Demonstrating the deep institutionalisation of de facto responsible research and innovation (rri) in participatory market contexts: Examples from Bolivia and Netherlands

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ABSTRACT

We reprise the concept of *deep* institutionalisation of responsible innovation, considering why and how it matters to add the qualifying adjective *deep*. Simultaneously, we show how specific normative features of responsibility are enacted, amplified and potentially institutionalised through *markets.* The paper proceeds in three steps. First it distinguishes *de facto* responsible research and innovation (rri) as the study of how actors frame, enact and govern responsibility through existing practices ('in the wild'), in contrast to Responsible Research and Innovation (RRI), which we reserve to refer to the design of particular policy artefacts ('from above'). Second, the paper proposes a diagnostic framework comprising four axes to facilitate a critical and reflexive empirical interrogation of deep institutionalisation (DI) of responsible innovation in a variety of settings. We argue that DI involves four processes: i) *emergence*; ii) *maturation*; iii) *overflowing*; and iv) *alignment*. Third, deploying the DI framework, the paper explores *deep* institutionalisation in two very different cases: an inter-organisational case of Participatory Guarantee Systems (PGS) in Bolivia; and an intra-organisational case of societal engagement within the organization of TNO in the Netherlands. Both cases show how particular market features become recursively *qualified* through the four processes that comprise deep institutionalisation.

Key words: Deep Institutionalisation, *De facto* responsible research and innovation rri, RRI, participatory society, markets, TNO, Netherlands, Participatory Guarantee Systems, Bolivia

"Political and moral reflection is at the heart of markets and not pushed out to their fringes"
Callon (2016: 17)

Introduction

The editors of the current Special Issue (SI) called for contributions to enrich and develop a recent thread within responsible innovation scholarship referred to as 'Responsible Research and Innovation (RRI) in Industry' (Stahl *et al.* 2017, Gurzawska *et al.* 2017, Stahl 2018, Inigo *et al.* 2020, Van de Poel *et al.* 2020). This stream of new research is motivated by the observation that whilst RRI has its origins in publicly-funded research environments, a great deal of research and innovation is undertaken by private companies (Stahl 2018). The authors within this stream have sought to redress this omission by focussing attention on the integration of RRI into the practices and tools of corporate management (Stahl *et al.* 2017). And yet findings to-date from 'RRI in Industry' researchers suggest that the integration of RRI into the decision-making, multi-criteria evaluation and innovation management processes of companies has been a struggle (Inigo *et al.* 2020). More nuanced is the recognition that "companies can be motivated to do RRI but not primarily in the form of RRI tools that are brought to them from the outside. Rather*, it is better to start from what companies already do and try to broaden that*." (Van de Poel *et al.* 2020: 700, italics added). This

recommendation to begin with an appreciation of how responsibility is interpreted, enacted, structured, and incentivised – in a nutshell how it is *a-priori* institutionalised – resonates with the notion of *de facto* governance (Rip 2018).

Three conceptual questions therefore implicitly underpin the Special Issue and they are explicitly surfaced and addressed within this article. They are: i) what is meant by *RRI?;* ii) what is meant by *institutionalisation?;* and iii) what is meant by *'industry'*? We have been grappling with the first two of these three questions for over ten years, afforded by our participation in two European Commission funded projects: Res-AGorA (2013-2016)[1,2] followed by JERRI (2016-2019)[3]. Res-AGorA provided an opportunity to undertake 26 exploratory studies across diverse sites and situations of research (and) innovation in Europe and South America. This suite of *inter-organisational* and *intra-organisational* cases analysed how actor constellations formed, around different responsibility framings, with responsibility enacted through the design and deployment of different governance mechanisms – constituting the study of what we later called *de facto* responsible research and innovation (or rri) (Lindner *et al.* 2016, Randles *et al.* 2016a, Loconto and Hatanaka 2018, Randles *et al.* 2022). We found that very different actor constellations, deploying contrasting (and contested) responsibility framings, encoded different visions of responsibility into a variety of 'soft' governance instruments and mechanisms. Res-AGorA researchers thus hypothesised that *deep* institutionalisation of *de facto* rri was where (new) responsibility framings were compatible with, indeed were often a direct evolution of, prevailing institutional logics that structured and incentivised research and innovation systems. The JERRI project then provided an opportunity to underpin the notion of *deep* institutionalisation with greater theoretical rigour supported by the rich insights from Organisational Institutionalism (OI) (Randles 2017). A conceptual architecture was developed under JERRI to underpin and theorise *deep* institutionalisation, with an important building block being the analytical necessity to distinguish *de facto* responsible research and innovation (rri) from Responsible Research and Innovation (RRI).

The primary purpose of this article is to enrich and advance the discussion about whether and how rri/RRI should/can be institutionalised by examining two cases of *deep* institutionalisation of *de facto* rri in participatory market contexts: 1) an *inter-organisational* case tracing the development of a participatory guarantee system (PGS) developed by the Bolivian Coordinating Unit of the National Council for Ecological Production (UC-CNAPE); and 2) an *intra-organisational case* which involved the three-year reform of the Strategic Advisory Councils (SACs) within TNO[4] in order to increase the participation of women and civil-society actors in this cross-organisational and permanent level of TNO governance. It proceeds in three steps. First, we reprise the conceptual architecture developed by the current authors to define and qualify *deep* institutionalisation of *de facto* responsible research and innovation (rri). Second, it operationalises this objective by proposing a diagnostic framework comprising four axes which enables researchers to critically interrogate deep institutionalisation (DI) – *do we see it? what does it look like? what difference does it make?* – by describing the presence/absence and flux of its proposed defining features. Third, drawing on longitudinal action research involving multiple methods of data capture and analysis within a broad

[1] The Responsible Research and Innovation in a Distributed Anticipatory Governance Frame (Res-AGorA) project received funding (2013-2016) from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 321427 (http://Res-AGorA.eu/).

[2] Res-AGorA: http://Res-AGorA.eu/news/navigating-towards-shared-responsibility/.

[3] The Joining Efforts for Responsible Research and Innovation (JERRI) project received funding (2016-2019) from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 709747 (https://www.jerri-project.eu/jerri/index.php).

[4] TNO is The Netherlands Organisation for Applied Scientific Research. It is a Research and Technology Organisation (RTO) that counted 3,400 employees in 2023.

abductive approach that seeks to learn from within-case and cross-case analysis, the paper applies the DI framework to illustrate the *deep* institutionalisation of *de facto* rri in the intra- and inter-organisational cases. The analysis shows how particular market features – or market *qualities* such as the widen(ed) participation of civil society actors, becomes recursively *qualified* – and therefore deepened, through the four processes that characterise deep institutionalisation. Our article shows how market variety is *constituted through* the enactment of processes which have the potential to deeply institutionalise normative responsibility qualities, such as participation, thus offering a response to the third question 'what is industry'? We conclude by discussing how markets might provide a route to the deep institutionalisation of particular visions and narratives of responsibility, including the objectives of *participatory society*.

Conceptual architecture: deep institutionalisation of *de facto* responsible research and innovation

In this section we summarise the elements of a conceptual architecture, developed through earlier theoretical and empirical analysis to understand how *de facto* responsible research and innovation becomes *deeply* institutionalised. In this article we extend the framework to demonstrate the institutionalisation of normative qualities, such as inclusive participation, in and through markets.

