Project acronym:	Res-AGorA
Project full title:	Responsible Research and Innovation in a Distributed Anticipatory Governance Frame. A Constructive Socio-normative Approach
Project number:	321427
Programme:	Seventh Framework Programme for research and technological development
Objective:	FP7 SiS.2012.1.1.1-1: Governance frameworks for Responsible Research and Innovation (RRI)
Contract type:	Collaborative project

Deliverable D3.5

Interim Report: Preliminary Lessons from the Case Study Programme

Author(s): Jakob Edler, Sally Randles, Sally Gee

Deliverable No.:	D3.5 (Work package number: WP 3)
Deliverable nature:	R (Dissemination level: PU)
Document version:	Version May 31 2014


ResAGorA

ResAGorA

Contents

Res-AGorA – A brief project overview

The EU seeks to become a genuine Innovation Union in 2020 striving for excellent science, a competitive industry and a better society without compromising on sustainability goals as well as ethically acceptable and socially desirable conditions. Europe thus needs to develop a normative and comprehensive governance framework for Responsible Research and Innovation (RRI). This is the major goal of Res-AGorA.

The Res-AGorA framework will build on existing RRI governance practices across and beyond Europe. It will be reflexive and adaptable to enable the inherent tensions in all governance of RRI to be actively addressed by procedural means aiming to facilitate constructive negotiations and deliberation between diverse actors.

The project will achieve these objectives through a set of work packages providing an empirically grounded comparative analysis of a diverse set of existing RRI governance arrangements and their theoretical/conceptual underpinnings across different scientific technological areas (WP2 and WP3), a continuous monitoring of RRI trends and developments in selected countries (WP5) and, based on the cumulative insights derived from these work packages, co-construct with stakeholders the central building blocks and procedures of an overarching future governance framework for RRI (WP4).

This governance framework will deliver cognitive and normative guidance that can be applied flexibly in different contexts. Res-AGorA will thus have direct impact on RRI practices (science, industry, policy), and strategic impact in terms of the political goals (Horizon 2020) and competitiveness (Lead Market through growing acceptance of new technologies).

Res-AGorA will ensure intensive stakeholder interaction and wide dissemination of its tangible and intangible outputs in order to maximise impact, including comprehensive and interactive stakeholder engagement, liaisons with other ongoing RRI activities funded by the SiS Work Programme, and a final conference.

For more information and updates on Res-AgorA's activities, please visit www.res-agora.eu.

Partners and contact information

1/Fraunhofer Fraunhofer Institute for Systems and Innovation Research, Germany

Contact person: Prof. Dr. Ralf Lindner Ralf.Lindner@isi.fraunhofer.de

2/UT University of Twente, Netherlands

Contact person: Prof. Dr. Stefan Kuhlmann S.Kuhlmann@utwente.nl

3/UNIPD University of Padua, Italy

Contact person: Prof. Dr. Elena Pariotti Elena.Pariotti@unipd.it

4/DBT Danish Board of Technology, Denmark

Contact person: Anders Jacobi AJ@Tekno.dk

5/IHS Institut für Höhere Studien, Austria

Contact person: Dr. Erich Griessler Erich.Griessler@ihs.ac.at

6/UNIMAN University of Manchester, UK

Contact person: Prof. Dr. Jakob Edler Jakob.Edler@mbs.ac.uk

7/AU University of Aarhus, Denmark

Contact person: Dr. Niels Mejlgaard NM@cfa.au.dk

8/UPEMLV Université Paris-Est Marne-la-Vallée, France / IFRIS

Contact person: Prof. Dr. Pierre-Benoît Joly Joly@inra-ifris.org

1 Introduction

1.1 Purpose of this report

ResAGORA aims at developing a socio-normative model to govern rri. This model will be derived at through an interplay of deductive considerations and inductive insights from empirical analysis. We first conceptualised a basic research model deductively, we then applied this model to empirical pilot cases and refined it (inductively), and then applied the model to a second stage of in-depth case work. The basic idea of this interplay of deductive and inductive work is to derive lessons from processes of *rri governance in the making* in different settings and situations.

This report summarises those governance lessons from our inductive work, i.e. from all our case studies. Its main purpose is to feed into the subsequent development of our the socio-normative governance framework (WP 4). The overall empirical analysis is being done in three stages, pilot stage (2013), more in-depth stage 2 (February and April 2014) and, later this year, stage 3 to fill specific gaps we have defined. The basis for drawing these first tentative transversal lessons were 20 cases[1], 7 pilot cases, 5 cases that started as pilots and were subsequently deepened as stage 2 cases, and 8 new stage 2 cases. The annex to this report gives an overview of all cases and the case work in those two stages. All of the cases have been discussed in two internal consortium meetings (Twente, October 10-11 2013, Padua, March 19-21 2013). A selection of the cases were discussed in our first WP2 expert meeting held Nov. 22, 2013 in London and the main lessons of this report have been discussed in a stakeholder workshop in Copenhagen (May 27-28 2014).. Our case selection first followed a bottom up approach, to build on existing field access of the team. In the second stage the case selection was done in an interactive, but ultimately more top down mode in order to fill certain gaps that were needed to further develop the research model. A more detailed explanation of the case selection is given in the annex. In line with the project working plan, after this second stage, the team will then decide which further gaps can and should be targeted with additional case studies.

1.2 Underlying research model and framework to characterise situations

The case work and its analysis is informed by the our research model and its key questions and analytical dimensions[2]. Two key research questions of the model that guided the case work:

RQ1: How is RRI in the making conditioned, and

RQ2: Are there building components for a socio-normative governance framework.

To answer these two questions, the model defined three main dimensions, i.e.

---

[1] Two further research projects within WP3 are ongoing at the time of reporting. They are a) Text Analysis of the historical development and socio-semantic structures of responsible research and innovation searching on key words and authors (Elise Tanciogne and PB Joly at IFRIS, and Sally Randles at MIOIR) and key actor 'Voices' on rri (Sally Randles at MIOIR, Elise Tanciogne and PB Joly at IFRS, and Kerstin Goos at Fraunhofer). These analyses are not included in this report.

[2] Walhout, B., Kuhlmann, S., Dorbeck/Jung, B., Edler, J., Randles, S, (2014): ResAGORA Research Model for WP3 stage 2 cases, internal document

- *rri governance arrangements* as the set of institutionally related instruments, fora and procedure related to responsibilisation in research and innovation,
- the *landscape of actors* who are involved in and/or affected by responsibilisation discourses and governance practices and the
- de *facto governance practice*, i.e. reflecting the actual, observable situations in which governance arrangements are put into action and get meaning.

Ultimately, ResAGORA needs to understand the effects of governance practices. These effects have been defined as **"well-doing"** of governance in the making. This well-doing has two dimensions

1) **Responsibilisation** (i.e. (self-)stimulating actors to take up (new) responsibilities vis-à-vis broader societal concerns or aspirations), which has two expressions

- the **adequacy** of how the issue is treated in terms of actor involvement, framing of the problem, embedding of responsibilities, capacity for learning and robustness of the knowledge base and
- the scope and direction of **transformation** in terms of change of actor perspectives and practices

2) **Dealing with contestation** (diverse and often competing positions, motives, and interests around the issues of responsibilisation) reflecting different normative orientations or interpretations of 'good' which again has a number of procedural and normative expressions

- **Procedural** e.g.
    - The **adequacy** of the level of trust in governance arrangements, the procedures and "rules of the game" and the overall transparency of the process.
    - The **transformation** towards responsive and reflexive improvement of governance practice in line with the requirements of the contested space (reflecting diversity, broad access etc.)**.**
- **Normative** e.g.
    - The mobilisation of actor strategies and resources to steer the outcome of a particular research/innovation process according to a preferred normative orientation.

When drawing lessons, the effects of governance practices ("well-doing") will have to be understood in light of these dimensions.

Finally, in order to understand the level of generalisation of a particular lesson, we need to understand the particular context of the case. A case is an illustration, a demonstration of an effect, or the outcome of multi-causal effects. Thus, abstracting from the specific case is needed by defining the situation of the case in more general terms. For this purpose, we can draw on a framework to characterise situations, composed of a limited number of dimensions which appear to influence considerably the emergence, functioning and effect of governance arrangements. Those dimensions can be distinguished between substantive and material dimensions on the one hand and procedural

dimensions on the other hand. A separate "Situations Paper"[3] introduces this framework. The following table summarises the substantive and procedural dimensions.

