incentivized and practiced from a knowledge deficit perspective (Simis et al., 2016) with the material consequence that academic institutions remain mostly fenced off from participation of wider publics (cp. Dewey, 1954) (Table 2).

The lab provided a setting to mobilize a collective of potential institutional

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have been shared and together they have explored future possibilities for implementing the Kiosk in the context of the MSCA scheme and beyond.

entrepreneurs around the narrative of RRI. Moreover, it provided a temporary space where dominant interpretations of *excellence* could be reflected upon and challenged, and counternarratives and -practices could be explored and amplified. Notably, methods for visioning seemed contributive in obtaining that goal as they informed the articulation of alternative futures. Crucially, the reflections and visioning were accompanied by an invitation to, and practical suggestions for, connecting time and again the envisaged futures with their institutional context and so support them to develop concrete actions in the here and now (cp. Quist & Vergragt, 2006).

While we initially managed to mobilize the participants around the RRI narrative (Owen & Pansera, 2019), over time many stakeholders appeared intrinsically motivated to engage with the existing institutional context to change structural conditions in the current science system. Even when word came that the EC had decided not to put the RRI concept in center focus in the upcoming funding framework (Fisher, 2020) the efforts remained 'on topic', addressing several of the issues in MSCA observed in the diagnosis. As a result, several successful interventions were developed. The Kiosk provided a practice-based alternative to one-way public engagement, RRI CAM provided a concrete, bottom-up call for rules and incentives that pay better attention to societal implications and engagement in research. The RRI Training built RRI advice capacities with crucial nodes in the funding network, and the RRI Manifesto provided a counter-narrative to standard ideas of excellence.

Joining forces in small groups, the participants can indeed be understood to have acted as *collectives* of institutional entrepreneurs, seeking to leverage resources and institutions to engage with the MSCA context (Battilana et al., 2009; Garud et al., 2007; Maguire et al., 2004; Weik, 2011). The active involvement of existing associations, networks, policy conferences and stakeholder events, together with seed money from the NewHoRRIzon project and practical support from the social lab team to guard and support momentum helped the participants to articulate desirable changes, find ways to convey these to relevant actors, and at least to some extent anchor these in standing institutions to ensure their continued impact. The efforts resulted in various concrete products (the methodological guidebook on the Knowledge Kiosk, the policy brief, training material including best practice stories and guidelines to the funding advice network and conference sessions with an MSCA policymaker) which each helped carry the message forward. Future observations over time will provide insight as to which extent the social lab contributed to larger ripples and waves that impact the shores of 'excellent' science in lasting ways. For now, the efforts, however modest, we conclude, contributed to the construction of pathways towards structurally opening the science system for diverse publics, challenging the status quo within the 'excellent science' system.

With these observations, we infer that the hypothesis we started out with can be confirmed. Furthermore, we can draw several inferences as to the how from our

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data. First, conducting a diagnosis of the existing institutional context (Lowndes & Roberts, 2013) is crucial to create an inventory of institutional dynamics, challenges and enablers. In the MSCA context, our new institutionalist perspective (Lowndes & Roberts, 2013) allowed us to unpack the relationship between a lack of two-way public engagement practices and the presence of rules, incentives and narratives that interpret and promote 'excellence' in science as publishing papers and garnering citations over societal relevance and public engagement (Table 2).

Second, engaging stakeholders with both an interest in change as well as a relationship to the institutional context through existing networks and associations builds momentum for change. Stakeholders may at first be mobilized around alternative narratives – such as RRI or alternatively Citizen Science (Strasser et al., 2019) or Open Science (Armeni et al., 2021) – but our analysis shows that they may (over time) become intrinsically motivated to implement their actions, especially if they are aimed at problems they experience in their daily practices.

Third, participatory arrangements may successfully leverage particular methods and management choices to enhance a sense of collective agency with participants to help them to translate their ideas into institutional interventions. Especially exercises that help them to develop future visions, to work towards concrete operationalizable ideas such as through backcasting, and strategic reflection exercises are of importance (Hajer & Pelzer, 2018; Quist & Vergragt, 2006). Furthermore, organizers of participatory arrangements may want take care to keep momentum between workshops by taking over specific tasks when protagonists are not able to bring an idea further due to time and resource constraints.

Fourth, our findings show that there are multiple ways in which a temporary participatory arrangement may contribute to change and not just by formalizing their efforts. They may contribute to transformative change by spurring capacity building, providing support for the development of new practices, sharing counter-narratives and proposing a change in rules and incentives in an institutional context. Enlarging the prospects for durable change beyond the confines of a temporary transformative arrangement does require explicit attention to the *anchoring* of interventions before the end of a project (Elzen et al., 2012; Loeber, 2003). The latter means that there is a crucial role for organizers of temporary participatory arrangements to invite participants to relate their new practices, narratives, and rules and incentives to the diagnosed institutional context and answer to real experienced challenges. This may safeguard against overt instrumentalization from both the side of the organizers as well as participants and the wider policy setting in which a participatory arrangement is organized (Bartels & Wittmayer, 2014).

In sum, analysis of our experiences in organizing a social lab on RRI in the European MSCA funding context showed the potential of using a temporary participatory arrangement for action research to contribute to transformative change that opens the

'excellent science' system to a diversity of publics. Our framework helped us to make sense of the case and showed that social labs may provide the space for transforming the science system to include more public engagement.

A potential limitation to this study is that the framework was applied to one particular social lab experimenting with RRI in a peculiar funding context. Future comparative research should therefore focus on ways in which (multiple) temporary arrangements for transformative (Schot & Steinmueller, 2018) and critical and relational action research (Bartels et al., 2020) such as social labs (Timmermans et al., 2020) and living labs (Følstad, 2008) may promote collective institutional entrepreneurship both in the R&I system as well as beyond (Hoogstraaten et al., 2020; Owen, Pansera, et al., 2021; cp. Sotarauta & Mustikkamäki, 2015).

In doing so, specific attention may be paid to the structural context (rules, practices, narratives and materiality) with reference to which such arrangements are organized, how they successfully mobilize and engage stakeholders, what methods and management choices they employ to enhance a sense of agency with participants and how they create and anchor experimental interventions in concrete institutional contexts. Equally, it will be important to investigate how temporary arrangements may successfully infuse further ripple effects (Trickett & Beehler, 2017), since even the tiniest of ripples may eventually turn into the waves that lead to a sea change in the academic system.

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Chapter 5

EXPANDING HORIZONS
Organizing Temporary Participatory
Experiments to Promote Collective
Institutional Entrepreneurship in the
Research and Innovation System

Abstract

This chapter seeks to bridge the gap between work on temporary participatory experiments and structural change in research and innovation. It does so by investigating both conceptually and empirically how temporary participatory experiments may contribute to more structural public involvement in the research and innovation system. To explore this matter, we build on recent work in institutional entrepreneurship in research and innovation to explicate a new institutionalist framework for analyzing how temporary participatory experiments may support participants to develop and act as institutional entrepreneurs. We then apply the framework to analyze efforts of a project that organized 19 temporary participatory experiments (so-called social labs) to promote the uptake of Responsible Research and Innovation in the European research and innovation funding scheme Horizon 2020. A systematic comparison of these efforts points out that temporary participatory experiments possess the unique capacity to support collectives of change agents to go beyond mere reflection and deliberation to conduct institutional entrepreneurship that promotes public engagement in diverse contexts of the research and innovation system. With insight into the institutional context, involvement of intrinsically motivated participants and support of the proper methods and management choices to enhance a sense of agency, these collectives will be empowered to conduct diverse forms of institutional entrepreneurship that promote responsible, open and engaged research funding and practice. Future research can leverage the framework and its typology of ideal typical interventions to explore the affordances of different policy concepts and experiments to promote institutional entrepreneurship that contributes to the institutionalization and consolidation of public engagement within different contexts of the research and innovation system.

Key words

5.1. Introduction

To address the grand ecological and societal challenges of our time, policy makers seem to express an increasing interest in experimenting with enabling a wide range of actor groups to participate in R&I (Kuhlmann and Rip, 2018). Such experimentation goes under the banners of *RRI, Open Science, Citizen Science, Co-design, Co-creation, Mission-oriented Innovation,* or *Transformative Innovation Policy* (Armeni et al., 2021; Diercks et al., 2019; Mazzucato, 2018; Robinson et al., 2020; Smallman, 2019; Stilgoe et al., 2013). What these approaches hold in common is the ambition of improving the R&I system and its relationship with society. Earlier research has shown that public participation may increase public trust in R&I, improve the substantive and democratic qualities of knowledge production and stimulate inclusiveness in sustainability transitions (Chilvers & Longhurst, 2016; Stirling, 2008). Despite policy interest in the issue and some scholarly recognition of its benefits, the existing R&I system still lacks structural opportunities for public participation (Braun & Könninger, 2018; Cohen, 2022; Jasanoff, 2016).

In the absence of structural inclusion, there is currently a surge of interest in organizing temporary participatory experimentation in so-called real-world labs (Følstad, 2008; Hassan, 2014; Lezaun et al., 2017; Schäpke et al., 2018; Timmermans et al., 2020). Organizers of such labs typically provide participants with a setting and the means to experiment with developing and discussing solutions to complex technological, societal and ecological challenges. However, since the current set-up of the R&I system obstructs continued participation, transformative change beyond add-on experimentation is arguably required (Braun & Könninger, 2018; cp. Schot & Steinmueller, 2018).

In that light, it is interesting how relatively little scholarly attention is paid to the relation between temporary participatory experiments and structural change (Kivimaa et al., 2017, p. 25).[43] This chapter aims to address this gap by exploring, both conceptually and empirically, how temporary participatory experiments may create conditions for more structural public involvement. In order to do so, we take as a point of departure the previous chapters and Owen et al.'s (2021, p.3) recent position that there is a "critical need for effective and enterprising institutional entrepreneurship" in R&I. Building on Maguire, Hardy and Lawrence (2004) amongst others, they describe institutional entrepreneurs as agents capable of articulating options for change in a compelling way, mobilizing stakeholders and resources to challenge existing structures and to realize suggested changes. We draw on these readings and our previous work to hypothesize that temporary participatory experiments may support participants in

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43   Most work from a transition perspective focuses more on experimentation as creating novelty and building niches with relatively little attention to the direct relationship between experimentation and structural change (cp. Sengers et al., 2019). More recently, some scholars have started to address this issue in the context of work on experimental governance (Potjer, 2019), second generation experiments (Grin, 2020) and experimental policy engagements (Ghosh et al., 2021).

developing into institutional entrepreneurs.

Below, we will first elaborate this hypothesis conceptually by elaborating various aspects of participant mobilization and organization from a third phase ("new") institutionalist perspective (Lowndes & Roberts, 2013). In doing so, we explicate a framework for analyzing how temporary participatory experiments may support participants to develop and act as institutional entrepreneurs. We then apply the framework to analyze efforts of the NewHoRRIzon project that organized 19 temporary participatory experiments (so-called social labs) to promote RRI in H2020. RRI, since 2011, has encapsulated discourse and practice around "*foster[ing] the design of inclusive and sustainable research and innovation*" (Burget et al., 2017; Owen & Pansera, 2019, p. 26; Stilgoe et al., 2013; Von Schomberg, 2013). As such, the concept seeks to promote structural public participation in R&I (Marschalek, 2018; Rip, 2016) – changes this system actively resists (Christensen et al., 2020; Novitzky et al., 2020; Owen & Pansera, 2019).[44] A systematic comparison of the experiences with the 19 social labs in light of our framework enables us to draw conclusions as to the question how temporary participatory experiments can contribute to structural change that opens up the R&I system to a diversity of publics.

5.2. Promoting collective institutional entrepreneurship through temporary participatory experiments: a conceptual framework

Public participation in (decision-making on) R&I has been reflected upon for almost a century (Dewey, 1954) and calls for actual public participation in R&I have increased in the last 40 years (Wilsdon & Willis, 2004). In Europe, the Science and Society action plan and subsequent funding programs have provided momentum to these calls (Macq et al., 2020). Despite these efforts, resulting participatory experiments remained by and large an add-on to mainstream R&I practices (Braun & Könninger, 2018).

This may not be surprising, considering the embeddedness of researchers and innovators in an institutional context that is not receptive to public engagement (cp. Garud et al., 2007, p. 961). Because of this embeddedness, Owen and others (2021) have recently pointed out a crucial role for institutional entrepreneurship in changing the R&I system. Maguire et al. define institutional entrepreneurs as "actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones" (2004, p. 657). A key question for institutional entrepreneurship is how actors, if they are fully embedded in given structures, possess the agency to envision alternatives to given structures and translate

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44 The European Commission defined RRI to include six key themes (public engagement, Open Access, Gender, Ethics, Science Education and Governance) with a central place for public engagement (cp. Marschalek, 2018).

these into new practices (Garud et al., 2007).[45]

Various authors in (new-) institutionalist and organizational research have identified specific requirements that enable individuals to act as institutional entrepreneurs (Battilana et al., 2009; Lowndes & Roberts, 2013; Randles, 2016; Weik, 2011). First, they must acquire insight in the dominant institutional arrangements in a specific setting. Second, they must be able to mobilize others to secure support for their proposed changes, notably because exercising "collective agency" (Lowndes & Roberts, 2013, p. 106) contributes to their success. Third, they must be able to imagine alternative futures to dominant ways of doing and thinking. To that end, they need to break "with existing rules and practices associated with the dominant institutional logic(s)" (Garud et al., 2007, p. 962). Fourth, institutional entrepreneurs must develop interventions and thus try to "institutionalize the alternative rules, practices or logics they are championing" (idem). These requirements are relevant, as they help to observe if and how temporary participatory experiments may support participants to develop into institutional entrepreneurs. Below, we will discuss each in some detail.

5.2.1   How to make sense of the institutional context of R&I?

A first challenge in using temporary participatory experiments to support change agents in developing into institutional entrepreneurs is providing insight into existing structures. Agents mostly act from what Bourdieu calls "learned ignorance" (Bourdieu, 1977, p. 19), therefore a first step is to explicate the structures which one usually does not notice. The new-institutionalist definition of structures is helpful in directing the agent's gaze here: studying structures implies looking at rules, narratives and practices (Lowndes & Roberts, 2013).[46] In view of setting up temporary settings for participatory experimentation to instigate change in the R&I system, this implies that the rules and incentives involved in R&I funding decisions and promotion criteria require proper scrutiny (cp. Åm, 2019). Narratives too require attention as they convey, amongst others, ideas about proper R&I, and pertain to the relationship between the R&I system and society (cp. Genus & Iskandarova, 2018; Randles et al., 2016; Sigl et al., 2020). Rules and narratives in turn shape practices through the tendency of practitioners to comply with what is standard and routine (cp. Schuijff & Dijkstra, 2020).[47] This line of reasoning implies an empirical question: which rules and incentives, dominant narratives and standing practices function as key structural barriers to the changes that agents may seek to instigate to increase public engagement in R&I?

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45 Institutional entrepreneurship differs from policy entrepreneurship in that the latter helps to analyze (groups of) individuals who sell and introduce new policy ideas whereas the former tries to explain how embedded agents can instigate structural changes within particular institutional contexts (Galanti, 2018, p. 42).

