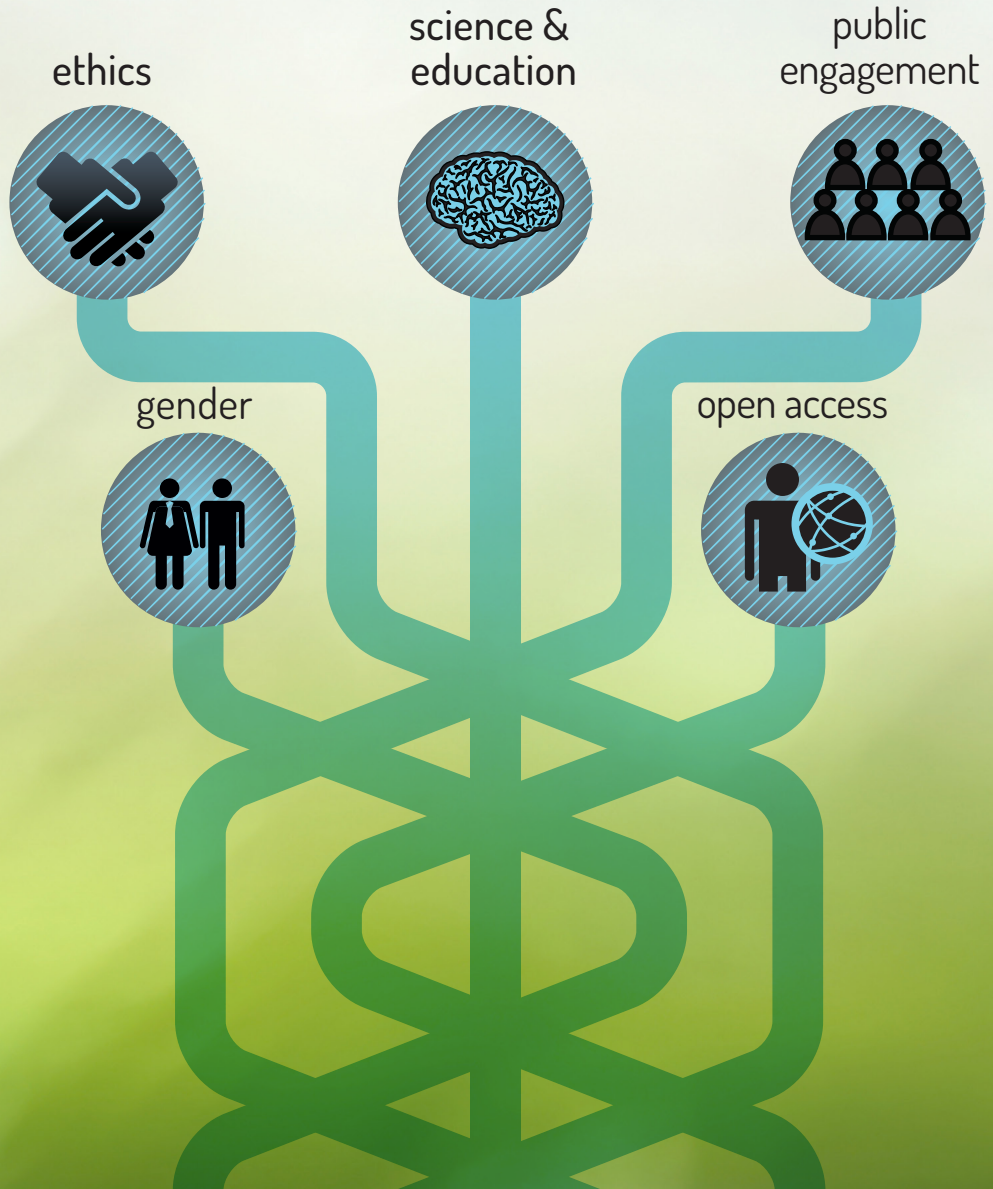
JERRI

JOINING EFFORTS FOR RESPONSIBLE RESEARCH AND INNOVATION

Deepening 'Deep Institutionalisation'

Deliverable D1.2



JERRI – Joining Efforts for Responsible Research and Innovation
Deliverable D1.2
Deepening 'Deep Institutionalisation

Elaborating a Concept and Developing a Typology to Analyse and Contrast the Institutionalisation of De-facto responsible research and innovation (rri); and H2020 RRI in Research and Technology Organisations (RTOs)

Project Name	Joining Efforts for Responsible Research and Innovation (JERRI)
Project No.	709747
Project Type	Coordination and Support Action
Project Duration	01.06.2016 – 31.05.2019 (36 months)
Project Coordinator	Benjamin Teufel, Fraunhofer ISI
Funded under	Horizon 2020, Call ISSI-5-2015
Work Package	WP 1 State of the art
Deliverable	D1.2 Advanced concept on deep institutionalization of RRI
Dissemination Level	PU (Public)
Planned Date	Month 6 (November 2016)
Actual Submission	12.01.2017 04.08.2017
Version	Final extended version August 2017
Authors	Sally Randles[1], Professor of Sustainability and Innovation, Manchester Metropolitan University
Approved by	Benjamin Teufel

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 709747.

[1] I acknowledge and thank Professor Philippe Laredo for on-going conversations on this topic over a number of years dating back to the inception of our reading and discussion group in 2011 composed of early career scholars at the Manchester Institute of Innovation Research, University of Manchester formed around questions of Responsible Research, Responsible Innovation and Responsible Governance. The outputs of this work will appear as Randles & Laredo Eds (2017) 'De-facto Responsible Innovation', Edward Elgar, forthcoming. I acknowledge and thank all the researchers from the Res-AGorA project for many days spent on empirical case studies the insights from which have informed this report and Benjamin Teufel for comments and corrections to earlier versions and Mohammad Hajhashem for help in the report production.

TABLE OF CONTENTS

CONTENTS

DELIVERABLE REPORT

1. Introduction: Overview of the Contribution of the Report

1.1 Deliverable Report 1.2 of the **JERRI** project contributes to WP1 'State of the Art' by providing a conceptual elaboration and typology of '*Deep Institutionalisation'* supported by classical texts drawn primarily from the large, theoretically highly developed and empirically supported literature on *organisational institutionalism*.

1.2 The concept '*Deep Institutionalisation'* of responsible innovation proposed by *Randles et al* (2014, 31-32) was inspired by the findings emerging from the suite of case studies of *de-facto responsible research and innovation* (or rri) that were conducted in three stages under WP3 of the EC FP7 **RES-AGorA** project (2012-2016).

The concept *Deep Institutionalisation* takes as inspiration Karl Polanyi's (1944) treatise *The Great Transformation* which dealt with the long instituted economic process that brought into being the most enduring and resilient innovation of the nineteenth century: ***market society***. In summary, the evolution of market society involved the creation of a range of forms of inter-dependent technologies and regulatory tools alongside the emergence of new professions and divisions of labour (the engineer, the factory owner, the factory worker, the financier) and new protocols facilitating trust in new forms of economic exchange (new standards, such as weights and measures) to facilitate trade and determine property rights. All of these processes, taken together, produced outcomes in terms of entanglements and inter-dependencies that enabled the innovation of market society to become '*deeply institutionalised: eventually to become invisible, taken for granted, unreflexive, reproductive and expansive'* (Randles et al 2014:31, original italics)

Randles *et al* extended this analysis to propose that *Deep Institutionalisation* of responsible innovation is distinguished by four characteristics:

1.2.1 First, its long-haul, long-term and resilient nature, including tendencies to socio-technical lock-in and irreversibility.

1.2.2 Second, Its transformative dynamic: the co-evolution of technological innovations and governance innovations serves to transform agents.

1.2.3 Third, 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.

1.2.4 Fourth, (methodologically), we cannot truly evaluate the effectiveness of transformation towards particular normative goals of (responsible) innovation *ex-ante*. We must wait and look back with the hindsight of history, in order to provide an *ex-post* evaluation of its 'success' as a project of (responsible) innovation, judging it both on its own terms (the normative ambitions of its originators and leaders, and those affected by it) and according to any new but explicit *ex-post* evaluation criteria of future assessors.

Randles *et al* further proposed that:

"the *deep institutionalisation* of *responsible* innovation… involves effective transformation towards a set of articulated normative goals embedding values into practices and processes and orienting action towards those goals. Critical to this idea is the integration resulting from the alignment of *multiple* governance tools, devices, techniques and forms of agency to orientate and steer innovation towards expressed societal values and normative goals. Deep institutionalisation would be the polar counterpoint to superficial or shallow institutionalisation which, for example, would entail the *ad-hoc* implementation of single governance tools or devices (with little or weak attention to the qualifying criteria of its uptake, such as 'taking care' of integrating perspectives from a wide range of societal actors). 'Shallow' or superficial institutionalisation will sit on the surface of organisations or systems like oil on water, failing to transform or orientate the underlying direction, structures, or incentives towards a new set of normative goals deemed 'more' responsible than earlier forms, or more responsible than alternatives……By contrast, deep institutionalisation requires a system of integrated, interconnected, and mutually co-aligned governance tools, structures and mechanisms to affect it. Deep institutionalisation can be posited as the internalisation of normative orientation, describing the amplification of a collectively shared value-system articulated through 'visions' but crucially performing those visions through their demonstrations in practice. Deep institutionalisation also involves the overflowing

> of local experiments (Callon 1998) to constituencies external to a single organisation or community: for example to shareholders, customers, suppliers, financial and scientific communities, professional and labour organisations producing a new normative 'model' (Randles and Laasch 2014, 2016)…… and yet, whilst the 'new normal' of deep institutionalisation with its alternative values embedded into new incentive structures, orderings and understandings of good-standing becomes inscribed into revised norms and routines (re)institutionalisation may still co-exist either with traces and legacies of earlier institutional regimes of with alternative normative models "
>
> (Randles *et al*, 2014: 32, original italics).

1.3 In fact, the above theorisation of deep institutionalisation is already implicitly underpinned by the neo-institutionalist literature. This report D1.2 provides an opportunity to make those theoretical underpinnings more explicit and elaborated. It also affords an opportunity to make the concept more analytically robust, by systematically separating its constituent analytical elements and by proposing a typology of characteristics and phases of deep institutionalisation, applied to the context of responsibility in research and innovation (both ***de-facto* responsible research and responsible innovation**; and in terms of the introduction by the European Commission in 2014 of the policy instrument, henceforth referred to as **H2020 RRI**). **JERRI** enables ***one instance*** of empirical testing (and refinement) of the concept by considering the uptake of RRI in Research and Technology Organisations facilitated by the efforts of the JERRI partners, with a primary focus on testing the institutionalisation of RRI at Fraunhofer-Gesellschaft in Germany (henceforth 'Fraunhofer'), the Netherlands Organisation for Applied Scientific Research (TNO), henceforth TNO and other selected RTOs.

1.4 This report D1.2 also provides an important complement to **JERRI** WP1 Deliverable 1.1 which analyses a first set of exploratory interviews within the two largest RTOs in Europe, Fraunhofer and TNO, in order to establish:

> Section 1 *The interviewee and its organizational context*: to acquire background information on the interviewee and her / his organizational context, to analyse her / his statements against this background
>
> Section 2. *De facto responsible research and innovation*: how respondents in the two organisations understand 'responsible research' and 'responsible innovation' and how their organisations' already operationalize these understandings.

Section 3 *RRI Practices:* existing activities already undertaken in the organisation consistent with the 5 Key Dimensions of H2020 RRI.

Section 4 Issues for the Institutionalisation of RRI to identify the qualities and challenges to RRI institutionalisation within the RTOs.

1.5 Together, Reports D1.1 and D1.2 of **WP1 'State of the Art'** support the follow-on 'implementation' work packages of **JERRI** by providing a conceptual framework which brings together an ***elaborated conceptualisation of Deep Institutionalisation (D1.2),*** and the results and ***findings from a first stage of exploratory interviews on how RRI is received and enacted in the two RTOs (D1.1).***

1.6 The report progresses as follows.

- ***Section 2.0*** **provides a number of key underpinning 'theoretical touchstones'** facilitating an easy-read summary of main terms and their origins located in the classical academic texts of organisational institutionalism. Organisational institutionalism is itself a subset of the neo-institutionalist literature, focusing on organisations. It is concerned with both institutional isomorphism (tendencies to homogeneity and resistance to change) and dynamics of organisational change. This literature is less concerned with broad systemic sweeps of political economy (of which the Polanyi text referred to above forms a part). However it does crucially concern itself with the influences of *shifting external institutional contexts* producing both pressures and opportunities to which organisations variously contribute and respond. The reference literature also concerns itself with the micro-level internal dynamics of organisational change processes, including the critical role of institutional entrepreneurs, *institutional entrepreneurship* and implications for institutional pluralism, where organisations operate within multiple institutional spheres.
- ***Section 3.0*** **turns to the applied context of responsible research and responsible innovation,** and provides a connecting interface between the institutionalist theory and the work we have previously done under Res-AGorA. It starts by distinguishing ***de-facto rri*** from **H2020 RRI**, and why it matters to our analysis to consider them both separately, as they are quite different empirical objects. This section moves from the institutional logics of the systemic ideal types that we labelled '6 Grand Narratives' of responsibility in research and innovation' describing six institutionalised 'ideal type' models characterised by different institutional logics. Importantly for this report we consider the 6 Narratives to be institutionalised at different depths. We also consider that new instituted forms sediment over older ones, never completely achieving (de)institutionalisation. ***Section 3 also recaps the lessons learned from the organisational case studies previously undertaken for RES-AGorA*** where these lessons are relevant to the JERRI objectives. Finally ***Section 3 also turns to the first round of JERRI interviews, and summarises the signals from those interviews*** which have a bearing on

processes of deep institutionalisation considering both ***de-facto*** responsible research and innovation and **H2020 RRI**.

- ***Section 4.0*** **proposes a typology of deep institutionalisation** by drawing both the theoretical and empirical material together.
- ***Section 5.0*** **completes the report by 'preparing the ground' for the next Work Packages of JERRI drawing upon the key findings, messages, lessons and implications of WP1 'State of the Art'.**

2. Organisational Institutionalism: Theoretical touchstones:

2.1 Institutional Context and Institutional Logics

If organisation theory is the quest to understand how organisations exist and behave in the way they do, organisational institutionalism provides the institutionalists' perspective on this question. Scholarship was originally motivated to address the question of why organisations exhibit remarkable ***homogeneity*** (of structures, form and content) and to investigate the source and explanation of this homogeneity (Di Maggio and Powell 1983). A great deal of progress was made on this question during the creative and productive period 1977-1983, with a key finding being that institutional conformity can be traced to a thorough appreciation of the external ***'institutional context'*** and its effects on organisations. The iconic papers by Meyer and Rowan (1977), and Zucker (1977) marked the beginning of this period, followed by Meyer and Rowan (1983), DiMaggio and Powell (1983) Tolbert and Zucker (1983) and Meyer and Scott (1983) cementing the American leadership of the field.