De facto responsible research and innovation (rri)

De facto rri starts from an actor-network approach that follows actors 'in the wild' (Latour 1987, Callon and Rabeharisoa 2003), to understand how different conceptions of responsibility become framed and codified in material 'devices' (Callon *et al.* 2007) by actors who can (or cannot) stabilise them within organisations, networks and systems (Callon 1991). Elsewhere we have proposed that *de facto* rri refers to '*what actors already do, in collective fora, in order to embed institutionalised interpretations of what it means to be responsible; into the practices, processes, organisational structures and outcomes of research and innovation'* (Randles 2017: 20). This is *de facto* rri (Randles *et al.* 2014, Lindner *et al.* 2016, Randles 2017, Randles *et al.* 2022) and it is theorised as historically contingent, emergent and always 'in the making' (Lindner *et al.* 2016, Kuhlmann *et al.* 2016, Randles *et al.* 2014, Randles *et al.* 2022). Paying attention to the long, forgotten or neglected pre-histories of R(R)I (to use Shanley's preferred acronym) (Shanley 2021, 2022; Randles *et al.* 2022) shows how responsibility was 'made to matter' by the actors involved, as new framings of responsibility encounter existing interinstitutional system logics (Thornton *et al.* 2012). New interpretations of responsibility, expressed through the words and actions of new discourse coalitions produce sites of competitive struggle (Hajer 1997; Randles *et al.* 2022), yet have a tendency to 'sediment over' rather than displace prior responsibility frames, norms and practices, serving to enlarge repertoires, or 'patchworks', of responsibility (Randles 2017, Randles *et al.* 2022, Owen and Pansera 2019, Owen *et al.* 2021a).

Responsible Research and Innovation (RRI)

While 'RRI in Industry' authors refer to broad range of definitions of RRI (Von Schomberg 2013), there is the implicit assumption that RRI is an immutable, settled and constant concept. Scientometric analysis of reports and publications authored by policy/practitioner and academic contributors reveals consensus across the discursive pre-history of RRI (i.e., before it was labelled as such) (Tancoigne *et al.* 2016). From 1998-2014 and associated with successive Science and/in/with Society actions within European Commission's Framework Programmes (FPs), the wider discourse of

RRI converged around three normative orientations: i) *governance:* encouraging dialogic processes advocating both greater participation of civil society actors and greater inter-disciplinary working as the hallmarks of responsibility in research and innovation, with a focus on contexts of the governance of new and emergent technologies; ii) *meanings of responsibility* : with an emphasis on prospective and anticipative rather than retrospective approaches; and iii) *goals of research and innovation*: with a focus on addressing societal 'grand' challenges (Macq *et al.* 2020, Randles *et al.* 2022). And yet in a sudden and quite aggressive turn in 2014, the coding of RRI into 5 keys[5] by the European Commission (EC) as one means to more directly focus policy attention on industrial actors and competitiveness turned RRI into what Flink and Kaldewey (2018) refer to as a bizarre policy artefact.

Indeed, Owen *et al.'s* (2021b) history the EC's revision of RRI as a policy artefact at this moment debunks the assumption that RRI is immutable. This history demonstrates that RRI policy is itself the product of the dynamic interaction and competitive struggle between different discourse coalitions representing different logics within the EC, and their alignment with different academic communities. Interestingly, many of the authors within the 'RRI in Industry' stream were directly involved in European Commission funded projects such as Responsible Industry (2014-2017)[6] and PRISMA (2016-2019).[7] The objective of these projects was explicitly instrumental. It was to *implement* RRI (as the 5 keys of the EC) *in* the corporate sphere, identifying and seeking to overcome barriers to its adoption.

And yet, Griessler *et al.* (2023), similarly to Owen *et al*. (2021b), now point to and trace the onset of fragility and instability of RRI as a policy concept of the European Commission, and indeed others have deployed the Deep Institutionalisation (DI) framework (Randles 2017) to analyse this fragility (Daimer *et al.* 2023). The point to highlight is that the mutability of RRI, as both a product and site of political struggle is largely overlooked by the 'RRI in Industry' scholars, with non-trivial implications for what it means to *'institutionalise RRI'.*

rri/RRI dynamics

Competitive struggles over alternative visions of responsibility are increasingly being published (Daimer *et al.* 2023; Griessler *et al.* 2023; Owen *et al.* 2021b; Randles 2017) and point to RRI's dynamic mutability. Empirical evidence thus points to the emergence and sedimentation of new narratives of both *de facto* rri *and* EC institutionalised RRI. In sum, there is no 'it' to the 'it' of RRI. It can be and was, cleaved, weakening the previous policy/academic consensus and partly *de*-institutionalising what went before (Dacin and Dacin 2008) with a resulting patchwork of responses. Therefore, an important object of study is the interaction between RRI and rri. Appreciating that both rri and RRI are dynamic, an important theoretical and empirical question in the study of deep institutionalisation is: What happens when *de facto* rri and RRI encounter each other? To address this, we first explore the theoretical underpinnings of the deep institutionalisation of *de facto* rri, then we propose a diagnostic framework for its analysis.

Capturing rri/RRI dynamics by studying deep institutionalisation

[5] The five keys are: public engagement, research ethics, gender equality, science education, and the open access in scientific publications. The sixth key of "governance" was dropped.

[6] https://cordis.europa.eu/project/id/609817.

[7] https://cordis.europa.eu/project/id/710059.

Inspired by Karl Polanyi's '*The Great Transformation*' (1944) which traced the economic process that brought into being what could be considered the most enduring and resilient innovation of the nineteenth century: *market society*; we have proposed elsewhere that Polanyi's market society represents an empirical archetype of *deep* institutionalisation (Randles *et al.* 2014). The identification of this archetype is distinguished by two aspects: 1) the invisibilisation (and a lack of reflexivity by actors) of the entanglements and inter-dependencies that enabled the innovation of market society; and 2) a system of integrated, interconnected, and mutually co-aligned governance tools, structures and mechanisms that maintain its functioning. "Traces and legacies earlier institutional regimes or alternative normative models" can still be detected within the market society (Randles *et al.* 2014: 32).

Transferring the characteristics of market society to consider the characteristics of *deep* institutionalisation of responsible innovation, we proposed that such a process would contain three distinguishing features. First is its long-haul, long-term and resilient nature; including tendencies to socio-technical lock-in. Second is its transformative dynamic: the co-evolution of technological and governance innovations serves to transform actors. Third is its inter-dependent, systemic nature comprising integrated and mutually supporting infrastructures of technologies, social norms and routines, governance tools as well as economic and ideological logics (Randles 2017: 5)

We lean heavily on the institutional logics perspective developed by Patricia Thornton and colleagues (Thornton *et al.* 2012). They build on Scott's (1995) three-pillars of institutions: the regulative (concerned with aspects of efficiency and expediency), cultural-cognitive (concerned with matters of expertise and shared cultural understandings) and normative pillar (concerned with ethical and moral bases conferring social obligations, rewards and sanctions). They highlight the interconnected material, symbolic, and normative elements that constitute institutional logics. Centralising the significance of materiality reprises the important role of technologies, techniques, and devices in the *performation* of responsibility put forward by Callon (2010). Such an understanding enables us to explore the normative dimension of debates about the nature and distribution of responsibility(ies) in our settings of *de facto* responsible research and innovation. Particularly when they form the basis of competitive struggles over the determination of what counts as good (ethical/responsible) conduct and the tools and methods that are designed to attribute (and claim) good standing and virtue.

Institutional logics as societal orders are understood as historically contingent and historically constituted (Ocasio *et al.* 2017, Battilana *et al.* 2017) and we can argue that they are therefore necessarily local in origin and in their empirical unfolding. Paying attention to intra- and inter-organisational settings offers insights into how and under what conditions hybrids and new forms of hybrid organising emerge as responses to external forces or the agency and creativity of internal organisation actors (Battilana *et al.* 2017). In our situations of *de facto* rri, this would manifest as variety generation, producing organisational change, innovation and pluralism. We can trace these as existing organisations adapt to – and new organisational forms emerge in response to – different responsibility framings and their recursive qualification, involving the blending of different institutional logics of *de facto* rri.