46 Furthermore, Lowndes and Roberts (2013) stipulate that it is helpful to look at the (social and economic) costs which are involved in ignoring institutional constraints: the higher the costs involved (e.g. punishment, exclusion or ridiculing), the more inert and salient some institutional trait is.

47 Lowndes and Roberts (2013) do not mention material structures. These however may have a major impact on, and role in structural change (Cohen, 2022; Grin, 2020; Kok et al., 2021).

5.2.2. How to mobilize and engage participants as agents of change?

There are several intricacies in mobilizing and involving participants in a participatory experiment to secure support for change initiatives. Which agents of change are involved will co-determine 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 et al., 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). However, research on stakeholder engagement in RRI shows the challenging frictions and politics in the selection and involvement of stakeholders (Blok, 2014). Taking these insights together this begs the following empirical questions: how do organizers successfully select and involve particular groups of stakeholders in a temporary participatory experiment? How do they overcome challenges in recruitment and how do organizers retain participants during the process?

5.2.3. How to enhance a sense of agency?

Developing insight in an institutional context that is usually taken for granted is challenging. But the crucial challenge is to help participants feel sufficiently empowered to actually act on that insight. A key question therefore is how the temporary experiment may support participants to develop a sense of agency. 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" as well as towards the present "as a capacity to contextualize past habits and future projects within the contingencies of the moment" (Emirbayer & Mische, 1998, p. 963). There is a rich literature on methods that enable individuals to reflect on past habits and frames (e.g. Forester, 2013; Loeber et al., 2007; Schön, 1983), imagine alternative futures (e.g. Hajer & Pelzer, 2018) and spur a sense of ownership to spark contextualized action in the here and now (e.g. via *backcasting*; Quist & Vergragt, 2006). In order to make sense of whether and how participatory experiments may help participants develop into institutional entrepreneurs, a relevant empirical question hence is: which methods and design ploys do organizers adopt to enhance, among the participants, a sense of agency?

5.2.4. How to design and implement interventions?

To observe the exercise of agency we shift the attention to the design and implementation of interventions in an institutional context (cp. Wiek et al., 2016). In line with the new- institutionalist focus, we look at interventions that challenge standing practices, dominant narratives and formal rules and incentives. However, to make a lasting impact, interventions require *anchoring* (Elzen et al., 2012; Loeber, 2003), that is, the adoption of the intervention by, and continued embedding in, existing organizations and networks. Interestingly, this topic is as yet seldom addressed in the literature (Kivimaa et al., 2017;

Schot & Steinmueller, 2018, p. 1563). Besides intentional acts of anchoring, analysts can also pay attention to unintended *ripple effects* (Trickett & Beehler, 2017). The associated empirical question is: what interventionist actions are designed and implemented as a result of the participatory experiment with which anchoring and ripple effects?

This elaboration sets a basis for a further specification of our initial hypothesis (Figure 8). On the basis of the above literature, and earlier conceptual and empirical work (Cohen, 2022; Cohen & Loeber, under review), we assume that temporary participatory experiments may support participants to develop into institutional entrepreneurs who can leverage existing resources and institutions to create pathways towards structural public engagement in the R&I system. They can do so *i) if* those involved are able to develop a proper understanding of the rules, practices and narratives that limit the space for such structural participation; *ii) if* initiators are able to recruit and mobilize participants as agents of change and keep them engaged, *iii) if* in the setting methods are employed, and management and design choices are made that help those participants to enhance their sense of agency, and *iv) if* they enable participants to exercise agency by designing and implementing interventionist actions, and have these anchored in the existing institutional context.

5.3. Materials and methods

The NewHoRRIzon project was set up to help promote RRI in the H2020 funding scheme with the help of a specific method for participatory experimentation: social labs.[48] These are temporary arrangements for participatory action research that aim to address complex social challenges in a social, experimental and systemic fashion (Hassan, 2014, p. 3; Timmermans et al., 2020). In NewHoRRIzon, 19 social labs were organized by teams from various disciplines and backgrounds representing 11 countries and involving stakeholders of 19 different sub-programs of H2020 across Europe (NewHoRRIzon Consortium, 2016).

Each organizing social lab team, consisting of a manager, a facilitator and an assistant, was asked to complete a document review and set of interviews, diagnosing the state of RRI (including public engagement) within a specific H2020 sub-program. After this diagnosis, each team organized a total of three workshops of one to two days at a time between Spring 2018 and Summer 2020. The goal was to bring together fifteen to twenty-five participants involved in the specific sub-program of H2020. They were invited to reflect on RRI and develop interventions ('pilot actions') to change aspects of that sub-program and related practices, for which a seeding budget of €15.500 was available per social lab. Based on a shared manual which was updated on the basis of cross-sectional learning, teams had the freedom to adapt workshops to participants' needs and contexts (Marschalek et al., under review).

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48   For more information about the NewHoRRIzon project, its concept and results see www.newhorrizon.eu.

How to mobilize and engage participants as agents of change? How do organizers successfully select and involve particular groups of stakeholders? How do they overcome challenges in recruitment and retain participants during the process?

How to enhance a sense of agency? Which methods and design ploys do organizers employ to enhance, among the participants, a sense of agency?

Process

Input

Temporary participatory experiment

Institutional entrepreneurs

Institutional context

Output

How to design and implement interventions? What interventionist actions are designed and implemented as a result of the participatory experiment with which anchoring and ripple effects?

How to make sense of the institutional context of R&I? Which rules and incentives, narratives and practices function as key structural barriers and enablers do actors experience when seeking to improve the structural involvement of stakeholders in R&I?

FIGURE 8 – Organizing institutional entrepreneurship through temporary participatory experiments (source: authors)

The data used in the below analysis were gathered by social lab managers and two of the authors involved with a comparative evaluation of all 19 social labs (Loeber & Cohen, 2018) incorporating elements of narrative, responsive and reflexive evaluation (cp. Arkesteijn et al., 2015; Constant & Roberts, 2017; Ivaldi et al., 2015). Social lab teams were asked to fill-in especially designed reflection and reporting templates before and after each of the three workshops. They were asked to produce small narratives on critical moments they experienced during the social lab, the choices they made in response and resulting consequences. Moreover, they were asked about stakeholder selection, the design and methods applied in their labs and to report on the design and development of the pilots.

Collected data were synthesized in running narratives (cp. Polkinghorne, 1995) for each lab. These narratives were shared with managers as a basis for in-depth interviews. Results from these interviews were reworked into concise narratives on a social lab's institutional context, process and pilot actions. For further validation and to gather lessons learned, these drafts were fed back to social lab participants in so-called narrative reflection sessions during the third workshop (cp. Roth & Kleiner, 1998)). The outcome of these sessions was described by social lab teams in a final reflection report. Pilot action narratives were also fed back to those involved by way of final member check. These data were analyzed iteratively and inductively using Atlas.ti, (and a codebook informed by the themes and categories generated in previous rounds of inductive analysis) culminating in the above framework (Figure 8). These comparative results are complemented here with a selection of case-descriptions (Yin, 2003) by authors responsible for the respective labs.

5.4. Research findings

This section presents the findings through the lens of our framework. First, we will provide insight in the institutional context of the experiments from a new-institutionalist perspective.

5.4.1. Making sense of the institutional context

H2020 was the largest R&I funding program in Europe, funding nearly 80 billion euros between 2014 and 2020 across Europe. It funded bottom-up R&I through *Excellent Science*, private sector R&I through the *Industrial Leadership*, R&I focusing on *Societal Challenges* and a *Diversity of* other *approaches* (Figure 9). We explore the narratives, formal rules and incentives and standing practices of each of these H2020 sub-programs, and how they related to RRI and public engagement below.

Excellent Science
The *Excellent Science* pillar contained four sub-programs: the *European Research Council* (ERC), funds for research into future and emerging technologies (FET), the

transnational researcher mobility-oriented *Marie-Skłodowska Curie Actions* (MSCA) and one focusing on research infrastructures (INFRA). Interviews and document analysis showed that low levels of institutionalization of RRI and public engagement appeared to be because of an experienced conflict between RRI and the operationalization of particular narratives of *excellence* in funding incentives and practice.

For example, ERC officials only wanted to fund bottom-up, curiosity-driven ('blue sky') research, claiming to make funding decisions solely based on scientific 'excellence'. In order to fulfill this task, the ERC fiercely defended its autonomy from outside publics. FET and MSCA rules and incentives reflected a mostly linear narrative of progression of technological and scientific advancement driven by fundamental science. Despite some enthusiasm for RRI at the policy level, public engagement was often understood and practiced as a necessity "to disseminate the project results, and to attract large public support" (European Commission, 2017b) and to make children enthusiastic for a scientific career respectively. In INFRA, elements of the RRI narrative were gradually finding a foothold in the sub-program's rules and incentives, while in practice, many large research infrastructures limited accessibility to vested research institutes.
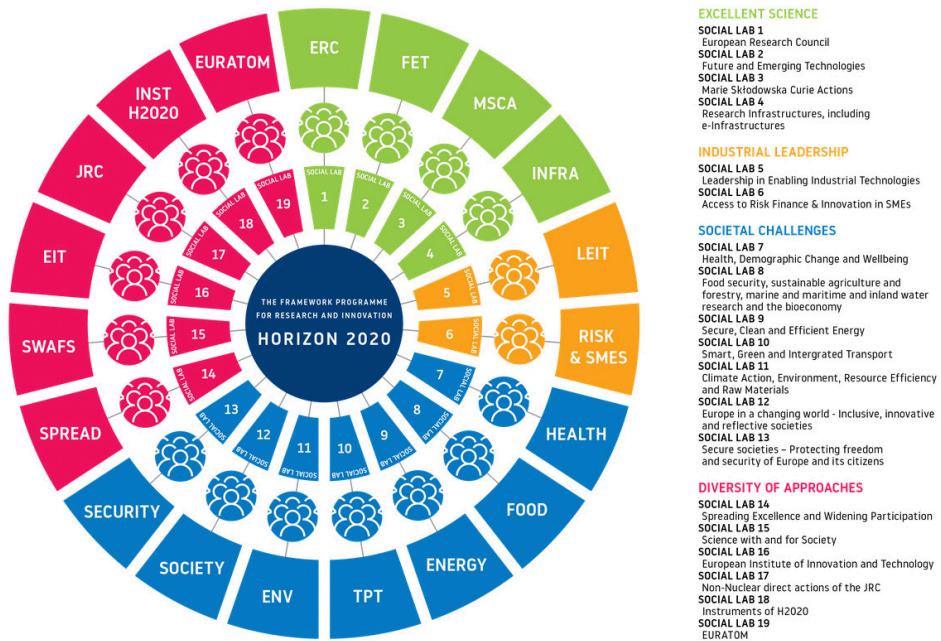
FIGURE 9 – Overview of the 19 institutional contexts with reference to which participatory experiments were organized (source: NewHoRRIzon Consortium, 2018)

Industrial Leadership

The *Industrial Leadership* pillar funded two sub-programs: one focused on industrial technologies (LEIT) and one focused on risk finance and innovation for small and medium enterprises (RISK & SMEs). Sub-program narratives and incentives predominantly focused on the development and marketisation of new technologies. There was some sensitivity to social and ethical challenges and interest in open innovation in practice, but many companies simply saw RRI as something that could negatively affect their competitive advantage. Apart from user-testing and customer research, most did not engage with the public in practice.

Societal Challenges

Third, under the banner of *Societal Challenges*, H2020 funded research into topics around HEALTH, FOOD, ENERGY, mobility (TPT), environment and sustainability (ENV), inclusive and reflective societies (SOCIETY) and SECURITY. The diagnosis showed that differences in the institutionalization of RRI and public engagement between sub-programs often related to existing narratives and practices of responsibility and participation.

For example, in HEALTH, narratives, rules and practices around RRI and public engagement built on medical ethical traditions of informed consent and patient engagement. In the FOOD sub-program, rules and incentives and narratives contained a growing attention for *multi-actor approaches* (MAA) in food systems research. In ENERGY there was a difference between narrative interest in RRI and its practical implementation whereas in TPT public engagement was often absent in practice and citizens were reduced to "users" in the narratives, rules and incentives. Alternatively, in ENV, awareness of RRI had grown, building on interest in narratives around sustainability and the *Sustainable Development Goals*. There was even interest in participatory research though in practice many bigger research institutes were hesitant to go beyond tokenism. In SOCIETY, many interviewees expressed the concern about the absence of narratives and incentives of RRI and public engagement whereas in SECURITY, engagement was predominantly described, incentivized and practiced as involving authorities and industry in developing new technology.

Diversity of approaches

Finally, the remaining institutional contexts focused on the funding of R&I in *Widening* countries (SPREAD), the *Science with and for Society* sub-program (SWAFS), the *European Institute of Innovation and Technology* (EIT), the policy-oriented *Joint Research Centre* (JRC), a diverse collection of funding *Instruments of H2020* (INSTH2020) and nuclear research (EURATOM). In general, institutionalization of RRI and public engagement was modest.

In SPREAD, support for RRI and public engagement in practice was notably absent.

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Narratives related this absence to the limited financial incentives to conduct R&I in these countries as well as a legacy of top-down (Communist) government. In SWAFS, RRI and public engagement were its raison-d'être, even though the EC decided to dissolve the policy unit, mid-2018, before political negotiations for the new framework program were ended. In EIT we found that solving societal challenges while developing profitable innovations was the central narrative animating the sub-program. However, incentives and practices focused on economic viability and profit over societal impact and public engagement. Quite alternatively, the JRC appeared to be in the middle of a process of opening up to outside stakeholders. Analysis of INSTH2020 showed that addressing societal challenges in R&I through public engagement was deemed important. However, it remained unclear whether in practice this was done to merely ensure public acceptance of technological developments. The latter appeared to be specifically the case in EURATOM, where public engagement was mostly interpreted, incentivized and practiced as a matter of informing the uneducated public of the positive benefits of nuclear energy and research.

Interim conclusions

The diagnosis showed that there was little evidence of a broad or deep institutionalization of RRI and public engagement in H2020 (cp. Novitzky et al., 2020). Differences between sub-programs appeared to be broadly related to existing narratives, practices, and rules and incentives of *scientific excellence* and innovation as focused on the production of marketable technologies. Even within those sub-programs focusing on tackling societal challenges and other diverse approaches, public engagement was mostly deemed important on the narrative level. With the notable exception of some changing practices and enabling narratives, rules and incentives (e.g. in HEALTH, FOOD, ENV, SWAFS and JRC), R&I was mostly practiced and incentivized from a deficit perspective with citizens reduced to users or ignorant members of the general public.

5.4.2. Mobilizing and engaging participants as agents of change

We now turn to our findings related to recruitment and retention of participants as potential agents of change in their institutional context. We first address the process and challenges around participant mobilization. Next, we describe issues of retention and how they were partly overcome to continually engage participants as potential institutional entrepreneurs.

Initial participant mobilization

Document analysis and interviews used to develop an understanding of institutional contexts were essential to inform selection of participants – for example, funding program officers; board members of international research networks; project leaders; etc. – all kinds of participants strategically positioned to become institutional

entrepreneurs. After ascertaining their relationship to the sub-program, prospective participants were interviewed and invited or asked 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. This led to the recruitment of a nearly gender-balanced group of 273 participants for the first cycle of workshops (Table 5).