Greenwood et al (2008) synthesise the foundational tenets of the field and source Meyer and Rowan (1977) as a ground-breaking paper. Meyer and Rowan (1977) drew upon Weber's notion of **maxims**: which comprise ***social norms*** which have an undisputed ***rule-like*** quality and formal regulations. Both norms and regulations impose behavioural obligations which tend to conformity. So ***institutional context*** (according to Meyer and Rowan 1983: 84) refers to 'the ***rules, norms, and ideologies of wider society'*** whilst Zucker (1983: 105) referred to '***common understandings of what is appropriate and, fundamentally, meaningful behaviour'*** and Scott (1983:163) proposed '***normative and cognitive belief systems'***, which were two of what would later become his celebrated '***3 pillars of institutions***' (Scott 1995:Chapter 3). The three 'vital ingredients' of institutions according to Scott (1995) are the ***regulative pillar*** (which drives to efficiency and expedience), ***the cultural-cognitive pillar*** **(**which conforms around shared cultural understandings) and the ***normative*** **pillar** (which has an ethical and moral basis, conferring social obligations, rewards and sanctions in the form of honour/shame). The ***normative dimension*** of social life in organisations can be evaluated and 'rank-ordered' for example through awards for good conduct, with indicators of good standing rendered visible to others through performance systems such as accreditation and certification schemes. Here I highlight the 'normative' dimension for two reasons : first for its significance to ***the understanding, interpretation and enactment of responsibility,*** therefore particularly significant to our topic, second because a number of contemporary scholars have expressed the view that the significance of the 'normative' underpinnings to daily life and practices is ***under-***

developed theoretically; and under-researched as a specific object of sociological study (Sayer 2011, 2015).

Continuing with the concept of ***institutional context*** as a source of ***alignment*** and inter- and intra-organisational ***convergence***, Meyer and Rowan (1977) describe institutional context as '***widespread social understandings that define what it means to be rational'*** (which they labelled these ***rationalised myths***).

A classical text on ***Institutional logics*** is provided by Friedland and Alford (1991). Institutional logics act as the ***glue holding systems and sub-systems together, albeit multiple, even contradictory logics can and do co-exist to 'order' an institutional system***. Examples of institutional logics are ***market, family, religion***. Thornton and Ocasio (2008) provide 'ideal types' of institutional logics co-existing within the institutional support structures of public accounting (Fiduciary and/versus Corporate logics); architecture (Aesthetic and/versus Efficiency logics); and higher-education publishing (Editorial and/versus Market logics), and devise a common set of analytical categories to compare and contrast the different logics[2].

The key characteristic of institutional logics is that they provide ***inter-institutional glue across institutions, providing a convergent binding property*** to the system and convergence ***of meaning to the separate parts***. Different parts and the overall dynamic of the system can be understood through the logic which thus provides ***a meta-theory of causal explanation of institutional 'order':***

> "Each *of the institutional orders has a central logic that guides its organising principles and provides social actors with vocabularies of motive and a sense of self (ie identity). These practices and symbols are available to groups and organisations to further elaborate, manipulate and use to their own advantage… each has a central logic that constrain(s) both the means and ends of individuals, organisations and society'* (Friedland and Alford 1991: 232, 248, 251-252 in Thornton and Ocasio 2008)

Friedland and Alford (1991) point to the contradictory practices and beliefs inherent in the institutions of modern Western democracies, explained by the ***co-existence of multiple institutional logics,*** such as (market)capitalism, state bureaucracy and political democracy. (In fact, if we add the logic of participatory democracy, we are

[2] I have borrowed this method to analyse the logics of the '6 Grand Narratives' models of institutionalised responsibility in research and innovation in Section 3 (See Table XX Appendix 1). That analysis also shows the reader how the querying of institutional logics in the RTO analysis might reveal co-existing contradictory institutional logics at play and their consequences for the analysis and further institutionalisation of *de-facto* rri and RRI respectively.

quite close to appreciating some of the contradictions inherent and visible in **H2020 RRI**).

2.2 Legitimacy and Legitimacy Construction Processes

Legitimacy and its construction provide a further important theoretical touchstone for our topic. In simple terms it refers to the level of ***social approval*** of an organisation. It is particularly significant because legitimacy construction is highlighted in the literature for its importance during phases of ***emergence*** involving the ***formation of new institutions***. Further, the literature points to an agency dimension of legitimacy construction, viz the ***differential strategic capabilities of actors to build legitimacy***. Process accounts of legitimacy construction also stress that legitimacy is particularly important during uncertain and unstable ***phases of institutional change*****,** when the legitimacy of incumbent organisation are typically questioned and legitimacy struggles are (re)opened, coming under attack by competing organisations or societal actors.

Meyer and Scott (1983) provided an early thorough definition of the concept:

> *"We take the view that organisational legitimacy refers to the degree of cultural support for an organisation – the extent to which the array of established cultural accounts provide explanations for its existence, functioning and jurisdiction, and lack or deny alternatives…. In such (an) instance legitimacy mainly refers to the adequacy of the organisation as a theory. A completely legitimate organisation would be one about which no questions could be raised. [Every goal, mean, resource and control system is necessary, specified, complete and without alternatives]. Perfect legitimacy is perfect theory, complete (ie without uncertainty) and confronted by no alternatives" (p201)*

Since legitimacy can be understood as ***the presence or absence of challenge and questioning*****,** Hirsch and Andrews (1984) elaborated two forms of challenge : ***performance challenges*** and ***values challenges***. Performance challenges occur when organisations are perceived by relevant actors as having failed to execute the purpose for which they were chartered ….. (whilst) values challenge place the organisations' mission and legitimacy for existence at issue (Hirsch and Andrews in Deephouse and Suchman 2008).

Legitimacy construction has been confirmed as an important factor in ***early stages of industry creation*** (Aldrich and Fiol 1994) or during the ***co-evolution of external crises and organisational responses*** such as during the rise of corporate environmentalism in the US Chemical industry (1960-93). Analysing this case, Hoffman (1999) observes that 'new forms of debate emerge in the wake of triggering events that cause a reconfiguration of field membership and/or interaction patterns (p351). In settings where the rules are under construction, new organisational forms emerge which may be lacking cognitive or normative legitimacy. However, pro-active ***legitimacy building strategies can be considered a capability and resource*** which supports and protects the survival and growth of new ventures (Zimmerman and Zeitz, 2002).

Legitimacy struggles therefore tend to open up during periods of crisis emanating from the external institutional context. Questioning legitimacy therefore also plays a key role in ***(de)institutionalisation processes*** where the status quo and its attendant logics, or an organisations competency to fulfil the performance criteria of a given logic, are called into question. Likewise 'complete' legitimacy may be considered the case-type where no questioning takes place and the existing status quo is taken for granted as correct and appropriate.

Legitimacy, at base, therefore might be considered a type of ***social evaluation***. Importantly for our report, we can add that by extension ***legitimacy judgements are subjective***; they cannot be made by the organisation itself and cannot be read-off from self-proclaimed claims to legitimacy. On the contrary ***legitimacy evaluations are relational***. They must, like a number of other subject-centred concepts such as 'authenticity', be understood as the product of a ***relational dynamic between the organisation and a plethora of external actors***. Legitimacy evaluations are ***in the eye of the beholder***. In our cases of responsibility in research and innovation, where there are an increasing array of number and diversity of governance actors, ***relational legitimacy construction*** can be very important to the success or failure of a new collective normative venture, such as the instituting of a new values-based label (such as Fairtrade or Energy Efficiency or Energy Saving labels) because the ***breadth of actor interests and perspectives create a turbulent institutional context*** where legitimacy evaluations are uncertain and unpredictable, precipitating the potential derailment of a collective institutionalisation project, which then may, or alternatively may not, subsequently recover (Dendler and Randles 2016).

Despite these instabilities which characterise institutional contexts composed of multiple diverse forms of actor rendering the outcomes of legitimisation processes unpredictable (as we might envision responsible innovation which explicitly seeks to include and integrate multiple actor perspectives to the innovation process);

Suchman (1995) has in fact produced a persuasive account of how actors build legitimacy by mobilising three kinds of institution-building strategies: ***'pragmatic' 'moral' and 'cognitive' legitimacy-construction strategies.*** Pragmatic strategies aim for common-sense, converging to solutions which serve the most actors interests. Moral construction strategies call for the right or virtuous outcome or decision. And 'cognitive' strategies aim for decisions based on facts and knowledge. All three strategies are shown to be used to gain legitimacy in collective, multi-actor coalition institutionalisation projects. Thus Schuman offers a similar triadic schema of legitimacy construction consistent to Scott's (1995) three pillars of institutionalisation. In a case study tracing the instituting of normative labelling schemes Dendler and Randles found coalitions of actors did mobilise all three '***pragmatic' 'moral' and 'cognitive' dimensions into their strategic legitimacy-building struggles and efforts***, and that success in institutionalising the label, was in part linked to their capabilities and success in mobilising these strategies (Dendler and Randles 2016).

Deephouse and Suchman (2008) finally introduce two further ideas that are conceptually close cognates to legitimacy, and which are also relevant to our topic since they provide alternative forms of ***social evaluation***. They are ***reputation*** and ***status***. Briefly, Deephouse and Suchman (2008: 59) distinguish reputation and status as follows:

- ***"Status*** is a socially constructed inter-subjectively agreed-upon and accepted ordering of ranking of social actors (Washington & Zajac, 2005:284) based on esteem or deference that each actor can claim by virtue of the actors' membership in a group or groups with distinctive practices, values, traits, capacities or inherent worth (Benjamin & Podolny 1999).
- ***Reputation*** is a generalised expectation about a firm's future behaviour or performance based on collective perceptions (either direct or, more often vicarious) of past behaviour or performance (cf Ferguson, Deephouse and Ferguson 2000; Fombrun 1996, Rindova et al 2005)".

The elaboration of both of these concepts – Status and Reputation, help appreciate two motives that RTOs might have, or could potentially strategically influence by embarking consciously on new projects or initiatives which (re)define their position and actions around responsible research or responsible innovation.

2.3 (De) Institutionalisation and Institutional Change processes

Leaning on the organisational instututionalism literature I have introduced above the two alternative institutional situations. The first describes conditions of convergence and homogeneity with a focus on stable institutional context and dominant institutional logics, as causal conditions which would tend to hold the institutional system in a ***state of isomorphism*** (Section 2.1).

The second describes situations/moments of ***instability or crisis*** and considers under what combination of institutional conditions such situations arise. The intuitionalist literature suggests this case-type situation arises ***when there is a challenge to the status quo*** . Such challenges may take the form of performance or values challenges, and trigger moments of uncertainty out of which institutional change may occur (Section 2.2)

But, periods of challenge, may or may not result in institutional change. We can extend the analysis above to suggest that three things influence the outcome of change processes, with a great deal of variety and uncertainty as to what outcomes actually occur. We can suggest there is a relationship between a) the ***ability of incumbents to buttress their position***, drawing on the credit or inertia 'banked' during earlier phases of legitimacy-construction (cultural-cognitive, moral, and regulatory 'assets' ie 'the way we do things around here') ; b) ***the nature of the problem or crisis or pulse*** creating the conditions out of which the challenge emerges; and c) ***the effectiveness of challengers*** (institutional entrepreneurs) in their efforts to build and sustain an alternative vision and narrative (including steps such as (re)framing of the problem and articulating for others the nature and extent of the harm that will result from leaving the status-quo unchallenged; offering an alternative or better future; and incentivising relevant or necessary actors to invest resources to participate in the change process. The outcome of the change process may be unpredictable, but we can posit from the literature that these three input factors are important.

Still, this picture of contest and struggle is very stark, and does not yet adequately look 'inside the box' to shed light on the ***nature of the institutional change process.*** To this question - the internal dynamics of institutional change processes - organisational intuitionalists have increasingly turned their attention.

Understanding ***de-institutionalisation processes sheds light on this problem***. The first point to establish is that for institutional change to be understood, attention needs to be paid to ***earlier histories of institutionalisation***, including prior-established institutional logics and their origin, and thorough appreciation of the history of prior institutional contexts, and thus the different forms and strategies that de-institutionalisation might take. Further

> "An important ontological point must be addressed at this stage. That is, if social life *cannot exist* except for in its institutionalised form, then any process of institutionalisation *must* involve a corresponding process of de-institutionalisation. Although separable analytically (and so far they are completely separate strands in the literature), we view institutionalisation and de-institutionalisation processes as *necessarily simultaneous"*
>
> (Randles & Laasch 2015:8, original italics)

So, institutional change will always comprise **simultaneous institutionalisation and de-institutionalisation processes, such that the process we actually witness is always a combination of both.** The empirical study of (de)institutionalisation processes therefore needs to ***pay attention to both the motives and circumstances which gave rise to the current institutional form; and the pressures, actors and strategies seeking to destabilise or change it***.

Dacin and Dacin (2008 :333) posit five mechanisms of dissipation: a process through which an incumbent tradition (or prior-institutionalised form) becomes de-institutionalised. The five processes to which they refer are : ***assimilation, dilution, disembedding, competition, and erasure***. Each can be summarised:

- '***Assimilation involves the absorption of new elements into an existing tradition***. The transformative dynamic is more evolutionary than radical, and more partial than complete
- ***Dilution involves adding new dimensions, enlarging the original set*** of institutional imperatives, producing greater complexity and ambiguity, as the original core expands
- ***Disembedding involves disconnecting or dismantling*** *core elements, so that the integrating logic is compromised.*
- ***Competition involves the presence of multiple logics which vie for the attention*** and support of key constituencies.
- ***Erasure is rare, and more aggressive*** as a transformational dynamic, involving the complete removal of core elements'***.***

Dacin and Dacin's typology of de-institutionalisation is not exhaustive, it is more illustrative. And like many typologies of institutionalism each 'type' serves as a caricatured exaggeration for analytical purposes. In empirical settings several of these forms of are likely to be simultaneously present.

Indeed, in our analysis of the '6 Narratives' of de-facto responsible innovation below, ***'assimilation'*** is clearly at play. Across the six narratives ***new institutional imperatives sediment on top of old rather than replacing them*** (as would be the case under situations of Erasure). There are clearly traces of earlier dominant logics shaping behaviour, even as new imperatives of responsibility are introduced. Hence, and perhaps as a consequence of this 'sedimenting' dynamic, our *de-facto* cases of responsible research and innovation witness Dilution, Disembedding, De-coupling and Competition also. This gives rise, as we have previously reported (Randles et al 2014, 2016), to situations of i) ***responsibility-overload***, as new imperatives of responsibility are loaded onto organisations by external pressures whilst the original logics and corresponding obligations remain; ii) ***responsibility-washing*** as a rational-myth type response when demands for new forms of virtuous behaviour are pressed by external constituencies with one kind of tactical response being to create a 'de-coupled' specialist unit to deal with the new imperative whilst leaving the rest of the organisation in-tact and performing according to earlier institutional logics; and iii) ***responsibility re-labelling*** , similarly, an institutional response, perhaps marking a phase of transition whilst organisation(s) contemplate, formulate or are pressed into a ***deeper institutionalisation*** response, with ramifications for what that might entail, or alternatively representing different strategies responding to the realities of responsibility overload.

2.4 Institutional Entrepreneurs as Change-Agents

The literature on ***institutional entrepreneurship*** continues the quest to understand institutional change, but now focuses on the ***actors*** of institutional change. Rather than the predominantly structuralist accounts which preceded, the dial shifts in the 2000's to pay more attention to the agency of institutional change, ie ***who or what does the changing***?. But herein lies the structure/agency puzzle which gives form to the main question which motivates scholarship into institutional entrepreneurship. That is the ***'conundrum of agency'*** which asks ***'if the actor is the product of the institutional context in which s/he is situated, how can s/he step outside of***

these structures - 'the structures which bind'[3] – in order to identify the harms caused by them, not least secure the resources and motivation to achieve, structural change?