In terms of the suites of inter-connected governance devices that act as performative carriers of particular responsibility visions, these often include evaluative performance systems such as assessment, accreditation and certification schemes. Such schemes confer 'status' by providing guarantees of operational compliance, produce rankings of social actors according to specified responsibility criteria, and serve-up this version of responsibility, and the examples which exemplify it through their evaluation as high-ranking to a range of external audiences (Arnold and Loconto

2021, Busch 2011). Reputation evaluations, in contrast, provide general expectations about an organisation's future behaviour based on evaluations of its past performance (Deephouse and Suchman 2008). Building on Deephouse and Suchman, we posit that both status and reputation-building activity can be mobilised strategically as part of the building of discourse coalitions to promote and 'bank' discursive evidence of good conduct according to particular (and changing) responsibility criteria, as accruable capital to build legitimacy and protect against future legitimacy challenges, even where the source and nature of future legitimacy challenges may not be known. Thus, the recursive qualification of particular framings of responsibility according to different and differently combined institutional logics form an important element in terms of the stakes in *de facto* rri.

Tensions and struggles over the normative pillar – who gets to determine and control what criteria count as morally and ethically responsible and which actors become involved in its adjudication – has implications for institutional stabilisation and change but remains under-researched. Not only does building legitimacy as a strategic asset serve to buttress incumbents in the face of legitimacy challenges to their standing as socially responsible entities (Deephouse and Suchman 2008), but influencing the social construction of legitimacy judgements can be seen as a collective strategy in new responsibility discourses that are emerging with rri and sedimenting with RRI. Paying attention to these struggles are therefore central to the study of *de facto* responsible innovation, which remains under-studied.

Given the market-based logic of innovation, we turn to markets as a form of economic organisation, where actors collectively enact (organise/shape) and recursively amplify specific market *qualities*, through the development of market *devices* (Callon *et al.* 2007, Sjögren and Helgesson 2007). Callon and colleagues refer to actor strategies of framing market problems – including contested ethical and responsibility problems – and their proposed solutions within multiple overlapping arenas (Delemarle and Larédo 2014). Here, '*individual and collective actors interact to define the cognitive and normative dimensions of a problem'* (Bonneuil *et al.* 2008, in Delemarle and Laredo 2014: 2). Market organisation and market shaping simultaneously involve the building of market infrastructures, proposed as a set of rules (what actors are allowed to do) of norms (what they ought to do) and values (what they want to do) (Delemarle and Larédo 2014) involving groups of diverse actors – or hybrid fora (Callon and Rip 1992, Rip 2018). Markets emerge, stabilise and enlarge (or not), through the work of market actors participating in multiple overlapping and variously aligned 'arenas'. Thus, it would be evident to expect markets in their substantive form to be highly specific, highly diverse and differently instituted as noted long ago by Karl Polanyi. Through this article, we argue that markets provide a context for investigating *de facto* rri that to-date has been neglected by responsible innovation scholars.

A Diagnostic Framework to analyse Deep Institutionalisation (DI)

The next step in our analysis proposes a simple diagnostic framework that translates the concept of *deep* institutionalisation of *de facto* rri, into a research protocol, to guide empirical investigation into potentially highly diverse, contrasting and so-far unconceived cases of it. Thus, by interpreting the presence/absence of features that we have proposed as a result of earlier abductive phases to characterise *deep* institutionalisation, we aim to better 'know it when we see' it. But not in a deterministic yes/no or is/isn't sense. Instead, we propose to reflexively learn from partial, variegated, puzzling, or so-far unimagined approximations to it, thereby advancing and nuancing our currently underdeveloped theory of *deep* institutionalisation.

Our proposed Deep Institutionalisation (DI) analytical framework comprises four axes (see Randles 2017 for the detailed protocol):

1. A historically unfolding process over time**,** emphasising its long-term and resilient nature involving multiple co-existing historically contingent 'institutional logics' of responsibility. In line with the analysis of institutional logics, elsewhere we conceived them as six 'ideal types' or Grand Narratives of *de facto* rri (Randles *et al.* 2016a, Randles 2017):

- Narrative A/ *Republic of Science,* where the logic is to maintain the tentative contractual State/Science balance where science is autonomous with little public scrutiny or government control.
- Narrative B/ *Technological Progress*, where the logic requests scientists to weigh risks and harms as well as benefits of new and emerging technologies.
- Narrative C/ *Participatory Society,* which follows a risk society logic, where citizens have a heightened appreciation of an uncertain future, which in turn opens the right for a wider constituency of actors to participate in the analysis of specific technological debates and questions around the shaping of innovation futures that unfold.
- Narrative D/ *The Citizen Firm,* is a logic where the requests for scientific ethics, and accountability to a wider range of stakeholders is required also from private companies engaged in R&I.
- Narrative E/ *Moral Globalisation,* concerns the local embedding of care for 'distant' economic and socio-ecological justice processes and outcomes, accommodating diverse cultures of R&I.
- Narrative F/ *Research and Innovation With/for Society oriented to addressing societal problems*, represents the most recent wave of mission-oriented policies where co-production, co-creation and co-construction of societal problems and solutions are to guide R&I.

2. A maturation process, represents the 'deepening' or amplification of the extent to which a particular framing of responsibility becomes performed as such, i.e., involves a system of organising routines, methods, techniques, procedures, material devices and incentive structures, embedding particular understandings of responsibility into organisational practice and orienting intra- and inter-organisational relations.

3. A systemic 'overflowing' of responsibility frames, where responsibility discourses and their attached actor coalitions 'extend' across networks to become systemically and relationally inter-connected, enrolling new actors and creating new actor groups (such as new professions, and new intermediaries) who were not present earlier. Technical instruments (devices) operate as boundary objects (Star and Griesmer 1989, Star 2010) contributing to the enrolment of new actors legitimating the new frame of responsibility. Boundary-spanning institutional work extends overflowing.

4. Multi-level alignment**,** where vertical multi-level policy coherence in interpretations of responsibility are present. For example, we can see alignment between organisational practice and organisational policy, and between local framings of responsibility and national and international policy.

Methodology

Abduction provides the overarching methodology for our work. Continuing the approach employed in Res-AGorA, abduction involves the continual search for empirical material which confronts and forces change to the theoretical propositions (temporarily) put forward whilst the theoretical propositions proposed are the best explanation on offer at the time (neither causally deductive nor

empirically inductive) (Randles *et al.* 2016a). Abduction demands action and provides a means of determining action in the face ongoing contingency and ambiguity (Adams *et al.* 2009). We adopted a case study method, (Ridder 2017, Yin 1984) for the purpose of comparatively demonstrating the empirical application of the DI framework. Three phases of abductive theory development were thus employed.

First, data collection and analysis has been conducted since 2013. The data were collected during two EU-funded RRI projects – Res-AGorA (2013-2016) and JERRI (2016-2019) – by the 2nd and 3rd authors, and were both analysed with the first author during the research projects. Consistent with the abductive approach of the study, common across the two illustrative cases of PGS in Bolivia and TNO in the Netherlands, is the deployment in both settings of multi-method multi-stage longitudinal action research.[8]

Second, the concept of *deep* institutionalisation of *de facto* responsible research and innovation (rri) was conceived within the Res-AGorA project that ran from 2013-2016 (Randles *et al.* 2014, Lindner *et al.* 2016). This conceptual framework emerged from findings across a number of case studies conducted through the three phases of the Res-AGorA empirical programme (including the Bolivian PGS case), with studies undertaken across multiple sites and situations of research and innovation, involving different actors, different ways of framing responsibility problems, and the deployment of different governance instruments and mechanisms (Walhout *et al.* 2016, Randles *et al.* 2016a, 2016b. in Lindner *et al.* 2016).