The process of initial mobilization and recruitment was not without challenges. In the *Excellent Science* pillar, the main challenge was to recruit important policy actors. For example, ERC officials refused to cooperate with the organizing team although various actors from research, funding and civil society were willing to participate. The FET and MSCA participatory experiments also had an issue with recruiting EC, industry and CSO participants although they managed to involve one EC sub-program officer, representatives of the *European Association for Research Managers* (EARMA), and people from the *Marie Curie Alumni Association* (MCAA). The *Industrial Leadership* teams had a hard time with identifying and recruiting relevant business actors. In response, the organizing teams adapted the protocol for interviews and invitation to cater to their information needs.

For the *Societal Challenges* participatory experiments, the particular challenge was to identify which CSOs were relevant for the sub-programs (e.g. in SECURITY and FOOD). Some other participants (e.g. in TPT and SOCIETY) did not want to get involved because the project was unclear to them. Participants from the latter, like those in FOOD, also remarked that the lack of EC and industry participation meant that they did not believe it would effect real change. The *Diversity of approaches* participatory experiments too suffered from a low initial response rate, often informed by confusion and skepticism about the project. Furthermore, some experiments struggled with getting institutional commitment (JRC; EIT). The JRC lab team managed to overcome this by arranging a meeting with the directorate. They received permission to organize the lab around a single project and the directorate even helped with participant recruitment. In SWAFS the initial low response rate was overcome when the *Research Executive Agency* (REA) sent a request for participation to project coordinators.

TABLE 5 – Participant composition over the participatory experiment 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

Challenges in retaining participants and responses

Participant numbers slowly dropped over the lifetime of the participatory experiments to 254 for the second and 196 for the third cycle of workshops (Table 5). The main obstacles to keep participants engaged concerned personal issues, lack of time and lack of institutional support. For example, in the *Excellent Science* ERC and MSCA some participants voiced worries about limited resources and policy influence respectively. In response to drop-outs, the organizing teams successfully used a snowballing method to recruit new participants. In ERC, a newly recruited participant even brought in an additional intervention idea which created lots of enthusiasm with the group. The *Industrial Leadership* experiments also experienced a high number of drop-outs. To stimulate engagement with interventions, they contacted incubators, intermediary sector organizations, and consultancy firms. Still, cancellations informed the abandonment of two interventions later on.

The *Societal Challenges* participatory experiments struggled with similar issues with the notable addition that CSO participants could not legitimize spending time on a project with unclear benefits. Again, snowballing was used to invite new participants. Some participants came on their own initiative, and outside experts and actors with policy influence were invited to deal with lack of knowledge on RRI and institutional influence respectively. In *Diversity of Approaches* some participants were uncomfortable with the open and experimental social lab approach and its possible lack of impact. Snowballing was used again to recruit new participants. EIT and EURATOM received requests from outsiders to participate and SPREAD participants and organizers even recruited managers relevant for anchoring an intervention.

Interim conclusion

Overall, almost all experiments had difficulties with attracting the participation of (EC) policymakers, businesses and CSOs and keeping participants engaged over the lifetime of the experiment. To overcome recruitment and retention challenges, some of the experiments successfully invited representatives from large networks of researchers and research funding advisors to participate (e.g. FET/MSCA) whereas others leveraged organizational channels to increase participation (e.g. SWAFS/JRC). As we shall see, especially the former helped later on in the implementation and anchoring of interventions.

5.4.3. Enhancing a sense of agency

Below, the methods and management choices are discussed that were used to enhance a sense of agency with participants. The data are organized chronologically, to convey insight in how the participatory experiments spurred agency through reflection on the past, envisioning alternative futures and contextualizing actions in the present institutional context.

Workshop 1: first steps in enhancing agency

We identified that organizers enhanced agency by helping participants reflect on their past perceptions, practices and institutional context, stimulating them to envision alternative RRI-imbued futures and providing them with the means for selecting and planning interventions.

All organizers invited participants to reflect on their past perceptions and practices of responsibility and how it related to RRI using different methods like *Bohmian dialogue* (Mandl et al., 2013) (ERC/INFRA), a *walkshop* (Wickson et al., 2015) (FET) and a *world café* (MSCA), or by asking participants to position themselves in the room with respect to the RRI keys and explain their own associations (SWAFS). Furthermore, all experiments presented the results of the institutional diagnosis and invited participants to reflect on this (also see 5.4.1).

Most organizers invited participants to share their future visions for RRI. For example, MSCA organized a process which combined a working dinner, in which participants were invited to write down future visions of RRI in 2027 on postcards, asking them to share these visions on the next morning in a plenary session. ENERGY organized a walkshop in lush palace gardens and TPT asked participants to envision mobility futures from the perspective of different prepared personas.

To further contextualize their efforts in the present, experiments organized a marketplace of ideas followed by a multicriteria voting procedure with sticky dots to spur ownership, motivation and further planning of contextualized pilot interventions. Experiments used methods such as *backcasting* (Quist & Vergragt, 2006) (MSCA), the *Disney* and *Brainwalk* method (SECURITY) to collect concrete ideas and spur ownership. All experiments subsequently gave their participants forms to plan their actions.

These efforts were not without difficulties. All experiments experienced some confusion and skepticism towards RRI, the experiments and the project and lack of time, resources and ownership for the interventions. In some experiments, participants had trouble creating clear future visions (EIT and EURATOM) whereas in other experiments participants came up with such ambitious ideas that they could be entire research projects. In response to this, many teams emphasized that resulting interventions should be interesting and doable ("baby steps", as EIT and INSTH2020 organizers emphasized). Many participants (e.g. in ERC, MSCA, INFRA, LEIT, SOCIETY, SPREAD, EIT, JRC and EURATOM) mentioned the lack of time for planning concrete follow-up steps. Issues of ownership surfaced quite strongly too, for example when several ERC and EURATOM participants mentioned that they could not be expected to do the work of the organizing social lab team. This was quite the opposite in the JRC where the organizing team described how the "institutional machine" of the JRC itself took over planning. For other experiments, social lab teams organized follow-up (online) communication to further contextualize ideas for action. Some teams (MSCA and INFRA) even temporarily took over work on refining and implementing the interventions.

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CHAPTER 5

Workshop 2: (re)building agency including challenges and responses

The second workshop was used to (re)build agentic capacity among participants. We identified that specific attention was paid to reflecting on past experiences with implementing interventions and helping participants to contextualize these in specific institutional contexts.

To serve this goal, experiments included presentations of the results or plans for the interventions. Many also included reflection methods to think about their RRI-quality. For example, some successfully introduced the new reflection method of the *Intellectual Tramp*, a jester-like figure who could intervene to break up existing thought patterns (TPT and EURATOM). Other teams supported capacity building by inviting RRI-related experts to present their work and think along (FET, HEALTH, FOOD, ENV, SOCIETY, SPREAD, SWAFS and INSTH2020).

To scaffold further contextualization and ownership, some experiments included sessions in which participants were asked to decide whether they wanted to continue with a pilot or not (ERC, SWAFS, EIT and INSTH2020). Furthermore, all experiments organized time to work on concrete future implementation plans for the pilots. Notably, quite some experiments included presentations on developments in the wider NewHoRRIzon institutional context to spur strategic anchoring (MSCA, INFRA, ENV, SECURITY and SWAFS).

Again, organization was not without difficulties. Lacking time and resources resurfaced as a theme and many experiments felt the need to address the uncertain future of RRI in the next framework program (e.g. FET, MSCA and ENV). To defuse any negative impacts, organizers successfully (re-)emphasized that interventions would have to build on the intrinsic motivation of participants, providing a renewed sense of purpose to their actions. With some this even led to the development of policy engagement (e.g. ENV and SWAFS) or RRI funding proposals (EIT and EURATOM). In between workshop 2 and 3 all experiments experienced further issues of motivation and resources. Despite continued responsiveness of organizing teams – by providing monetary, knowledge and network resources – this still sometimes affected progress.

Workshop 3: reflection and anchoring

The third workshop was mainly used to reflect on the past efforts with experiments holding presentations and narrative reflection sessions. Some experiments also worked on further anchoring (e.g. MSCA, FOOD and ENERGY), with some (e.g. TPT and SECURITY) inviting new participants to take note of the developed interventions. Evaluation results showed that many participants mentioned the positive personal effects and that the collaborative, trial-and-error experimental nature of the labs helped them to grasp RRI and make it tangible. Nonetheless, many participants also mentioned that there should be earlier and clearer strategic discussions on the anchoring of interventions beyond the lifetime of the project (e.g. LEIT, RISK & SMEs, SECURITY, SPREAD, EIT, INSTH2020).

Interim conclusion

Taken together, the results paint an interesting picture on how temporary participatory experiments can enhance a sense of agency. The first workshop helped in instigating reflection on past perceptions and practices of responsibility and participants' institutional context, envisioning alternative RRI-imbued futures and providing the means for selecting and planning interventions as important instruments to enhance agency with participants. The second workshop enhanced agency by providing a space for reflection on past experiences with implementing the interventions, capacity building and by supporting participants with planning to further contextualize their actions in specific institutional contexts. In between workshops, organizing teams played a crucial role in keeping the participatory experiment responsive to participants' needs and keeping momentum. An interim survey and reflections from the third workshop generally showed that participants liked the experiment, though many voiced the critique that contextualization and anchoring could be strengthened earlier.

5.4.4.   Designing and implementing interventions

Finally, we analyze how agency and institutional entrepreneurship were exercised through the 59 interventionist actions that were designed and implemented as a result of the experiments.[49] Our new-institutionalist perspective helped to discern three possible ways in which agency could be exercised: through changing practices, constructing counter-narratives and changing rules and incentives. Furthermore, inductive analysis of our results, in a co-construction effort with organizing teams and participants uncovered a continuum of many possible ideal-typical interventions. The continuum ranged from capacity building (a first step *towards* structural change) to changing practices, promoting new implementable designs, constructing counter-narratives, producing communicable output for practitioners and decision-makers to changing the rules and incentives (the most formalized and structural form of change) (Figure 10). Below, each category is illustrated with two examples, paying specific attention to their anchoring.

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49   In terms of RRI issues addressed, of the 59 pilot actions produced, by far most of them focused on RRI in general (23), and on improving Public Engagement (26). Others had elements of Gender Equality (3), Ethics (8), Science Education (10), Open Access (4), Governance (7) and elements such as Responsiveness and Privacy.
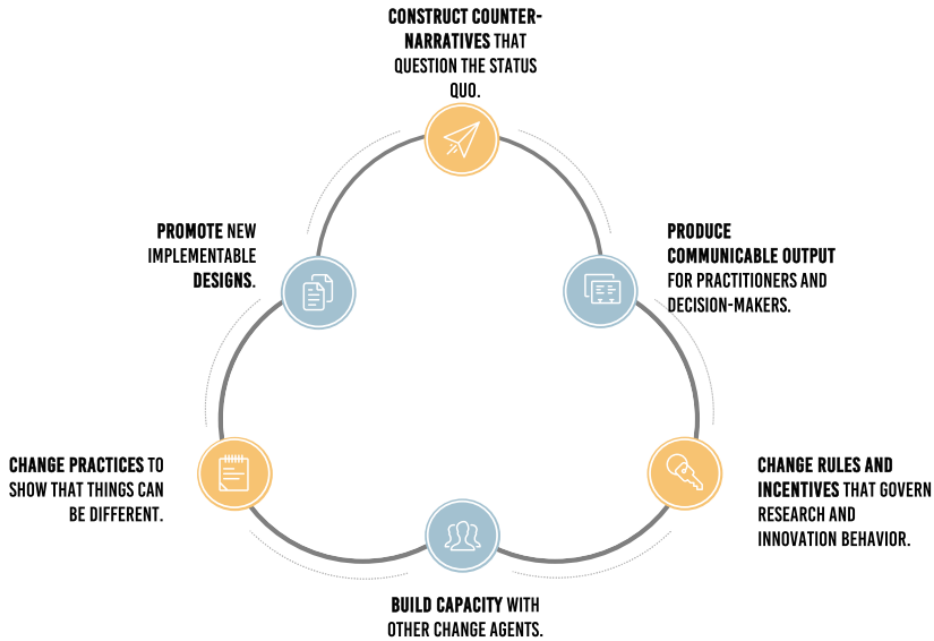
FIGURE 10 – Visualizing the continuum of ideal typical interventions
(source: Pia Weinlinger in Cohen & Loeber, 2021, p. 35)

Build capacity with other change agents

The initial participatory experiments led to the development of many interventions that contained an element of capacity building, informing further training and exchanges of knowledge and/or skills beyond the initial workshops (28). For example, many participatory experiments sparked the organization of *RRI Trainings* for National Contact Points (NCPs) (MSCA, ENERGY, SPREAD) in different European countries. In terms of anchoring, these trainings helped to share knowledge and tools on RRI and public engagement with NCPs, who integrated the material in their training for funding applicants across Europe. Another intervention *STEP-UP* (FOOD), sought to build capacity for stakeholder engagement across ERA-Net, a European network of funders. Involved change agents organized a full-day training on the topic for the network in Ghent, Belgium. As a result, ERA-Net revised its second Implementation Plan for the period from 2020 through 2021.[50] Capacity building thus showed to be a first step towards structural change, enabling change agents to promote engagement in their own contexts.

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50   The participant leading this intervention also communicated that work on the intervention inspired a change in a 2019 joint-call of the network regarding stakeholder engagement.

Change practices to show that things can be different

Quite a number of interventions (19) helped to change existing practices as one of the basic forms of structural change. One example came in the form of *Green Village* (INFRA), an innovative community near Delft University, The Netherlands. The group around this intervention organized a workshop to introduce RRI as a holistic package to be integrated in three concrete projects. The projects set out to experiment with it in practice and the results were evaluated after six months in another workshop with RRI experts. This helped projects to take next steps in further integrating societal perspectives in their practices (Marschalek et al., 2021). In *RRI and Changes to the nature of work* (SOCIETY), organized at the Brightland Institute for Smart Services (BISS) in Heerlen, The Netherlands, a participant invited local experts, policymakers and organizations to discuss local (ethical) challenges around the digitalization and automation of work. Amongst others, this formed the starting point of collaborations on the ethical regulation of AI between local police and BISS researchers, with subsequent funding applications to further anchor and continue this practice of cooperation.