Hereupon the literature divides, approximating two strands: one which supports the view that capabilities and achievements of ***'heroic entrepreneurs'*** are critical, and supports this position by providing case ***studies of particular individuals, and seeking to classify and understand the leadership qualities of individuals;*** and those in contrast who highlight the ***collective, incremental and multi-level elements of institutional entrepreneurship as process*** (Hardy and Maguire 2008:198). In fact some of the most recent scholarship has found some resolution between these two polemic accounts. First by stressing the criticality of the actors' position in the field, ie from where he or she already has an assemblage of relevant position-enhancing capitals (economic, cultural and social resources, drawing on the work of Bourdieu and Wacquant 1992) and how these resources confer unequal power, making successful change strategies more likely for those endowed with these capitals. And those who take the flip side, arguing that institutional entrepreneurship is more likely to be successful within a structural context (institutional culture) where it is positively favoured, encouraged and rewarded.

For scholars studying these processes (eg Weik 2010) generic conclusions were starting to emerge. One, that ***institutional entrepreneurs are adept at critical reflection*** taken as a capability to imagine oneself 'as if' outside of the structures which bind, and critically look back into those structures to identify the harms they cause (Randles *et al* 2014 inspired by Polanyi 1962)[4] ***; to articulate a path*** which aims to correct those harms; and is able to ***mobilise a collective response to them, taking the risks which are likely to ensue for agents of institutional change, such as the risk of isolation even rejection for 'daring to be different' .*** This collective and reflexive theorisation of institutional entrepreneurship (Weik 2010) implies **an enabling cultural context is needed:** one where bottom-up entrepreneurial responses are enabled to articulate and enact local collective responses to particular societal problems of 'responsibility'. And where particular capabilities and capacities of institutional entrepreneurialism can be identified, codified, and encouraged through system-level capacity-building and training (Randles *et al* 2015).

[3] To borrow from Jean Jacques Rousseau (1762)

[4] And introduced by K Polanyi (1944), final chapter

This context, that of Institutional ***entrepreneurialism*** is a causal structural condition which encourages and facilitates (bottom-up) ***entrepreneurial responses to structural problems,*** achieved through the ***collaborative efforts of collectives of heterogeneous actors*** (ie focussed at the meso-level)***, taking place in particular geographical spaces; to achieve transformative outcomes, where actors work together to contest, negotiate and determine appropriate future actions, for themselves (Randles and Laredo et al eds 2017)***.

2.5 Institutional Pluralism

We can complete this section by coming full circle, to the nature of the organisation and the institutional context within which it sits, and by positing that ***institutional pluralism*** is a helpful concept for appreciating the practical implications of the ***co-existence of multiple logics of responsibility within large and complex organisations such as RTOs*** like Fraunhofer and TNO.

Kraatz and Block (2008) say that it is no surprise to find that large and complex organisations, which are outfacing to multiple constituencies of user (and 'stakeholder'), operate in multiple institutional spheres, and accordingly come under the influence of multiple institutional logics. Such organisations will likely participate in multiple discourses and possess multiple identities. And yet, the apparent confrontations and contradictions of multiple co-existing institutional logics, do not bring the organisation down. Rather, it ***'gets along'***.

According to Kraatz and Block (2008: 266/7):

> "Such organisations ***'do seem to hang together (however imperfectly***), and the centripetal forces that integrate them are no less scientific than the centrifugal ones that tend to fragment ….. (*and yet*)…….any person who has spent time in a position of organisational authority likely recognises the need for some notion of shared purpose, common good, and/or collective identity, however vague... These integrative and idealistic notions are not only useful for elites who are looking to consolidate their power…… ***Rather, we think they are also essential resources for leaders who are actually trying to do justice, achieve diverse purposes, act responsibly, and achieve a common good within their organisations (ie to achieve something vaguely resembling substantive co-operation)"***

Such organisations ***may find themselves in state of near-constant flux and change as it grapples with multiple priorities and identities within wide pallets of possibilities.*** Further, Kraatz and Block (2008) attribute a significant role to

middle-managers within such organisations, as the actors responsible for both the practical integration of multiple agendas and identities into everyday work scheduling; and for communicating 'up' the organisation how they are practically integrating/coping with different (competing) logics. They say;

> 'Institutional pluralism has the effect of ***making leadership both practically necessary and philosophically possible***. The pluralistic organisation does not automatically hold itself together …. *(rather)*…. social and political processes may facilitate institutionalisation and the formation of the organisational self. ***Political structures and integrative mythologies may likewise help sustain this emergent self***…. *(moreover)*… ***people who find themselves at the top of (or in the middle of) pluralistic organisations have much work to do knitting them together ….. because they work at the nexus of multiple identities (and multiple normative orders) they regularly find themselves in situations where they have 'no choice but to choose'*** (p263, bold and parenthesises added)

The significance of these passages on institutional pluralism and the pluralist organisation, are its implications for a practical form of governance - **governance 'that works'** – where such organisations have the possibility to not only survive but make a strategic virtue of the ambiguity that arises from an institutional setting comprising multiple logics and identities.

> "We think that the single most important feature of the pluralistic organisation may be its inchoate capacity to govern itself – and its parallel ability to develop a self which becomes a focal point of its governance efforts. More tangibly, the pluralistic organisation has the capacity to constitute itself by choosing its identities and commitments from a menu of choices presented by its would-be constituencies, and by society at large' (p255)

For Fraunhofer, TNO and the other RTOs working with the JERRI consortium the key question is ***whether they recognise themselves in these descriptions***, and if they do, what implications arise. ***For the pluralistic organisation, in terms of its responsibility-scope, may operationalize its own identity-formation, visioning, goal-setting and governance of the moral self, constituted through the selection, enactment and integration of a wide variety of de-facto responsibility anchors and identities***.

3. Iterating Theory and Substantive Context: What we have already learned About Institutionalisation of Responsibility in Research and Innovation Situations

The first objective of this section is to analytically differentiate two empirical objects, they are ***de-facto responsible research and innovation (or rri)*** and the European Commission's cross-cutting policy instrument on the topic, **H2020 RRI**. Because it is important the two are conceptualised separately; and that the separation is maintained while the action-research effort of JERRI moves into the next phases (work-packages) of empirical observation, analyses, co-construction and implementation seeking to guide the participating RTOs towards the enactment of their own vision of responsible research and innovation and its constituent elements. This may involve the elements prescribed by **H2020 RRI** or may include or incorporate other elements deemed (equally) significant according to different or co-existing institutional logics.

De-facto rri and H2020 RRI are each briefly elaborated below, in order to explain their difference and emphasise the significance of holding their analysis apart.

3.1 De-facto Responsible Research and Innovation (rri)

De-facto responsible research and innovation (or 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**. Further ***normative orientations*** play a significant role in *de-facto* rri , encompassing both the ***values*** of actors; and the ***normalisation*** or collective acceptance of those values (Randles 2013, Randles et al 2014, 2016, Randles and Laredo *eds* (2017, forthcoming)).

The concept of *de-facto rri* draws on Arie Rip's concept ***de-facto* governance** (Rip 2010) where, following *Henry Mintzberg*, Rip conceives of the *de-facto* governance of research and innovation as always comprising both **'bottom-up' processes of experimentation** (which we can liken to the role of institutional entrepreneurs under an institutional culture of institutional entrepreneurialism), and **'top-down' steering** (which we can liken to the affective system-shaping influence of institutional context).

Elsewhere (Randles et al 2013, 2016, Randles and Laredo *eds* 2017, forthcoming) we have proposed six 'ideal-types' - or 'Six Grand Narratives' - of responsibility in research and innovation, showing how and from where each 'Narrative' has historically emerged and which actors in which places mark their emergence. In

positing the 6 Narratives as separate and internally coherent ideal types, we also suggest that each has specific and unique characteristics which define it, and distinguish each from the others, and that each is held in place by a distinctive 'glue' of ordering characteristics – ***institutional logics.***

A significant finding from this work is that when we place the six narratives next to each other in their contemporary form, ***traces of prior Narratives do not disappear;*** we do not see an aggressive form of *erasure*. Rather ***new understandings of responsibility and their attendant practices become 'sedimented' over previous ones***, such that the elements of prior logics come to ***co-exist*** with new ones. We also find in their actuality, ***structural overlaps across two or more Narratives form integrative bridges***; and that ***institutional entrepreneurs play a critical role in presenting future visions and programmes of proposed action*** which cross-cut the Narratives, potentially producing both ***integration impulses and scope for variety-generation*** (Randles and Laredo *eds* (2017) forthcoming).

We have adapted Thornton and Occasio's (2008) Institutional Logics framework to systematically compare and contrast the six logics, and present this analysis in Appendix A of this report.

The six Narratives are listed below and a short description of each is provided in Appendix B of this report taken from Randles *et al* 2016: Chapter 3.

Table 1

A/ *Republic of Science*
B/ *Technological Progress: Weighing Risks and Harms as well as Benefits of New and Emerging Technologies*
C/ *Participatory Society*
D/ *The Citizen Firm*
E/ *Moral Globalisation*
F/ *Research and Innovation With/for Society*

3.2 H2020 RRI

H2020 Responsible Research and Innovation (RRI), as a policy instrument of the European Commission has a long lineage. Its origins lay within the earlier Framework Progamme actions of the Science in/with/for Society Unit of DG Research.

Elsewhere, we have used text-analysis to systematically trace the discursive ***evolution of RRI*** through EC policy reports and texts (Tancoigne et al 2017, under review). We find that **H2020 RRI** is simply the most recent incarnation of a long thread of policy instruments aiming to shape and steer science/society relations in the direction consistent with ***participatory society.*** (Narrative C in our 6 Grand Narratives).

It differs, however, from antecedent lines within this thrust of the EC Science/Society policy, in a number of ways:

a) The first is the explicit appropriation of the adjective 'responsible'. Immediately prior to the formulation of RRI, the EC experimented with the launch, in 2008, of a 'Code of Conduct for responsible nanosciences and nanotechnologies research' which struggled to gain acceptance both within and outside the Commission[5]. Responsible Research and Innovation (RRI) followed, as a new policy phrase within Science/Society programmes, and can be traced in policy texts to 2011, with the clarification of content comprising the '5 keys' only formulated during the negotiations which produced the final text of the '***Rome Declaration' on RRI in November 2014.*** Here the hand of antecedent and legacy themes of FP6 and FP7 are clearly visible in the choice of five thematic lines which became known as the ***the 5 keys, viz : public engagement, open access, gender, ethics, and science education***. Indeed those present at the Rome event witnessed first-hand the political struggles which took place, to maintain key lines in the text of the new policy instrument around which certain actors present had already invested resources, knowledge, expertise and social capital under FP6 and FP7. These themes did in fact come to the fore, producing the rather ad-hoc and fragmented '5 keys' of **H2020 RRI.** However, in the use of the word 'Responsibility' we can see tactical and political benefits from the use of a word of ***which 'who could be against?***' (See David Guston's contribution in Randles *et al*, 2012; and Valdivia and Guston 2015) and in addition a word of great ***flexibility (it can be interpreted differently by different constituencies)*** whilst still holding together as an integrative concept, qualifying it as an '***umbrella term***' (Rip & Voss, 2013). Such that its integrative property qualifies in our

[5] The CoC failed to survive within the Commission as an actively promoted instrument (having been superseded by RRI) and externally, the author to this report was involved in EC consultation processes, including with input from practitioners, who were struggling to achieve organisational acceptance of the Code.

view as an effective ***Word of Power'*** (Tanciogne et al 2017, under review). As Callon & Lacoste also concur:

> "Responsible innovation is, in a way, a collective statement: an expression that gathers together a variety of communities, groups and viewpoints around a shared concern"
>
> (Callon & Lacoste, 2011: 20)

b) A further discursive advantage of the ***flexible adjective 'responsible'*** is that it is already institutionalised into the normative vocabulary of natural scientists and researchers (see Narrative A above) and therefore is an ***'acceptable' word, if variously interpreted***, for example under Narrative A, it associated with the moral regulation of scientists and researchers practice (regulating against researcher plagiarism and fraud, taking care that vulnerable subjects are not exploited, ensuring health and safety in the laboratory etc).

c) This flexibility has also enabled its acceptance for the first time as a ***cross-cutting policy of SWAFS origin, spanning the three H2020 Pillars of Excellent Science, Industrial Leadership, and addressing Societal Challenges***. It therefore has the propensity to be expanded in its scope and reach - '***mainstreamed' – in a way that antecedents lacked, enabling it to escape the narrow confines and boundaries of the Science with/for Society (SWAFS)*** unit which gave birth to it.

d) The broadening of the scope and boundaries of its application, from the governance of science and research to the governance of innovation. Adding 'Innovation' to the scope of Science/society relations ***expands the scope and reach*** of RRI regulation to actors and processes beyond scientists and researchers***, entering into and seeking to influence the less familiar territory of the commercial sphere of firms and into spaces where the conception, design and manufacture of new products travel through networks, finding their way onto markets and into the lives of consumers and end-users (Joly 2011).***

However, in its current form, the ECs definition of RRI is still surprisingly unstable.

For example, on the EC website under the cross-cutting pillars of H2020, RRI is defined thus:

Responsible research and innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation

https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation, Accessed 12 December 2016

Whereas on the EC website under the Science with and for Society, RRI is defined:

The specific objective is to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility. It allows all societal actors (researchers, citizens, policy makers, business, third sector organisations etc.) to 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. This approach to research and innovation is called Responsible Research and Innovation (RRI).

https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society
Accessed 12 December 2016

If we assume these differences are not an administrative oversight, we can perhaps understand these different definitions as different ***discursive strategies***, and therefore RRI as an explicit political tool. With the help of insights from the work of *Vivien Schmidt* (2008, 2010) on the 'the 4th Institutionalism' which she calls ***Discursive Institutionalism (DI),*** this can be considered a branch of institutionalist theory which ***takes ideas and discourse seriously,*** for their powerful influence on institutionalisation processes.