Third, cross-case analysis involved the three-author research team working together to interrogate the data from both cases to analyse the similarities, differences, presences and absences, that surfaced by looking across the two cases together rather than individually, through the common analytical lens of the 4-dimensional DI framework. The aim was to consciously and reflexively seek greater analytical insight by undertaking systematic cross-case analysis. The two case examples of PGS and TNO therefore whilst acknowledging some differences in methodological approaches, hold important dimensions of method in common: both rest on a wider commitment to abduction as iterations between theory-building and empirical analysis, both involve longitudinal action research involving the sustained and deep engagement with subjects and participants lasting more than three years, and both utilise mixed methods comprising text and language analysis, interviews, workshops, extended on-site engagement and immersion with participants, in order to trace how responsibility is understood, conditioned and enacted in both cases.

Introducing the two cases

Case: Participatory Guarantee Systems in Bolivia

Organic agriculture – ecological agriculture or agroecology more specifically – is a policy priority that was introduced in Bolivia as part of the national response to the core societal challenge of food insecurity and biodiversity loss. Following three years of consultations guided by the Ministry of Rural Development, Agriculture and the Environment – with the participation of Bolivian Association of Organic Farmers' Organisations (AOPEB), other national organisations, and six specialised UN

[8] A chronology and timeline of the specific steps of the longitudinal multi-method action research in the PGS (from 2013 and 2021) and TNO (from 2016-2019) cases is presented in Table 1, Appendix 1. The table details the mix of methods employed in both cases, comprising analysis of policy documents and reports, convening and participating in workshops, conducting interviews, and engaging in participant-observation at meetings and conferences.

agencies – the Ecological Law 3525 was passed in 2006. The law established a public agency (CNAPE) to implement the law and, with the National Food Safety Authority (SENASEG), to act as the authority over the control system. The law also created a way to institutionalise agro-ecology by requiring municipal level governments to incorporate programmes and/or projects for training, technology diffusion, promotion, research and/or development of ecological production into their municipal development plans.[9] The Ministry of Education was required to incorporate information about the environmental, nutritional, economic and cultural benefits of ecological production into their academic curricula, while CNAPE was also given the mandate to create and strengthen specialised research and technological innovation centres for ecological production and provide incentives for increasing research and innovation. Research and innovation programmes were focused on locally grown and culturally appropriate food such as quinoa, maize, llama meat and local pastries.

The core innovation developed by the coordination unit of CNAPE (UC-CNAPE) was a participatory guarantee system (PGS) that relies upon the scientific peer review model where farmers are the experts who peer-evaluate other farmer-experts (Loconto *et al.* 2016). Emerging independently in Japan, France and Brazil, the first international conference on PGS was held in Torres, Brazil in 2004 (Loconto and Hatanaka 2018). The presence of 45 people from 21 organisations and 5 countries – with representatives from MAELA, IFOAM, GIZ and FAO[10] – offered great legitimacy to the PGS project and was responsible for the inclusion of PGS in the Brazilian organic law (Niederle *et al.* 2020). A Bolivian delegation participated in this meeting and used these learnings to build the participatory Bolivian system.

UC-CNAPE's role in the deep institutionalisation of the reformed food system is through its promotion of the Law 3525 and by disseminating all aspects of agro-ecological farming. Almost simultaneously in February 2012, a ministerial decision approved the national technical standard for PGS, which provided for an ecolabel in recognition of the work of smallholders. It has achieved the ultimate aim of improving these family farmers' chances of achieving differentiated access to local markets, as well as raising their profile as agro-ecological farmers. Some of the major outcomes of this joint programme that was completed in 2017 were: 7 000 producers trained in agro-ecology; 17 PGSs consolidated, with 650 producers classed as agro-ecological farmers and 2 700 producers classed as in transition, totalling around 3400 agro-ecological farmers in the highland, valley and tropical ecoregions. Support was also given to local marketing spaces such as farmers' markets, including the Raymi organic farmer's market in Sipe Sipe municipality (Cochabamba), Bio Tarija, and Bio Achocalla.

Case: TNO

TNO was established by public law[11] in 1932 as a not-for-profit knowledge organisation to support companies and governments with innovative, practicable knowledge. The objective of TNO is to conduct applied scientific research and innovation projects that contribute to the common good (Art. 4 TNO Law). In 2018, TNO restructured its internal organisation from a *matrix*-structure, with five departments ('Themes'), each responsible for a specific application domain and, *perpendicular*

9: http://www.pnud.bo/webportal/%C3%81reasdeTrabajo/Reducci%C3%B3ndelaPobreza/IniciativasLocales/ BOL70779.aspx.

[10] Movimiento Agroecológico de América Latina y el Caribe (MAELA), International Federation of Organic Agriculture Movements (IFOAM), German Technical Cooperation (GIZ), Food and Agriculture Organization of the United Nations (FAO)

[11] https://wetten.overheid.nl/BWBR0003906/2022-05-01. Articles 4 and 5 outline TNO's objectives: to conduct applied scientific research and to contribute to the application of research findings to serve the common good. TNO's mission is to 'strengthen the competitiveness of companies and the welfare of society in a sustainable way' (www.tno.nl).

to these departments, a cluster of expertise groups, of 30-60 people each, typically working for more than one domain; to a *units*-structure, with nine Units, each working for a specific domain, with relevant expertise groups *within* each Unit, mostly working for that particular Unit.[12] The nine 'units' each present the relevance of TNO's work in addressing different, pressing, societal challenges, in 'accelerating innovation', and in working towards a 'better society'. In order to promote societal engagement, each of TNO's departments is required to have a 'Strategy Advisory Council' (SAC) to enable TNO to (better) align its strategy to concerns and needs in society. The Managing Directors of the different Units are responsible for finding a chair for the SAC for 'their' Unit, and together this chair, in collaboration with the SAC are tasked to find other members for the SAC. Typically, they convene twice per year to discuss their Unit's strategic plans and to invite advice from the SAC [13]. Effectively, TNO puts into practice, whenever possible, collaborations with civil society organisations, government, industry and academia in what has become known as a Quadruple Helix approach (Carayannis and Campbell 2009).

In this article we reflect specifically on TNO's activities and actions to make the SACs more diverse and inclusive (Steen and Nauta 2020) as an example deep institutionalisation. In 2015 the SACs comprised a total of 58 people: 29 from industry, 13 from government, 7 from academia, and (only) 4 from civil society organisations. In addition, there was a gender unbalance, with (only) 7 female members in a total of 58. Partly due to the JERRI initiative the composition of the SACs changed: membership of people from Civil Society Organisations increased from 4 (7%) to 10 (13%) and female membership increased from 7 (12%) to 18 (23%). Examples of CSOs in the SACs include Urgenda, which promotes sustainable development and climate action and Natuur en Milieu, which promotes sustainable development and protection of the environment.[14] This was achieved by enlarging the membership to include more women, more representatives of civil society organisations and more young people, creating a permanent and transformative change to the governance of TNO involving a widening of the participation and perspectives feeding 'outside-in' to the strategic deliberations and decision making of TNO and 'inside-out' enlarging the constituency of actors associated organisationally with TNO (Steen and Nauta 2020).

Demonstrating deep institutionalisation: applying the DI framework to analyse the two cases of PGS in Bolivia and SACs in TNO

In this section we explore how each of the four axes of deep institutionalisation unfolded in each case.

1. A historical unfolding process: both cases are locally contingent and emergent

The Bolivian case demonstrates how the interpretation of responsibility dates from pre-hispanic times. It involves building trust, collaboration and mutual learning across multiple and diverse local stakeholders. What is important to highlight about the PGS is that it challenges the idea that peer review (that comes from science) is the only way to approach social control (which is the official word for how they conduct their audits). On the contrary collective learning across stakeholders, in particular through the mechanism of peer-review by the farmers themselves, is a way of democratising the process (Loconto and Hatanaka 2018). So, the challenge for market-driven

[12] https://www.tno.nl/en/about-tno/organisation/. These Units were further re-organized at the end of 2022; they are now: Mobility and Built Environment (merger of 1 and 9); Defence, Safety and Security (same as 3); Energy and Materials Transition (merger of 2 and 4); Healthy Living and Work (same as 5); High-Tech Industry (mainly 6); and ICT, Strategy and Policy (merger of 7 and 8).