Promote new implementable designs

Other institutional entrepreneurs went a step further by promoting new implementable designs and tools for RRI and public engagement which could be taken up in different contexts (15). For example, the *Quadralogue* (ERC) institutional entrepreneur and his students organized workshops at Ben Gurion University of the Negev, Israel to implement and promote a new game to increase dialogic engagement at the university level. He involved university managers to anchor the tool beyond the project. In similar fashion, a group of change agents around the *Knowledge Kiosk* (MSCA) developed and successfully tested a new design thinking tool in Barcelona, Spain and Lisbon, Portugal. It aimed to foster two-way engagement between science and society through a series of co-design workshops, first inviting citizens, then scientists and subsequently bringing them together to produce local prototypes for dialogue. To further anchor the new design, they applied for funding from the Barcelona city council.[51]

Construct counter-narratives that question the status quo

Many of the groups of change agents produced counter-narratives that tried to raise awareness and energize others to start acting differently. More than half of the interventions contained a focus on this form of institutional change (32). For example, the group on *Public engagement from "nice to have" to "NEED to have"* (ENV) questioned the dominant narrative that public engagement is nothing more than an add-on. They used a survey to gather insights and develop a narrative as to how public engagement is

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51   The group also produced an openly accessible methodological guidebook which was shared with EC policymakers and MCAA representatives, a good example of producing communicable output.

necessary to steer clear of a sustainability backlash in response to the green transition. To anchor results, the narrative was informally shared by e-mail with ENV policymakers though it remained unclear to what extent it affected policymaking. A group of institutional entrepreneurs around *The future of science?society* (SWAFS) intervention recognized the changing policy tides around RRI as an opportunity to develop four alternative scenarios for the future of science and society (Daimer et al., 2021). They applied for funding to further raise awareness on the narratives and anchor their ideas but unfortunately their application was not successful.[52]

Produce communicable output for practitioners and decision-makers

Yet other groups went a step further by creating communicable output for practitioners and decision-makers in the form of especially curated brochures and policy briefs (31). For example, the *RRI Show* (EIT) group created a brochure of eight RRI stories from across EIT, including a story on the value of public engagement for developing new products and services in an EIT context. The brochure was published online and an EIT HQ representative invited one of the participants to present on the stories at the EIT HQ in Brussels in Autumn 2019. A group of early career researchers (ECRs) around the *RRI Career Assessment Matrix* (MSCA) produced a policy brief in which they called on policymakers to use new insights in evaluation and update the notion of excellence to reward responsible and engaged research (Cohen et al., 2019). To anchor the insights in policymaking, the policy brief was presented by the head of the MCAA at an MSCA stakeholders meeting in December 2019 in Brussels, Belgium. It was later included in an EC report on the meeting and has been hailed by another ECR representative as "a great example of successful policy engagement by ECRs, as the majority of points were implemented in the new MSCA program" (Personal communication, 2021).

Change rules and incentives that govern R&I behavior

Interestingly, a smaller number of interventions focused on formalizing (elements of) RRI by contributing directly to the construction of new rules and incentives on the transnational and the local level (10). For example, one group of institutional entrepreneurs, including a representative of a funding agency, worked on the *Magna Charta* (INFRA). With this intervention they used the RRI principles to update the current *European Charter for Open Access*, a guiding document for the set-up of research infrastructures across Europe, to increase the accessibility for research infrastructures to all types of stakeholders. They attempted to anchor their efforts by presenting their proposed changes to the EC *Directorate General for R&I* (DG RTD) and the *European Strategy Forum on Research Infrastructures* (ESFRI) in Brussels in September 2019, although it was unclear whether

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52   The group was also involved with a declaration (Gerber et al., 2020) and text parts for the consultation of the new European framework program, a good example of the next type of intervention.

insights were taken up. At the local level, a group of institutional entrepreneurs set out to contribute to *"RRI-zing" the University of Novi Sad* (SPREAD). They sought to solve the issue of brain drain at a Serbian university and lacking European connection by formalizing RRI in their organization. With support of the temporary participatory experiment, institutional entrepreneurs managed to involve the university management to create several institutional initiatives at different departments and levels of the university, including the installation of a dedicated RRI team. To further anchor their efforts, they successfully managed to acquire funding for two more projects to institutionalize RRI in their own university and the wider Western Balkan R&I system.[53]

Ripple effects

Work in the participatory experiments also informed many ripple effects. The teams working in an *Excellent Science* context mentioned the sharing of policy briefs and methodology booklets online and at multiple conferences, the organization of webinars and involving newly developed tools and knowledge of RRI in (the evaluation of) new funding applications. The *Industrial Leadership* teams mentioned no ripple whatsoever whereas *Societal Challenges* and *Diversity of Approaches* mentioned many ripple effects, with capacity building exercises, tools and practices being implemented in other projects and further unplanned funding applications, presentations at conferences and publications.

Interim conclusion

Many interventions focused on capacity building, constructing counter-narratives and producing communicable output. Changing practices and promoting implementable designs were also popular whereas a smaller group focused directly on changing rules and incentives. Despite this, insight into the diversity of anchoring attempts and ripple effects, shows that the participatory experiments enabled involved change agents to engage in diverse interventions that can be interpreted as diverse forms of (burgeoning) institutional entrepreneurship.

5.5.   Discussion and conclusion

In this chapter, we attempted to bridge the gap between literature on lacking institutional impact of temporary participatory experiments (Braun & Könninger, 2018) and literature on institutional entrepreneurship in R&I (Owen, Pansera, et al., 2021). We set out to investigate the hypothesis that temporary participatory experiments can

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53   The university now plays a central role in one of the Change Labs of the *Co-Change* project that aims to promote RRI in RFOs and RPOs and coordinates the *WBC-RRI.net* project that promotes RRI across the Western Balkan region.

support participants to develop into institutional entrepreneurs who leverage existing resources and institutions to create pathways towards structural public engagement in the R&I system.

To see whether or not the participatory experiments were capable of doing so first required some insight into the existing institutional context through the lens of our framework (Figure 7). Our findings confirmed earlier discussions that there was little evidence of a broad or deep institutionalization of RRI and public engagement in the European R&I system (Braun & Könninger, 2018; Christensen et al., 2020; Randles, 2016). Adding to this, our new-institutionalist lens (Lowndes & Roberts, 2013) helped to uncover that the differences between various parts of the H2020 funding scheme were related to context-specific narratives, practices, and rules and incentives of *scientific excellence* and innovation. Even within sub-programs aimed at tackling societal challenges, public engagement was often practiced and incentivized from a deficit perspective.

These findings confirm scholarly work that shows how narratives and incentives of *excellent* science, profit-oriented innovation and top-down tackling of global challenges reduce citizens and publics to users or ignorant members of the general public (cp. Åm, 2019; Ludwig et al., 2021; Randles et al., 2016; Schuijff & Dijkstra, 2020; Simis et al., 2016). They also confirm the broader importance of context for the implementation of RRI and public engagement (cp. Tabarés et al., under review). Going beyond this, our new institutionalist perspective helped us to make sense of the specific R&I funding context beyond the merely organizational level (Owen, Pansera, et al., 2021). Such a nuanced understanding of each context helped to make better sense of potential structural barriers and enablers for public engagement across the R&I system (Cohen, 2022; Cohen & Loeber, under review).

Furthermore, our new-institutional perspective and subsequent empirical work helped to observe many (burgeoning) types of institutional entrepreneurship (Figure 10). Only 10 of the 59 interventionist actions explicitly focused on the formal change of rules and incentives (cp. Åm, 2019). However, our analysis of the interventions and their anchoring attempts and ripple effects shows that the many interventions focusing on capacity building (28) and changing standing practices (19) (cp. Schuijff & Dijkstra, 2020), creating implementable designs (15), constructing counter-narratives (32) (cp. Randles et al., 2016), creating communicable output (31) and the diverse attempts at anchoring these, can all be argued to provide answers to the barriers to public engagement identified in the institutional diagnosis. This insight, including attention to ripple effects, 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 (cp. Loeber et al., 2011; Owen, Pansera, et al., 2021).

Moreover, in their work on institutional entrepreneurship within R&I, Owen and others note the crucial role for local leadership and peers in influencing the modification

of seemingly engrained R&I behavior and institutionalization of RRI. They underline that these influences are especially effective "when combined with an approach that opens up creative, collaborative spaces for reflection, anticipation and engagement" (2021, p. 9). Our findings provide empirical backing to this assertion by showing how temporary participatory experiments can support involved change agents to conduct institutional entrepreneurship in many different institutional contexts.

Firstly, by providing temporary collaborative space to mobilize and engage participants as intrinsically motivated agents of change within a particular institutional context of the R&I system. Even though (EC) policy, CSO and industry participants were hard to engage or retain, many labs still managed to mobilize and continuously engage a diversity of intrinsically motivated participants. They were especially successful in recruitment and engagement if they managed to get support from funding actors (SWAFS) or host organizations (JRC). When confronted with lack of 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 (cp. Mignon & Kanda, 2018; Schuijer et al., 2022; Van Meerkerk & Edelenbos, 2018) while putting extra effort in the recruitment and retainment of specific groups (policymakers, CSOs and businesses).

Adding to this, our findings implicate that the application of a specific set of methods and management choices (cp. Marschalek et al., under review) may help recruited and engaged participants develop a sense of agency needed to move beyond deliberation to engage in action. Methods that invited participants to reflect on their personal sense of responsibility, develop visions of an alternative (RRI-imbued) future (cp. Hajer & Pelzer, 2018) *and* relate these to their context in a practical manner (cp. Quist & Vergragt, 2006) were particularly instrumental in furthering a sense of agency with participants (cp. Emirbayer & Mische, 1998; Lissandrello & Grin, 2011). Judging the output of 59 interventions, these exercises allowed participants to temporarily imagine themselves "as if outside of the structures which bind, and critically look back into those structures" (Randles, 2016, p. 7) to come up with alternatives and implement them in existing structures. Subsequent support by organizing teams, including follow-up digital meetings and workshops with further reflection, capacity-building and planning exercises helped to reaffirm agency despite lacking time and resources. Participant reflections do show that timely reflection on the anchoring of their interventions is crucial if one wants to induce change after the project (Elzen et al., 2012; Loeber, 2003).

Our analysis points out that participatory experiments possess the unique capacity to support collectives of change agents to go beyond mere reflection and deliberation and conduct institutional entrepreneurship that promotes public engagement in diverse contexts of the R&I system. With insight into the institutional context, involvement of intrinsically motivated participants and support of the proper methods

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and management choices these collectives will be empowered to conduct diverse forms of institutional entrepreneurship that promote responsible, open and engaged research funding and practice. With enough responsive support, they can work on pathways towards structural change.

We use the word pathways here to caution that it is not yet possible to ascertain longer-term impacts at the time of writing, a direct result of the current *projectification* of research. Taking the accompanying inherent tension of organizing temporary experiments to achieve structural change as a given (cp. Torrens & von Wirth, 2021), future research ought to particularly explore strategies to improve anchoring and ripple effects of project outputs. Another limitation to this study is that the framework and insights were developed with reference to specific participatory formats (social labs) that experimented with a certain concept (RRI) in a peculiar context (European R&I funding). However, the diverse ways and sub-contexts in which these participatory experiments were operationalized give us reason to suggest that the framework (Figure 7) and its typology of ideal typical interventions (Figure 10) may be leveraged by organizers of different temporary (participatory) experiments (Ghosh et al., 2021; Grin, 2020; Lezaun et al., 2017; Potjer, 2019; Schäpke et al., 2018). Especially now that RRI appears to be out of vogue at the political level (Griessler et al., forthcoming), organizers may use the affordances of different policy discourses (see 5.1 for an overview of terms) to promote institutional entrepreneurship in different local and (trans)national contexts, all with an eye to improve public engagement in the R&I system.

Finally, juxtaposing the rich collection of institutional entrepreneurial interventions with the observed lack of direct involvement of policymakers leads us to recommend the latter to take more responsibility by getting involved in participatory initiatives that are funded on the basis of their own policy frameworks. This means that, apart from their specific role in changing rules and incentives, policymakers also ought to create institutional space (i.e. reserve resources and time) to more structurally partake in and learn from new participatory initiatives. They may also play a role in identifying and creating linkages between temporary experiments, bottom-up networks and associations and existing institutions to promote the uptake of results. Enhanced policy backing and tracking can thus enlarge chances that participatory experimentation in temporary arrangements will durably open up the R&I system to the participation of a diversity of publics.

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Chapter 6

CONCLUSION

We started our journey at an experimental workshop where participants were challenged to interrogate and reflect on their understanding of responsibility in R&I. There we heard about the tension that they experience between living up to this responsibility and working in an R&I system that puts a premium on the production of papers and profitable patents. In the introduction it was noted, too, that policymakers have started to increasingly look to R&I to come up with novel solutions to some of the grand problems of our time and thus increase the prospects for a better future for our planet and species. Many scholars have started to recognize that such problems can be tackled with the help of R&I *only* if the latter democratizes and thus structurally engages with the values, needs and expectations of the publics affected by it (Stilgoe et al., 2013). Unfortunately, despite the growing impact of R&I, many citizens do not recognize themselves as members of affected publics, neither do they possess the democratic possibilities to share their concerns and hopes about the direction R&I ought to take (Dewey, 1954).

As we have seen, this situation is exacerbated by the current set-up of the R&I system and its structural barriers to public participation. In the past decades, engaged scholars have leveraged concepts such as RRI and participatory methods such as social labs to experiment with ways to increase public engagement within the R&I system. However, as yet, it is unclear how such temporary participatory experimentation might move beyond the add-on and ad hoc phase. How might this form of experimentation contribute to structural changes that inform broader and deeper public participation in R&I, resulting in a democratization of the R&I system?

With this research, I sought to advance debate around the democratization of R&I from a pragmatist, new institutionalist and action-oriented perspective. In particular, my aim was to leverage conceptual insights from these literatures, alongside empirical action research, to develop a conceptual framework and practical heuristic for promoting more public participation in the R&I system. Taken together I thus set out to answer the following main question:

> *How can experimentation with RRI in social labs support structural change to improve public participation in the European research and innovation system?*

6.1. Changing the R&I system through experimentation

To answer this question, I built on original action research in the form of a collection of social labs focused on the promotion of RRI in the context of European R&I funding and practice. In line with the action research conundrum that there is "nothing more practical than a good theory" (Lewin, 1952, p. 169), I started out the research with a conceptual

exploration seeking more clarity on the problem that confronted us. Together with my co-author, in **Chapter 2** I unpacked the current European debate around the concept of RRI and its attempt to reconnect R&I to the values, needs and expectations of European citizens. We discussed the contemporary history of RRI, including scholarly critiques on its lack of conceptual clarity, its missing real-world implementation and lacking institutionalization and mainstreaming (Christensen et al., 2020; Novitzky et al., 2020). Although we recognized these shortcomings, we also underlined that it would be a mistake to dismiss RRI's underlying ethical and democratic spirit and accompanying agenda of structurally improving the relationship between R&I and society.

Siding with Nordmann (2018), we particularly noted the recent experimentalist turn in dealing with these issues. More than that, we uncovered that the existing literature does not sufficiently address the implicit *democratic* character of such a reconceptualization of the RRI project. In response, we noted that Dewey's pragmatist philosophy (1954) could provide those interested in collective democratic experimentation with RRI a fruitful way forward. To explore this at a conceptual and normative level, especially in connection to recent calls to use social labs for RRI, we set out to answer the following research question:

> *What is, from a pragmatist perspective, a proper way to conceptualize and understand collective democratic experimentation with RRI in social labs?*

In our answer we unpacked Dewey's pragmatist understanding of democracy as an ethical way of life in which all members of a public affected by a shared issue have the means to share in the production of values that regulate their lives and to experiment with alternative solutions in practice. As mentioned in the introduction, Dewey too recognized that our complex societies often do not provide adequate means and conditions for citizens and publics to achieve this. It was his understanding that this would require attention to further democratic experimentation, to empower members of publics to develop their potential as democratic citizens in existing practice.