Analysing RRI through the lens offered by Schmidt, which primarily in the context of policy, traces through the units of analysis: ***ideas, philosophies, policies and programmes***, we might say that the expansion of the sphere of influence enabled by the ***flexibility of RRI as a 'Word of Power'*** – has come at some cost. As the two alternative definitions of RRI above demonstrate, ***we now lack a coherent narrative*** which positions RRI as a naturalised Big Idea providing solution(s) to problem(s) recognised as both pressing and legitimate by the multiple audiences to which it is

targeted***. Nor, because of its rapid fragmentation into the 5 keys, does RRI appear to provide a coherent anchor which might otherwise provide an effective policy instrument by shaping the institutional context*** under which research and innovation actors voluntarily respond, potentially empowering and incentivising the self-organisation of actor coalitions to share responsibility for the organisation and the implementation of inclusive processes which frame and seek to collectively solve pressing problems of society***.*** Without such a systematic ***link between philosophy and practical action,*** which is difficult to discern within RRI; ***the integrative logic which has the potential to provide institutional glue between different audience spheres, policy, programmes and action in a way which resonates with diverse audiences; is easily lost, since the logic which translates the (multiple) Visions of RRI, into the concrete 5 keys of its implementation strategy, is very hard to see.***

3.3 What we learnt about institutionalisation from the RES-AGorA project

The RES-AGorA project undertook 26 in-depth phased case studies over two years, of ***de-facto rri***, covering a range of situations where actors ***de-facto*** interpret and enact 'responsibility' in a number of research and innovation situations and organisational settings. For example, from analysing the governance and regulation of ***controversies in the emergence of new technologies*** such as 'Fracking' in Austria and UK, (Lang 2014); synthetic biology (Van Doren 2014); 'garage' innovation in 3D printing and psychonauts (Soderberg 2014); Nanotechnologies (Walhout 2014, Arnaldi et al 2014a); to ***national research priority setting*** exercises (Nielsen 2014); and the uptake of ***voluntary governance instruments*** such as the EC Code of Conduct on nanosciences and nanotechnologies (Ruggiu at al 2014) . Importantly for this report, we spent a great deal of effort researching and analysing different ***'critical organisations'***, such as Fraunhofer as an RTO (Goos and Lindner 2014); multi-national corporations (Loconto 2014); Universities (Randles 2014; Griessler 2014); national research councils (Stahl Nielsen et al 2014); and professional societies (Arnaldi et al 2014b). http://res-agora.eu/case-studies/. Undertaking Cross-cutting analysis of this corpus of diverse rri cases provided the input for our abstracted ***'13 Lessons' on the institutionalisation of rri*** (Randles et al 2015)[6] and provided in-part the empirical groundwork which enabled the

[6] http://res-agora.eu/assets/ResAGORA-lessons-Stakeholder-Report_final_formated.pdf

development of the ***'6 Grand Narratives'*** (this report, Appendix A) and the RES-AGorA main practitioner output : ***The RES-AGorA Navigator*** (Kuhlmann et al 2015).

Goos and Lindner (2014, also in their chapter (2015) to Randles and Laredo 2017 forthcoming) take a ***multi-level*** analytic approach to understand the dynamics and development of *de-facto rri* at the Fraunhofer Society of Germany (Henceforth FhG). With 24,000 employees distributed across 67 semi-autonomous units (in 2016), geographically spread across Germany, FhG shows all the characteristics of the ***pluralistic organisation*** (described at Section 2.5 above) with associated implications in terms of 'hanging together' in the face of multiple, potentially contradictory institutional logics pressing on the organisation. Further the ***multi-level analysis*** (Benz 2007) which Goos and Lindner adopt highlights the critical influence of external ***institutional context*** . Coupled with their use of the concept of ***'shadow of hierarchy'*** (Scharpf 1997) their analysis brings to the fore institutional logics impacting *de-facto* from two directions. On the one hand they highlight the critical influence of the German Federal State. Effectively the size and significance of FhG within the research and innovation system of Germany establishes it as a *quasi* arm of the Federal State. Two examples are given. Firstly, influenced by the Lund Declaration of 2009, the Federal Ministry of Education Research develops innovation policy strongly steering delivery organisations towards addressing ***grand challenges of our time,*** a policy which flows down to influence FhG. Another example, The Federal Ministry for Labour and Social Affairs, drew up a ***National Strategy for Corporate Social Responsibility*** in 2010, which both directly and indirectly influences FhG by encouraging take-up by both FhG and their client companies, providing an ***aligned normative steer***. On the other hand, the level and increasing pressure for FhG to generate a greater proportion of income from private contracts (standing at Euros 1billion out total income of Euros 2.1billion in 2015) introduces an increasingly pressing ***market logic*** influencing different FhG units to different degrees and varieties in terms of institutional steering. These different dominant pressures suggest that whilst FhG have introduced a specific specialist ***RRI Unit*** (with a focus on enabling projects to incorporate participatory methods, and with a history in gender issues) the other FhG units are not obliged to incorporate input from the RRI unit, this unit is somewhat ***de-coupled*** from de-facto rri in FhG.

By contrast, the study of Arizona State University as a 'Good University' by Randles (2015, 2016) highlights the ***entrepreneurial strategies*** pursued by ASU President, Michael Crow, and his Senior Management Team adaptively transforming the organisation, strategically and intentionally, over a long period of fourteen years, effectively ***from a Narrative A institution to a Narrative F one.*** Albeit, similarly across the world, Narrative A is the most acute governance logic in 'Ivy League' and

equivalent elite universities, whereas Narrative F has steered the direction of more applied and technical and applied universities, since their inception. Importantly the ASU case shows how this transformation was internally ***implemented through the creative design and implementation of governance instruments established at the central strategic unit of the organisation.*** Further, significant to the successful transformation of ASU is an income-growing business model which (for example) quadrupled research income over ten years following a mission of society-facing, inter-disciplinary problem-solving and therefore 'impactful' research. The resulting success in terms of income-growth performance, provides the legitimacy to enable self-autonomy, within an institutional context where the hand of State on the normative direction of Higher Education Institutes is relatively light. Thus there is wide scope in the USA for the normative orientation of Universities to be determined locally, albeit in a ***highly market-competitive context*** for both student numbers and research income. The ASU case provides an example of ***intra-organisation*** *de-facto* rri leveraged through a logic of ***institutional entrepreneurialism.***

In Arnaldi's case study (2014, also in his chapter (2015) to Randles and Laredo 2017 forthcoming) concerning the incorporation of ***sustainability statements*** into the Codes of Conduct of ***engineering Professional Societies***, we were interested to understand how *de-facto rri* performed within an organisational context largely ignored in case studies of rri (and RRI), ie that of ***Profession***. In fact profession is an important unit of collective organisation determining the normative steers (as well as the identities and folklore) of ***professional practice***. A strong example is the influence of the Hippocratic Oath on the medical profession. Arnaldi finds a great deal of convergence on how engineering professions across different countries are responding to the incorporation of ***principles of sustainability*** **into their Codes of Conduct**, in such a way which ***assimilates new imperatives into earlier institutionalised normative anchors***. The reasoning and means of incorporating sustainability into the profession's ***a-priori moral code*** is that ***outputs of engineering professions are retained materially in society long after the originators have left the scene***, motivating ***a care and attention future worlds***, which translates into ***precautionary approaches to research and innovation in the present,*** so that present societies can be assured as to the safety for future generations and the natural environment, of the impact of infrastructures (eg bridges, buildings, technologies, and other enduring artefacts) designed and introduced into society today. This line of reasoning ***produces an anticipative normative orientation from the profession***. Whilst we were surprised that this futures-oriented normative perspective did not apparently translate into the training syllabi of the profession (which would provide one indicator of how normative principles translate into professional practice) more research on professions (including with professional

practitioners engaged in their everyday practical work) would shed a brighter torchlight on how *de-facto rri* manifests in the context of professional practice.

A similar process is discernable in the way that the ***UK Research Councils have adopted a combination of de-facto rri AND new frameworks of RRI*** (Stahl Nielsen *et al* 2014). At the Engineering and Physical Science Research Council (EPSRC) the RRI framework recently developed by Jack Stilgoe, Richard Owen and Philip Macnaghten in the context of Geo-engineering in the UK (Stilgoe et al 2013) was at first adopted but has since modified to produce the ***AREA framework (Anticipate, Reflect, Engage and Act)*** whilst at the Biotechnology and Biological Sciences Research Council (BBSRC), no specific new RRI framework has yet been accepted (to our knowledge). Partly the explanation seems to be that the BBSRC believes in the ***robustness of its long-standing role and status as arbiter of scientific responsibility in biological sciences (and close cousins, medical sciences)*** including a role mediating quite specific issues, deliberations and challenges to the science and research establishment, such as taking responsibility for framing the hot topic of the 1990s: the ethics and morality of animal biotechnology including the genetic modification and cloning technique that produced 'Dolly the Sheep' (Straughton 1999). These differences in response to rri/RRI reflect differences in the nature of research objects, the nature of contemporary problems and challenges being addressed to the scientific establishment. They also take account of long histories, and iconic cases forged into the folklore of different science, research and professional disciplines and communities, such that it is hard to see how a 'one size fits all' approach to rri/RRI would work.

A final case-type of 'critical organisations' investigated by RES-AGorA are ***multi-national corporations*** (Loconto 2015). Here we find a different approach, premised on ***establishing systems and standards which can be externally and independently validated to provide rank-orderings which cement, shift or buttress organisational reputation*** evaluated by external constituencies in the face of crises or competitive challenge. Such protocols of reputation are acknowledged (indeed often designed and evaluated by) external bodies, such as NGOs or ethical investors. ***Certification schemes backed by systems of internal and/or independent assessment, monitoring, evaluation and reporting are the governance instrument of choice by MNCs***. They provide robust evidence that particular cares and concerns are translated into the firm accepting certain non-commercial social and environmental responsibilities, and translating those responsibilities into concrete action which can be measured. Such regulatory devices are not instituted in order to achieve the internal regulation of a community or profession (as in the cases above) but rather to seek and maintain the trust of

external groups whose behaviour towards the firm affects its short and long term survival and success: customers through end-user markets; investors and shareholders through financial markets; employees through labour markets. ***Such mechanisms also are critical to maintaining the firms external relational approval and validation by key audiences and thus to its ability to maintain its relational position as an authentic and trustworthy citizen firm***. As Loconto (2015) shows, the two areas where such elaborate evaluation systems are most developed are ***sustainability*** and ***corporate social responsibility***. Further since ***a great deal of internal investment and resources are necessary to put in place and maintain such systems*** these mechanisms have ***become the de-facto rri of large MNCs, and incorporate many 'integrated assessment' performance metrics*** such as diversity and gender policy and performance measures, performance on the care and protection of scarce natural resources, performance on emissions reduction, supply-chain tracing, reporting of working conditions of employees in supplier companies, performance on engagement with local communities of various kinds and so on. It is therefore of little surprise that mncs report that they are ***'already doing' RRI but not under this name***.(Loconto 2015). Alternatively, for those who interpret RRI as 'CSR for Research and Development', reference is made to long-established involvement of users, customers and potential customers in new product development research, and as part of on-going inclusion of various publics in methodologies to monitor the (changing) external environment: screening the horizon to gain anticipative intelligence on future trends and technological challenges, opportunities, and controversies facing the firm.

From the above case studies we see the importance of multi-level analysis since and *de-facto rri* must be appreciated as the outcome of multi-level dynamics:

So, we can propose three analytical levels

A/***Institutional logics informing external institutional environments and conditioning organisational responses***. Importantly this level of analysis includes the influence of interpretations of *de-facto rri* and formal policy frameworks of RRI, in respective ***Nation States (Ger, NL)***

B/***Organisations***, how organisations combine and cope with different institutional logics arising from specific organisational cultures, histories, core missions and foci. Also including how corporate policies are translated and adapted into different units and functions of the organisation

C/***Institutional entrepreneurs*** and their influence as leaders and change-agents in organisations, both at ***senior levels*** (top-down) and ***middle-levels*** (bottom-up).

3.4 What we learnt from the JERRI pilot interviews (& D1.1)

A programme of exploratory interviews were undertaken during the summer of 2016 with respondents from FhG, TNO and other RTOs as part of WP1 'State of the Art', reported by Teufel et al (2016): D1.1 of the JERRI project. Together, the two reports, D1.1 and this D1.2 provide guidance to WP2 (Visioning and goal-setting) and WP3 (action-planning) of JERRI by providing empirical (D1.1) and literature/conceptual (D1.2) underpins to support the next stages of JERRI.

In total 42 respondents participated in 40 interviews by telephone or skype (14 from FhG; 18 from TNO; 9 from other European RTOs and one representative from the ECs DG RTD responsible for RRI implementation). The semi-structured interview questions covered both de-facto responsible research and responsible innovation and H2020 RRI:

> Section 1 *The interviewee and its organizational context*: to acquire background information on the interviewee and her / his organizational context, to analyse her / his statements against this background
>
> Section 2. *De facto responsible research and innovation*: how respondents in the two organisations understand 'responsible research' and 'responsible innovation' and how their organisations' already operationalize these understandings.
>
> Section 3 *RRI Practices:* existing activities already undertaken in the organisation consistent with the 5 Key Dimensions of H2020 RRI.
>
> Section 4 Issues for the Institutionalisation of RRI to identify the qualities and challenges to RRI institutionalisation within the RTOs.

The findings from the exploratory interviews were highly consistent with the literature-based analysis of this report; on the conceptual theory-generated considerations and characteristics needed to elaborate the concept of *Deep Institutionalisation.*

Briefly, analysis of the interviews found:

- There is no organisation-wide discussion on the concept of RRI[7] as such within any of the RTOs, moreover, institutionalisation in several areas is lagging ambition (p6)
- (Although) organisational rationales, missions and cultures, long-standing experiences with ethics, corporate responsibility and sustainability, increase the receptiveness for RRI related practices. (p6)
- Further, the underpinning values of RRI are mostly and in broad terms written into the *social missions* of all the RTOs though in different hues, content and emphases.
- Except for Ethics, interviewees wouldn't have thought of the other four dimensions under the umbrella term of RRI.
- In terms of translation of RRI into practice: 'At this point none of the RTOs researched have embarked on a systematic appraisal of organisation-wide strategic development with the aim of incorporating RRI (p61)
- Of the 5 dimensions , gender equality and open access are broadly established within RTOs often as an already integral element in organisation-wide strategies;
- All RTOs have some experience of public engagement, which is more often concentrated in specialist units of the organisation, rather than part of the organisations ethos . There was no specific organisation-wide mission to achieve inclusion or requirement to engage in participatory methods. The latter tended to be concentrated within specialist units of the organisation (p62)
- Public engagement was alternatively understood as Stakeholder Engagement covered by the framings and protocols of Corporate Social Responsibility.

Factors influencing institutional transformation to RRI. Interviewees reported that the assimilation of RRI was more likely to occur where

i) *Committed leadership existed.*

ii) *Framework Conditions*: where there was an identifiable pressure, motivation or incentive emanating from the external context:

[7] Neither de-facto responsible research and innovation (rri) nor H2020 RRI (RRI)

a. Some interviewees pointed to the dangers of external steering which was mis-aligned with the organisations own deliberations and foci of 'responsibility' and warned against the risk of 'superficial' tick-boxing that might be the outcome of such a requirement.

b. However where there was a genuine incentive linked to research-evaluation assessments, links to research funding criteria, or changing social norms on what constitutes 'responsible action' to which the organisation was likely to respond.

c. Enabling experimentation and pilot 'demonstration' projects evidencing the benefits accruing to the organisation of changing current practices towards RRI would incentivise institutional change and provide a vehicle for mutual learning. (p63)

iii) *Internal incentives*:

a) A FhG interviewee commented that they expected funding to be made available from FhG HQ shortly, and this would signal an organisational commitment to RRI and support awareness raising and training.