Table 1: Dimensions to characterise a governance situation

Substantive or Material Dimensions	Procedural Dimensions
▪ R&I context : Science, Research, Technology, Innovation. ▪ Actor Landscape: Range and variety of actors involved and respective normative positions ▪ Scale : locality, nationality, globality ▪ Techno-science domains & cross-domain platform technologies (health, agro, environment, energy, advanced manufacturing, ICT). ▪ Nature and level of uncertainty ▪ Nature of the contestation ▪ Nature of institutional 'conditioning conditions' e.g. national political-economy and political system. ▪ Level of RRI governance intervention (e.g. institutions of global governance – OECD; hybrid fora or network; single organisation; capacity-building reflexive individuals)	▪ Bundle and variety of instruments ▪ Modes of actor mobilisation ▪ Resource mobilisation (funds, social networks, knowledge) ▪ Capacity building (people, skills, knowledge) ▪ Lead actors/ origin and voicing of responsibilisation & well-doing

1.3 The logic of drawing and presenting lessons and structure of the report

The lessons drawn from the cases are presented following three principles:

1) We organise the lessons according to a limited, simplified number of "governance situations" and alongside concrete **governance challenges** within those situations. Those governance situations are structured in three blocks

a. the main structuring block is the **spectrum** of **basic science/emerging technologies** on the one hand and **innovation and market introduction** on the other hand. We have chosen this substantive dimension of the situations paper as a first ordering device because it reflects the very essence of rri (research and innovation), and our reading of all cases has shown that out of all dimensions of the situations paper this is the one that most dominates the nature of what is to be governed in terms of responsibility. In this block of situations governance challenges arise because of the practice of science and innovation more generally, and because of the tension of curiosity and economically driven science and innovation activities on the one hand with ethical, sustainable, safety and other social issues on the other hand.
b. a second block can be captured as proactive governance, i.e. "**thematically orientating science and innovation towards societal preferences / grand challenges**". Here, governance challenges arise because the practice of science and innovation is to be steered in terms of topics to be covered, production of outcomes and expectations to contribute to the solution of societal problems.

[3] Jakob Edler, Sally Randles, Sally Gee, Stefan Kuhlmann, Bart Walhout (2014): Governance Situations and Challenges. Conceptualising variety to underpin a socio-normative RRI governance framework. Report to the European Commission, Manchester/Twente

c. **Organisational designs and re-designs towards responsibility**. This block takes individual organisations and intra-organisational dynamics in its focus and investigate how multiple governance arrangements, intra-organisational actor groups, governance protocols and instruments operate in alignment.

2) We take the dimensions of the situations paper seriously, i.e. governance challenges and related lessons are contextualised using the dimensions of our situations paper as appropriate.

3) We comment in each lesson on the nature and level of the effects, the “well-doing” as introduced above.

2 Preventive and reactive rri governance situations across the science –innovation spectrum

2.1 New and emerging technologies (NET)

Governance Issue: The tensions between freedom of science and ethical considerations

Case 1: Xenotransplantation in Germany– integrating ethical expertise into science activities[4]

The case: Xenotransplantation is a scientific research practice has been faced with enormous ethical challenges and the prospect of Xenotranplantation as a medical practice has experienced strong normative contestation based on scientific and ethical uncertainty. In our specific case, scientific research has been going on in recent years funded by a specific programme in Germany, while the public debate about the negative consequences has ebbed down. The scientists funded in that programme, however, continued to establish practices of interacting with ethicists and theologians, taking advantage of a concrete provision in the funding programme representing those contesting views, in order to be well equipped should the debate and contestation become hot again as well as self-organising responsibilisation, i.e. the orientation of scientific practice towards understanding and integrating ethical concerns. Even if the case cannot reveal if the actual attitudes and behaviours of scientists is being changed in the process of interacting with non-scientists on ethical issues, we see **transformation** of scientific activity through integration with non-scientists and the governance provision taken in this case would allow a robust and well informed response to a new contestation debate, built on cooperation and mutual trust. More basically, the integration with non-scientists ethical experts is a way to **deal with contestation** within daily routines of science practice.

Main lessons out of this case: In situations in which ethical or other kinds of responsibility contestation is not yet (or not anymore) object of public contestation, but could very well be (again), a range of governance practices can support well-doing:

- By visibly mobilising ethical experts, *Scientists* not only acquire a "licence to operate" to go ahead but they enhance the robustness of and trust in the knowledge produced and processed in the scientific process. This embeds responsibility in the production of knowledge and – potentially – also changes the way scientists research and transfer their research results.
- For *programme funders* and for *managers in research organisations* this means that processes and structures to safeguard for ethical concerns and integrate a broader range of actor in the scientific process not only when controversies are "hot", but also when the public debate itself has ebbed down without the contestation being visible in any way.
- For these governance practices to become truly transformative and normatively binding, i.e. for ethical concerns to truly make a difference for the behaviour of scientists, the process must be
    - truly inter-disciplinary, i.e. the ethical experts need to integrate with scientists, leading to interactive and joint learning (capacity building), whereby ethical experts do not so much analyse the project externally, but are an integrated part of it ;

[4] Case done by Erich Griessler, Institute for Higher Studies, Vienna.

- the funding programme and/or the organisation need to provide the conditions and requirements for that.

Note: In the actual case, the cooperation with ethical experts was not really transformative because this integration was lacking.

Case 2: Ethical Committee – safeguard for ethical behaviour in research and funding organisations[5]

The case: In the context of Austrian Universities, ethical committees within research organisations and in funding programmes are voluntary institutional safeguards to make scientists aware of the ethical dimension of their work and align with basic ethical standards. There are multiple motives to create those committees, e.g. to defend against potential future controversies, to sign off a scientific publication as ethically unobjectionable, to safeguard an internal allocation of funding. The organisations that set up these committees see them both as part of a defensive strategy and as a potentially effective organisational intermediary to promote the diffusion of ethical practices. However, in the empirical case there is no evidence of **any strong contestation** of ethical issues **nor** does it suggest **strong transformation** of actor behaviour, the latter due to a lack of standing, resources and embedding of the committee.

Main lesson[6]: ethical committees can be a means to orient research towards ethical principles; they can support individuals in their decisions through establishing an additional control mechanism. In order for ethical committees in organisations and within funding programmes to make a difference in terms of the re-orientation of scientists and organisations towards more reflexivity and awareness considering ethical dimensions, ethical committees:

- should focus exclusively on the ethical dimension and be separate from any assessment of the science excellence;
- have to be strongly embedded in the governance structure of the University and accepted within the university as a body to advise university members in these issues. Thus, they need to
  - have high status and standing as well as necessary resources and time in order to exercise the power to reject, not just smokescreen.
  - Delegation (maybe even election by the faculty) therefore seems to be essential to create trust, as well as additional external evaluation to avoid conflict of interest.
  - take a proactive approach to inform all university members about its activities and to clarify the importance of its tasks in all faculties
  - provide joint learning and capacity building more broadly by
    - supporting proposals with advice, rather than simply rejecting or “whitewashing”;
    - taking steps beyond the limited control function to widen the understanding of ethics at the university from pure research ethics and integrity to also include the ends of research (societal needs, sustainability).

[5] Underlying case study by Erich Griessler, Institute for Higher Studies, Vienna.

[6] We owe some of those lesson formulations to the author of the underlying case, Erich Griessler.

More generally, organisations need to establish structures, procedures and inventive systems. This means they need to change conditions that impede the development of ethics in research and innovation by – inter alia – reducing organizational fragmentation and hierarchical structures limiting free communication and dialogue, provide finances and broad incentive system (not focus solely on impact factors and acquired contract money), stabilize contracts for researchers and have champions of ethical standards at high places in the University hierarchy.