Building on Dewey, we suggested that a renewed focus on *democratic experimentation* could provide an answer to the lack of democratic relationships in the context of R&I. Standing on his shoulders, we conceptualized the latter as a process of *social inquiry* that ought to involve a diversity of *publics*. We contended that for such social inquiry to be successful, specific attention ought to be paid to the social, experimental and *public* nature of the process.[54] The latter was deemed important to increase the chance that insights resulting from social inquiry would find their way into existing practices and institutions and in circular fashion inspire further democratic experimentation with

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54 By paying attention to the involvement of different stakeholders and experts in a cooperative process, experimenting methodically and making both the process as well as the results as public as possible.

reference to the R&I system and beyond.

To show the concrete value of this conceptualization, we connected it to the recent call for experimentation with RRI through social labs. We found that social labs, by their very focus on social experimentation with alternatives to systemic challenges, could in principle provide the space to conduct Deweyan social inquiry that leverages RRI to support affected citizens in the quest for the alleviation of problematic situations around and resulting from R&I. Most importantly, to bring the *democratic* potential of such processes into practice, our research pointed to the importance attending to their public character. With enough attention to the *publicness* of the experimental process (i.e., by connecting to existing (bottom-up) citizen communities and networks) and to the *publicity* of the outcomes (i.e., by communicating the insights and outcomes in an accessible and engaging way), such democratic experimentation could provide a platform to integrate democracy as an ethical way of life into diverse R&I contexts and practices.

Although this initial exploration brought some preliminary conceptual ends in view, our analysis also raised the question of how this greater democratic potential could be realized in the context of an R&I system that provides little room for maneuver for public engagement (Krabbenborg, 2016, p. 918). Given the systemic ambition of many temporary participatory experiments, we felt it was important to conduct further research on the role that these could play in changing structural conditions for public engagement. We specifically wanted to develop a conceptual framework and practical heuristics to help such venues for social inquiry transform existing structures to increase space for public participation across the R&I system.

In **Chapter 3** I took up this challenge by conceptualizing and analyzing the lack of institutionalization of public engagement in the R&I system. I situated the argument in recent work on the systemic turn in public participation in science studies (Braun & Könninger, 2018). I posited that what was still missing from this systemic turn was a clear pragmatist and new institutionalist framework to support (action) research into the institutionalization of public participation in the R&I system. In the chapter I sought to fill this gap by answering the following question:

> *How can we conceptualize and analyze the relationship between publics*
> *and R&I institutions to support structural changes towards more extensive*
> *public engagement in the R&I system?*

First, I developed a pragmatist conceptualization of the *dialectical* relationship between publics and institutions of R&I. Building on earlier work by Dewey (1954, p. 31), I noted that many scientific findings and innovations inform a reordering of society and the ecology, thus causing different ethical, societal and/or environmental issues to arise which affect different publics. The problem is that members of affected publics have a

hard time engaging with R&I institutions to address such issues, often to the detriment of these publics and even to the detriment of the problem-solving capacities of R&I institutions. To improve this situation, I noted in line with Dewey that R&I institutions must become more open to take in diverse claims, concerns and issues of affected publics and be open to changing their momentum accordingly.

Although Dewey provided us with some first conceptual pointers, his own reading of institutions seemed impractically broad and outdated. To make up for this, I made use of recent new institutionalist work which differentiates institutions into *rules and incentives, practices* and *narratives* (Lowndes & Roberts, 2013). I added to this an interest in *materiality* (Grin, 2020) and used the developing framework to analyze the structural lack of institutionalization and consolidation of public engagement in the British research funding context.

This first application of the framework confirmed the importance of looking for structural barriers to public engagement beyond those in the form of formal institutions. It showed the importance of considering informal *deficit* narratives and the lack of supportive material technologies and infrastructures, and how these operate in conjunction with formal rules and incentives focused on journal publications to foreclose more dialogic and upstream public engagement at the level of practices. Apart from unpacking barriers and enablers, this differentiation between structures invited us to think of structural change in multifaceted ways, such as by altering rules and incentives, circulating counter-narratives around public engagement, designing supportive material infrastructures and altering concrete practices that underpin the relationship between researchers, innovators and publics.

In conceptualizing opportunities for instigating such structural change, agency was found to play a central role. Applying a new institutionalist designation for such agency, institutional entrepreneurship, I posited that *collective institutional entrepreneurship* could form a key contributor to the further institutionalization of public engagement in the R&I system. This led me to further develop the framework and an agenda for (action) research into what I termed *institutional entrepreneurial collectives of R&I*. The latter are collectives of institutional entrepreneurs who can play the role of lever to help open up the R&I system to more diverse publics. I noted that subsequent research and experimentation might concentrate on analyzing the four layers of structural barriers and enablers and how they interact in practice. Furthermore, conceptual work on the framework demonstrated the need to pay attention to processes of mobilization and engagement of relevant stakeholders and supporting them with methods and management choices that enhance their sense of agency (cp. Emirbayer & Mische, 1998). Finally, our conceptualization showed that attention ought to be paid to how these collectives engage with the institutional context and implement and institutionalize interventions that lead to pathways that open up the R&I system to a diversity of publics.

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In **Chapter 4** we subsequently applied the framework to a case study of a social lab that was organized to promote RRI in the context of the MSCA *excellent science* funding program. This chapter answered the following question:

> *How can a temporary participatory arrangement contribute to structural change that opens up the 'excellent science' system to a diversity of publics?*

Analyzing experiences in the organization of this social lab through the lens of our framework helped to make sense of the case and further refine the framework. It showcased how temporary participatory arrangements can support participants to form institutional entrepreneurial collectives that open up the excellent science system to a diversity of publics.

First, one can support such efforts by providing *insight into the existing structural context from a new institutionalist and materialist perspective* (cp. Lowndes and Roberts 2013; Grin, 2020) to create an inventory of structural dynamics, challenges and enablers for public engagement. In the MSCA institutional context this helped us to uncover that relationships between academics and non-academic citizens were predominantly narrated, incentivized and practiced from a knowledge deficit perspective (Simis et al., 2016), with the very material consequence that academic practice remained fenced off from wider publics.

Second, analysis of the results showed that *engaging the 'right' stakeholders* with both an interest in change as well as a relationship to the structural context helps to build momentum for structural change. Our social lab experiment allowed us to mobilize an institutional entrepreneurial collective of diverse MSCA stakeholders. Engaging with the alumni association and a funding advisor network appeared especially fruitful for mobilization. The results indicate that while such stakeholders may at first be mobilized around an alternative narrative, like RRI, they may over time become intrinsically motivated to implement actions, especially if these are aimed at problems they experience in their daily practices.

Third, participatory arrangements may successfully leverage particular *methods and management choices to enhance a sense of (collective) agency* among participants to help them translate their ideas into concrete interventions in the structural context. In our case, the interactive presentation of institutional diagnosis results, employing visioning and *backcasting* methods, including adaptations on the ground, allowed our collective to come up with operationalizable interventions into current MSCA structures. Further help in strategic planning supported them to further leverage existing resources and institutions to engage with the MSCA context.

Fourth, our results confirm that there are *multiple types of interventions* through which a temporary participatory experiment may contribute to transformative structural changes, and not just by formalizing efforts. Our findings show that

participatory experiments can contribute to transformative changes by providing support for the development of new practices *(Knowledge Kiosk)*, sharing counter-narratives *(RRI Manifesto)*, proposing a change in rules and incentives (*RRI CAM)* and spurring capacity building *(RRI Training)* in a specific institutional context. Durable change does require explicit attention to the *anchoring* of efforts by the organizing team, while keeping an eye out for unintended ripple effects. In our MSCA social lab this resulted in participants sharing insights and a methodological guidebook with MSCA representatives and the European Commission (*Kiosk*), participants presenting a policy brief at a crucial stakeholders' event (*RRI CAM*), delivery of reusable training material including best practice stories and guidelines to the funding advice network (*Training*) and organization of a conference session with an MSCA policymaker (*Manifesto*). Each of these interventions provided concrete, implementable answers to some of the problems observed in the diagnosis, thus contributing to the construction of (pathways toward) inclusion of a diversity of publics in the excellent science system.

Chapter 5 then described application of the refined framework to data from 19 social labs organized in the context of the NewHoRRIzon project, answering the following question:

> *How can temporary participatory experiments contribute to structural change that opens up the R&I system to a diversity of publics?*

In this chapter, we used the refined framework to compare the 19 social labs organized with reference to the European H2020 framework program. We set out to investigate the hypothesis that temporary participatory experiments can support participants' development into (collectives of) institutional entrepreneurs who can leverage existing resources and institutions to create pathways toward structural public engagement in the R&I system.

First, we made sense of *the institutional context of R&I across H2020*. Analysis of the H2020 context through our new institutionalist lens uncovered how little evidence there was of deep institutionalization of public engagement in H2020 funding. Differences between program lines were broadly related to existing narratives, practices, rules and incentives of *scientific excellence* and innovation. Public engagement was at best deemed important at the narrative level and mostly practiced and incentivized from a deficit perspective in which citizens were reduced to users or ignorant members of the general public (cp. Simis, 2016).

Second, given this situation, we set out to uncover how participatory experiments might *mobilize and engage participants as agents of change* within their institutional contexts*.* Despite a lack of participation from policymakers, CSOs and businesses, the participatory experiments still managed to involve a large group of interested change agents. The results indicate that the labs were especially successful in recruitment and

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engagement if they managed to get support from host organizations, funding actors and bottom-up networks of researchers and funding advisors. Recruitment of new participants helped bring in new initiatives and anchor existing actions in specific institutional contexts.

Third, we were interested in *how participatory experimentation might enhance a sense of agency among involved participants*. Here, our results uncovered a set of specific methods that enhanced a sense of agency. Those that helped participants reflect on their existing context were especially useful in creating awareness of barriers and enablers. Furthermore, methods that invited participants to reflect on their personal sense of responsibility, develop visions of an alternative (RRI-imbued) future *and* relate these to their context in a practical manner were instrumental in furthering a sense of agency among participants. Timely intervention – by organizing teams, temporarily taking over tasks or organizing digital meetings and follow-up workshops to discuss progress and provide capacity-building/reflection – was also instrumental in maintaining momentum.

Fourth, we were interested in *how the involved change agents could design and implement interventions.* Analysis of 59 validated pilot actions developed as a result of the temporary participatory experiments showed that only 10 focused directly on formal changes in rules and incentives. However, an inductive analysis and validation of the material supported by a new institutionalist perspective suggested that this was only part of the story. The participatory experiments informed many more capacity-building exercises (28) and other interventions focusing on changing practices (19), creating implementable designs (15), the construction of counter-narratives (32) and creating communicable output (31), with different attempts to anchor them and many more ripple effects. Thus, results suggest that there are many diverse ways in which temporary participatory experiments can contribute to transformative changes that open up the R&I system to a diversity of publics.

6.2. Public experimentation with institutional entrepreneurial collectives

Combining these chapters' findings, we can provide an answer to our main question:

> *How can experimentation with RRI in social labs support structural change to improve public participation in the European research and innovation system?*

First, we learned that the organization of experimental processes of *social inquiry* might provide an answer to the lack of public participation in the European R&I system. We found that experimentation with RRI in temporary social labs, by definition,

provides a venue to *experiment* with the integration of RRI and public engagement in a *social* manner. However, to ensure that such experimentation contributes to more *democratic* relationships between R&I and society in practice, we noted that organizers need to attend to the *public* character of such processes. In other words, at its core, experimentation with RRI in social labs ought to focus on involving a diversity of publics in *public experimentation* with the concept of RRI to tackle problems that said publics experience in relation to the R&I system. This can be organized concretely by organizing social, experimental processes for learning that engage with bottom-up citizen communities and networks (paying attention to the *publicness* of the process) and communicate resulting outcomes in an engaging and accessible way (paying attention to the *publicity* of the outcomes). In this way it may promote further collective democratic experimentation in the R&I system.

However, our initial analysis also underlined the importance of creating the right conditions for this type of experimentation to flourish. A big issue here is that the current R&I system leaves little structural room for extensive public engagement (let alone public experimentation). Without the right conditions and room for citizens to impact the R&I system, public and participatory experimentation thus runs the continued risk of remaining in the add-on and ad hoc phase. This suggests the need to develop concepts and heuristics to deal with this less-than-ideal situation.

In view of this need, I further developed a conceptual framework and heuristic to support (action) researchers in their quest to structurally change and democratize the European R&I system from within. This framework was used to analyze a case study of one social lab. The resulting refined framework was subsequently used to analyze the results from 19 different social labs experimenting with RRI. The outcomes indicate that public experimentation in temporary participatory experiments can contribute to structural change that opens up the R&I system to a diversity of publics by *supporting collectives of change agents to develop into institutional entrepreneurial collectives*.

To this end, a first requirement is that temporary participatory experiments *provide insight into the existing structural context* for how it precludes and/or enables public participation. This can be done by analyzing existing rules and incentives, narratives, practices and, when applicable, materiality. Second, they should *involve the right participants*, that is, potential agents of change who have both an interest and motivation to change the status quo and a relationship to the context. The latter can be recruited and retained by involving their home organization, funders or bottom-up practitioner networks and associations in the process. Third, temporary participatory experiments should support those agents of change with methods and management choices that *enhance a sense of agency*. Our analysis found that visioning and *backcasting* exercises, and supporting participants with the development of concrete plans for interventions and the *anchoring* of these is particularly helpful.

Fourth, as our framework helped to show, these processes can lead to *different*

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(burgeoning) forms of institutional entrepreneurship: from building capacity among other change agents to changing practices to show that things can be different, promoting implementable designs, constructing counter-narratives, producing communicable outputs for practitioners and decision-makers and changing the rules and incentives that govern R&I behavior. Our action research in the context of European R&I funding demonstrated that, with enough attention to the above four dimensions, public experimentation with RRI in social labs can support institutional entrepreneurial collectives to create pathways toward structural changes that improve public participation in the European R&I system.

6.3. Contributions to the literature on RRI and the institutionalization of public engagement

This research sought to advance conceptual, empirical and methodological debates around democratizing R&I from a pragmatist, new institutionalist and action-oriented perspective (Dewey, 1954; Guston, 2004; Jasanoff, 2017). I aimed to leverage insights from these literatures to develop frameworks and tools with which to experiment with the development and institutionalization of more democratic relationships between R&I and its publics.