[13] Art. 15(4) TNO Law; one of TNO's obligations (in public law) is to have Strategy Advisory Councils (SACs).

[14] TNO Annual Report 2020, pp. 42-43 (https://www.tno.nl/media/18208/tno_annual_report_2020.pdf).

approaches is who can you trust if there is no external evaluation of the conformity to technical standards? The Bolivian PGS resolves this in two important ways. First, it focuses on direct participation in both the peer review process and by selling mainly to members of their broader community – so people who live close by or who also are active in the organic movement are the primary beneficiaries. Second, they build trust in the people to be responsible and control each other through the practice and protocols dimensions of its control system – so that people who are not directly participating can trust the people who are doing the peer review. Here the legitimacy from the State helps as does the indigenous cosmology and respect for nature that are (somewhat stereotypically) tied to the communities who are producers. In fact, the Bolivian case is an example of a competing narrative and discourse coalition building to oppose Industrial Organic.

Similarly, the TNO case appeals to 'poldering' practices and governance of the Middle Ages. This term refers to the need to collaborate and achieve consensus, invoking historical references to the need to work collectively to build and maintain dikes, reclaim land and regulate water levels, and to live together in a small area of land. In folklore this invokes a story-line that emphasises a tradition of trust, collaboration and consensual decision-making (Wittrock *et al.*2021). In their essay 'The Dutch Polder Model in Science and Research', Van Dijck and van Saarloos (2017) argue that tight-knit networks, cooperation, consultation and trust are vital features of the Dutch science system that have allowed it to 'punch above its weight'. A recent study put forward that The Netherlands undertakes *de facto* rri in a particular manner: with a focus on both economic and societal relevance of research and innovation; and embracing practices of inclusive deliberation and collaboration (Van der Molen *et al.* 2019). The normative orientations combine and integrate economic and societal relevance; inclusivity and collaboration; and integration and synergy and can be viewed as a blend of German and Scandinavian models (focused on economic prosperity and on societal concerns, respectively).

2. Two different maturation processes

The Bolivian PGS is resilient – if the test of resilience is taken to mean that the regime remains and is taken up by other actors even if critical originating actors leave – with the continuity and resulting stabilisation enacted through Law and embedded in the reproduction of practices. However, it seems that there is resilience in the concepts, but not necessarily in the practices. There are two key difficulties in maintaining such a market-coordinated system. The first is that without the maturity of the market i.e., the ability of producers to sell their products, it is difficult for them to see the benefit in dedicating their time to make sure that the system functions over time. When we collected field data in Tarija, the school feeding program was in the middle of a crisis where the farmers had not been paid by the municipality and in the period directly following our field data collection, the community suspended the local public procurement from PGS certified farmers. In the period that followed, some of the farmers had become demotivated and commitment to participation faltered. However, others had already dropped out of the public procurement part of the scheme because they had found better markets – that paid on time – in the communities, with national processors and particularly at the monthly farmers markets (Loconto 2020).

What is interesting about the case of TNO, is that, on the one hand, Societal Engagement is a key element in its objective and mission (part of the 'organisation's DNA', according to some), whereas, on the other hand, relatively little is formally arranged to achieve and keep under review the extent to which the organisation enacts *societal engagement* in practice. There is a dissonance and deficit between organisational policy, and daily practice, which risks undermining the legitimacy and reputation of the organisation as committed to the authentic participation of under-represented actors. There is only the formal requirement to have Strategy Advisory Councils (SACs). The JERRI

project team members therefore chose to use the SACs as an entry point for bringing about the desired change: making the SACs more diverse and inclusive. The JERRI TNO team collaborated with the people who make decisions about the SACs; reasoning that the organisation needed to recruit these 'change agents' to help realize this change, and that the new, more diverse and inclusive, SACs would subsequently provide frameworks for many more people within TNO to promote Societal Engagement. Using the metaphor of the DNA; the JERRI researchers argued that the right conditions would bring to expression the organisation's Societal Engagement DNA.

However, during the intervention—which incorporated interviews and workshops (above)—concerns of legacy and longevity were often raised: will these new, more diverse and inclusive SACs indeed lead to lasting change, to sustainable improvements of the Societal Engagement of the organisation? It is probably too early to answer this question definitively, but informal observations would lead us to believe that TNO has indeed become more active in Societal Engagement, and moreover is more consciously positioning its projects to address societal grand challenges framed as the United Nations' Sustainable Development Goals[15].

3. Achieving the systematic 'overflowing' of responsibility frames: designing and deploying boundary objects in both cases.

In Bolivia, the key boundary object that formed part of the PGS suite of socio-technical market devices was a set of pocket-sized documents that all of the farmers, municipal officials, NGOs and national official carried (Figure 1). The first part depicted the Law 3525, which lays out the principles, criteria and the creation of the CNAPE agency that orchestrates the implementation of the law. The second document was the technical standard for the participatory guarantee system, which set out the roles and responsibilities that were to be created among the different stakeholders operating in the system. These documents were produced by the public agencies and used at all levels to create additional training and communications materials – such as farmer guides, PGS committee guides, auditor guides, labels to display in markets and name tags for participating in events. These documents focused on both shared and distributed responsibilities, which were taken up by the actors who participated in the PGS.

Figure 1: PGS pocket guides.

TNO also developed a number of boundary objects: graphics depicting visions of the restructuring of the organisation, which helped to convey a sense of urgency and mobilize actors; the numbers and pie charts that represent the SACs' compositions and that help to articulate the 'problem'; and the

[15] https://www.tno.nl/en/about-tno/tno-society/our-impact/.

Terms of Reference, which motivated and supported the relevant actors to direct their efforts towards a solution to this problem.

Pie-chart visualisations enabled and facilitated the development of a shared understanding of an organisational problem – starkly portraying a material disconnect between the organisational reality of limited participation of wider constituency of actors in the SACs and the organisational self-identity of being committed to inclusivity. The graphics brought to sharp attention the need to correct this situation by recruiting a wider and more diverse membership to the SACs, in order to better align TNO's reality with a desired (and expected) identity of itself. In addition, the creating of a *Terms of Reference* document was critical for promoting clarity and responsibility. The document contained rather practical instructions and suggestions to make the SACs more inclusive and diverse (Figure 2). The project team members collaborated with people at Corporate Strategy to write these, and the Executive Board then issued them to the Units' Managing Directors with the request to follow them in composing the partly-new SACs.

- *Good balance between business, academia, government and societal organizations*
- *Especially societal organizations are currently underrepresented. Based on TNO's mission and ambitions for societal engagement, e.g., alignment to the United Nations' Sustainable Development Goals, there is an emphatic appeal to explore possible inclusion of these types of organizations*
- *Good balance of men/women, in line with the ratio in the domain where of each Strategy Advisory Council*
- *Attempt to represent different age groups [an advocacy for more younger people]*

Figure 2: Terms of Reference.

Thus, efforts to widen the membership of the SACs and in particular the profile of the new members, provides a material qualification of a particular responsibility framing according to the logic of 'participatory society', supporting the maintenance of organisational legitimacy internally and externally according to TNO's contemporary interpretation of its societal licence to operate. There was a three-fold imperative to this urgency. First the need to re-set and restore the organisation's symbolic self-understanding as a socially responsible organisation welcoming a wide and inclusive range of voices to the table to participate in TNO's internal reflections shaping its visions of the future. Second to symbolically qualify TNOs performation of participatory society to buttress legitimacy and defend itself from legitimacy challenges inviting renewed (or new) bases for social approval conferred by a raft of external agencies. And third as required by contemporary interpretations of TNO's founding law. All three imperatives have the effect of confirming and communicating TNO's commitment to its continued (and updated) social licence to operate. The pie charts thus provided a visualisation of a normative organisational problem that required urgent corrective action to improve the performative credentials of TNO as a socially responsible, and socially responsive, organisation.