Governance issue: Understanding the opportunities and threats of a technology to guide future choice

Case: Synthetic biology roadmap UK – defining future pathways of technologies[7]

The case: The high level of uncertainty about the opportunities and threats posed by research in the inter-disciplinary area of synthetic biology (synbio) provided the starting point of a policy driven process to define future pathways for the technology at national level in the UK. A panel of experts was created, the composition of which suggests a largely uncritical view of synbio, mainly seen as a large economic opportunity for the UK. There were no societal or environmental groups involved that are openly critical towards synbio, and RRI issues are dealt with as additional dimension to be considered, but are not in the centre of the consultation.

The consultation from the beginning was very much oriented towards the innovation opportunities of synbio (market oriented actors). RRI was included in the remit and the report. The case worker reported that the study did not indicate any major contestation around synbio or RI and synbio, and thus clearly does not accord with the broader, more critical discourse on synbio. The roadmap makes general references to other discourse processes, but is not linked to their outcome and does not institutionalise subsequent processes to ensure the "empowerment of society". The de-link of societal dialogue (despite some references) and the actual definition of the roadmap seems to be a severe limitation of responsibilisation and thus to **any meaningful transformation**.

Rri is dealt with through a number of high level, general principles of "inclusion" and empowering of societal actors. There is therefore grounds to support a claim to input-legitimacy.

However, the issue is not further elaborated, but two consequences are presented:

1) the potential negative effects of rri is interpreted to be covered by the strong formal regulatory framework existing in the UK that is seen as sufficient to deal with potentially negative consequences of synbio.

2) the range of concrete synbio products and innovations that deliver benefits for society is considered in the case to be a precursor for wide societal acceptance of synbio.

In sum , the actors of the science and innovation system represented in the road-mapping exercise refer to the existing legal framework (to cover the potential negative effects of synbio) and the preceding societal discourse (to cover the responsiveness to societal concern). The impact of the

[7] Underlying case study done by Davy van Doren, Fraunhofer ISI, Karlsruhe

roadmap as a policy and research priorisation tool and a tool for political legitimisation is high despite the exclusion of societal concerns and a limitation of the rri to regulatory frameworks and promised future benefits. There are no indication of a broad acceptance of synbio priorities and research in society based on the roadmap, and we have no indications as to the use of the roadmapping process to engage more broadly and create broader awareness or a the change of orientation of the research and funding system based on input by society.

Main lessons:

- Defining pathways for research in emerging and contested technologies necessitates a process of balanced inclusion and open moderation of contestation, i.e. even if scientific expertise is needed to understand the technology and the potential benefit, the process of defining priorities cannot be limited to scientific and corporate actors with clear interests in the pursuit of research; reference to pre-existing societal consultation and expected societal benefits is not enough, rather provisions are needed to link critical perspectives into the concrete process of defining future opportunities.
- A thorough understanding of rri issues, both in a negative sense (avoiding negative consequences) and a positive sense (understanding the aspirations and expectations of society) is needed. For such a robust knowledge base to emerge, openly critical voices must be included and confronted with proponents of the technology. For a roadmap to have effects on the broader rri discourse cannot be referred to (pre-existing discourses) or outsourced.
- The specificities of each technology requests that the nature of consequences and aspirations are clearly "constructed" interactively and on that basis, an explicit discussion about the ways in which existing frameworks can deal with potential negative consequences is needed, is made explicit (rather than simply referred to). This then allows to understand the need for tailored regulations and soft mechanisms to fill governance gaps as needed. Simple cross referencing to existing frameworks de-legitimises roadmap process in terms of rri.
- The explicit inclusion of rri in pathway definition exercises like the roadmap can be counterproductive and damaging if it is done in a superficial, not inclusive, non-discursive way as seen in the roadmap process of the UK. This de-legitimises not only the process, but also does not lead to productive interaction, to a real mutual understanding between societal actors and the science and innovation system as the process is captured by existing pro-technology interests.

Case 2: Technology Assessment in Synthetic Biology – mobilising a particular governance instrument as part of the process of constructing claims about responsibility and the potential benefits and threats posed to society of a particular class of emergent technologies [8]

The case: Eleven technology assessment reports on synbio were analysed to interrogate who has produced TAs, what they reported, and what seems to have been their motivations for doing so. The

[8] Underlying case study done by Davy van Doren, Fraunhofer ISI, Karslruhe

cluster of TAs analysed in the case were produced by a variety of classes of actor (NGOs and not for profit foundations, Business Representatives, National and European collective Research Institutes, and business/sector representative organisations) and covered different country and regional administrative levels (EU/EC, USA, Germany, Netherlands and cross-national NGOs).

The review showed that such assessments can support **transformations**, in that they help scientists, policy makers, funders, firms and society more broadly to establish a discourse (1) about what the technology offers and where the potential risks are and (2) where different actors stand in their interpretations of those risks and opportunities and thus in their expectations and strategy as regards the technology.

Main lessons: in order for technology assessments to play those roles, they must

- be credible, i.e. be based on robust knowledge base mainly by involving a heterogeneous group of experts and stakeholders in the formulation process to avoid conscious or unconscious bias towards the organisation who funds the science or the assessment itself
- allow actors to make their position clear (rather than an understanding of "objective" assessments dominated by a small group of homogeneous actors).
- be linked across different domains of scientific disciplines, as a lack of breadth in understanding rri issues is due to a limited view on the specific consideration of a sub-community around a specific specialised field.

Governance Issue: Making scientists and the scientific enterprise more reflexive to understand the tensions related to new and emerging technologies and act accordingly: Capacity building

Case 1 Nanonext NL – educating researchers within existing research programmes[9]

The case: A programme in the Netherlands was designed to integrate Risk Analysis and Technology Assessment (RATA) into an existing specific Nanotechnology programme at National level that spans 160 different, heterogeneous organisations (Universities, funders, SME, large companies, medical centres). So as to embed reflexive consideration of societal concerns into the development trajectory of nanotechnologies, in particular for early-career researchers (Doctoral and post-doc) to integrate this thinking into on-going Nanotechnology research, mainly organised around PhD projects,. 15% of the programme budget was allocated to RATA activities across the different streams of the programme, based on an open hearing organised by the Parliament and linked to the EU wide dialogue (thus providing a robust societal backing). The organisation of the RATA activities was then done by an agency of the ministry rather than rolled out more broadly, and RATA thinking was linked to business opportunities in addition to the conduct of science more generally. The main activity was education days (the RATA course) and events for Nano researchers. As for transformation, while the general acceptance of RATA for the programme was high, rri awareness amongst researchers in the programme remained low and the interactive RATA events were not taken up across the programme and the separate RATA management faces resistance. However the mid-term review put forward a number of recommendations to make this programme more

[9] Underlying case study done by Bart Walhout, University of Twente

effective in achieving its stated aims. It found that the new programme did not well integrate the new agenda (of societal responsiveness) into existing nano research programmes in the Netherlands. Whilst the early career researchers rose to the challenge, the programme did not involve or mobilise the interest of principal investigators nor research managers, back at the 'host' institution. These actors will need to play a role if the ambitions of the programme are to become part of any deeper institutional change within the PhDs 'host' organisations. Rather, the principal investigators permitted their young researchers to attend the programme only as long as the time spent on the 'external' training did not detract from the 'business as usual' – the 'real' work - at the lab bench. The mid-term evaluation led to reconsideration of activities, including a new debate about business focus, which was – however, - again contested. A further transformation was the setup of a management structure that over time should acquire the knowledge and skills to adjust rri activities within the programme.