In terms of my first research objective I explored what recent scholarly and policy debates on the proper relationship between science and society, particularly in relation to the concept of RRI, could learn from Dewey's conceptualization of democratic experimentation. As discussed, there is a growing understanding that RRI – as one of the latest installments in a long history of concepts to improve relationships between science and society – is at a conceptual, implementation and policy deadlock (Christensen et al., 2020; Fisher, 2020; Novitzky et al., 2020; Ribeiro et al., 2017). Against the grain, some have argued for treating RRI as a collective experimentation strategy, paying attention to how it might inform experimental processes of social learning around responsibility in concrete R&I practices (Nordmann, 2019; Timmermans et al., 2020). This line defends RRI as a rather open-ended experimental framework from instrumental, conservative and often technocratic stances (Klaassen et al., 2018; Nordmann, 2018; Timmermans et al., 2020). The current experimentalist turn in RRI seems to emphasize the *social* and *experimental* character of such a process.[55]

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55 Chapter 2 helped to further conceptualize and operationalize this from a pragmatist, Deweyan perspective. Our exploration emphasizes that the social character implies that the process should allow all those affected by the issues to deliberate and cooperate with experts to come up with alternative solutions. This includes listening to diverse viewpoints, including those of minorities, who may have different interpretations of responsibility in a certain context. It elaborates on the *experimental* character of these processes in that it calls for providing the right methodological support for diverse publics affected by particular R&I issues to bring their own ideas into practice. This also means that space should be provided to learn from failure and that specific normative outcomes per context ought to be accounted for.

Most importantly, Chapter 2 added to this that the greatest potential of the experimentalist turn lies in it refocusing attention on RRI's underlying *democratic* agenda for inquiry into responsibility in research (Owen et al., 2012, p. 754). For this, we built on Dewey's conceptualization of democracy as an experiment in which all kinds of affected publics can participate in processes of social inquiry that act on concrete issues that affect them. In line with this conceptualization, we saw that to truly realize their *democratic* potential, organizers need to pay active attention to the *public* character of these processes. With sufficient consideration for the *publicness* of the process and *publicity* of the outcomes, democratic experimentation with science-society concepts such as RRI in temporary venues like social labs can inspire future iterative processes of social inquiry that can contribute to more democratic science-society relationships.

Our conceptual exploration of Dewey's ideas thus yielded an important lesson for the current RRI debate and the experimentalist proposition for change. It invites us to see RRI for what it is, namely, a conceptual instrument that can help democratize relationships between R&I and society in practice (or not). In line with this, instead of merely critiquing the concept and its lack of implementation and institutionalization (cp. Latour, 2004), scholars might shift their focus to *promoting public experimentation with concepts such as RRI*. Concretely, such an orientation could be useful for developing hypotheses and testing these to see how they may or may not contribute to the *realization of democratic change in the R&I system and in practice* (cp. Shanley et al., 2022).

My second conceptual research objective was to contribute to the recent systemic turn in public engagement with science studies, which focuses on how public engagement practices might enact and/or transform existing institutions (Braun & Könninger, 2018, p. 683/684). Still missing from this systemic turn was a pragmatist and new institutionalist framework to support (action) research into the institutionalization and consolidation of public participation in the R&I system.

Dewey's earlier work helped us to conceptualize the relationship between publics and R&I institutions within the R&I system as dialectical. Recent insights from new institutionalism and the materiality of structure (Grin, 2020; Lowndes & Roberts, 2013) helped us to further operationalize the framework to both bring together and uncover how existing formal (rules and incentives) and informal (narratives and practices) institutions and material structures interact in a specific context to foreclose more extensive opportunities for dialogical or upstream engagement. Further work on the role of agency and institutional entrepreneurship (Emirbayer & Mische, 1998; Maguire et al., 2004) in the promotion of change helped us to conceptualize possibilities for actively working against this situation and instigating change through temporary participatory formats such as social labs.

Thus, our pragmatist and new institutionalist perspective on institutional change helped uncover how 'the R&I system' can be deconstructed into interacting layers of

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structures that keep the status quo intact. The new institutionalist perspective does this by shifting focus beyond the mere organizational or formal level, to include attention to the level of dominant practices and narratives (Loeber et al., 2011; Owen, Pansera, et al., 2021). Finally, it sheds light on the relevance of the proper organization of temporary participatory arrangements in mobilizing stakeholders and enhancing their sense of agency to develop into institutional entrepreneurs that actually do something about changing the status quo.

My other objectives were, in line with Chapter 4 and 5, focused on refining the framework by testing it on case studies on one social lab and a comparative analysis of 19 social labs. This finetuning exercise helped make sense of the relevance of the developed framework and its results for current scholarly debates. The relevance was found to lie mainly in its help in conceptualizing, analyzing *and* organizing change in the R&I system. More than deconstructing and critiquing the current situation, as is often done in the existing literature (Braun & Könninger, 2018; Latour, 2004), our framework helps uncover cracks and fissures in existing institutions with an eye on leveraging these in an action-oriented process later on. In other words, it provides the engaged analyst with the conceptual tools and insights to find entry points for institutional changes in the R&I system that may lead to increased public engagement.

Finally, this research builds a bridge between the literature on the impact of temporary participatory experiments (Lezaun et al., 2017) and the growing interest in the role of institutional entrepreneurship in R&I (Owen, Pansera, et al., 2021). It contributes to both bodies by demonstrating that temporary participatory experiments can work as venues that promote (collective) forms of institutional entrepreneurship in the R&I system. Its contribution lies in particular in showing empirically that change agents – after being engaged and mobilized in a temporary participatory experiment, with the right insight into an existing institutional context and with the right methodological support to enhance their sense of agency – can develop interventions as pathways toward structural changes that increase public engagement in the R&I system in many ways. Beyond the formal level of changing rules and incentives, resulting interventions can focus on the level of practices and narratives and in-between variants such as capacity building with other change agents, promoting implementable designs and creating communicable output for practitioners and decision-makers (cp. Termeer & Dewulf, 2019). These results further problematize a mono-focus on the formal and organizational level in looking for pathways for structural change (Loeber et al., 2011; Owen, Pansera, et al., 2021).

6.4. Recommendations for R&I policymakers and funders

Notwithstanding the above insight, it is important to underline that R&I policymakers and funders have a specific role to play in changing the R&I system to better accommodate the values, needs and expectations of affected publics. At minimum, they possess a large influence on other actors in the R&I system and, with their relative freedom to maneuver, are crucial gatekeepers for any attempts at system change (Curry et al., 2020; European Commission, 2019). To execute this function for the benefit of society, they can take on board the following recommendations:

1. **Policymakers and funders are crucial in changing rules and incentives.**
   Our research has indicated that (trans)national R&I policymakers and funders should take responsibility for their role in changing the rules and incentives system that structures daily R&I behavior. This means moving beyond the promotion of alternative narratives like RRI to changing the actual rules and incentives within the R&I system in the quest to promote public participation. At the same time, this entails being mindful of the fact that they are one actor among many in the R&I system. As Chapter 3's new institutionalist analysis underlined, this also means paying attention to the fact that rules and incentives always interact with narratives and materiality and should be evaluated for their impact on practices.

2. **They ought to involve (early-career) practitioners in the process.**
   In their endeavor to enhance the R&I system, policymakers and funders are advised to take inspiration from the many R&I practitioners who are willing to engage with society but find themselves constrained by narrow evaluation systems. As the results from our work in Chapter 4 indicate, R&I policymakers and funders are especially advised to listen to early-career researchers, as they will be the next-generation of R&I leaders and engage with their call to enlarge the *excellence* criterion for R&I evaluation to include education, leadership and community engagement, in order to improve possibilities for open, engaged and responsible R&I (Braun et al., 2021; Cohen et al., 2019).

3. **They should create structural space for policy experimentation.**
   As the results from Chapter 4 and 5 show, R&I funders and policymakers are advised to create and nurture spaces for continued policy experimentation in R&I funding and governance. Concretely, this entails reserving more budget and structural space to engage with temporary participatory experiments that can provide alternative ways of funding open, engaged and responsible research. These experimental spaces provide a venue for bringing together different actors from across the system into one (virtual) room to discuss practice-based alternatives

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to the current system, as illustrated by our experiences within the NewHoRRIzon project. Furthermore, they can build on the recent example of a network of funders that joined forces to experiment with the implementation of *responsible research assessment* in the current funding system (Bendiscioli et al., 2021). Engaged policymakers can build on current developments in experimental governance and transformative government to further try out new forms of cooperation between policymakers, R&I practitioners and society in the search for better solutions to public problems (Braams et al., 2021; Potjer & Hajer, 2021).

4. **They can tap into current policy debates on enhancing the R&I system.**
    To build momentum, (trans)national R&I policymakers and funders are advised to tap into ongoing (trans)national policy debates around changing research assessment and practice. Current European and national policy discourse regarding research assessment and open science provides momentum that can be leveraged to move beyond the open access of data and publications to truly enlarge public involvement in the R&I system (European Commission DG RTD, 2021; Rathenau Instituut, 2021; VSNU et al., 2019). Policy reports and networks on public engagement and enlarging the societal impact of R&I will be equally of interest to policymakers who care about bringing R&I in line with the values, needs and expectations of affected citizens (Impactalliantie, 2022; Samenweten, 2022).

6.5. Practical directions for future experimentation

This research explored how experimentation with the concept of RRI in social labs, could support the further institutionalization and consolidation of public participation in R&I and thus contribute to a democratization of the European R&I system. Based on original research done with colleagues from the NewHoRRIzon project, I developed a conceptual framework to analyze how temporary participatory experiments might contribute to structural changes toward public engagement in the R&I system. Analysis of experiences and empirical work through the lens of this framework leads me to suggest the following directions for future public experimentation.

1. **Diagnose the structural context.**
    This research shows that action researchers interested in improving relationships between R&I and society should pay close attention to the specific structural context in which they seek to organize change. This can be done by conducting a policy document review and semi-structured interviews to gauge the state of public participation within a specific context of the R&I system. Researchers can differentiate between rules and incentives, narratives, practices and material

structures, recognizing that these can play out differently in different contexts. This process helps uncover contextualized enablers and barriers for participation which can feed into the further experimental process later on.

2. **Engage participants as agents of change.**
    Action researchers are advised to map important stakeholders and potential agents of change during their initial process and recruit them while interviewing and through snowballing. Extra time should be reserved for harder to reach groups (such as policymakers, businesses and CSOs) with a focus from the start on achieving buy-in for the further experimental process from policymakers and organizational managers. If that proves impossible, they should seek out relevant bottom-up associations and networks of practitioners to find intrinsically motivated participants who care about changing the R&I system for the better. They should be open to letting participants go and inviting in new participants with new initiatives, or ask existing participants to bring in others who possess the connections and organizational or institutional clout needed to anchor interventions.

3. **Enhance a sense of agency.**
    Structural change is hard to achieve, but our research shows that with the right experimental support, agents of change can develop into institutional entrepreneurs (or collectives thereof). In its ideal form, such support starts with a clear explanation of the background of the participatory experiment, including the space for experimentation and the support participants can expect. It should include a structured reflection on the context and perceptions among participants, a visioning process and planning exercises to help participants form concrete ideas and groups around a certain interventionist idea. Furthermore, organizers ought to pay attention to the responsiveness and reflexivity of the process and create enough moments for participants to come together (digitally and physically) to reflect on progress and commitment. Finally, organizers should support capacity building among participants, step in when they note a lack of motivation or resources and actively invite participants to reflect on how their interventions can be anchored beyond the temporary experiment in the existing structural context.

4. **Design and implement diverse interventions.**
    The process can help participants design and implement diverse sorts of interventions. Ways this can be done range from providing capacity building to other change agents in participants' networks to changing existing practices so as to demonstrate that things can be different and promoting new implementable designs for interaction between R&I and affected publics. It can also entail the construction of counter-narratives that question the status quo, the promotion

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of alternative visions through specifically curated brochures and policy briefs for practitioners and policymakers, and finally the changing of R&I rules and incentives. Organizers and participants should pay specific attention to developing anchoring strategies (Elzen et al., 2012; Loeber, 2003) while keeping an eye out for unintended ripple effects beyond the immediate project (Trickett & Beehler, 2017)

Those interested in learning more about how this may work in practice can make use of the *Guide to Good Practices* that we developed together with colleagues and participants from the NewHoRRIzon project (Cohen & Loeber, 2021). Researchers working under the banner of RRI in social labs (Timmermans et al., 2020) and on institutional change (Owen, Pansera, et al., 2021) are especially advised to bundle forces and apply the *Guide*'s insights and lessons to increase prospects for their experiments to achieve structural change toward democratization of the R&I system.

At the same time, recent developments in the discourse around RRI, specifically its recent demise at the European policy level (Owen, von Schomberg, et al., 2021), lead us to recommend that action researchers heed the pragmatist call for constant conceptual reconstruction and exploration. Concretely, this means that we suggest that future research also explores the affordances of other concepts as potential instruments to improve the democratic character of the relationship between R&I and its publics. Projects and communities working under the conceptual banner of *Open Science*, *Citizen Science*, *Co-design*, *Co-creation*, *Co-production, Mission-oriented Innovation*, and *Transformative Innovation Policy* and *transformative research* may benefit from taking the above lessons to heart in their experiments to improve the R&I system and its relationship to society (Armeni et al., 2021; Ghosh et al., 2021; Hölscher et al., 2021; Mazzucato, 2018; Robinson et al., 2020; Smallman, 2019; Voorberg et al., 2015).

Furthermore, while the lessons shared here were gathered in a range of social labs experimenting with RRI in different parts of the European R&I funding context, the different ways in which these labs were operationalized, and the specific contexts in which this was done, give us reason to believe that they can be similarly applied by other researchers and innovators. The lessons will be especially useful for those conducting action research in living labs and other temporary participatory experiments and wishing to involve the public in efforts to address complex societal and ecological challenges. Action researchers might explore further application of the framework and its insights in local cities and (trans)national networks seeking to bring together research, education and local citizens to solve societal and ecological challenges both within and beyond Europe (Agenda Stad, 2021; Netwerk Kennissteden Nederland, 2015).

More than 80 years ago, Dewey wrote an essay called *Creative Democracy: The Task Before Us*. In it he reflected on the sharp rise of fascism. He argued that enemies of democracy, such as at that time the Nazi regime, could only be met successfully by promoting democratic attitudes and practices across society. Notably, he clearly and

powerfully explicated the following democratic creed:

> Democracy is a way of life controlled by a working faith in the possibilities of human nature [...]. That belief is without basis and significance save as it means faith in the potentialities of human nature as that nature is exhibited in every human being irrespective of race, color, sex, birth and family, of material or cultural wealth. This faith may be enacted in statutes, but it is only on paper unless it is put in force in the attitudes which human beings display to one another in all the incidents and relations of daily life
> (Dewey, 1939, p. 2).

Dewey was aware that the promotion of democracy in daily life is a continuing project and that ideas of democracy "must be continually explored afresh; [as] it has to be constantly discovered, rediscovered, remade and reorganized" (Dewey, 1990, bk. 11, p.182). More than the development of ideas, he noted "that every generation has to accomplish democracy over again for itself [as it has] to be worked out in terms of needs, problems and conditions of the social life of which, as the years go by, we are a part" (Dewey, 1990, bk. 13, p. 299). With these insights, Dewey provided us with an inspiring view of the democratic experiment that calls on us to constantly keep (re)searching for the public.

 Together with my colleagues I have tried to provide a contemporary contribution to this task. It is my sincere desire that this research and its specific contributions amount to more than updated statutes on paper. I hope that the recommendations and practical suggestions inspire further, prolonged experimentation with the democratization of R&I. I particularly hope that the accompanying lessons help those interested to develop democratic alternatives to the current structural conditions of R&I, to support all types of actors to work together and tackle persistent problems in ways that truly serve the values, needs and expectations of the publics of today and tomorrow.