4. Multi-level alignment

In Bolivia, the embedding of a PGS council at the level of the municipality ensured that the national level system opened up local technological spaces of experimentation that also "provide[d] political platforms for future debate on agroecology" (Municipal Official, Oruro). Indeed, the PGS model adopted by the Bolivian government has benefited from forging a vertical bureaucracy that ensured legitimacy by linking the farmers to both the agriculture and health ministries. By following the internationally negotiated definitions of both organic agriculture and PGS, Bolivian farmers have learned directly from the Brazilian experience and from experiences from around the world through

the IFOAM network. Opening up space for the establishment of horizontal networks and platforms that provide the knowledge (creation and training), markets, resources and policy support for local actors was important for this multi-level alignment. Autonomy in conducting the physical peer-reviews, farmer training and selling products to the school feeding programs, the monthly organic farmers markets or through community market channels were found to be important for institutionalizing the approach. The direct linkages to researchers through municipal level extension officers dedicated to ecologic agriculture and also the mobilisation of farmer networks that rely upon indigenous knowledge that is valued locally and nationally were fundamental to building the trust among innovators.

TNO is part of the Dutch research and innovation landscape, which has a relatively long and solid track record of Technology Assessment (TA). As early as 1986, the *Netherlands Organisation for Technology* Assessment, renamed *Rathenau Institute* in 1994, was founded. One of the first of such organisations in Europe, Dutch scientists and engineers pioneered TA and notably two variations that promote Societal Engagement: *Constructive TA* and *Participatory TA* (Schot 2001; Rip, Misa, and Schot 1995), and the Dutch Research Council has pioneered and funded Responsible Innovation since 2008.[16] In short, Dutch norms and values of *de facto* responsibility as a commitment to inclusion and public engagement pre-dated RRI as a European policy artefact, and this contributes to the observation that within the JERRI project, of the five key dimensions, Societal Engagement was already aligned with TNO. As a consequence, it was relatively easy to gain acceptance and management buy-in at TNO. The increased diversity and inclusivity of TNO's SACs helped to better embed organisational values related to Societal Engagement (notably, the objective and mission to work for the common good), which predated both H2020 RRI and the JERRI project. The SACs were then identified as a concrete organisational site where visible, concrete and enduring change could be made, which would influence practice across the organisation, rather than in one isolated specialist unit of the organisation, as sometimes happens. The SACs function as mechanisms to promote outside-in involvement of societal actors into TNO's strategies.

Discussion

On the face of it, the two cases that we draw upon to illustrate the application of the DI diagnostic framework and demonstrate *deep institutionalisation* in practice - TNO in the Netherlands and PGS in Bolivia - could not be more different. Apart from the obvious difference of geography and cultural context, the TNO case is a study of a single large Research and Technology Organisation (RTO) which occupies a strategic position participating in a number of overlapping market arenas (Delemarle and Larédo 2014) intermediating and straddling worlds of applied research and technology, government policy, academia, business and civil society. The case shines a light on an *intra*-organisational negotiation, experienced by those involved in the internal governance reform as a three-year process of collaboration, reciprocal trust, and openness. Among the concrete Actions of the JERRI project, the example of '*Societal Engagement*' traces how internal organisational support at TNO was mobilised around a new process involving a series of boundary objects: a set of visuals which starkly highlighted an urgent 'problem' – the lack of inclusivity and diversity within TNO's governance structure represented by membership of TNO's SACs – and the subsequent design and deployment of a new instrument, a ToR, which facilitated the successful recruitment of a wider and more diverse constituency of actors to the SACs, particularly women, representatives of civil society

[16] https://www.nwo.nl/en/researchprogrammes/responsible-innovation.

organisations, and youth. Improving the 'outside-in and inside-out' openness of TNO to the perspectives and views of a wider range of voices, can be interpreted as the amplification and overflowing of a particular expression of 'participatory society' in TNO's own performative qualification of the qualities of responsibility (Callon *et al.* 2007). This particular action conducted by TNO within the JERRI project was considered by TNO as successful, i.e., a durable example of achieving organisation-wide, long-term change to TNO's governance structure, and thereby potentially permanently altering the organisation's relationship with its external environment and the constituency of actors and perspectives that were subsequently enrolled into an (enlarged) circle of its organisational boundaries, bringing organisational practice better in line with the organisation's symbolic self-identity and buttressing organisational legitimacy. Importantly whilst the TNO case ostensibly concerns the institutionalisation of one of the RRI 'keys' i.e., public engagement, as the analysis has shown, inclusivity has long been a hallmark of the Dutch research and innovation system in general and TNO's self-identity in particular, long before it was designated as an RRI 'key'. Its successful 'institutionalisation' within the TNO case is therefore unsurprising, and the case more accurately shines a light on an encounter between *de facto* rri and RRI.

The example of PGS in Bolivia by contrast is an example of how responsibility is framed and performed in an innovative approach to food system organisation. The PGS case represents a case of market-*agencement* (Callon 2016). It focuses on an innovative approach to certification – a PGS – that redistributes responsibilities within short value chains (comprising seed producers, farmers, processors, wholesalers, retailers and end consumers) and refocuses actors' attention towards taking on the responsibility for achieving food sovereignty within a global discourse where responsibility for feeding a growing population in a world of diminishing resources is considered to be a core societal challenge. The PGS case therefore provides an example of *inter*-organisational collaboration, inclusion, and collective participation across (shortened/local) value chains as the qualification of 'participatory society' as a market quality (Callon *et al.* 2002). It examines the institutionalisation of a national PGS in Bolivia through the use of a new instrument, a guide for municipalities, but demonstrates how this public system is embedded within an international network that now covers 76 countries. PGS thus "certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange."[17] The Bolivian case emphasises how closer linkages between multiple stakeholders are achieved in defining, controlling, and implementing research and innovation that is responsive to farmers, experts, public sector officials, food service agents and consumers[18]. The example of developing a PGS in Bolivia is one example from a number of studies of PGS across multiple sites globally. The Bolivian case was considered to be a particularly interesting one, for illustrating its success in supporting the re-embedding of global agricultural value chains locally, this being a central orientating goal of the responsibility discourse in this case study.

And yet, despite these very different settings, looking across the two cases through the lens of the DI diagnostic framework, we see interesting similarities. In terms of *Axis 1 – A historically unfolding process*, both cases demonstrate the significance of history in producing the contemporary blending of Narrative B – *technological progress*, (where 'progress' becomes associated with) Narrative C – *participatory society*, together directed towards Narrative F – *orienting research and innovation with/for society in order to address societal 'grand' challenges*. This blending and hybridisation

[17] IFOAM PGS Definition; http://www.ifoam.org/en/valuechain/participatory-guarantee-systems-pgs.

[18] Loconto, A. (2013) Linking responsible research and innovation on the farm: the case of participatory guarantee systems (http://Res-AGorA.eu/assets/IFRIS-2-Stage-2.pdf).

(Battilana *et al.* 2017) of the institutional logics of *de facto* rri demonstrate two very different examples of how a place at the table in research and innovation futures is prefigured by the committed, organised and deliberate participation of a widened constituency of actors to include under-represented voices. In our two cases, participation is demonstrated as comprising not simply *ad hoc* consultation, but as the organised, structured and sustained inclusion of different forms of expertise in research and innovation processes. Turning to *Axis 2 – A maturation process*, it is clear that both cases in fact raise questions regarding this axis. Both cases faltered on the extent to which policy ambitions were sustained in practice, and both raise questions concerning the maintenance of a progressive forward dynamic involving recursive amplification. On this axis then, both cases show that *deep institutionalisation* is not an end-state, nor should it be conceived as a single automatic uni-directional forward dynamic. As a consequence of a multiplex of causal factors, it potentially stutters, stalls and reverses. According to *Axis 3 – A systematic 'overflowing' of responsibility frames* in both cases, communication devices were designed which served as boundary-objects enabling the recruitment and enrolment of new actors, beyond the groups originally envisaged, facilitating the systemic 'overflowing of' responsibility frames and attendant corresponding practices, both within and across organisational boundaries, classically following Callon's (1991) theory of overflowing. Finally, according to *Axis 4 – Multi-level alignment*, in both cases, law and policy at multiple levels show alignment: EU, Dutch law and National Research Councils/Funders and TNO in the TNO case; national bodies and law; UN Agencies; local municipalities, local economies and communities in the PGS in Bolivia case.