A common start-point:

D1.1 concludes:

> "*Organisational histories of Fraunhofer and TNO show significant - and over the last decade increased – efforts to promote responsible research and responsible innovation at various levels* ***(ie de-facto rri).*** *The flipside of this longtime engagement seems to be that organisational structures (and related sense-making) were established before the official concept of RRI emerged* ***(ie H2020 RRI).*** *Consequently, no organization-wide discourse on the concept of responsible research and responsible innovation can be observed at Fraunhofer or TNO. This speaks for further engaging in a conceptually 'open' approach. The preliminary working definition of responsible research and responsible innovation as the process of aligning the orientation and effects of research and innovation to societal needs and values allows to capture the diversity of RRI-related practices at Fraunhofer and TNO and other RTOs. Thereby it becomes obvious that, beyond the five key dimensions, responsibility has also been part of other framings, discourses and co-ordinated activities, such as sustainability and corporate social responsibility, scientific integrity and the establishment of organisational codes of conduct. This view that various forms of de-facto RRI (sic) could be observed before the concept of RRI emerged is also shared by the interviewee from DG RTD "*

4. Implications for 'Deepening Deep Institutionalisation' – Developing a Typology of Deep Institutionalisation

To develop a typology of Deep Institutionalisation we can return to its salient features and characteristics, as signalled by the organisational institutionalism literature, and our earlier conceptualisation of deep *institutionalisation* (Randles et al 2014, Section 1 of this report).

Institutionalisation of responsibility in research and innovation can be conceived, according to this report, as:

4.1 A historical process.

The main thesis we propose from our analysis of the **'6 Narratives' Ideal Types of *de-facto rri*** is that new understandings of responsibility ***do not replace***, but rather ***sediment over*** earlier ones. The historic dynamic of *de-facto rri* appears consistent with Dacin and Dacin's de-institutionalisation type '***assimilation', where new elements are absorbed alongside existing traditions rather than replace them.*** We also witness in empirical cases processes of '***dilution', 'dis-embedding', and 'competition'***, but not erasure. We have analysed the 6 Narratives of *de-facto rri* as corresponding to different dominant ***institutional logics*** thus theorising a small, and distinctively different, number of 'ideal types' each with distinctive characteristics and profiles (different normative underpinnings and folklore of historical events, different actor groups, organising around different 'responsibility problems' etc). However in actual empirical and organisational settings we find that the ideal-types ***co-exist and structurally overlap*** even where (indeed producing) tensions and contradictions. Thus there is an ***effective integrative momentum***, albeit this doesn't drive to homogeneity. Rather we find the opposite. The integrative dynamic across two or more ideal types is a source of ***variety generation*** as institutional entrepreneurs act to negotiate and incorporate different and new responsibility imperatives bringing together two or more of the ideal types into locally-constructed negotiated framings responding to different responsibility settings and situations. ***In essence then the historicity of de-facto rri copes with – gets along with- the apparent contradictions implied in by co-existence of the 6 Narratives***. The significance of history (and with it the significance of 'place' and 'problem' based origins of *de-facto* responsible innovation) means that the 6 narratives we propose are not intended as an exhaustive list, there is scope for actors engaging in this conversation outside of

the empirical settings and contexts that we have encountered (for example from other parts of the globe) to propose additional or re-formulated ideal types. The '6 narratives' we offer is simply a first analysis within a bigger research quest to theorise the causal mechanisms, dynamics and institutional outcomes of ***de-facto rri***.

However there is a practical significance to this dynamic of historical sedimentation of multiple interpretations of responsibility in research and innovation and their actual or attempted embeddedness into the practices, structures, and incentives of organisations. One important implication is that if new logics sediment over old, without erasing earlier understandings, or the performance metrics that go with them, ***then the scope for responsibility overload is high.*** This potentially puts pressure on actors responsible for the daily delivery of 'responsibility' when there are multiple simultaneous pressures to 'perform' responsibility with consequential pressures on time, resources and focus of effort, and not least, resultant mental stress on individuals. An alternative response is the development of ***new specialist internal division of labour with different groups of the workforce responsible for the delivery of different logics of responsibility*** (for example, one community of scientists delivers Narrative A measured in terms of publishing in specialist academic journals, whilst others deliver Narrative B, a model of more applied research and technology development partnering government and industry actors, whilst a third delivers Narrative C 'Participatory society' through engagement with civic society and other 'local/community' constituencies). Across Europe currently each of Narratives B-F are consistent with an institutional context which encourages (and has developed metrics to measure) 'impactful' or outward-facing research, consistent with Narratives B-F as countervailing model of research against the supposed inward facing Narrative A. If this response becomes itself systemically institutionalised, then a question will arise concerning different rewards (promotion and remuneration) to the different sub-groups of researcher labour. Will 'Narrative A' researchers (continue) to be better rewarded than Narrative B,C,D, E, F researchers, despite signals systemically calling for and encouraging the deepening of Narratives B-F?

Further organisational responses might be to simply muddle-along with periodic reporting making *ex-post* sense of a portfolio of organisational activities, which have not substantially changed. This would be the case of ***'shallow institutionalisation'*** coupled with ***responsibility-wash***: reporting responsibility performance without any accompanying underlying change; or ***decoupling*** : creating a specialist 'front-office' unit without 'deep' or organisation-wide change occurring behind. More strategically, the contemporary question facing RTOs will be how to internally discuss, cope with, negotiate, and guide an intra-organisational conversation on how to decide between

or integrate, multiple logics of responsibility under a single organisational umbrella. This is the organisational task that JERRI has been designed to support and facilitate.

Thus, for the purpose of JERRI, the ideal types provide a means to commence a systematic organisation-wide conversation with the consortium and RTOs on whether they recognise the Ideal types at play, or wish to propose others; whether they can analyse the impacts that the different narratives and their-co-existence have on professional practice within different functions and units of the RTOs; and what implications they have for underpinning and assisting an organisation-wide strategic reflection on a desired future - 'Visioning'- of de-facto rri in each RTO (and the role that can be helpfully played by H2020 RRI within that vision); and the operationalization of the vision as a progressive and continuous process of adaptive evolution in the face of new 'responsibility' problems so far unanticipated.

4.2 A maturation process

The emphasis on historical development as a sedimentation process, as new understandings of responsibility layer atop earlier ones without erasing them, ***points to the need to incorporate a 'maturation' aspect to the theorisation and typology of deep institutionalisation, such that institutional 'depth' corresponds with phases of 'emergence', 'maturity', and 'resilience'.*** We have proposed that ***'emergence' is the perpetual state of de-facto rri which is always adapting and evolving in the face of new responsibility framings and problems. It is always 'In the Making'*** (Kuhlmann et al in Lindner et al 2015)**.** However*,* ***there is a second-order underpinning dynamic*** **whereby older deeply institutionalised understandings of responsibility** (of which we suggest 'Narrative A' corresponds) ***are challenged*** by the normative basis of new actor groups, corresponding to new understandings of responsibility. So, Narrative B brings new imperatives of economic development and therefore the role of business, into the Science-State nexus of Narrative A; creating the 'Triple-helix' of science-state-business actors; Narrative C brings the normative arguments of participatory democracy, the operationalization of which involves the early and serious inclusion of new actors from civil society, and thus the need to develop new techniques and methods to support the operationalisation of a new political ideology and principles of participatory society, and so on**.** Further, whilst **'maturity' would represent a general acceptance of the new proposition of 'responsibility' and its**

embedding into the everyday practice and systematised techniques, methodologies, procedures, incentive structures and performance metrics of actors; 'resilience' would take this a step further**. 'Resilience' would suggest the newly instutionalised form to be resilient in the face of new challenges** (indeed as Narrative A has shown itself to be). **Resilience also corresponds to the situation where the institutionalised practices continue, no-longer disturbed by reflexive challenge, long after the original entrepreneurs associated with their establishment have moved on.**

4.3 Its systemic 'overflowing' character

'Deeply institutionalised' forms of responsibility would be ***systemically and relationally inter-dependent, moving from ad-hoc localised experiments to extensively shared routinized techniques, norms, standards and governance and regulatory instruments and structures, organising, ordering and co-ordinating practice and inter-organisation exchanges (including market transactions with clients and customers)***. Mutually accepted understandings of responsibility would be shared by different professional groups and organisations creating shared understandings, and roughly ***agreed, or alternatively, contested divisions of labour over who should take responsibility for what*** and hence systemic interdependencies over portfolios of responsibilities. New professions emerge to take on specific roles to lubricate and intermediate the system 'boundary-spanners'. Devices are designed and implemented to 'sufficiently' connect different cognitive frameworks and enable symbolic sense-making across different communities of practice, so-called boundary-objects (Star and Griesmemer 1989, Star 2010) spanning structural holes in professional networks and carrying ideas, interpreted by the 'other' as new innovations, from one group to another (Burt 2004).

Different heterogeneous actors in a 'system' of responsible innovation would share a common language of responsibility albeit translated locally into different professional languages and norms of professional virtue, ethics and action. Normative orientations would inform and influence the training programmes and syllabi of apprentice professionals. Codes of Conduct would regulate and embed those understandings into professional practice. Systems of voluntary and formal regulations and laws would reinforce the normative underpinnings of responsibility and so-on. In the world of material artefacts, new norms of responsibility would be inscribed into new products and goods and communicated to customers and users who share the normative basis through devices such as product labelling,

certification and accreditation schemes (Narrative D, E). Under Narrative F as the 'ultimate' systemic integration of preceding Narratives B-E, each of the earlier normative orientations would be brought together, incorporated into inclusive collectively organised, inclusive, deliberation and action, aligning research and innovation towards (albeit contested and in flux) needs, values and problems of society.

A particular mark of a deeply institutionalised system would be, as Callon has pointed out (Callon1998) the **'overflowing' into new spheres of economic and professional life beyond the place and actors where the transformative impulse originated, and beyond the imaginations, expectations or strategic influence the originators, thus taking on an autonomous self-perpetuating dynamic.** For such a momentum to occur, there must be inherent motives and incentives accruing to it. Typically 'overflowing' would take the normative orientations into the strategic steering and regulating parts of the system, eg into financial systems such as the growth we witness in ethical finance, and the FTSE 100 obligation imposed on multi-nationals to report on their corporate social responsibility actions (Laasch in Randles & Laredo 2017 forthcoming).

Albeit of course, an outcome of such extreme levels of inter-dependency or 'system closure' would be systemic 'lock-in', accompanied by high levels of bureaucracy potentially precipitating a decline in reflexive questioning of the normative origins of the transformation, and potentially giving rise to new forms of institutional isomorphism, as Karl Polanyi lamented in his treatise on 'instituted economic process' (Polanyi 1957) which gave rise over several decades of processes of inter-dependent economic and technological change to the pervasiveness of the 'market system' (1944) and eventually 'our obsolete market mentality' (Polanyi 1957).

4.4 Multi-level alignment.

Effectively 4.3 characterises horizontal systemic alignment, whilst here at 4.4 ***multi-level alignments*** approximates to ***vertical multi-level coherence.*** An easy way to envision this is the relationship of an organisation to its external institutional context, as one source of convergence of organisations (section 2 above). Whilst flawed in the sense that powerful organisations have scope to influence and shape the 'external environment' rather than passively accept it as a fixed external determinant, as well as well as potentialities for the organisation to reflexively identify and to adapt to new external pressures, challenges and opportunities, nevertheless the ordering capacities of institutional context (and therefore footprint on de-facto rri as well as

H2020 RRI), are not to be under-estimated. An important step to understanding the past, present and future of ***de-facto rri and the likely successful uptake of RRI (or not), lies in a thorough analysis of the external environment and institutional context in which each RTO is embedded.***

The Fraunhofer case-study (Goos and Lindner 2015) and the Fraunhofer interviews undertaken for D1.1 of this study, concur on the significance of extra-organisational developments and dynamics, including 'shadow-hierarchy' for understanding both de-facto rri and the uptake of RRI, where multi-level alignment would correspond to deep-institutionalisation, whilst multi-level dissonances would be an indicator of resistance to particular responsibility framings (and was raised as a risk or resistance to the uni-lateral top-down imposition of RRI). In particular, in all cases of RTOs with a ***close and inter-dependent relationship with respective policy priorities and apparatus of Nation States, the interpretation of responsibility politically and culturally reflected in the policies and regulatory frameworks of respective nation states***, bear strongly on the 'variety' of *de-facto* rri which emerges, country by country. In a word, the nation-state matters to *de-facto* rri and thus the uptake of RRI.

At the level ***of individual RTOs as examples of institutional pluralism*** (above Section 2), the degree to which the organisation experiences, and copes with multiple, potentially contradictory institutional logics, can help the organisation understand its own identity and sense-making strategies, in the face of multiple understandings and changing imperatives of 'responsibility'. It also points to the coping mechanism of local translation of multiple (competing) logics into forms that potentially help decentralised units to 'get along'. Finally, in terms of intra-organisational institutional change, the analysis above highlights that ***the presence of institutional entrepreneurs as change agents, as long as embedded in an institutional context of institutional entrepreneurialism where experimentation is encouraged and rewarded,*** makes a difference to how new understandings of responsibility can embed deeply into organisations, or not, as highlighted in the case of Arizona State University.

4.5 A four-way matrix of deep institutionalisation

Combining the above four axes of deep institutionalisation, we can propose the following analytical framework (and emergent typology) of deep institutionalisation of de-facto rri which combines the four axes below, and which equally has implications for the analysis of uptake of RRI into organisations.

i) ***6 Grand Narratives : The sedimenting of institutionalised 'ideal types' of de-facto rri***:

A/ *Republic of Science*
B/ *Technological Progress: Weighing Risks and Harms as well as Benefits of New and Emerging Technologies*
C/ *Participatory Society*
D/ *The Citizen Firm*
E/ *Moral Globalisation*
F/ *Research and Innovation With/for Society*

ii) ***A maturation process***:
Simultaneously combined phases of:

A/ Emergence
B/ Maturity
C/ Resilience

iii) Systemic consolidation and overflowing
Extent of systemic inter-dependence : 'reach' and 'influence' of shared norms, albeit locally translated:

A/ Ad-hoc experiments, demonstrations, and creative institutional design
B/ Niche integrated normative networks
C/ Pervasive inter-dependent system with overflowing
D/ New taken-for-granted unreflexive institutional logic, no longer reflexively questioned or challenged (co-exists with earlier logics)

iv) Multi-level alignments

Vertical alignment

A/ Institutional context & external conditioning factors, trends, pressures, challenges and opportunities (including role of the State and other forms of 'shadow hierarchy')
B/ Intra-organisational translation and 'getting along' with multiple institutional logics, within different units and functions of large/complex forms of 'organisational pluralism'
C/ Institutional entrepreneurship and /or forms and expressions of leadership and intermediation at different levels of the organisation

5. Preparing the Ground: Implications for the next phases of JERRI action research and interventions with Fraunhofer and TNO .

The anticipated outcome of applying the above 4-way matrix to the next stages of the JERRI deliberations, would be the realisation of process which generates variety as RTOs respond reflexively to the typology in their deliberations ie WP2 and 3 (Goal setting) and WP4 and 5 (Action planning). Under the next stages of JERRI, the consortium, together with participants from the RTOs, will be asked to reflect upon (and feel free to respond to it by offering corrections, edits, and revisions to) the 6 Narratives table, and its incorporation into a typology of Deep Institutionalisation, in particular using these devices as a tool to help them analyse their own respective organisational settings and institutional dynamics viz a viz responsibility in research and innovation settings, contexts, and situations.

It is not of importance whether the participants agree with the typology in its entirety or not. Rather it aims to provide a common framework and basis to stimulate self-questioning, to be taken-up into the forthcoming deliberations, across the two main RTOs of FhG and TNO. The purpose is to provide a common start point so that the RTOs can question the existence and influence of the different logics of the 6 Narratives and use these to reflect upon their manifestation in their own organisations (or not!) and to analyse their own organisation (and units within them) against the typology of deep institutionalisation, both in terms of its content and 'depth'. This is the antithesis of 'one size fits all', approach, and aims to open, rather than close-down, the next phases of organisational analysis, providing the basis for the so-far 'absent' organisation-wide strategic reflection, Visioning and Action-planning on de-facto rri and RRI.