Main lessons: in order to build capacity for reflexivity through learning programmes and further awareness measures as an element of responsibilisation in science funding programmes, those programmes should

- have dedicated budget and programme activities, backed by formal commitment of the 'host' organisations and on the need and the form of capability and awareness activities, and supported by a dedicated management team that can acquire skills and trust over time;
- include a process for a mid-term 'milestone' review as a helpful step to identify some of the lessons to be reflexively corrected for the remaining life of the programme.
- integrate rri thinking into the definition of projects at the outset, rather than allowing it to become an add-on element taking place external to and in isolation to the working environment of the lab process. This would ensure young researchers are sent onto external rri training mandated by the core aims of the research project and the 'host' institution,.
- align the values, aims and incentive structures of the 'host' organisations with those of the early career researcher programme (in our case RATA) thus providing the early career researchers with an open and encouraging door back into the host institution, as a pre-condition to integrate their RATA learning into the 'host' organisations' ethos and practice when returning to the lab.
- reflect awareness and capacity building objectives within the research management and incentive structures of the 'host' organisation, including allowing the time and resources needed to translate and integrate their learning into the lab context.
- integrate awareness and capacity building activities work with the work of physical and natural scientists, not outsourcing it to external experts.
- be deployed together with and integrated with other national science programmes and policy measures (which are reciprocally adjusted also to adopt rri), not in isolation from what already exists.
- be targeted not only at individual, young scientists without supporting context conditions in their organisations that allow them to change practice, but must be more comprehensive and include more senior scientists and organisational managers (those with more power to change context conditions and practices)

- be broadly defined, i.e. not focus on certain isolated aspects of responsibility (in this case health and safety only), but reach out to the broader issues of responsibilisation and societal responsiveness (including responding to societal grand challenges)

Case 2: EC Code of Conduct and local laboratory practice – intermediation and link between global and local[10]

The case: The Italian nano-toxicology laboratory is a transfer and support institute working closely with external stakeholders. The case explores the extent to which the EC Code of Conduct (CoC)for Responsible Nanosciences and Nanotechnologies Research (EC, 2008) has been orientating or influencing the transfer activities of the toxicology laboratory, especially in its dealings with its client base a of mainly local SMEs, and with regulatory bodies. The case found that the CoC had limited impact on the lab/client interface. More influential were the ISO standards that the client companies were much more familiar with as a more highly specified set of guidelines determining what 'tests' the toxicology lab would be asked to perform in order to qualify as ISO-compliance.

This raises the broader issue of conditions under which CoCs as voluntary instruments are effective in securing compliance in the setting of NET testing regimes. In this case the lab-client interface is influenced more by the governance standards, demands and requirements of the local user community (clients) than by the self-regulation of the nano-toxicology community. As for **transformations**, despite the empowerment of a trusted local intermediary, there is no compliance at all, the CoC makes no difference within the lab and in its transfer activities.

Main lessons of the case: In order for "external" (national, transnational) voluntary codes to be transformative (for scientists and for firms),

- addressees must be equipped with the capacity to understand them and to feel the need for compliance
- addressees must associate individual (for firms: commercial) value with compliance (e.g. reputation gains)
- the codes must be formulated in a way that speaks to addressees
- voluntary codes must be linked to formal regulations (the link must be explained) and can be supported through additional funding that allows cooperation and exchange in order to work towards compliance
- the role of intermediation (through central actors, through overarching programmes) can be highly supportive through
    - translation of codes to regional context and diverse stakeholders, e.g. by formulating guidelines, pro-actively diffusing information and interpretation,
    - connecting different kinds of expertise and providing a framework of permanent interaction

[10] Underlying case study done by Simone Arnaldi, Alessia Muratorio, UNiversity of Padova

Case 3: Reviewing the Evaluations and Consultations on the EC Code of Conduct (CoC)for Responsible Nanosciences and Nanotechnologies Research [11]

The case reviews the literature and reports/outcomes from past consultation processes on the 'soft' regulatory instrument the EC Code of Conduct (CoC) for Responsible Nanosciences and Nanotechnologies Research (EC 2008).

The case highlights that the CoC takes as its normative anchor points the EU goals set forth in the Treaty on the European Union such as techno-scientific advance, market competitiveness, sustainability and fundamental human rights. The CoC addresses as its target audiences : Member States (to which it advocates a brokering role), researchers (and research centres) research funding organisations and civil society organisations. The case reviews three consultations (between 2007-2011, two directly by the European Commission) and one as an FP7 project (2010/11). They all considered 'responsibilisation' issues in the sense that they considered the distribution of responsibility between different stakeholders (actor groups).

Main lessons: Three lessons emerge, the first deals with the conditions of implementation of a supra-national (EU) government formulated 'soft' regulatory instrument (the EC CoC) while the latter two deal with the formulation of such a 'soft' voluntary governance instrument.

- The engagement of public authorities (eg in this case the member states) can be deemed a pre-requisite of successful allocation or acceptance of responsibilities. In short the actor to whom responsibility has to be both aware of, and accept, that responsibility if the instrument is to be effective.
    - The implementation of the EC CoC in NL shows that it is more likely to be accepted and effective where it is accepted by the member state and indeed aligns with that Member States own formulated normative goals.
    - And the instrument is more likely to be accepted and effective where it corresponds to the normative orientation and strategic objectives of several soft mechanisms operating in alignment (aligned to existing incentives and rewards and disincentives).
- The instrument is more likely to be effective and considered legitimate by stakeholders (actors) if the distribution and the nature of responsibilities across stakeholders is deemed fair. For example the EC CoC consultees were reticent of the reference in the CoC to responsibilities to 'future generations' where the impact on future generations/future impacts was impossible to anticipate or assess with certainty (as opposed to assess with all reasonable care and steps taken).
- Communication turns out to be crucial. Language and structure of the instrument text are fundamental to gain stakeholders trust and commitment. Communication appears crucial also with regard to acceptance of the underpinning normative anchor points: EU goals need to be clearly expressed within Community instruments in order to effectively specify the normative underpinning and rationale for the instrument.

[11] Underlying case study done by Daniele Ruggiu, Eleana Pariotti, Guido Gorgoni, Simone Arnaldi, University of Padua, Padua

- Despite these limitations, other research on the effectiveness and acceptability of the CoC has found that, even when the awareness of the CoC is low to non-existent (for example within nano-labs at the University of Bergen), once aware of the instrument and having engaged in a discussion with social scientists about it, nano-researchers see a useful role for the instrument as a training tool for reflexive learning.

Case 4: Occupational health and safety protection: standards-setting as an example of self-regulation in the handling of nanomaterials.[12]

The case concerns the development of soft regulation (a standard) to govern occupational health and safety in the handling by researchers and others of nanomaterials. The development of the standard was initiated by a regional organisation in Italy (the Veneto Region Research Cluster on Nanotechnology) in conjunction with ECSIN (European Centre for the Sustainable Impact of Nanotechnologies) in view of an absence of, and uncertainties around, how issues of occupational health and safety are covered under current legislation of hard law. The rationale for the development of a standard is therefore a 'gap' or 'deficit' in existing legislation. The region of Italy and the client base for the standard – being mainly SMES – is reluctant to engage with established voluntary standards like ISO as they do not have either the financial resources nor technical capacities and expertise to engage with ISO standards.

Main lessons:

- New self-regulatory standards emerge ,bottom-up, to address a perceived gap or deficit in existing hard law (legislation) and/or where for whatever reason existing soft-regulation (eg ISO standards) are also considered inappropriate.
- The initiating bodie(s) in this case operated at the collective level, on behalf of SMEs within a region. There was also a bridging and combining of interests across the regional representative body, and an EU agency, also normatively oriented to the safe development of nanosciences and nanotechnology via an instrument to codify and provide a common standard of protection, in this case concerning occupational health and safety.
- Unlike the EU CoC, this instrument was bottom-up developed and co-constructed with the final users, with due attention to local culture and contexts.
- It is possible for the instrument to then develop (up-scale) to address an enlarged group, in this case it 'spread' to the value chain offering a dynamic for spread and up-take which isn't top-down governed.

Case 5: Nanosafety governance in the Netherlands[13]

The case focusses on a number of public policy initiatives to design and establish precautionary measures and information-sharing measures to contribute to the goal o safe development of nanotechnologies The Dutch government first established a 'model' of nanosafety governance,

[12] Underlying case done by Alessia Muratorio, Guido Gorgoni, Elena Pariotti, Simone Arnaldi, University of Padua

[13] Underlying case done by Bart Walhout and Bärbel Dorbeck –Jung, University of Twente

laying down five normative principles : 1) transparent decision making 2)explicit statement on (the distribution of) responsibilities 3)early involvement of citizens in decision making 4)risk-benefit weighing 5) taking into account possible accumulation of risks. Two of the projects initiated within this national model. The two are compared within this case, to study how 'responsibilisation' was enacted in the two projects. The first project was initiated by the employer association VNO-NCW and the chemical industry association VNCI on the topic of creating an information-sharing system about the use of nanomaterials so that a database of available knowledge about the potential risks to safety of nanomaterials could be set up. The second project again involved VNO-NCW, this time working with two important trade unions (FNV and CNV) and was conducted by two physical safety consultancy organisations.