It is important to recall that in 'selecting' the TNO and PGS cases as illustrative examples of the (deep) institutionalisation of *de facto* responsible innovation, the choice of the two was not accidental. First, by taking the two cases together we emphasise that the study of *deep institutionalisation* requires paying attention to what is happening *within* organisations, particularly within large organisations with strategic system-wide influence such as RTOs, illustrated by the *intra*-organisational case of TNO; to what is happening *across* discourse coalitions comprising networks of diverse organisations, illustrated by the *inter*-organisational case of PGS in Bolivia; and thirdly paying attention to the porosity of the boundary between an organisation and its external environment, drawing attention to the significance of the 'outside-in and inside-out' perspective, where the governance reform implemented at TNO heightened two-way learning and appreciation of diverse perspectives *across* the organisational boundary, effectively enlarging and 'opening' it. We therefore intentionally selected and juxtaposed these two cases on the grounds that they illustrated these different organisational forms, enabling us to look into the co-ordination of responsibility within each case-type. There was also a strong element of their self-selection. Both emerged in the respective Res-AGorA and JERRI projects as interesting examples of the potentially successful institutionalisation of *de facto* rri despite their very different settings. Moreover, by demonstrating the criteria we wish to illustrate as qualifiers of deep institutionalisation, we are affectively contributing to its own designation as deep institutionalisation. Callon and colleagues describe how qualification involves the design and deployment of new technical devices – classification schemes, journals, codes of conduct, terms of reference, manuals, guidelines and frameworks – that serve to define problems and designate the actors to be included in (and excluded from) appropriate activities towards the resolution of the problem as it is defined. Crucially, recursively performing the theory of the problem-solution matrix contributes to its stabilisation, becoming the reality of it (Callon *et al.* 2002, Callon 2010). And so, borrowing from Callon, the criteria and conditions under which the institutionalisation of responsibility becomes 'deep' according to our theorisation of it are illustrated in our cases, which become a demonstration of it.

Conclusion

This article has offered a demonstration of the *deep institutionalisation* concept, through the lens of the DI diagnostic framework, and was motivated by the question 'what does the (deep) institutionalisation of *de facto* responsible research and innovation (rri) look like? and how would we know it if we see it'? To study *de facto* responsible research and innovation, we follow actors 'in the wild' as they discursively construct and 'perform' responsibility in multiple and specific research and innovation sites and situations (rri) rather than assume *a-priori* a particular definition of it. And thus, what does the institutionalisation of these particular, situated, instantiations of responsibility look like?

We drew upon insights from organisational institutionalism where scholars have developed a rich understanding of how institutionalisation (and de-institutionalisation) processes proceed and institutional change occurs. For the current paper, we have shown that despite the two very different geo-political and organisational settings of the case examples – TNO in the Netherlands and PGS in Bolivia – in both cases 'institutional logics' of *de facto* rri – Narrative B , 'technological progress', Narrative C 'participatory society', and Narrative F 'science with/for society which is goal-oriented to address societal challenges' are blended in the discursive construction and enacted practices of responsibility, which contain strong normative co-ordinating orientations by contrasting 'what *is*' with 'what *should* be'. In both cases, historical antecedents and traditions which emphasise collaboration – 'poldering' in the Netherlands; and the co-operative arrangements of pre-colonial Andean agricultural systems in Bolivia – provide the institutional 'glue' that are adapted, evoked and (re)deployed in contemporary settings to build legitimacy around a particular responsibility frame. In both cases, the local expression of responsibility is aligned to, reflects and is reflected in national and international discourses of responsibility as a further signifier of deep institutionalisation. In both cases, a considerable level of institutional work is evident as collective rather than individual endeavour, sustained over a period of time and measured in years rather than days, weeks or months. In both cases, collaborative learning is emphasised as the mode of amplifying and extending the particular conception of responsibility in the two very different settings.

We can conclude that *deep* institutionalisation, qualified as institutional change that makes a *sustained* difference – in the sense that it is transformative – requires continuous effort, continual monitoring, critical questioning, and conscious deliberate responsiveness. It is the business of normatively committed institutional work (Lawrence *et al.* 2009). As such, *deep* institutionalisation should not be considered a final or end-state, neither a single uni-directional dynamic, since it can and does involve cross-currents of institutionalisation and de-institutionalisation, co-existence, competition, struggle and contestation between different discourse coalitions seeking to institute their particular conception of responsibility. Simultaneously then, the cross-case analysis according to the DI diagnostic, not only demonstrates DI in action, but further deepens our understanding and elaboration of a *theory* of deep institutionalisation of *de facto* responsible innovation.

The article raises a number of further questions pertinent to the themes of this special issue i.e., towards furthering our understanding of the institutionalisation of responsible innovation in competitive environments and industrial settings. A first raises the fundamental question of what we mean by 'competitive environments'. Both our cases have foregrounded the importance of *intra*- and *inter*-organisational collaboration in the formation, extension, and institutionalisation of the respective discourse coalitions of responsibility. Does this mean that competitive struggle has been smoothed away, to be replaced by the warm glow of collaboration? To address this turns attention to the question of what the relevant 'unit of competition' might be. The analysis presented in this

paper suggests that under *de facto* responsible research and innovation the relevant unit of competition is not the individual organisation, (e.g. competition *between* firms, competition *between* universities etc) but rather the co-existence of, and competitive struggle between, multi-actor discourse coalitions occupying landscapes of alternative (and contested) responsibility framings; with intra- and inter-organisational collaboration being a hallmark of intra-coalition relations in our two cases with individual large organisations very likely participating in multiple discourse coalitions.

Second, whilst our analysis centres on the features of an 'ideal-type' empirical manifestation of deep institutionalisation – and was originally inspired by such an ideal-type i.e., Karl Polanyi's market society – the achievement of deep institutionalisation is not intended to act as an orientating 'end state' or ambition for those who would wish to see a particular vision of responsibility 'become' instituted. Not least because in its pure form deep institutionalisation would correspond to an absence of legitimacy challenges and a reduction in questioning, whether internally or externally originated (Deephouse and Suchman 2008). We would also arguably expect that in *all* situations where research and innovation is oriented to addressing pressing societal challenges – from the urgency of the COVID pandemic to climate, energy and food crises – this class of situations are, by definition, all characterised by high levels of uncertainty, contestation, and complexity (Wanzenbock *et al.* 2020), representing different competing visions for how a particular societal problem 'should' be addressed, involving what combination of actors, social practices and material artefacts. We would expect therefore to see in such situations the generation of multiple co-existing vision pathways representing different responsibility frames expressed through a plurality of discourse coalitions. Competitive struggle would take the form of new visions of responsibility rubbing up against socio-material incumbency (Stirling 2019) with its attendant sources of authority and legitimacy, seeking to resist, contain or otherwise accommodate overflowing. Such examples of coalitions of multiple actors organising around 'hot' controversies bring to mind Arie Rip's earlier notion of *hybrid fora* (Callon and Rip 1992, Rip 2018). We would expect the institutionalisation of *de facto* responsible research and innovation therefore to be empirically always partial, temporary, incomplete, and 'in-the-making' (Kuhlmann *et al.* 2016).