The purpose of D1.2 has been to provide a systematic literature overview of key theoretical terms and 'touchstones' provided by the organisational institutionalism literature, in order to provide a shared, literature-underpinned, vocabulary and understanding moving into WP2 and WP3, combined (and finding a high level of consonance with) the exploratory interviews conducted for D1.1.

The next step will be to discuss with the consortium and key RTO members, the creation of a systematic protocols to be used in both RTOs to guide WP2 and WP3.

If we can hazard a working hypothesis on the implications for both de-facto rri and H2020 RRI, it would be that taking ***de-facto governance*** (Rip 2010)seriously, means combining both ***top-down and bottom-up considerations***, therefore enabling maximum flexibility for RTOs ***to work out for themselves, what de-facto rri means to them, assisting both a strategic organisation-wide deliberation; and its local translation into decentralised units and functions, informed by, and in some loose sense strategically aided by the findings of D1.1 and D1.2, and the analytical typology of Deep Institutionalisation outlined above.***

For H2020 RRI the findings of this report are consistent with D1.1 suggesting that retaining RRI as a strategic 'overview' - a vision consistent with Narrative F, as an integrative concept which is not inconsistent with the incorporation of Narratives B – E, and the ongoing co-existence of Narrative A, maintains RRI as an 'open (steering) concept' beyond the 5 key dimensions. This would be important to prevent the premature fragmentation of RRI into the 5 dimensions, making each the responsibility of different actors, and losing its integrative power. Further H2020 RRI as a broad political vision, if it can demonstrate concrete social, environmental and economic returns to the effort and investment expended can play a role consistent with the concept of ***Discursive Institutionalism*** in influencing and shaping the institutional context within which RTOs and other research and innovation actors understand and act 'responsibly'. Taken together, this double-dynamic of bottom-up ***de-facto rri*** with an 'open concept' of **H2020 RRI** which takes a more strategic, framing, system-shaping and incentivisation role is consistent with the concept of *'responsibilisation'* (Shamir (2008) Dorbeck-Jung & Shelley-Egan (2013)).

6. Bibliography

Aldrich, H. and Fiol, C.M., (1994) 'Fools rush in? The Institutional Context of Industry Creation' *Academy of Management Review* Vol 19(4) 645-670

Arnaldi, S. (forthcoming) 'Responsibility and reflexivity in engineering: Professional Societies and Codes of Ethics' in Randles, S., and Laredo P. Eds (2017) *De-facto Responsible Innovation* Cheltenham: Edward Elgar, (forthcoming)

Arnaldi, S., & Muratorio, A., (2014) Anchoring knowledge transfer activities. The EC CoC and normative anchor points in laboratory practices in Italy' A RES-AGorA case study by the University of Padua available at http://res-agora.eu/assets/Padua-1-Stage-2.pdf

Arnaldi, S., and Muratoria, A. (2015)' Responsibility and Reflexivity in Engineering : Professional Societies and Codes of Ethics' A RES-AGorA case study by the University of Padua available at http://res-agora.eu/assets/Final-Engineering-Professions-SA.pdf

Benjamin, B.A., and Podolny, J.M (1999) Status , quality and social order in the Californian wine industry' Administrative Science Quarterly 44:563-589

Benz, A., (2007) 'Multilevel Governance' in Benz, A.; Lütz, S.; Schimank, U.; Simonis, G. (Eds.): Handbuch Governance, Theoretische Grundlagen und empirische Anwendungsfelder, p.297-310.

Bourdieu, P., & Wacquant, L.J.D (1992) *An Invitation to Reflexive Sociology* Chicago: Chicago University Press.

Burt, R.S., (2004) 'Structural Holes and Good Ideas' *The American Journal of Sociology* Vol 110(2) 349-399

Callon, M Ed. (1998) *The Laws of the Markets*, Oxford: Blackwell Publishing.,

Callon M., and Lacoste, A. (2011) 'Defending Responsible Innovation' *Debating Innovation* Vol1 (1)5-http://www.debatinginnovation.org/docs/di/DI_2011_01-01_005-018.pdf

Dacin, M.T., and Dacin, P.A, (2008) 'Traditions as Instiutionalized Practice: Implications for Deinstitutionalisation' in *The Sage Handbook of Organizational Institutionalism*, Singapore: Sage Publications, Chapter 12.

Dendler, L., and Randles, S., (2016) '*How do we explain institutionalisation processes which are not uni-directional? Relational legitimacy construction and the instituting of normative labels'* Working paper presented to the Manchester Institute of Innovation Research internal seminar series. University of Manchester, 8 June 2016

Deephouse, D.L, and Suchman, M., (2008) 'Legitimacy and Institutionalism' in Greenwood, R., Oliver, C., Sahlin, K., Suddaby, R., Eds. (2008) *The Sage Handbook of Organizational Institutionalism*, Singapore: Sage Publications, Chapter 1.

DiMagio, PJ and Powell, W.W (1983) 'The iron cage revisited : Institutional isomorphism and collective rationality in organisational fields' *American Sociological Review* 48: 147-160

Dorbeck-Jung, B., and Shelly-Egan, C., (2013) 'Meta-regulation and Nanotechnologies: The Challenge of Responsibilisation within the European Commission's Code of Conduct for Responsible Nanosciences and Nanotechnologies Research' *NanoEthics* 7:55-68

European Commission (2009, July) The Lund Declaration: Europe must focus on the Grand Challenges of our Time, http://www.vr.se/download/18.7dac901212646d84fd38000336/Lund_Declaration.pdf

European Commission (2014, November) Rome Declaration on Responsible Research and Innovation in Europe https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

European Commission (2015, December) Lund Declaration 2015 : Lund Revisited , Published on RIO - H2020 PSF (https://rio.jrc.ec.europa.eu)

Ferguson, T.D., Deephouse, D.L., and Ferguson W.L (2000). Do strategic groups differ in reputation? Reputation building and corporate strategy. *Academy of Management Journal* 33: 233-258

Fombrun , C. J. (1996) *Reputation: Realizing Value from the Corporate Image* : Boston MA Harvard Business School Press.

Friedland, R., and Alford, R.R (1991) Bringing society back in : Symbols, practices and inctiutional contradictions in Powell, W.W. and DiMaggionP.J., (1991) Eds. *The New Institutionalism in Organizational Analysis* . Chicago: University of Chicago Press

Goos, K., & Lindner, R. (2015) Institutionalising RRI – The case of a large research organisation' A RES-AGorA case study by Fraunhofer ISI available at http://res-agora.eu/assets/Institutionalising-RRI_FhG_20150325-formatiert.pdf

Goos K, & Lindner, R. (2017) Institutionalising Responsible Research and Innovation : The case of a large research organisation' in Randles, S., and Laredo P. Eds (2017) *De-facto Responsible Innovation* Cheltenham: Edward Elgar, (forthcoming)

Greenwood, R., Oliver, C., Sahlin, K., Suddaby, R., Eds. (2008) *The Sage Handbook of Organizational Institutionalism*, Singapore: Sage Publications

Griessler, E. (2015) 'Non-Mandatory Ethics Bodies at Austrian Universities' A RES-AGorA case study undertaken by the Institute of Advanced Studies, available at http://res-agora.eu/assets/IHS-Griessler_non-mandatory-ethics-body_final2.pdf

Hardy, C., & Maguire, S. (2008). Institutional entrepreneurship. Greenwood, R., Oliver, C., Sahlin, K., Suddaby, R., Eds. (2008) *The Sage Handbook of Organizational Institutionalism*, Singapore: Sage Publications, Chapter 7.

Hirsch, P.M., & Andrews, J.A.Y., (1984)' Administrator's response to performance and values challenges: Stance, symbols and behaviour ' in Segiovanni, t.J., and Corbally, J.E., Eds. *Leadership and Organisational Culture*. Urbana: University of Illinois Press

Hoffman, A., (1999) 'Institutional Evolution and Change: Environmentalism and the U.S. Chemical Industry' *Academy of Management Journal* Vol 42(4) 351-371

Joly, P.B., (2011) *Innovation in Society* Presentation to the Franco-British workshop 'Responsible Innovation : From Concepts to Practice, French Embassy, London, May 23-24,

Kraatz, M.S. and Block, E.S. (2008) 'Organizational Implications of Institutional Pluralism' in Greenwood, R., Oliver, C., Sahlin, K., Suddaby, R., Eds. (2008) *The Sage Handbook of Organizational Institutionalism*, Singapore: Sage Publications, Chapter 9.

Kuhlmann, S., Edler, J., Ordonez-Mataoros, G., Randles, S., Walhout, AM., Gough, C., Lindner, R. (2016) 'Responsibility Navigator ' in Lindner, R., Kuhlmann, S., Randles, S., Bedsted, B., Gorgoni, G., Griessler, E., Loconto, A., Mejlgaard, N. Eds (2016) "*Navigating Towards Shared Responsibility in Research and Innovation. Approach, Process and Results of the Res-AGorA Project"* **,** Heidelberg https://adobeindd.com/view/publications/eaeb695e-

a212-4a34-aeba-b3d8a7a58acc/jo0u/publication-web-resources/pdf/RES-AGorA_epaper.pdf, Chapter 11.

Lang, A. (2014) 'Fracking in Austria' RES-AGorA Case study by the Institute of Advanced Studies, Vienna, available at http://res-agora.eu/assets/IHS-1-Stage-1_final.pdf

Lang, A. (2014) 'Fracking in Austria and UK : A Comparative Study' RES-AGorA Case Study by the Institute of Advanced Studies, Vienna, available at http://res-agora.eu/assets/IHS-1-Stage-2_final.pdf

Laasch, O., (2017) 'How the FTSE100 Embeds Social Cares: Business Model Descriptions as Normative Assemblages' in Randles, S., and Laredo P. Eds (2017) *De-facto Responsible Innovation* Cheltenham: Edward Elgar, (forthcoming)

Lindner, R., Kuhlmann, S., Randles, S., Bedsted, B., Gorgoni, G., Griessler, E., Loconto, A., Mejlgaard, N. Eds (2016) "*Navigating Towards Shared Responsibility in Research and Innovation. Approach, Process and Results of the Res-AGorA Project"* **,** Heidelberg https://adobeindd.com/view/publications/eaeb695e-a212-4a34-aeba-b3d8a7a58acc/jo0u/publication-web-resources/pdf/RES-AGorA_epaper.pdf

Loconto, A. (2015) 'Critical Organisations: Multi-National Corporations' RES-AGorA Case Study undertaken by IFRIS, France, available at http://res-agora.eu/case-studies/

Meyer, J.W and Rowan, B. (1977) 'Institutionalised Organizations: Formal Structure as Myth and Ceremony' American Journal of Sociology 83:440-463

Meyer, J.W and Rowan, B., (1983)'The structure of educational organizations' in Meyer, J.R and Scott, W.R (eds) '*Organizational Environments: Ritual and Rationality'* Beverley Hills : Sage Publications.

Meyer, J.W and Scott, W.R (1983) *Organizational Environments* Beverley Hills : Sage Publications

Nielsen, M, V. (2014) 'Horizontal Foresight to Address Societal Challenges in Danish Priority Setting for Strategic Research' RES-AGorA Case Study undertaken by the Danish Board of Technology available at http://res-agora.eu/assets/TEKNO-1-Stage-2.pdf

Polanyi, K., (1944) *The Great Transformation* , Boston : Beacon Press.

Polanyi, K. (circa 1955) *Freedom and Technology*. Unpublished notes and manuscript. File 36.9, Polanyi Archives, Karl Polanyi Institute of Political Economy, Concordia University, Montreal

Polanyi, K., (1957a) 'The Economy as Instituted Process' in Polanyi, K, Arensberg, C.M. and Pearson H.W eds *Trade and Market in the Early Empires*, New York, The Free Press, Chapter 13.

Polanyi, M., (1962) The Republic of Science: Its Political and Economic Theory' *Minerva* 1:54-74

Porter, M., and Kramer, M. (2011) 'Creating Shared Value' *Harvard Business Review* Jan-Feb 2011

Randles, S., Youtie, J., Guston, D., Hawthorn, B., Newfield, C., Shapira, P., Wickson, F., Rip, A., von Schomberg, R., Pidgeon, N., (2012) 'A Trans-Atlantic conversation on Responsible Innovation and Responsible Governance' in Van Lette, H., Coenen, C., Fleischer, T., Konrad, K., Krabbenborg, L., Milburn, C., Thoreau, F., Zsulsdorf, T. eds *Little by Little : Expansions of Nanoscience and Emerging Technologies* IOS Press AKA , Heidelberg

Randles, S., Loconto, A., Walhout, A.M., Lindner, R (2013) '*Framings and Frameworks of Responsible (Research) and Innovation: A Proliferation of micro-level initiatives'* Presentation to the Go4 consortia and the Governance and Ethics Unit of the European Commission, Go4 workshop, Brussels, 12-13 October.

Randles, S., and Laredo P. (2013) 'Doing Good/Being Good: Five Building Blocks of an Institutionalist Sociology of Responsible Innovation', Presentation to S.NET conference, Boston 27-29 October 2013

Randles, S., Dorbeck-Jung, B., Lindner, R., Rip, A., (2014) 'Report of the Roundtable at S.NET Boston 2013: Where to next for Responsible Innovation?' in Coenen, C., Dijkstra, A., Fautz, C., Guivant, J., Konrad, K., Milburn, C., van Lente, H. eds. *Innovation and Responsibility : Engaging with New and Emerging Technologies,* Berlin: AKA Press, Berlin. Chapter 3

Randles, S. (2015). *Managing publicness in the "Good University": What does it entail and how*
does one accomplish it? Paper presented at the conference "Institutional Design Frontiers Summit:

Futures of Higher Education," Conference organised by CORD, Arizona State University, Scottsdale, Arizona. April

Randles, S., Gee, S., Edler, J., (2015) 'Governance and the Institutionalisation of Responsible Research and Innovation in Europe: Transversal Lessons from an Extensive Programme of Case Studies' (Deliverable 3.6 of the RES-AGorA Project) http://res-agora.eu/assets/Res-AgorA_321427_Del_3-6_final.pdf

Randles, S., & Laasch, O., (2016) 'Theorising the Normative Business Model (NBM)' *Organization and Environment* 29(1) 53-73

Randles, S., Edler, J., Gee, S., Gough, C., (2016) 'RES-AGorA case studies: Drawing transversal lessons' in Lindner, R., Kuhlmann, S., Randles, S., Bedsted, B., Gorgoni, G., Griessler, E., Loconto, A., Mejlgaard, N. Eds (2016) "*Navigating Towards Shared Responsibility in Research and Innovation. Approach, Process and Results of the Res-AGorA Project"* **,** Heidelberg https://adobeindd.com/view/publications/eaeb695e-a212-4a34-aeba-b3d8a7a58acc/jo0u/publication-web-resources/pdf/RES-AGorA_epaper.pdf, Chapter 7.