The first project 'stalled' and has been deemed for the moment to have failed because:

- No agreement could be reached on protection of confidential information.
- Various industry associations involved preferred European level arrangements to national level ones
- There were divergent views across the organisations collaborating (the employer association and the industry associations) concerning the basic requirement of information sharing viz establishing a definition of nano-materials

By contrast the second project succeeded to the point of collectively agreeing a list of reference values on exposure to nanomaterials, which was then taken up by the Dutch government as a list of values to be applied to situations of exposure to nano-materials as 'voluntary, but without commitment'.

Main lessons

- In this case a common set of framing conditions is provided by the national context (NL) establishing a model specifying a common set of normative principles. However the two projects had very different outcomes. The case is helpful in pointing to possible sources and explanations for these different project-level outcomes, within a common national setting:
    - The presence of a 'Champion actor' in one of the cases made a difference in keeping the project on the rails and progressing it to the point of completion with successful outcome.
    - The mix of interest groups within the two projects made a difference: the alliance between an employer association and trade unions was more effective in coming to a conclusion than the more bi-polar positions brought to the table in the form of employers association and industry interests.
    - The nature of the task in hand is important. For the reference values it seems less difficult to come to an agreed output (the common 'bar' to be achieved is quite low and does not contradict or threaten the interests of the actors); whereas for higher-order and more controversial topic of sharing of sensitive information proved more difficult and stalled at an early-level point of agreeing on definitions, perhaps a symptom of, rather than a cause of, difficulties resolving the different 'stakes' involved in the negotiations.

Governance issue: Whether and how to involve lay publics in science and innovation processes

Case : Public Engagement and RRI[14]

The case undertakes critical assessment of a number of public engagement initiatives in Germany. The case is not yet complete and will be completed under Stage 3. However early indications in terms of responsibilisation and well-doing are:

- The case raises larger questions about a potentially serious mismatch between theoretical ideal of public engagement; and its application in practical terms where 'responsibilisation' (effective and legitimate practices) and well-doing; as constructive (ie quality of inclusiveness and other indicators) and productive (ie transformative) interaction, are found wanting in the practical and empirical world.
- A tentative finding and general lesson is that, simply by virtue of their presence, (rather than the quality of the processes and the motivations which underpin them) exercises in public engagement do not ***necessarily*** provide an indicator of Responsibilisation or Well-doing.
- The researchers working on this case are concerned that in some cases, public engagement initiatives are being used in a superficial or shallow way as 'window dressing' , in an attempt to legitimate action rather than motivated by a genuine normative goal to make research and innovation processes and practice more societally responsive.
- Further reporting to support and provide evidence to substantiate these provisional findings is forthcoming.
- Based on the final Stage 2 report and further empirical testing in Stage 3 we will be able to provide a better informed critical perspective on situations where public engagement exercises ***do*** appear consistent with well-doing and when they ***do not***.

2.2 Downstream technology controversy

Governance issues: establishing and providing deliberation and interaction that are widely accepted and underpin responsibilisation processes

Case: Fracking[15]

Situation: Hydraulic fracking as a technology to extract gas from shale far under the surface is not in itself novel is now being rolled out in many places globally (US leading). The associated benefits are to have access to a cheap and local energy source (independence) and to make economic profits at company level and at national level (taxes, jobs) from selling energy rather than having to buy it internationally. The application of this technology has been hotly contested, with some localities and countries not rolling it out, and others having developed large scale strategies to do so. The case

[14] Underlying case done by Kerstin Goos and Ralf Lindner, Fraunhofer Institute for Systems and Innovation, Karlsruhe

[15] Underlying case study done by Alexander Lang, Institute for Higher Studies, Vienna.

compares the UK, where the government has backed fracking and supports the roll out of the technology, while in Austria the roll out of fracking has been stopped. In both countries, opposition of local and national groups has been strong.

Downstream controversies inevitably involve normative and material interests (immediate application, markets). They are likely to involve heterogeneous actors, and because of concrete application at concrete localities, there is a nexus between locally perceived benefits and threats on the one hand and national benefits and threats on the other hand. Also, while the technology is applied locally, the basic issues are the same globally. The outcome in both cases is very different. In Austria there is a clear **transformation**, as the fracking process that had been started was stopped, based on **contestation mediation** by the government as neutral mediator itself and support by environmental impact assessment, and following the overwhelming view of society in conjunction with scientific evidence provided. In the UK, there was no moderated process to deal with contestation, the government took position early on that fracking is secure if done properly and that the economic and energy sufficiency argument are compelling to go ahead. Thus, fracking remains a strategic priority of the national government which creates a range of incentives for local actors to comply, fracking activities seem to spread despite ongoing hot controversies. In the UK, we see an **absence of a governance process particularly designed** to deal with the contestation and the potential peculiarities of fracking, and consequently, **no visible transformation** of attitudes of actors or an increased mutual understanding within the contestation can be detected.

Main lessons

"Hot" controversies about a concrete application of a contested technology, with normative, material and political interests involved are not likely to be resolved in any consensual way. As long as scientific evidence is not overwhelmingly clear and broadly accepted, any resolution of those controversies in terms of pursuing the activity or stopping it will result in on-going controversies. However, governance of rri can be successful in the sense of establishing a true dialogue amidst hot controversies, better informing actors, leading to acceptance of divergent views (without necessarily sharing them) and providing a knowledge base and interest representation that is accepted by all involved. For those transformations to happen, an adequate governance approach would follow a range of principles:

- The underpinning knowledge about the potential benefits (economic, energy security and independence etc.) and the potential sustainability and ethical threats must be perceived as being scientifically robust, involving input from diverse actor groups and produced by agents that are credibly neutral towards the material interest in the technology. Scientific controversies about consequences of the technology must be made explicit and explained in lay terms.
- The scope of technology assessment must be broad, must involve short and long term impacts (trivial) and must be discussed with all stakeholders involved.
- Environmental Impact Assessment as inclusive and comprehensive assessment tools could be either mandatory in cases of high controversy or could be "demanded" by stakeholders. EIA cannot only be based on existing "global" knowledge or transferred from other contexts, but must take into consideration local knowledge and data, EIA must be localised

(constructing EIA within a local context not only makes the knowledge more robust, it also creates interaction and understanding)

- Hot controversies need a framework that involves strong neutral moderators. Moderation is not only needed at local level between the different stakeholders and those affected. It is also needed between local and national level, as material interest and normative interests also (may) differ between local and national levels and as national level regulation and economic expectation feed back into local decisions.
- If the state (as in UK) takes sides early on, other settings must be found in which both proponents and opponents feel they meet on equal grounds.
- Media coverage is beyond the immediate realm of governance activities, and should be so. However, especially in hot controversies with immediate concerns it should be ensured that different actor groups get access to media coverage.
- The development of new regulation around a contested technology that is to be applied needs to take into account the meaning of existing regulation. A thorough analysis of how the requirements of the new technology can be met with existing regulations. The reference to existing sustainability, health and safety regulation needs to be justified and potential regulatory gaps addressed.
- In order to position the governmental actors as a balanced and neutral moderator, a wider range of diverse interests and perspectives from ***within*** the State administration would need to be involved in the process. In the concrete cases, while the Austrian organised discourse was not fully transparent and inclusive, it nevertheless ensured that a broad variety of government views were represented, thereby allowing the state to play a balancing role, while in the UK the governmental involvement was dominated by the one ministry responsible for science and innovation and the economy (BIS), the two departments responsible for environment and energy and climate change appeared to have a strong role or influence on the process.