Finally, and importantly, understanding *deep* institutionalisation as the recursive qualification of the *qualities* of responsibility – in this case, the participation of a wide(ned) range of actors as a defining quality of (particular) *markets* – we are able to critically confront a key opposition that has a tendency to run through much responsible innovation scholarship. That is the bracketing of the virtues of participatory governance and its attendant practices as always 'good' *versus* markets as invariably 'bad'. Our analysis challenges this binary by drawing attention to examples where the intentional enrolment of a diverse range of actors into the fabric of intra- and inter-organisational governance and decision-making structures, requires considerable investment in collective work to co-ordinate and orchestrate activity across enlarged actor networks in the shaping of particular *markets*, forming a critical dimension in the performativity of markets. Re-casting this as competitive struggle *between* discourse coalitions, we conclude that it is entirely plausible that markets are experienced as authentically participative; whilst the co-option of diverse actors in consultative governance processes can just as plausibly be experienced as exclusive and disempowering. Our two cases suggest that the qualification of qualities of participatory society and markets play an entangled role in the contested politics, controversies and protests of *de facto* responsible innovation. To conclude, we argue that markets provide an object of study that has been largely overlooked by responsible innovation scholars to-date and that this is a direction that warrants further debate, critical reflection and research.

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APPENDIX 1

Interrogating Deep Institutionalisation in the inter-organisational (PGS) in intra-organisational (TNO) cases: multi-method and multi-stage research processes.

In the *inter*-organisational case tracing the development of a Participatory Guarantee System (PGS) in Bolivia (Case #1), research started under the Res-AGorA project in 2013, as an analysis of relevant policy documents and interviews in order to identify how responsibility was *de facto* framed and understood by actors involved in the organising and shaping of participatory markets for food in Bolivia including the design and implementation of PGS certification as a critical market device. It therefore aimed from the outset to trace the development of a new market governance mechanism – a new certification scheme – which served to co-ordinate and enlarge the activities of local coalitions of (market) actors aligning local concerns to national policy priorities to secure and maintain food sovereignty. Research continued for some years afterwards, in total covering a period of eight years from 2013-2021 being the period that this paper draws upon. This case was itself carried out as part of a broader participatory research project on institutional innovation that brought together innovators from 20 countries (Loconto *et al.* 2016). Here the second author conducted fieldwork in Bolivia during two different periods, provided technical assistance to the UC-CNAPE team and co-produced the data and analysis with local and global innovators. The researcher thus not only followed the case from the 'outside', but was actively involved in participating in it 'from within'.

For the *intra*-organisational case of TNO (Case #2) which was carried out within the EC H2020 JERRI project (2016-2019), a systematic structured research process was designed in advance of the start of the JERRI project in order to provide loose but organised 'guide-rails' to organise the participatory research process that lasted from June 2016 to May 2019. The longitudinal research comprised a series of pre-defined stages from 'goal-setting' to 'implementation' to 'learning and reflecting' involving a structured series of workshops and interviews with individuals across all levels of the organisation aiming from the outset to seek to bring about organisational change according to each of the RRI 'keys'. The JERRI project facilitated a structured and organised process of action research, moving through iterative cycles of interaction and reflection constituting an immersive process over three years aimed at bringing about the change that was identified internally as desirable, into concrete outcomes. The third author of the current paper had the dual role of TNO employee and researcher, working alongside TNO colleagues to design and introduce the Action identified. Thus, a systematic process of iteratively learning through reflection, theory and action, passing through a number of cycles, was the innovative hallmark of the JERRI methodology.

Case #1: inter-organisational institutional change and market formation; Framing and performing responsibility through a Participatory Guarantee System in Boliva	
2013	(1) *International call for proposals of institutional innovations* in linking smallholder farmers to markets was launched and the Bolivian research team responded to the call with a short description of the innovation. The Bolivian case was chosen from among 87 innovations to participate in the participatory research project that lasted from 2013-2020.
2014	(2). *10 open key informant interviews were conducted in Bolivia* (La Paz and Oruro). Responses informed the development of a structured questionnaire. Field observations were used to understand the value chain dynamics.
2015	(3). *22 structured interviews were conducted* using a questionnaire developed following analysis of (2) and administered to key informants (La Paz and Tarija). (4) *A researcher-practitioner workshop was held* in Bogotà, Colombia where the Bolivian team participated and worked with innovators from 21 countries to explore institutional innovations and responsible innovation.
2016	(5) *Qualitative analysis of the interview transcripts* from (1) and (2) and of official documents and reports was conducted to identify the actors' interpretations of responsibility and the role of the PGS in the performation of responsibility. (6) *A second researcher-practitioner workshop* was held in Chiang Mai, Thailand to reflect upon the Bolivian case and to begin developing a guide for innovators (7) *Together, the interview material, official documents and reports, and field observations that were collected since 2013 were analysed* to understand how the actors understood the concept of responsibility and how they frame and perform that responsibility within the value chain of the PGS system.
2017	(7) *The author conducted participant observations* at the 10th Congress of Rede Ecovida in Erechim, Brazil. (8*) A third researcher-practitioner reflective workshop* was organized in New Delhi and participatory scenarios were used to analyse the dynamics of PGS.
2018	(9) *A reflective workshop on innovation was organized* during the Food and Agriculture Organization's 2nd Global Symposium on Agroecology. PGS was one of the innovations that formed the basis of discussion.
2019-2021	(10) *The lessons learned since 2013 were finalized* in the innovators handbook that was published in 2020/2021. (11) *Reflective workshops were organised* with PGS operating in France and with different countries (Brazil, Fiji, Italy, New Calendonia, Uganda, Tanzania) through the COMPAIRS project (financed by the French Agency for Ecological Transition, ADEME). (12*) In September 2021, an international workshop on PGS* – that focused on innovation, diversity and sustainability in PGS – was organized by the author with IFOAM and an updated version of the Bolivian case was presented by Fundación AGRECOL Andes.

Case #2: intra-organisational institutional change through internal governance; TNO; making SACs more diverse and inclusive	
June 2016 - May 2017	*Goal setting*: with stakeholders and change agents in TNO;
June 2017 - May 2018	*Planning Actions*: with stakeholders and change agents in TNO, in line with the organisation restructuring process
	Zooming-in on one effort: Making the Strategy Advisory Councils more diverse and inclusive:
19 Sept 2017	*Workshop with the Strategy Managers of the nine new Units, plus the Manager Corporate Strategy (who became a focal change agent)* Project team members 'enrol' Strategy Managers who work at TNO Corporate Strategy, a group of approx. 20 people, nine Strategy Managers are responsible for bringing/coordinating the strategies from Corporate to the nine Units
28 Sept and 19 Oct 2017	*Meetings with the (future) Managing Directors of the nine new Units, plus this key change agent.* Once the Strategy Managers were okay with the ambition to make the SACs more diverse and inclusive, we (project team members) had two meetings with them (some staying in their role; some new in this role; officially all new) Managing Directors of the new nine Units
23 Oct 2017	*Workshop with Strategy Managers, who coordinate creating the new Strategy Advisory Council* in this workshop, we did two activities: we discussed options for new SAC members, notably Civic Society Organizations; and we started to articulate the *Terms of Reference*—the latter proved to be very useful, forming an 'agencement' for the SACs
Nov 2017	*Executive Board gives Terms of Reference to Units' Managing Directors, to assemble new the SACs*
End 2017—start 2018	*The Strategy Managers and Managing Directors of the nine Units assembled new, diverse and inclusive SACs.* the Strategy Manager and Managing Director of each Unit set out to assemble new SACs, using these *Terms of Reference,* resulting in SACs that are more diverse (more Civic Society Organizations) and inclusive (better balance of men and women)
19 April 2018	*Reflective workshop with the TNO and Fraunhofer JERRI teams: Deep Institututionalisation of RRI in Theory and Practice: What does it look like for the two organisations? Bringing it all together*
June 2018 - May 2019	*Reflection and learning*: with stakeholders in TNO; to make it part of 'business as usual'