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APPENDIX

Appendix A - Data Acquisition and Sources

As mentioned in the introduction, the research for this thesis contained a conceptual component and an action research component supported by a multiplicity of research methods: from primary and secondary document analysis to co-constructed pilot action narratives. In this section I will elaborate on the use of different data sources and forms of acquisition.

TABLE 6 – Overview of different data sources and acquisition

Case (research period)	Document analysis	Diagnosis interviews	Workshops (R&R templates)	Survey responses	Narrative reflection sessions	Narrative interviews	Group calls	Social lab events & Consortium meetings	Pilot action narratives
European RRI debate and the experimentalist turn (2018-2019)	Secondary sources	/	/	/	/	/	/	/	/
PE in British research funding (2018-2019)	Secondary sources	/	/	/	/	/	/	/	/
Marie Sklodowska Curie Actions social lab (2018-2022)	Primary & secondary sources	12	3 (6)	14	1	1	32	14	4
NewHoRRIzon social labs (2018-2021)	Primary & secondary sources	/	57 (105)	75	15	19	/	15	59

General approach for data acquisition

The second chapter built on desktop research into recent scholarly work on the lack of RRI implementation and mainstreaming (Christensen et al., 2020; Novitzky et al., 2020; Fisher, 2020). I specifically connected the recent call for an experimentalist turn in this literature (Nordmann, 2018; Timmermans et al., 2020) to literature on Deweyan pragmatism (e.g. Dewey, 1954; Campbell, 1995).

The third chapter builds on conceptual work within the recent systemic turn in public engagement with science studies (Braun & Könninger, 2018) to develop a pragmatist and new institutionalist framework to support further institutionalization and consolidation of public engagement in the European R&I system. To develop a conceptual framework to that end, I made use of quotes from a report on the lack of institutionalization of public engagement in British research funding. This study comprised, amongst others, "a web survey of 2,450 researchers, a web survey of 269

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staff working in role which facilitates public engagement and a qualitative study of 50 in depth telephone interviews with researchers and staff who support public engagement" (Hamlyn et al., 2015, p.9).

For the fourth chapter I built on multiple forms of data collection in close cooperation with my co-author and in an effort of co-construction with participants. As a first step in the action research process, we conducted a diagnosis of the state of RRI and public engagement in MSCA. This included a document analysis of policy documents related to the MSCA program and twelve semi-structured interviews of thirty up until ninety minutes with a variety of different MSCA stakeholders. We organized three two-day social lab workshops over the course of two years, using a total of six especially designed six reflection and reporting (R&R) templates to report on critical moments and choices before and after each of the three workshops. To further bring in participant perceptions during the process we also developed and implemented a participant survey post-Workshop 2 and designed and conducted a narrative reflection session during Workshop 3 (see below for a complete description). Adding to this, data collection took place through the organization and transcription of (over) thirty group calls in which we brought together collectives to discuss the different pilot actions. Together with data collection on the many events that followed from the social lab and the pilot actions, this provided well-rounded insight into the social lab and its impact and output.

For the fifth chapter we asked all social lab teams (including ourselves) to use the R&R template to produce small narratives on critical moments they experienced during the social lab, the choices they made in response and resulting consequences. Moreover, the templates asked teams to provide information about stakeholder selection, the design and methods applied in the workshops and to report on the design and development of the pilots. To check the congruence between this reporting and participants' experiences we made use of a post-Workshop 2 survey where apt. Moreover, the collected data were synthesized in a running narrative (cp. Polkinghorne, 1995). This was used as a basis for an in-depth one-hour narrative reflection interview. Results from the interview were reworked into concise narratives on a social lab's institutional context, process and pilot actions. For further validation and to gather lessons learned, these drafts were fed back to social lab participants in so-called narrative reflection sessions during the third workshop (cp. Roth and Kleiner, 1998). The outcome of these sessions was described by social lab teams in a final reflection report. Finally, on the basis of this we constructed a total of 59 pilot action narratives that were fed back to participants for a final member check. Complemented with notes and insights from the many consortium meetings this provided us with a thorough in-depth perspective on the entire NewHoRRIzon project, its social labs and pilot actions. Below we provide a further specification of the data sources on the MSCA social lab and the NewHoRRIzon social labs.

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Case: MSCA social lab

TABLE 7 – MSCA diagnosis interviews

#	Role	Date and medium/ location	Transcribed
1	Policy advisor MSCA	February 7, 2018, online call	No
2	High level MSCA policymaker	February 8, 2018, online call	Yes
3	Science journalist and webinar moderator	February 13, 2018, online call	Yes
4	Open Science expert	February 21, 2018, Amsterdam	Yes
5	MSCA Evaluator and RRI expert	February 23, 2018, online call	Yes
6	Private sector researcher and former MSCA grantees representative	February 28, 2018, online call	Yes
7	MSCA National Contact Point (NCP)	March 1, 2018, Den Haag	Yes
8	Private researcher and Marie Curie Alumni Association (MCAA) board member	March 6, 2018, online call	Yes
9	Technical university funding advisor and Open Science trainer	March 9, 2018, online call	Yes
10	MSCA National Contact Point (NCP)	March 27, 2018, online call	Yes
11	MCAA Policy Working Group representative	April 9, 2018, online call	Yes
12	University funding advisor	May 24, 2018, Amsterdam	No

TABLE 8 – MSCA social lab workshops co-organized

#	Date and location	R&R templates
1	June 8/9, 2018, Amsterdam	2
2	May 10/11, 2019, Amsterdam	2
3	February 27/28, 2020, Amsterdam	2

TABLE 9 – MSCA pilot action group calls co-organized

#	Pilot action	Date and medium	Transcribed
1	Knowledge Kiosk	October 9, 2018, online videocall	Yes
2	RRI Manifesto	October 16, 2018, online videocall	Yes
3	RRI CAM	December 7, 2018, online videocall	Yes
4	RRI Manifesto	December 17, 2018, online videocall	Yes
5	Knowledge Kiosk	December 18, 2018, online videocall	Yes
6	RRI Training	January 3, 2019, online videocall	No
7	RRI CAM	January 8, 2019, online videocall	Yes
8	RRI Manifesto	January 13, 2019, online videocall	Yes
9	Knowledge Kiosk	January 25, 2019, online videocall	Yes
10	Knowledge Kiosk	February 20, 2019, online videocall	Yes
11	RRI CAM	February 20, 2019, online videocall	Yes
12	RRI Manifesto	February 20, 2019, online videocall	Yes
13	RRI Training	March 20, 2019, online videocall	Yes
14	Knowledge Kiosk	March 20, 2019, online videocall	Yes
15	RRI Manifesto	April 3, 2019, online videocall	Yes
16	Knowledge Kiosk	April 4, 2019, online videocall	Yes
17	RRI CAM	April 4, 2019, online videocall	Yes
18	RRI Training	August 21, 2019, online videocall	Yes
19	RRI Manifesto	August 26, 2019, online videocall	Yes

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TABLE 9 – Continued.

#	Pilot action	Date and medium	Transcribed
20	RRI CAM	September 3, 2019, online videocall	Yes
21	Knowledge Kiosk	September 26, 2019, online videocall	Yes
22	RRI CAM	September 29, 2019, online videocall	Yes
23	RRI Manifesto	October 16, 2019, online videocall	No
24	RRI Training	November 5, 2019, online videocall	Yes
25	RRI CAM	November 20, 2019, online videocall	Yes
26	Knowledge Kiosk	February 14, 2020, online videocall	Yes
27	RRI CAM	February 19, 2020, online videocall	Yes
28	RRI Manifesto	February 19, 2020, online videocall	Yes
29	RRI Manifesto	August 26, 2020, online videocall	Yes
30	Knowledge Kiosk	September 10, 2020, online videocall	Yes
31	Knowledge Kiosk	March 24, 2021, online videocall	Yes
32	Knowledge Kiosk	February 7, 2022, online videocall	Yes

TABLE 10 – MSCA pilot actions overview

#	Pilot action	Organizational runtime and location(s)	Major outputs
1	Knowledge Kiosk	June 2018 – February 2022, Barcelona, Lisbon, Vienna, online	6 co-creative workshops and an open access guidebook
2	RRI Career Assessment Matrix (CAM)	June 2018 – December 2019, Vienna, Brussels, online	A plenary MCAA session, a participatory workshop and a policy brief presented at an important stakeholders' conference
3	RRI Training	June 2018 – December 2019, Bern, online	An NCP training, a report with recommendations and a (recorded) webinar
4	RRI Manifesto	June 2018 – September 2020, Triëst, online	A comic manifesto and a (recorded) ESOF session

TABLE 11 – Events and outputs related to MSCA pilots

#	Pilot action	Event	Date and location/ medium	Output
1	RRI CAM	MCAA Conference session and WS on RRI and career assessment	February 25, 2019, Vienna	Policy brief
2	Knowledge Kiosk	MCAA Conference poster presentation	February 25, 2019, Vienna	Poster
3	RRI Training	Net4Mobility+ training on RRI	February 26, 2019, Bern	Slides and a report
4	Knowledge Kiosk	Workshop 1 – with non-scientist citizens	May 4, 2019 Barcelona	Ideas for dialogue
5	Knowledge Kiosk	Workshop 1 – with non-scientist citizens	July 27, 2019, Lisbon	Ideas for dialogue
6	Knowledge Kiosk	Workshop 2 – with scientists	October 18, 2019, Barcelona	Ideas for dialogue
7	Knowledge Kiosk	Workshop 2 – with scientists	November 30, 2019, Lisbon	Ideas for dialogue
8	RRI CAM	MSCA Stakeholders Event Presentation	December 3, 2019, Brussels	Stakeholders' report
9	RRI Training	MCAA Webinar Winning ITNs with RRI	December 17, 2019, online	Slides and Youtube recording

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TABLE 11 – Continued.

#	Pilot action	Event	Date and location/ medium	Output
10	Knowledge Kiosk	Workshop 3 – citizens and scientists	January 18, 2020, Lisbon	Prototypes and a guidebook
11	Knowledge Kiosk	Workshop 3 – citizens and scientists	January 23, 2020, Barcelona	Prototypes and a guidebook
12	RRI Manifesto	ESOF Session: Who is responsible for transferable skills and how can RRI/OS help?	September 5, 2020, Trieste and online	Web article and Youtube recording
13	Knowledge Kiosk	NH Conference: Engaging stakeholders in research practice: the how & why of co-creation	May 18, 2021, online	Youtube recording

Case: NewHoRRIzon social labs

TABLE 12 – NewHoRRIzon social lab data gathering

#	Social lab	Date & location WS 1	Date & location WS 2	# survey resp.	Date & location WS 3	Narrative reflection session	# R&R templates
1	ERC	May 22/22, 2018, Vienna	April 11/12, 2019, Vienna	6	January 23/24, 2020, Vienna	Yes	5
2	FET	May 24/25, 2018, Trømso	March 12/13, 2019, Trømso	5	March 4/5, 2020, Trømso	Yes	6
3	MSCA	June 8/9, 2018, Amsterdam	May 10/11, 2019, Amsterdam	14	February 27/28, 2020, Amsterdam	Yes	6
4	INFRA	May 14/15, 2018, Vienna	April 10/11, 2019, Vienna	6	October 24/25, 2020, Vienna	Yes	6
5	LEIT	June 18/19, 2018, Wageningen	November 4, 2019, Wageningen	0	April 1, 2020, online	No	5
6	RISK& SMEs	June 18/19, 2018, Prague	July 10/11, 2019, Madrid	0	March 31, 2020, online	No	5
7	HEALTH	June 26/27, 2018, Frankfurt	November 22/23, 2019, Milan[56]	4	February 12/13, 2020, Tunis	Yes	6
8	FOOD	May 30/31, 2018, Trømso	February 19/20, 2019, Trømso	5	March 4/5, 2020, Trømso[57]	Yes	6
9	ENERGY	May 17/18, 2018, Vienna	April 4/5, 2019, Vienna	9	November 7/8, 2020, Vienna	Yes	6
10	TPT	May 23/24, 2018, Vienna	March 7/8, 2019, Prague	5	December 11/12, 2020, Vienna	Yes	5
11	ENV	May 17/18, 2018, Berlin	March 21/22, 2019, Berlin	3	February 20/21, 2020, Berlin	Yes	6
12	SOCIETY	May 3/4, 2018, Tallinn	May 2/3, 2019, Rome	0	February 4/5, 2020, Sevilla	No	5

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56 The HEALTH team decided to run an extra workshop to keep momentum. The third workshop was held on May 14/15, 2019 in Stockholm.
57 The FET and FOOD organizing team decided to combine the final workshop to provide a venue for exchange between participants of different labs.

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TABLE 12 – Continued.

#	Social lab	Date & location WS 1	Date & location WS 2	# survey resp.	Date & location WS 3	Narrative reflection session	# R&R templates
13	SECURITY	May 2/3, 2018, Tallinn	April 10/11, 2019, Brussels	8	November 26/27, Kieve	Yes	6
14	SPREAD	March 22/23, 2018, Madrid	November 29/30, 2018, Prague	1	October 24/25, Novi Sad	Yes	6
15	SWAFS	May 24/25, 2018, Berlin	April 1/2, 2019, Ljubljana	10	January 20/21, 2020, Bonn	Yes	6
16	EIT	April 17/18, 2018, Budapest	December 10/11, 2018, Munich	0	January 8/9, 2020, Aarhus	Yes	5
17	JRC	September 24/25, 2018, Brussels	May 6/7, 2019, Ispra	3	October 26, 2020, online	No	5
18	INSTH2020	April 20/21, 2018, Budapest	November 19/20, 2018, Munich	1	December 10, 2020, Lyngby	Yes	5
19	EURATOM	May 17/18, 2018, Brussels	January 29/30, 2019, Vienna	5	November 19/20, Warsaw	Yes	5

TABLE 13 – NewHoRRIzon social lab narrative interviews conducted

#	Role	Date and medium	Transcribed
1	INFRA Manager	September 11, 2019, online videocall	Yes
2	TPT Manager and Assistant	September 27, 2019, online videocall	Yes
3	SPREAD Manager	September 30, 2019, online videocall	Yes
4	EURATOM Manager and Facilitator	October 4, 2019, online videocall	Yes
5	JRC Manager and Assistant	October 4, 2019, online videocall	Yes
6	ENERGY Manager	October 9, 2019, online videocall	Yes
7	SECURITY Assistant	October 22, 2019, online videocall	Yes
8	INSTH2020 Manager	November 16, 2019, online videocall	Yes
9	EIT Manager	December 16, 2019, online videocall	Yes
10	SWAFS Manager	January 15, 2020, Brussels	Yes
11	ERC Manager and Assistants	January 20, 2020, online videocall	Yes
12	SOCIETY Manager	January 30, 2020, online videocall	Yes
13	HEALTH Manager	February 6, 2020, online videocall	Yes
14	ENV Manager	February 7, 2020, online videocall	Yes
15	FET Manager	February 24, 2020, online videocall	Yes
16	FOOD Manager	February 24, 2020, online videocall	Yes
17	MSCA Assistant	February 26, 2020, online videocall	No
18	RISK&SMEs Manager and Facilitator	March 27, 2020, online videocall	Yes
19	LEIT Manager	March 31, 2020, online videocall	Yes