2.3 Change in innovation pathways and innovation systems

Governance issue: To re-orientate innovation (and research) activities in an established market as a consequence of a recognition of new societal and economic tensions associated with the underlying technology (and thus the need to resolve new tensions between normative and material interests)

Case: Re-design of a government instrument (fuel standards) in bioethanol[16]

The case: The established trajectory of the first generation biofuels in the US was challenged by various societal and economic concerns (environmental impacts of biofuels, food price spikes (fuel vs food) and social welfare issues (workers' rights in developing countries) which were based on rapid scaling up of the technology and new scientific findings (negative impacts). The discussion and re-design of a concrete regulation (from "Renewable Fuel Standard" (RFS) 1 to RFS 2) show the controversies and the ways (and limitations) in which those controversies did find their way into the

[16] Case study done by Sally Gee and Jakob Edler, Manchester Institute of Innovation Research

new standard. The actor landscape is extremely diverse, with a number of heterogeneous coalitions building. The debates were held both in the general public, but then more strongly and concretely in the established arenas of policy and law making (hearings, listening sessions, public comments, presentation of evidence).

The final outcome, RFS2, represents a compromise, not a new consensus as contestation remains. However, it changes the trajectory for bioethanol and puts pressure in the system for rapid diffusion, thus reacting to the change of responsibility perception. The key elements in the case are 1) the mobilisation of new knowledge to re-frame the debate in areas that have originally been framed "responsible" and 2) the mechanisms that are employed do so. The case allows to identify key mechanisms to re-frame debate and change governance mechanisms.

The process has led to a **transformation**, i.e. change of position of key actors, includes the key agency responsible for the design and implementation of the regulation, some societal organisations who realise the complexity and acknowledge new knowledge, oil companies (realising the need and opportunity to invest in new forms of fuels). The case also shows how **contestation was mediated** through inclusion and access. However, some actor groups remain opposed and continue to legally challenge the outcome of the process as being not based on realistic assumptions.

The case is an example of broad actor inclusion through different established channels and with diverse coalition building ensured robust knowledge underpinning the process:

Main lessons:

The re-opening responsibilisation debates in established markets inevitably links normative and material interests. The inevitable political nature of contestation that emerges from the clash of different normative values and different material interests and their combination must be recognised and accepted. The combination of material and normative values needs even more robust knowledge base. Also, there is not a consensus to be expected, but what can be achieved is a compromise with a basic level of acceptance based on well-doing of the process. The compromise found must credibly be based on a perception of voice and access of all stakeholders and an underpinning scientific knowledge justifying regulation.

Established political processes to (re-)design policy and regulations can be mobilised to insert responsibilisation, the very process of redesigning policy can be designed as a responsibilisation process:

- In highly politicised processes "neutral" intermediation is important, especially as the lobbying efforts and resources are highly imbalanced between the different actor groups.
- Policy designing and implementing agencies can play the role of constructive intermediator if they
  - are empowered to moderate the process,
  - mobilise broadly and are equally accessible to interest group (and are perceived as such)
  - pro-actively mobilise actors with less resources and capabilities .

Actors involved, in order to be heard successfully, need to have the capacity to link up with other actors, construct and use new coalitions (advocacy coalition), whereby interests must be

complementarity rather than identical. Capacity of actors to coalesce and to digest new knowledge inputs in the process is of utmost importance.

2.4 Garage and grassroots research and innovation

Governance issue: how to establish a shared understanding of responsibilities in bottom up innovation contexts

Case 1: Garage innovation [17]

The case: Garage or bottom up innovation movements are characterised by a level of non-conformity to established regulatory frameworks and institutionalised norms as they grow out of individual, decentralised activity, without relying support of established research funding programmes and without relying on, do not rely on public infrastructure and initially take off largely outside established public and private organisations. This being the case, their attitudes and practices are not embedded in on-going discourses of responsibilisation and related institutional settings. A prime example of bottom up innovation with potentially huge transformative power is 3d printing. There is a fast growing community and a broadening area of application of 3d printing. This is enabled by technological development many of which originating in public labs and driven by individual activists. A growing number of individuals and small start-ups are active in the field, and an international 3d printing community has emerged, organised in an online platform RepRap. 3d printing is seen as a massive economic opportunity for novel and established businesses, as well as a means to democratise the capacity to produce products. There are two main issues concerning responsibility, and for both there is not as yet a dominant narrative.

First, the use of the GPL in the development and commercialisation. The community has started off with that model, however, the commercialisation of products manufactured with 3d printers based on the GPL would itself have to be published under the same sources. This has led to a strong conflict within the 3d community and also across the wider actor landscape of users and manufacturers. The applicability of the license to hardware commercialisation is not backed up by the existing regulatory system, there are calls for a hardware open license So far, within the community, concrete conflicts as well as principle debates about practices are dealt with merely through name and shame and community pressure. This signals a broader conflict about the basic norms of the community of openness and easy access, with formal IP regulation violating those norms. As 3d printing becomes more widely applicable, and traditional market actors intensify the commercialisation of 3d manufactured products, these conflicts intensify, and no mechanisms have been found to reconcile the two positions, both within and outside the 3d printing community.

A second issue around which responsibilisation processes have emerged is the use of 3d printing that is interpreted as unethical and dangerous by many. The most prominent example are firearms. The existing regulatory framework and its implementation is not as yet suited to control these

[17] Case done by Johan Söderberg, LATTS/IFRIS, Écoles des Ponts/Université Paris-Est

developments. Any means to control the production of firearms through 3d printing would at the same time be a limitation of the general freedom of using this technology broadly.

Main lessons

A first lesson is the need of a bottom up innovation community to institutionalise the basic norms and values they share early in the process. The bottom up process in our case illustrates the build-up of an internal community of early developers and users which are decentralised, but organised as a web-based community. The initial community appeared to be relatively homogeneous in terms of the basic rationales of the innovation practice itself (democratisation of hardware production, open source model). A process of self-responsibilisation, driven by networking and web-based community building of initially like-minded individuals, was successful at the beginning. However, the growth of the community and the opening up of a broad range of economic opportunity as well as instances of perceived unethical use of the technology have led to a more visible contestation of those initial basic principles, both within the community and across external stakeholders, users and producers. The open, web-based discourse could not sufficiently deal with this contestation, debates were closed to internal fora and conflicts became more visible and sustained. The case shows a successful initiation of a community capable of driving the development of the technology, but a lack of strong institutionalisation of the initial norms across the community. Once contestation became hot, this deficiency became apparent, and seemed to have weakened the position of the initial core community over time also vis-à-vis other stakeholders outside the community.

Second, networked bottom up community would need to think pro-actively and early on about the link to the existing regulatory frameworks and governance arrangements, and the relation of informal, non-codified to codified rules. In our case example, the debate as to how the new community could link to external regulations, mainly the existing formal IP system, was not pushed proactively, rather the call for a hardware equivalent of the GPL for open source was late and came amidst on-going material conflicts about infringements. While the conflict about IP, as we know from the open source movement, is never to be resolved consensually, new bottom up practices may succeed in making their own values of openness and democratisation of innovation heard and potentially gain momentum in the on-going normative contestation if they find some common ground and push for their views in the general discourse on IP. AS we have seen in the open source movement, this can get some traction in the IP system, beyond traditional community insiders (note the case of IBM, shifting to open source).

Governance issue: how to create bottom up conditions for sustainable markets

Case 2: Local initiatives to create markets for sustainable agro-products[18]

The case: Participatory Guarantee Schemes (PGS) are bottom up instruments to create commitment to sustainable agro food research and production and subsequent local markets for those products. They are used in a number of developing countries. Mostly, they are initiated by NGOs in

[18] Underlying case study done by Allison Loconto, Ifris, Paris

conjunction with a broad range of heterogeneous local market actors. The starting point is the formulation of a strong vision as to what a sustainable agricultural market should be in a given location. Around this vision, close links between all actors involved in the production and consumption of agricultural products are created with the aim to build a shared understanding of the basic standards for agricultural products. The actual PGS are networks of those heterogeneous actors which guarantee the acceptance of sustainably produced products, and thus for market formation. They are a means for local communities to change attitude and behaviours and establish their markets accordingly, outside of and against established, traditional agricultural certification schemes and their international players. The implementation of the scheme is based on shared responsibility, organised through a committee with heterogeneous actor representation, on mutual trust, on peer review and transparent and participatory decision making, and implementation through democratically elected representatives. Most importantly, the debates about the standards are supported by local capacity building, enabling actors to participate. In some instances national laws regulate and mandate capacity building at local level to support this process.