Randles, S., Laredo, P., Loconto, A., Walhout, A.M. Lindner, R. (2016) 'Framings and Frameworks: six grand narratives of de-facto rri' in Lindner, R., Kuhlmann, S., Randles, S., Bedsted, B., Gorgoni, G., Griessler, E., Loconto, A., Mejlgaard, N. Eds (2016) "*Navigating Towards Shared Responsibility in Research and Innovation. Approach, Process and Results of the Res-AGorA Project"* **,** Heidelberg https://adobeindd.com/view/publications/eaeb695e-a212-4a34-aeba-b3d8a7a58acc/jo0u/publication-web-resources/pdf/RES-AGorA_epaper.pdf, Chapter 3.

Randles, S. (2017) 'A new social contract, de-facto responsible innovation and institutional change: The case of Arizona State University (ASU)' *Global University Network for Innovation (GUNi)* Higher Education in the World Report No 6 'Towards Socially Responsible Higher Education Institutions, Globally and Locally Engaged' (in-press).

Randles, S., and Laredo P. Eds (2017) *De-facto Responsible Innovation* Cheltenham: Edward Elgar, (forthcoming)

Rindova, V.P., Williamson, I.O. Petkova, A.P., & Sever , J.M., 'Being good or being known: An empirical examination of the dimensions, antecedents, and consequences of organizational reputation. *Academy of Management Journal*, 48: 1033-1050.

Rip, A., (2010) '*De Facto* Governance of Nanotechnologies' in Goodwin, M., Koops, B-J., and Leenes, R. Eds. *Dimensions of Technology Regulation* , Nijmegan: Wolf Legal Publishers 285-308.

Rip, A., & Voss (2013) 'Umbrella Terms as Mediators in the Governance of Emerging Science and Technology' *Science, Technology and Innovation Studies* (9) 39-59

Rousseau, J.J (1968 [1762]) *The Social Contract* London: Penguin

Sayer, A. (2011). *Why things matter to people: Social science, values and ethical life*. Cambridge, England: Cambridge University Press.

Sayer, A. (2015) Time for a Moral Economy, *Geoform* 291-293

Scharpf, F. (1997) *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*. Oxford: Westview Press.

Schmidt, V. A. (2008). Discursive Institutionalism: The Explanatory Power of Ideas and Discourse. *Annual Review of Political Science*, 11/1: 303–26.

Schmidt, V.A. (2010). Taking ideas and discourse seriously: explaining change through discursive institutionalism as the fourth 'new institutionalism'. *European Political Science Review*, 2/1: 1–25

Scott (1995) *Institutions and Organizations* CA- Sage Publications
Shamir, R. (2008) 'The Age of Responsibilization: On Market-embedded Morality' *Economy and Society* 37: 1-19.

Södeberg, J., (2014a) The responsibilisation and regulation of garage innovation open-source 3D printing' A RES-AGorA case study undertaken by IFRIS available at http://res-agora.eu/assets/IFRIS-1-Stage-2.pdf

Södeberg, J., (2014b) The responsibilisation and regulation of garage innovation : DIY drug innovation in psychonaut sub-culture ' A RES-AGorA case study undertaken by IFRIS available at http://res-agora.eu/assets/IFRIS-3-Stage-2.pdf

Stahl-Nielsen, K., Gee, S. & Edler, J., (2015) 'Critical Organisations: Research Councils of UK' RES-AGorA Case Study undertaken by MIOIR, Manchester.

Star, S.L and Griesemer (1989) 'Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkley's Museums of Vertebrate Zoololgy , 1907-39' *Social Studies of Science* 19(3): 387-420

Star, S.L (2010) 'This is not a Boundary Object: Reflections on the Origins of a Concept' *Science, Technology and Human Values* Vol 35(5) 601-617

Stilgoe, J., Owen, R., and Macnaghton, P., (2013) Developing a Framework for Responsible Innovation Vol42(9) 1568-1580

Suchman, M., (1995) Managing Legitimacy : Strategic and Institutional Approaches. Academy of Management Review , 20:571-610

Tancoigne, E., Randles, S., Joly, PB (2016) 'Evolution of a Concept: A Scientometric Analysis of RRI' in Lindner, R., Kuhlmann, S., Randles, S., Bedsted, B., Gorgoni, G., Griessler, E., Loconto, A., Mejlgaard, N. Eds (2016) "*Navigating Towards Shared Responsibility in Research and Innovation. Approach, Process and Results of the Res-AGorA Project"* **,** Heidelberg https://adobeindd.com/view/publications/eaeb695e-a212-4a34-aeba-b3d8a7a58acc/jo0u/publication-web-resources/pdf/RES-AGorA_epaper.pdf, Chapter 4.

Tancoigne, E., Randles, S., Joly PB (2017) *'Reframing relations between Science and Society? Genealogy and the Future of Responsible Research and Innovation (RRI)'* (under journal review)

Teufel, B., Lindner, R., Gransche, B., Good, K., Nauta, J., Steel, M., Emmert, S., Joignant, A.,
(2016) ' JERRI- Joining Efforts on Responsible Research and Innovation- Synthesis on Existing Practices' (Deliverable 1.1 of the EC JERRI project).

Thornton, P., and Ocasio, W., (2008) 'Institutional Logics' in Greenwood, R., Oliver, C., Sahlin, K., Suddaby, R., Eds. (2008) *The Sage Handbook of Organizational Institutionalism*, Singapore: Sage Publications, Chapter 1.

Tolbert, P.S. and Zucker L.G (1983) Institutional sources of change in the formal structure of Organisations: The Diffusion of civil service reform, 1980-1935 Adminsitrative Science Quarterly , 30: 22-39

Valdivia, W., and Guston, D. (2015) Responsible Innovation : A Primer for Policy-makers, Center for Technology Innovation at the Brookings Institute *https://www.brookings.edu/wp-content/uploads/2016/06/Valdivia-Guston_Responsible-Innovation_v9.pdf*

Van Doren, D. (2014) Integration of RRI in policy advice : The case of synthetic biology assessments' A RES-AGorA Case study by Fraunhofer ISI available at http://res-agora.eu/assets/Fraunhofer-1-Stage-1.pdf

Walhout, A.M & Dorbeck-jung (2014) 'Nanosafety governance in the Netherlands' A RES-AGorA case study undertaken by the University of Twente, available at http://res-agora.eu/assets/Twente.-Stage1.pdf

Washington, M., amd Zajac, E.J. (2005) Status evolution and competition: Theory and Evidence' *Academy of Management Journal* 48:282-296

Weik, E. (2011). Institutional entrepreneurship and agency. *Journal for the Theory of Social Behaviour*,
41, 466-481.

Zimmerman, M., and Zeitz, G., (2002) 'Beyond Survival: Achieving New Venture Growth by Building Legitimacy' *Academy of Management Review* Vol 27(3) 414-431

Zucker, L.G. (1977) The Role of Institutionalization in Cultural Persistence , American Socioloogical Review , 42: 726-743

Zucker, L.G (1983) 'Organizations as Institutions' *Research in the Sociology of Organizations* 2:1-47

APPENDIX A – 6 GRAND NARRATIVES' – INSTITUTIONAL LOGICS OF SIX IDEAL-TYPES OF *DE-FACTO* RESPONSIBILITY IN RESEARCH AND INNOVATION

(Adapted from Thornton and Ocasio, 2008)

	Narrative A **Science Republic**	Narrative B **Technological Progress: Risk Management of Emerging Technologies**	Narrative C **Participatory Society**	Narrative D **Citizen Firm**	Narrative E **Moral Globalisation**	Narrative F **R&I With/for Society**
Basis of Mission	To achieve the independent pursuit of scientific knowledge (adopted from the traditions of natural and physical sciences).	To ensure the effective and efficient assessment of new and emerging technologies, in order to increase the probability they will safely enter society as new products and services. To enable technology-supported	To advance research, technology & innovation through the inclusive participation of all societal actors, with a focus on civil society and those traditionally excluded from R&I processes.	To secure the reputation/status of firms as legitimate, trusted and ethically conscious actors in society, in the eyes of their customers, employees, financiers and other actors involved in evaluating firms performance, with consequences of these judgements	To connect the point of production (predominantly far away in poor societies) to the point of consumption (predominantly in rich societies) To mobilise the 'political consumer' who expresses	R&I involves all societal actors who are mobilised to the task of framing, addressing, and solving societal problems (from disease, health and well-being to climate change, energy, depletion of natural resources, communication,

		economic growth.		impacting firms short and long term success and survival.	political concerns through purchase decisions.	mobility, security etc)
Basis of Attention	Production of new scientific knowledge	Risk assessment to minimise harm and maximise benefits from emergent new technologies. To enable 'safe' market entry of new technologies. Retrospective (back) facing to avert earlier crises. Quantitative indicators. Scope limited to risk/harm/benefit calculations.	To achieve socio-technical integration premised on the view that 1/Research and innovation are done 'better' when all societal actors are involved in all stages from issue-framing to design and commercialisation bringing new products and services to market. 2/Conversely,	To ensure programmes of activity and monitoring are in place to provide evidence to support the firm's claims that it is an ethical and responsible actor in society, considering 'plural' or 'hybrid' objectives combining economic (market revenue, share prices, profit, attracting investment) and societal/environmental care (very little attention	To develop instruments which evidence how different actors in the supply chain of products can be mobilised collectively participate to improve the conditions under which those goods are produced (labour conditions, environment, protection and responsible use and guardianship of scarce natural resources)	To prioritise social and commercial activity which solves societal problems over other concerns such as the advancement of knowledge for its own sake; or the production of goods for purely for consumer pleasure (if other concerns such as environment or labour welfare are shown by trusted actors to be subordinated to consumer sovereignty

			democracy and democratic society is 'done better' when citizens are empowered to participate in processes which produce new products and services with better fitness to exist within and shape future societies	currently related to, or recognition that external constituencies are making demands for societal participation in the evaluation of the R&D activity of firms)		
Basis of responsibilities	Caring for the neutral production of new scientific knowledge. To protect the scientific realm from external challenge by self-regulating the	Caring for the safety of humans and natural environment by identifying and reducing the risks associated with launching new technologies and products into society. To gain societal trust	Caring for the inclusive participation of all societal actors in research and innovation processes, in order to create 'better' products more aligned to societal	Caring for particular societal/environmental concerns and constituencies which relate to the firms areas business activity (both supplier sourcing and end-user markets). Seeking to develop programmes	Caring for the conditions of production of every day household products consumed primarily by richer Western societies.	Caring for the amelioration of pressing societal problems, locally and around the world.

	ethical conduct of scientists and scientific practice I order to sustain confidence and trust the scientific project (thereby maintaining autonomous self-regulation with minimal interference from other actor groups).	and heighten the legitimacy of incumbent techno-economic actors.	needs	which combine societally responsible action, with market opportunities		
Source of Legitimacy	Tradition rooted in Autonomy : the outputs of the scientific enterprise are best achieved by retaining their distance and autonomy from other societal	Trust: in established incumbent actors: 3 key actors (business, universities, government) together have the expertise and other qualities required to do 'best'	Participative democratic action: The success of the Democratic /Participatory political model of the State to produce citizens with higher levels	Status: of he firm as responsible citizen firm communicated to all constituencies on which the performance of the firm depends. (often evidence as position in rank-ordered	Distributive Justice: to secure fairer/better standards and recognition/awarenes s of pay and working conditions of peoples and the use of natural resources the inputs of which exist materially within	Moral : Calls to mobilise societies natural and human resources and talents to address pressing societal problems

	actors who may have vested interests which 'corrupt' the ability to deliver pure/neutral science results. Tradition. Expertise of specialists	for wider societal constituencies that they serve. Technological progress is route to economic growth (jobs and businesses) To avert technology-related crises and/or consumer back-lash. – GMO, Chernobyl.	of 'wellbeing'.	league tables)	the goods we consume.	
Source of Authority	The rational scientist and Scientific method (positivism) and/or abstract theory. Iconic scientists (individuals) past and present.	Using advanced systematic assessment methods will avert Tech crises. (rationalised myth?)	Habermassian view of political publics where civil society is 'conscious, desiring and waiting' to be mobilised into wider public sphere.	Formalised indicators and evidence of good-standing as corporate citizen. Awards gained and rank-order in league tables. Pro-active and successful participation/leadership of normative labelling schemes	Lead actors in the determination of supply-chain regulation Innovators and developers of supply-chain tracing certification	Strongly rhetorical moral justice : Appeals to divert State and private resources to solve pressing societal problems through appeals to publics showing suffering on

	Newton, Einstein,		Rights of civil society, to participate as a pro-active actor in R&I development processes will produce better products and services for the wellbeing of society (beyond economic rationale)	(such as Energy Efficiency) Membership and leadership of collective fora concerned with societal issues such as the World Business Council for Sustainable Development (WBCSD)	instruments	the part of peoples and the planet. Appeals that the problems described are close to home and/or far away Evidence that voluntary 'giving' or participation in activity that creates positive impact on societies of various kinds is better than that which doesn't. Scientific evidence that participation in social 'good' of various kinds enhances feelings of cohesion and social wellbeing.
Economic System/Busines	State funding in exchange for new	State and Market funding. Private	Weak. Difficult to raise resources for	Market and investment	Multi-firm co-operation (or	Solving societal problems through

s model	knowledge made public.	monopolistic funding from large MNCs	this mission, except in countries /eras where supportive democratic state is to the fore.	performance considered positively correlated to reputation as citizen-firm	compliance) to agree and direct the distributional shares of the entire supply chain	mobilisation of multiple actors has dual outcomes for society : it contributes to the solving of the problem and it brings economic rent to the primary economic actors (it also brings private resources into the problem-solution space)
Governance Mechanism	Evaluation by peer scientists. State-Science contract	Governments-Technical Universities and Institutes- Large Business	Civil Society Organisations and NGOs partner with Social Scientists and the Democracy and consumer/human rights/education functions of the State.	Multiple sophisticated voluntary governance mechanisms, from Codes of Conduct to sustainability monitoring and accounting, to Corporate Social Responsibility Reports, aimed at persuading all constituencies of valid	Formal laws, plus voluntary ceritification instruments, communicated to the political consumer in the form of product labels and Codes of Conduct	Collective mobilisation of multiple actors to frame, address, and solve societal problems. Involves interactive dialogue on two levels : inter-disciplinary mobilises actors from different science and research disciplines to focus

				qualification as citizen firm. To protect current position and buttress the organisation in the face of reputation or status challenges, and negative evaluations impacting performance in current or future crises etc		on the problem; and inter-constituency, brings actors from different kinds of actor groups (science and research, firms, civil society, national and local state, professional bodies etc) to work together on the formulation and solving of problems
Mode of Reproduction	Via recruitment and mobility of elite scientists (gender balanced)	State and Market Business Model. Dominant idea: 1/economic growth facilitated by technological progress coupled to 2/ avert technical crises of the past	Seeks resources to fund demonstration projects which provide evidence for claims that products/services produced under this model are preferred by society than those	Market relations with all other actor constituencies (customers, suppliers, employees, investors). Strong efforts to influence the institutional and	Evidence of successful certification schemes in improving the conditions of production which it targets, will increase the entrepreneurial design of new schemes, with	Successful problem solving through these experimental methods and approaches, provide illustrations of good practice which then flow to other contexts of place and problem as mode of both reproduction and

			that arent (and are more successful in market terms) Suffers during times of economic crisis. Needs a favourable democratic Nation State normatively aligned to the aims of participation society.	regulatory environment in order to influence market and relational/reputational assets and resources (shape markets).	different lead actors	scale-up
Key Events	Establishment of Oxbridge 16th Century England. Humboldt model of research and role of Universities in Germany mid19th century.	1975 Asilomar Conference on GMO. 1984 Bhopal explosion in India 500,000 people exposed to poisonous gas emissions. 1986 Chernobyl	National multi-stakeholder nanotechnology assessment exercises in DK, UK Fr in 1990s? (check) DEMOS deliberation in UK	Long-standing debate on the role of business in society (Dunham 1928). Formalisation of concept of 'corporate social responsibility' in 1950s . 1992 Rio De Janeiro	After WW2 – first Fair Trade Organisations (FTOs) were established 'Banana wars' timeline	1968, creation of the Club of Rome. Brought committed high-status individuals together concerned to address societal problems. EU Lund Declaration