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TABLE 14 – NewHoRRIzon consortium meetings and workshops attended

#	Meeting	Date and location/medium	Minutes
1	NewHoRRIzon Consortium Meeting	June 21/22, 2018, Berlin	Yes
2	NewHoRRIzon Consortium Meeting and Cross-sectional Workshop	October 22/24, 2018, Vienna & Reichenau a/d Rax	Yes
3	NewHoRRIzon Consortium Meeting	June 18/19, 2019, Prague	Yes
4	NewHoRRIzon Advisory Board Meeting	October 11, 2019, Amsterdam	Yes
5	SPREAD Workshop 3	October 24/25, 2019, Novi Sad	Yes
6	LEIT Workshop 2	November 4, 2019, Wageningen	Yes
7	NewHoRRIzon Consortium and Review Meeting	January 14/16, 2020, Brussels	Yes
8	LEIT Workshop 3	April 1, 2020, online videocall	Yes
9	NewHoRRIzon Consortium Meeting	June 22/24, 2020, online videocall	Yes
10	NewHoRRIzon Consortium Meeting	January 18/20 2021, online videocall	Yes
11	NewHoRRIzon Final Conference	May 17/28, 2021, online videocall	Yes
12	NewHoRRIzon Consortium Meeting	September 21, 2021, online videocall	Yes
13	NewHoRRIzon Final Review Meeting	December 16, 2021, online videocall	Yes

TABLE 15 – Analysis and narratives NewHoRRIzon interventionist pilot actions

#	Social lab	Title	Capacity building	Changing practices	Promoting implementable designs	Constructing counter-narratives	Creating communicable output	Changing rules and incentives
1	ERC	EURO-Expert and RRI				X	X	
2		Quadralogue		X	X			
3	FET	Quantum Rebels	X					
4		RRI Ethics Review				X	X	X
5		Yggdrasil		X	X			
6	MSCA	Knowledge Kiosk		X	X		X	
7		RRI CAM					X	X
8		RRI Training	X				X	
9		RRI Manifesto				X	X	
10	INFRA	Green Village	X	X		X	X	
11		Magna Charta					X	X
12		Museum Lab		X	X			
13	LEIT	Involvement of CSO in grant writing	X			X		
14		RRI Training	X					
15		ECR Research Integrity				X		
16		Privacy-preserving Onl. Verification		X				
17	RISK& SMEs	RRI Implementation in TACR				X	X	X
18	HEALTH	Enriching funding mechanisms				X	X	X
19		Patient involvement services design	X	X		X		

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TABLE 15 – Continued.

#	Social lab	Title	Capacity building	Changing practices	Promoting implementable designs	Constructing counter-narratives	Creating communicable output	Changing rules and incentives
20		Good practices of co-creation				X	X	
21	**FOOD**	Bias^2	X					
22		STEP-Up	X			X	X	X
23		Confession Time	X					
24		The STEM			X			
25	**ENERGY**	NCP Training	X			X	X	
26		Renewable Energy Knowhere	X	X	X			
27		RRI in Living Labs			X	X		
28	**TPT**	Workshop RRI/PE	X			X	X	
29		Mobalance Consensus Conference		X			X	
30		Research Goes 2 Street		X	X		X	
31		Genvoice		X			X	
32		Critical Automobility Studies Lab		X	X	X		X
33	**ENV**	Value Added Transfer				X	X	
34		Training on stakeholder integration	X				X	
35		PE: from "nice to have" to "NEED to have"				X	X	
36		Public Innovation Compass	X			X		
37		Urban Transition Coalitions		X			X	
38	**SOCIETY**	EuroSolidarity				X		
39		Responsible democracy				X		
40		RRI "Changes to the nature of work"		X		X		
41	**SECURITY**	Capacity building of RRI in HE	X					
42		RRI compass tool SMEs			X			
43		Responsible AI Framework						X
44		Extending CSR: impact on society	X			X		
45	**SPREAD**	Promotion of openness and ethics in science at IPPG		X				
46		RRI Training 2.0	X					
47		"RRIzing" University of Novi Sad	X				X	X
48		Attracting more public in TUCN	X	X				
49	**SWAFS**	Measuring the impacts of RRI		X			X	X
50		RRI Education	X				X	
51		The future of science?society				X	X	
52	**EIT**	RRI Show	X			X	X	
53	**JRC**	RRI and Connected and Automated Vehicles	X	X	X	X	X	
54	**INSTH2020**	Bintelligent	X	X	X	X		
55		RRI Lab	X		X	X	X	
56		Tips&Tricks for RRI	X			X	X	
57	**EURATOM**	Nuclear Dating	X			X		
58		Teach the teacher	X			X	X	
59		EURATOM Proposal				X		X

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Appendix B – Archive

The (action) research conducted in the context of this study lead to the collection of many different types of data. The index below offers an overview of the archived documents and their total number. Access to the archive can be requested from the author.

Case: MSCA Social Lab

For the MSCA social lab we can discern data for the diagnosis (policy documents and interviews), data on the three workshops (content, organization and workshop output) and data on the interventionist pilot actions (content, organization and pilot action output).

TABLE 16 – Data MSCA diagnosis and workshops

Topic	Type of data collected and produced	# of files
Diagnosis	Documents: policy documents, guides for applicants, instructions for evaluators, CORDIS project information	83
	Interviews: recordings and transcripts	21
Workshop 1	Content and organization: exercises and forms, program and script, slides	28
	Output: notes, pictures, R&R templates, scans	25
Workshop 2	Content and organization: Exercises and forms, program and script, slides	38
	Output: notes, pictures, R&R templates, survey results	83
Workshop 3	Content and organization: Exercises and forms, program and script, slides	21
	Output: notes, pictures, R&R templates	32

TABLE 17 – Data MSCA interventionist pilot actions

Topic	Type of data collected and produced	# of files
Knowledge Kiosk	Content and organization: descriptions, e-mail conversations, promo, pictures, questionnaire, scans, slides, tweets, group call transcripts	164
	Output: slides, two-pager, poster, open access guidebook	10
RRI CAM	Content and organization: e-mail conversations, program and script, slides, scans, tweets, group call transcripts	42
	Output: policy brief and stakeholder reports	13
RRI Training	Content and organization: e-mail conversations, pictures, program and script, promo, scans, tweets, group call transcripts	42
	Output: training and resources slides, webinar recording, questionnaire results, network report	25

TABLE 17 – Continued

Topic	Type of data collected and produced	# of files
RRI Manifesto	Content and organization: e-mail conversations, program and forms, scans, tweets, group call transcripts	26
	Output: notes, conference session recording, website posts and manifesto comic	10
General	Output: pilot action narratives	4

Case: NewHoRRIzon social labs

Here we can discern general data that provide an overview of all the social labs and pilot actions and data per Work Package (Excellent Science, Industrial Leadership, Societal Challenges and Diversity of Approached): data for the diagnosis (diagnosis reports), data on the social lab process (reflection and reporting templates, narrative construction and interviews) and data on the output (pilot action narratives).

TABLE 18 – Data NewHoRRIzon social labs diagnosis, process and output

Topic	Type of data collected and produced	# of files
General	Consortium meeting and workshop minutes	18
	Overview social labs and pilots: posters, questionnaire results, two pagers	68
Excellent Science: ERC, FET, MSCA, INFRA	Diagnosis: collection of diagnosis reports	1 (4)
	Social lab process: R&R templates, narrative interview transcripts, emplotted narratives	45
	Output: collection of pilot action narratives	9
Industrial Leadership social labs: LEIT, RISK & SMEs	Diagnosis: collection of diagnosis reports	1 (2)
	Social lab process: notes, R&R templates, narrative interview transcripts, emplotted narratives	21
	Output: pilot action narratives	7
Societal Challenges: HEALTH, FOOD, ENERGY, TPT, ENV, SOCIETY, SECURITY	Diagnosis: collection of diagnosis reports	1 (7)
	Social lab process: R&R templates, narrative interview transcripts, emplotted narratives	81
	Output: collection of pilot action narratives	22
Diversity of Approaches social labs: SPREAD, SWAFS, EIT, JRC, INSTH2020, EURATOM	Diagnosis: collection of diagnosis reports	1 (6)
	Social lab process: notes, R&R templates, narrative interview transcripts, emplotted narratives	64
	Output: collection of pilot action narratives	19

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Appendix C - List of Publications

Guide to good practices

Cohen, J. B., & Loeber, A. (2021). *Changing the research and innovation system through democratic experimentation: a guide to good practices for Responsible Research and Innovation*. University of Amsterdam. https://newhorrizon.eu/changing-the-research-and-innovation-system-through-democratic-experimentation-a-guide-to-good-practices-for-rri/

Policy briefs

Braun, R., Bernstein, M. J., Blok, V., Cohen, J. B., Daimer, S., Dragosits, S., Frankus, E., Gianni, R., Goos, K., Griessler, E., Kebo, V., Lindner, R., Loeber, A., Marschalek, I., Meijer, I., Schoisswohl, U., Tabarés, R., Tyynelä, J., Unterfrauner, E., … Wunderle, U. (2018). *NewHoRRIzon Policy Brief #1 Responsible Research and Innovation in H2020: Current Status and Steps Forward* (Issue May 2018). https://newhorrizon.eu/wp-content/uploads/2018/06/newhorrizon-rri-h2020-policy-brief-001.pdf

Braun, R., Cohen, J. B., Griessler, E., & Loeber, A. (2021). *NewHoRRIzon Policy Brief #5 Social Responsibility in Research and Innovation: From Concept to Changing Rules and Incentives* (Issue October). https://newhorrizon.eu/wp-content/uploads/2021/10/newhorrizon_policy_brief_2021_October.pdf

Cohen, J. B., Bajanca, F., Lam, M. E., Stroobants, K., Novitzky, P., Björnmalm, M., Kismihók, G., & Loeber, A. (2019). *Towards Responsible Research Career Assessment* (Issue December). https://doi.org/10.5281/ZENODO.3560479

Newspaper articles

Cohen, J. B. (2020, August 31). 'Huawei draagt bij aan de genocidale onderdrukking van Oeigoeren.' *Folia*. https://www.folia.nl/opinie/139768/huawei-draagt-bij-aan-de-genocidale-onderdrukking-van-oeigoeren

Cohen, J. B., & Saidi, A. (2021, February 11). Opinie: 'Oeigoeren hebben niets aan inclusief gepraat op Amsterdamse universiteiten.' *Het Parool*. https://www.parool.nl/columns-opinie/opinie-oeigoeren-hebben-niets-aan-inclusief-gepraat-op-amsterdamse-universiteiten~be4f9491/

Academic publications

PhD thesis chapters 2-5

Cohen, J. B., & Gianni, R. (forthcoming, 2022). Democratic Experimentation with Responsibility: A Pragmatist Approach to RRI. In V. Blok (Ed.), *Responsible Research and Innovation: An Evidence-based Reconceptualization*. Springer.

Cohen, J. B. (2022). Institutionalizing public engagement in research and innovation: Toward the construction of institutional entrepreneurial collectives. *Science and*

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Public Policy, 1–13. https://doi.org/10.1093/scipol/scac018

Cohen, J. B., & Loeber, A. (under review). Excellent Engagement: sparking institutional entrepreneurial collectives to promote public engagement in 'excellent science.'

Cohen, J. B., Loeber, A., Marschalek, I., Blok, V., Bernstein, M. J., Tabarés, R., Gianni, R., & Griessler, E. (under review). Expanding Horizons: organizing temporary participatory experiments to promote collective institutional entrepreneurship in the research and innovation system.

Other

Braun, R., Christensen, M. V., Cohen, J. B., Frankus, E., Griessler, E., Loeber, A., Hönigmayer, H., & Starkbaum, J. (under review). Social labs as temporary intermediary learning organizations to implement complex normative policies. The case of Responsible Research and Innovation. *The Learning Organization*.

Marschalek, I., Unterfrauner, E., Focke-bakker, E., & Cohen, J. (2021). Social Labs as Transformative Approach to Implement Responsible Research and Innovation. *16th International Public Communication of Science and Technology Conference (PCST 2020+1),* 1–7.

Marschalek, I., Blok, V., Bernstein, M. J., Braun, R., Cohen, J. B., Daimer, S., Hofer, M., Nieminen, M., Seebacher, L. M., Thapa, R. K., Unterfrauner, E., & Christensen, M. V. (under review). The Social Lab as a method for experimental engagement in participatory research. *Journal of Responsible Innovation*.

Potjer, S., & Cohen, J. B. (under review). Engagement: de rol van onderzoekers in experimenteel bestuur. In E. Dammers & E. Kunseler (Eds.), *Balanceren op de grens van wetenschap, beleid en samenleving*. PBL.

Shanley, D., Cohen, J. B., Surber, N., & Stack, S. (2022). Looking Beyond the "Horizon" of RRI: Moving from Discomforts to Commitments as Early Career Researchers. *Journal of Responsible Innovation*, 1–9. https://doi.org/10.1080/23299460.2022.2049506

Tabarés, R., Loeber, A., Bernstein, M. J., Griessler, E., Blok, V., Nieminen, M., Cohen, J. B., Hönigmayer, H., Wunderle, U., & Frankus, E. (under review). Challenges in the Implementation of Responsible Research and Innovation across Horizon 2020. *Journal of Responsible Innovation*.

Deliverables

Bernstein, M. J., Griessler, E., Cohen, J. B., Loeber, A., Seebacher, L. M., Marschalek, I., & Unterfrauner, E. (2018). *NewHoRRIzon Deliverable 2.1: Diagnosis: RRI in Excellent Science*.

Bernstein, M. J., Brandstätter, T., Griessler, E., Cohen, J. B., Loeber, A., Seebacher, L. M., Marschalek, I., Unterfrauner, E., & Voigt, C. (2019). *NewHoRRIzon Deliverable 2. 2: First Cycle: Developing Actions and Activities for RRI in Excellent Science*.

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Cohen, J. B., Griessler, E., Hönigmayer, H., Loeber, A., Marschalek, I., Seebacher, L. M., Stack, S., & Unterfrauner, E. (2020). *NewHoRRIzon Deliverable 2. 4. Third Cycle: Refinement of Actions and Activities in Excellent Science.*

Griessler, E., Hönigmayer, H., Brandstätter, T, Cohen, J. B., Gerhardus, A., Thapa, R. K., Loeber, A., Marschalek, I., Seebacher, L. M., Stack, S., & Unterfrauner, E. (2021). *NewHoRRIzon Deliverable 2.5 Actions and Activities to Realize RRI in Excellent Science.*

Loeber, A., & Cohen, J. B. (2018). *NewHoRRIzon Deliverable 8.1: Framework for comparative assessment.*

Loeber, A., & Cohen, J. B. (2021). *NewHoRRIzon Deliverable 8.2: Comparative assessment and evaluation of the Social Labs.*

Thapa, R. K., Griessler, E., Bernstein, M. J., Wickson, F., Loeber, A., Cohen, J. B., Marschalek, I., Seebacher, L. M., & Unterfrauner, E. (2019). *NewHoRRIzon Deliverable 2. 3 Second Cycle: First Adaption of Actions and Activities for RRI in Excellent Science.*

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