The bottom up initiative has had **transformative** effects in a range of developing countries, where new local markets for sustainable food were created based on a basic, widely shared understanding of the value of sustainable agriculture in the whole local actor network. The case study shows that there are on-going **contestations**, mainly around the concrete implementation and meaning of standards especially once the personal networking and inclusion is challenged when standards are transferred over distances. This indicates a persistent limitation of the scheme, i.e. its spill over to markets and the recognition of the certifications beyond the actual local community that certifies the standards.

Main lessons

The case illustrates the possibility **of local communities to embed responsibilisation** (horizontally and vertically) and align local actors, their attitudes, interests and (individual) actions. The discourse and community building around the normative starting point of sustainable food production and more independence from externally defined standards and economic dependence create a link between sustainability and economic interests. The case shows how the local facilitation of the institutionalisation of the specific rri instrument (in this case PGS) through broad networks of heterogeneous actors together with a strong focus on follow up and implementation can enable a wider range of actors to take responsibility in the entire innovation, production and consumption process.

While the locally embedded personal interaction is a key feature of this bottom up process, there is an **institutionalised link** both to the **national level** and the **international level** that facilitates the process and helps the institutionalisation of values and practices. International NGOs can mobilise globally accepted sustainability and ethical principles and can support the process of local embedding through training, process facilitation and financial support. National governments can support through creating a legal framework that supports capacity building, without, however, imposing a uniform institutional framework on local initiatives or controlling it administratively. However, this support relies on local empowerment, broad engagement and the contextualisation through local techniques, processes and interaction. Furthermore, in all cases strong local leadership was a key condition, whereby those local elites establish links between transnational and local actors.

The bottom up voluntary (bottom up and horizontal) activity and social control is not "un-controlled" or anarchic, but creates its own institutional framework which embedded in complementary national regulatory frameworks and international communities of practice mainly through NGO links.

Bottom up process can create strong **legitimacy** and thus the basis for sustainable transformation through **transparency** and **inclusiveness**. In this case of PGS, in all steps of the process representatives from all actors groups in the production and consumption network were included. Furthermore, while **local elites** take on **leadership roles**, the cases show strong **democratic elements** such as election of representatives in the PGS committees and accountability processes through monitoring and evaluation. The perception of broad local involvement can nurture trust among local actors. An important condition for acceptance in the cases has been that different actor groups have come to understand the meaning and design of rules and processes and that the interactive implementation and verification processes have acted as a re-enforcing mechanism rather than an unconnected downstream activity.

However, legitimacy, shared understanding and trust in the case studies depend on **geographical proximity**, on locality. The greater the distance between implementation of standards and their and origin, the more challenging personal interaction and trust building becomes, and the less legitimate and the standards and the processes associate with it become. Thus, the more an instrument to create shared responsibilities relies on local integration and communication, the harder it is to make legitimacy claims beyond the local context.

A major condition of bottom up initiatives that rely on strong mobilisation is **capacity building**. The main effect of participation in the guarantee scheme is learning through engaging of a variety of different actors. Importantly, this learning aspect was, in our cases, supported by national legal requirements for the local governments to support the capacity building process, making local actors understand the link between sustainable agriculture, economic well-being and local empowerment. This included to nurture an understanding that actors do not only have one role (producers or consumers or citizens), but various roles in production and consumption, and to stress this hybrid nature of all actors helped to create broader awareness. In this process, NGOs acted as a transmission belt between the global discourse and knowledge around sustainability in agriculture and the local communities.

The comparative case studies finally illustrate the importance of **localisation and flexibility**. While the principles just summarised here are important in all cases, there is a high degree of flexibility in the concrete set up of processes and mechanisms and the final PGS itself. Tested instruments to develop shared understanding (of what the rri issues), trust, and compliance can be rolled out in other contexts (countries), but while the basic principles need to be enforced, there is a strong claim for flexibility to adapt the instrument and its process to local contexts, both to create local ownership and legitimacy and to take account of differences in local and national framework conditions.

3 Orientating research and innovation towards challenges – content development towards societal concerns

The governance issues here take their starting point from the societal concern, whereby the opportunities inherent in science and innovation are to be defined and captured in order to contribute positively to society. Governance challenges here arise from

a) the fact that society needs to be enabled to define priorities which then need to be translated into research and innovation priorities through programming, framework conditions and scientific practice (priority definition and compliance challenge);

b) the tension between the curiosity driven practice of scientists and scientific organisations and the orientation towards specific kinds of research, including the connection between disciplines to work towards solutions (Science re-orientation challenge)

c) the tension between the economic interest of firms to innovate and introduce innovations into the market place following their business models and expectation of maximised benefit on the one hand and the expectation of society or societal groups (innovation re-orientation challenge).

Governance issue: how to define research priorities that reflect societal concerns so that they are accepted by society and change orientation of the funding and the science system performing system

Case example: Horizontal Foresight to Address Societal Challenges in Danish priority-setting for Strategic Research[19]

The case: The Danish government organised a national multi-step foresight 'horizontal' process in order to set research priorities that correspond to Societal Grand Challenges. The idea was a transformation towards an orientation that is driven by contributing to solution to societal challenges with all the changes in research practice this might entail (inter-disciplinarity, less long term, less blue sky). Responsibilisation in this case is the process of this orientation of the scientific and industrial community as well as the funding bodies and policy makers towards societal concerns. The process was initiated by a small team within the ministry. Its main tool was a broad web-based consultation to maximise inclusiveness that was – in a first instance – based upon an OECD wide scan of societal challenges. A team of selected experts clustered the 500 responses from across the science and innovation system into 31 themes (25% of which coming from ministries and research council), while the ministry led a final step including research council and a few selected key actors of the system to finalise to 21 themes.

Transformation: the exercise had significant impact on policy making and research council strategies. The orientation of the system thus was expressed through the policy and funding landscape. However, impact in terms of a re-definition of research strategies of research organisations or individual researchers, or a formulation of new interdisciplinary teams as a result could not be found as yet. This may, however, be a time issue, as re-orientation of scientists as reaction to changed conditions in research funding come with a time-lag.

[19] Underlying case study done by Morten Velsing Nielsen, Danish Board of Technology, Copenhagen

Main lessons:

Reorientation of the research system towards societal challenges , i.e. research policy, research funding, research strategies and research practice through interactive foresight processes is successful only if a number of conditions are met:

The process is not seen as a large *consensus* building process, but a process of constructing societal compromise on the basis of the multitude of heterogeneous inputs and aspirations. The expectation management of the process must ensure that what is expected is a compromise based on transparent access and input, with a last decision of the translation into concrete policy and funding priorities with the ministry and the funding bodies.

Online processes have a specific challenge here, as they allow broad inclusion, but the mobilisation can be erratic and methodologically biased (certain communities are more likely and able to contribute to online discourses). There is a danger that processing of the input remains largely in-transparent when it is transferred back to experts and the policy making community. The process needs to ensure a pro-active mobilisation of marginalised groups and needs transparent depiction and digestion of the inputs.

The acceptance of the outcome, inter-active learning and transformation are is higher if

- the formulated outcome can clearly be linked back to the input
- if the initial input (the starting discussion of grand challenges) is robust (in terms of scanning challenges) and open. The definition of initial challenges needs to be linked to and emerge from the system in question, the initial process of defining initial challenges must be seen as an interactive, open and system driven exercise. The case suggests that it should be a mixture between a bottom up discourse of challenges in the system and a reflection on challenges defined internationally (relying only on national discourse might create a lock in based on strong opinion leaders, relying only on the international scan of challenges might lead to a mismatch to societal concerns in the country). (note: in the case example, the initial OECD list of challenges was partly contested)
- if the process is explained thoroughly to the general public (including a proper expectation management as to the need to take into account existing research structures and pathways, and thus the in-built limitations for radical change) and the general public is mobilised in a pro-active, meaningful way.
- if the necessary *expert driven process* of closing down, of translating broad input based on challenges into research priorities is transparent, with a balanced selection of scientists and the opportunity for adequate learning processes (process learning), including representation of actor groups that traditionally are marginalised in the process of formulating research priorities (which however have been part of the consultation process). There should be some continuity of broad actor representation throughout the process (with efforts made to keep the process “understandable” for representatives of societal groups) rather than a “handover” of consultation results to the usual closed group of policy and funding actors and a few selected scientists with access to this system. This could moderate the natural tension between broad societal input and expertise needed for closing down the process and

formulating concrete priorities. The impression of a closed shop of policy makers, funders and usual experts in the final stage can de-legitimise the process.