	1996 in Biological sciences; the genetic modification and cloning technique which produced 'Dolly the Sheep' in Scotland. Scientists 'playing God?'	nuclear disaster in Russia. 1972 Office of Technology Assessment established in USA 1990 Establishment of European Parliamentary Technology Assessment (EPTA) network.	USA – National Nanotech Initiative launches Centre for Nanotechnology in Society (1991)	Earth Summit gives rise to the World Business Council for Sustainable Development (WBCSD) in 1995. Institutionalisation of content and metrics of CSR 2010, ISO 26000 established to provide guidance to organisations on the concepts, terms and definitions of social responsibility. 2014, ISO 26000 reviewed and confirmed. 1990s Global Reporting Initiative (GRI) pioneers	Fairtrade label established	2015(2009) for shaping the institutional context under which collectives of multiplex distributed actors are incentivised to mobilise to address problems constituent of 'societal grand challenges'. 2015 Paris Climate Change Summit.

				sustainability reporting . 2010-2014 GRI issues guidelines on sustainability reporting including how to combine GRI and ISO26000. New age of 'integrated reporting'. FTSE 100 companies obliged to report social responsibility value and activities enables scrutiny by charities (Charities Aid Foundation 2014, 2016)		
Key Actor Groups	Elite Research Universities. Academies of Science.	'Iron Triangle' 1/Research/ Technology Organisations (inc	Participatory Democratic model of the State and polity.	Corporations (mainly large and multi-national). Corporate and multi-		All actor groups are potentially mobilised, but the specifics of who should be

		Universities, Institutes) 2/Large Business 3/Government (economic/enterprise and Technology Devpt Ministries)	Organised civil society. Social Scientists of Science and Technology.	actor representative bodies. Standards organisations developing accreditation and evaluation procedures and guidelines. Scrutinising NGOs.		mobilised, where and when, begins with the articulation of the problem.
Institutional Entrepreneurs	Wilhelm von Humboldt King Friedrich Wilhelm III. To re-assert Prussian prestige following Napoleonic defeats.	Eg Office of Technology Assessment, USA; Fraunhofer Institute, Germany	Rathenau Institute, NL, Danish Board of Technology (now DK	Unilever (eg palm oil) World Business Council for Sustainable Development (WBCSB) Michael Porter (shared value concept)	Fairtrade Marine Stewardship Council (MSC) Sustainable Palm Oil Initiatative	There are not yet iconic and widely circulated examples of Narrative F that are widely known (folk-lore) and resonate with all publics? Among the RES-AGorA organisations cases the 'Stroke

						Assocation' case provides an experiment-demonstrator
Structural Overlaps	Later, overlaps into into Narrative B. Fiscal crisis gives rise to 'Entrepreneurial University'. Cant rely on State funds,. Appeals to diversify funding base, appeals to companies for private sphere to support fundamental science	Advocates of Narrative C call for *revision* of Narrative B *transforming* into Narrative C by including more diverse societal actors into TA. eg see the work of sociologists and philosophers of science advocating Constructive Technology Assessment (CTA) (Rip) and Anticipatory Governance (Guston).	Integrative Narrative linking critique of Narrative A, with revisionist approach to Narrative B; seeking to appeal to the dominant actors in Narratives D and E. This narrative is highly compatible in its normative aims to Narrative F. Yet it is struggling to gain institutionalised traction. Evidence of participation	Some structural disconnect with Narrative C? Does the citizen-firm experience pressure to involve citizens in (private) R&D activities? Response to Narrative C (beyond 'market research'?) ie is there a pressure from institutional context for new modes of citizen/user integration into new product conceptualisation, design and marketing. Engaging the citizen-firm may depend on	Strong intersection with Narrative F, except E has more specific geographical (global trade) , povery, 'inclusive innovation as including the global poor dimensions	Diametrically opposite in all respects to Narrative A. However, Narrative F encompasses and is compatible with all Narratives B-E. And can be seen as the archetypal integrator of Narratives B-E A persuasive integrative narrative can be politically mobilised from the

			fatigue by general publics at the 'generic' level? (Lay normativity suggest people participate to individual causes which directly affect them, relate to their cares, and fit with their own identity and sense-making structures.	their focus in the market place (eg heavy R&D dependency) and the effectiveness of other actors to influence the institutional context of the citizen firm (Democratic State shaping the regulatory context, CSOs demonstrating benefits of citizen engagement, positive links to firm performance evidenced?		Narrative F position which brings focus and attention (and therefore strength and heightened legitimacy) to Narratives B-E. In its revisionist form (ie incorporating CTA and AG there are intersections between Narrative B and Narrative F. Indeed Rip and Guston play the role of institutional entrepreneur in advocating transformative integration of B and F.

APPENDIX B – 6 'GRAND NARRATIVES' OF *DE-FACTO* RESPONSIBLE INNOVATION:, REPRODUCED FROM RANDLES ET AL 2016: CHAPTER 3

Narrative A : Science Republic
As articulated by Michael Polanyi in 1962, this narrative revolves around the self-regulation of scientific activity, by, with and for scientists, to freely and independently identify and pursue their own problems, as members of a closely knit organisation. The implications for responsibility lie in the conditions for maintaining these freedoms, set primarily by the main funding body, the State. In exchange for such freedoms, the scientific enterprise must comply with certain guarantees thus creating a *de-facto* Science-State contract. A number of dimensions sit at the heart of this contract. A first is to make research results a public commons through peer-review publication in scientific journals. A second is to guard against fraud and other deviances which would undermine trust in the scientific establishment, such as the misrepresentation of results, linked to a requirement to provide clear and replicable details on research methodology. A third relates to an ethics of care around the treatment of objects of research (whether human or non-human): how experimental objects are obtained and maintained, including how animal welfare is ensured and testing conditions regulated. A fourth relates to the maintenance and reproduction of the scientists own field of operation: from health and safety in the laboratory to the training and support of young scientists and would-be scientists, most recently stretched to issues of gender and diversity within the scientific community. The identification and achievement of each of these 'responsibility aims', is today negotiated between the scientific community and agents of the state such as funding research councils, and drives the evolving governance of practice in this narrative. Most recently, Arnaldi and Bianchi (2015) provide an elaborated account of the opposition between Narrative A : *Republic of Science* and Narrative F : *Research and Innovation With/for Society.*
Narrative B: 'Technological Progress: Weighing Risks and Harms as well as Benefits of New and Emerging Technologies'
How best to govern the uncertainties of new and emerging technologies is an age-old question, which over the past decades has generated multiple forms of institutionalised responses such as risk mitigation, remediation insurance, and

	evaluation techniques under conditions of uncertainty (including Foresight methods). The central question is how to balance the opportunities and benefits afforded by new technologies with uncertain technology-induced risks and harms. The narrative extends already firmly institutionalised rights and regulations (protecting the health and safety of workforce and users) to those 'in close proximity' of facilities such as local residents. The management of such risks and the balancing of harms and benefits, is addressed via both voluntary instruments and law, exemplified/accelerated in the aftermath of disasters, with some ubiquity around chemical catastrophes (Chernobyl, Bhopal). The precautionary principle extends this care to unforeseen and unforeseeable risks. The constituency of actors now expands, bringing in a central role for business alongside scientists and technologists, and the state as regulator. A long trend addressing these concerns can be traced for example to the establishment of the Club of Rome in 1968[8] and is more recently illustrated by the highly significant development and implementation of the European Union Chemicals Directive, REACH (2006) which regulates the specification, usage, production and distribution of chemicals. An important regulatory extension within this narrative involves the emergence of 'soft law', or voluntary measures to govern such risks, such as ELSA[9] assessments and reflections; and the EU Code of Conduct for Nanosciences & Nanotechnologies (EC 2009). This narrative is all about the precautions that are required in the steering and anticipation of technological development; and the mechanisms and methods that can be put into place to reflect upon, and then mobilise the results of such reflections, into the next rounds of development of new and emerging technologies.
Narrative C: 'Participatory Society'.	
	The main argument in this narrative, as articulated by Beck, (1992 [1986]) is that since we exist increasingly as a knowledge society, a heightened appreciation of an uncertain future opens the right for a wider constituency of actors to participate in the analysis of specific technological debates and questions around the shaping of the innovation future that unfolds. 'Participation society' acts as an adjunct and additional support to the modes of decision making under contemporary models of representative democracy. Particularly, this narrative demands a place at the table of research and innovation futures and at the origination and design stages of

8 Founded in 1968, the Club of Rome is an association of independent leading personalities from politics, business and science, sharing a common concern for the future of humanity and the planet http://www.clubofrome.org/

9 Ethical Legal and Societal Aspects of the emergence of new technologies

research and innovation processes, for civil society organisations and other organised constituencies of actors such as user groups, before decisions and trajectories become 'locked in'. The demand therefore is not just about inclusivity of a wider and more diverse range of perspectives, but that inclusion follows a co-construction ambition, quite different from linear processes associated with conventional science communications, outreach, or 'make and then consult' approaches since all of these modes negate the possibility of wider interests participating in the framing of research, innovation, and responsibility 'problems'. This narrative represents a research and political agenda championed by sociologists of science and technology studies (STS), who seek to define and operationalize progress towards the normative objectives and governance mechanisms that define Narrative C (e.g.citizen juries), creating a distinct line in the academic literature (Tancoigne et al. 2015).

Narrative D: 'The Citizen Firm'

The normative questioning of the role of business in society maps to a historical reflection on the firm as social as well as economic actor. To date, the concept of 'Corporate Social Responsibility (CSR)' has been mainstreamed and standardised, mainly by individual (large) companies and latterly stabilised for practitioners (if not academia) through voluntary instruments for corporate responsibility. However, this stable conceptual interpretation, which according to Carroll (1999) originated in the 1950s, but which in fact we can trace to Doham (1927) has evolved and been contested over seven decades (Carroll 1999) only recently finding institutional stability as represented by the ISO 26000 standard on Social Responsibility. In terms of the scope of appropriate activities, investments and the roles, relationships and division of responsibilities between the firm and other organisations (called 'stakeholders' in this narrative), this is opened again through new debates on planetary stress, climate change and the depletion of natural resources. Covered also are the implications for management practice of embedding social dimensions into the fabric of the organisation, and quantitative and qualitative evaluations of the stakes at stake, the diversity of forms, and the difference it makes, to be a highly developed socially transformative and innovative 'Citizen Firm'. Work within management sciences has produced a large corpus of literature on CSR, business ethics, and sustainability, responding to the changing implications on/by the Citizen Firm and managerial responses to it.

Narrative E: 'Moral Globalisation'

Moral Globalisation witnesses the engagement of Civil Society Organisations (CSO) in the (re)introduction of moral dimensions and ethical values calling for the remediation of adverse conditions of production through the mechanism of collective governance of global value chains. It introduces us to the ethical consumer, and intervenes on innovation system trajectories via international economic exchange and markets. Coalitions of co-ordinated actors including but going beyond CSOs invest in the formulation of governance instruments (such as environmental and ethical labels and standards: fair-trade, marine stewardship and protection, sustainable forests and palm oil), accompanied by certification processes seeking to embed social and environmental values and transformation into international economic activity (via supply chains and markets). In a certain way, action in this domain compensates for the failures of inter-governmental regulatory bodies. These new modes of intervention connect places of (distant) production to sites of consumption, putting centre stage the role and force of a new actor the 'political consumer'.

Narrative F : 'Research and Innovation With/for Society'

Finally, the actuality of 'Research and Innovation With/for Society' beyond an intellectual ideal to its manifestation in practice, incorporates the normative rationales of narratives B-E above, but importantly stands at a 180 degree turn - an inversion of and opposition to Narrative A: '*Republic of Science'*. The central argument is that research, technological development, and ultimately entire innovation complexes are too important a domain to be delegated to a narrow group of actors. It is for wider and more diverse collectives to co-construct with scientists and researchers, the societal problems and orientations that science and research should address (including but not exclusively 'grand challenges'). The focus is first on societal outcomes, with processes such as deliberation or participatory governance aiding this outcome, not being ends in themselves. At present, Narrative F is far from institutionalised, in the sense of existing in an integrated cohesive form which is systematically routinized, historically stable, and supported by discourse, resources and action. Nevertheless, Narrative F seeks to put in place assurances that those who are tasked with and have received investments from wider society (tax and fiscal returns) to develop the specialist knowledge to carry out the important science/research; work on behalf of society, do so in such a way that benefits society by addressing and solving societal problems and taking co-responsibility for societal impact. Science, research and innovation exist to serve society. To be effective, according to this narrative,

processes must include wider publics in the definitions of societal problems and challenges and co-construct with scientists and researchers the technological and innovation pathways that shape those futures.

PUBLICATION BIBLIOGRAPHY

American Statistical Association (2016): Ethical Guidelines for Statistical Practice. Prepared by the Committee on Professional Ethics of the American Statistical Association. Available online at https://www.amstat.org/about/pdfs/EthicalGuidelines.pdf, checked on 14.09.2016.

Arnaldi, S.; Gorgoni, G. (2016): Turning the tide or surfing the wave? Responsible Research and Innovation, fundamental rights and neoliberal virtues. In: Life sciences, society and policy 12 (1), p. 6.

Bogner, A.; Decker, M.; Sotoudeh, M. (Eds.) (2015): Responsible Innovation. Neue Impulse für die Technikfolgenabschätzung? Berlin: Nomos (Gesellschaft - Technik - Umwelt, 18).

CIOMS: Ethical Guidelines for Biomedical Research Involving Human Subjects. Available online at https://info.fraunhofer.de/ueber-fraunhofer/gute-unternehmensfuehrung/ethik/Ethik-Leitlinien/Documents/CIOMS_guidelines-Biomedical%20Research%20involving%20human%20subjects10_september_2015-WITH_WATERMARKS.pdf, checked on 14.09.2016.

Freeman, R. E. (1984): Strategic Management. A Stakeholder Approach. Boston: Pitman/Ballinger.

Murphy, P. (2015): Debates on assisted reproduction should begin the classroom. We need to engage with the technological and societal challenges of reproductive ethics at secondary level. In: The Irish Times, 2015. Available online at http://www.irishtimes.com/news/education/debates-on-assisted-reproduction-should-begin-in-the-classroom-1.2195313, checked on 02.03.2017.

ABBREVIATIONS

ISSI	Integrating Society in Science and Innovation
JERRI	Acronym for the project Joining Efforts for Responsible Research and Innovation
NGO	Non-governmental organization
R&I	Research and Innovation
RRI	Responsible Research and Innovation
RTO	Research and Technology Organization