- if the process is given time and the change of priorities and research activities is made explicit and communicated back to those who participated initially (not done in the case of Denmark it seems). This takes into account that transformation downstream takes time. Consequently, foresight process should not only support priority setting in a given time, they also can insert reflexivity and awareness in the system, both on the side of society (challenges can be translated into research priorities), but also on the side of scientists (opportunities of the dialogue with non scientists). Thus, elements of a foresight process can be institutionalised to support learning between normally disconnected actor groups and thus increase the reflexivity of the system.
- The latter can be supported if the actual foresight process is accompanied by a social science driven activity that analyses and supports learning and networking between actors *throughout* the process and is itself part of the foresight activity

In sum: public consultation to define challenges and on that basis define research priorities can be one means to make the research system responsive (and responsible) vis-à-vis societal concerns, but the process has a high number of preconditions and limits, and f those are not understood and pro-actively dealt with the process could not only be of limited effectiveness, it could be counterproductive because of the mismatch between claim and reality and subsequent frustration and alienation between the research system and society at large.

4 Organisational design and re-design towards responsibilisation

Governance Issue: how to envision and operationalise organisational design/re-design towards responsibilisation and societal responsiveness.

Under this heading we consider case studies taking individual organisations and intra-organisational dynamics as our focus, rather than as we have in Sections 2 and 3 above, considering inter-organisational arrangements, such as multi-actor policy for a, service/client relationships, networks or systems-level perspectives. Further, rather than focussing on the creation and uptake of one governance instrument, procedure or methodology we will investigate, in the organisation cases, at how multiple governance arrangements, intra-organisational actor groups, governance protocols and instruments operate in alignment ; or are potentially mis-aligned, producing multiple orienting steers and incentive structures, producing potentially contradictory or conflicting logics of action (practice) and responsibility. We will investigate the working hypothesis of intra-organisational responsibility conflicts or responsibility 'overload'. We look at the source and explanation of such competing or contradictory conflicts and logics.

The organisations we will consider come into different classes such as universities, professional associations, multi-national corporations, and charitable foundations. Of particular interest will be representative or membership bodies working at a strategic level and/or acting as bridging or boundary organisations between different interests (business-policy-civic society-universities and research etc).

This focus will be taken up more systematically in our final Stage 3 cases. However for this report we have an entry point to these questions in terms of a first pilot case-study under the 'Good' University project, that of Arizona State University, which will be compared with two-three other universities (European and other non-European) in Stage 3.

Case: The Good University[20]

The Arizona State University (ASU) case takes into account radical top-down, bottom-up and horizontal organisational re-structuring and a re-incentivisation of intra-organisational relations . The role of cross-disciplinary centres and institutes oriented and incentivised to face outwards from the university to address societal problems and issues, is prioritised, whilst single discipline-focussed research and teaching with no disciplinary or institutional cross-overs is discincentivised.

The case highlights the role of charismatic President Michael Crow, primary architect of a fundamental organisational transformation which took ten years and is still ongoing. The Crow vision , collectively formulated and co-created with his senior management team, was to create a demonstration 'protocol model' of an American public university which is responsive to societal needs (both in terms of research orientation, and in terms of its own organisation (energy efficiency and self-sufficiency, research excellence through award-winning science oriented to solving societal problems, societal engagement of local publics and demonstrable positive impact for/with local state publics from local communities to multi-national companies, an inclusive student demographic which mirrors the demographic of the State of Arizona, and training methodologies which prioritise entrepreneurial self-determinacy within very strong, explicit, and widely publicised organisation-wide public and societal values and culture which are 'carried' throughout the organisation. New faculty are attracted to, and recruited for, their proven track-record and synergies with these values.

The transformation involved structural re-design, closing a large number of discipline-focussed departments, releasing funds for new inter-disciplinary society-facing institutes, centres, and initiatives, commissioned from the centre (under the direct overview of the senior management team). New cross-disciplinary centres are commissioned (and potentially closed)on a five-year review process, and are expected to become income-generating within that period. Cross-disciplinary working is not only structurally organised, but financially incentivised and but career-development supported.

The case highlights the role of collective & reflexive institutional entrepreneurialism, operating a strong centralised 'vision' driving a strong public-values centred culture (including valuing environmental sustainability and human care and well-being) , as a learned capability of the students, and 'role modelled' by faculty top-down and bottom-up.

The transformation was not without casualties. There were winners and losers archetypical of innovation 'creative-destruction', as an 'old guard' of discipline-focussed academic style gave way to (some faculty adapted, some didn't) greater inter-disciplinary working consolidated over a period of ten years. All faculty now retain multiple identities and affiliations. In terms of academic discipline

[20] Underlying case study done by Sally Randles, Manchester Institute of Innovation Research.

specialism all faculty are hosted by schools for teaching purposes; with second and third affiliations eg as 'solar engineer' and 'Sustainability Scientists' affiliated to the Global Institute of Sustainability'

Main lessons:

Organisations desiring to radically transform towards societally-responsive interdisciplinary research, teaching, and engagement/impact will need to take into account a series of multi-causal factors and conditions. In the ASU case :

- The role of charismatic institutional entrepreneur able to combine clarity of vision with strategic action and implementation (Crow) was critical.
- However, the transformation was reflexively and collectively co-constructed and implemented led by a close 'inner-circle' and the mobilisation of like-minded community of faculty and administrative cadre thereafter.
- Governance of the transformation aligned new organisational structures, with research, teaching and engagement structures which prioritised and rewarded inter-disciplinarity, creativity and innovation in research, teaching and impact/engagement, both financially and in terms of career progression (and discincentivised, through resource withdrawal, old routines and structures of disciplinary silos).
- However Crow claims that the transformation of ASU is context-specific. He doesn't believe such a project would be possible within 'elites' universities , such as the US Ivy League. Success at ASU came partly from being 'off the radar' of excessive external control and scrutiny giving greater autonomy to the internal leadership.
- Tough financial years arising from the financial crisis were addressed collectively, including the decision from Faculty to take pro-rata pay cuts rather than make staff redundant.
- Conscious, well communicated strategy was in evidence, with a clear priorisation of the new direction over old routines
- 'Deep' institutional transformation was a long-haul project, taking ten years and counting
- Creating interdisciplinary teams to move this agenda forward, as single PIs are much less likely to move towards rri, while interdisciplinary teams, and outward facing teams (oriented towards challenges) are more likely to be "responsible"
- Energy efficiency, translating organisational ideals into facilities construction and management: new solar-energy technologies are tested on campus and there is a desire to become an energy self-sufficient (solar) campus, slashing energy bills as well as demonstrating commitment to renewable energy. New buildings are built to exacting sustainability standards.
- The funding model which drives the University integrates the ambitions for a large and inclusive student body (over 70,000 students) with recognised inter-disciplinary research excellence. Student fees income (often state supported for poorer students) provides the cash cow that supports and subsidises research.
- Successful climbing up the US and international University performance league tables is a lagged consequence of the ASU strategy, not a driver of it.

5 Conclusion

This report has provided lessons in light of specific case situations. This is important for the subsequent steps to create a framework that is able to cover a range of different governance challenges across a range of different situations. When constructing the framework, the ResAGORA team will come back to these individual situations. Nevertheless, there are a range of transversal lessons and principles that can be pulled out of a cross reading of our cases, a number of factors that contribute to the productive and constructive quality of interaction and thus to the likelihood of well-doing and transformation. Those main lessons are summarised here by way of concluding this report.

Capacity and capabilities building

One of the key elements which render de facto governance processes transformative is the bottom-up building of capacities and capabilities to 'do' responsible research and innovation according to a particular pre-given normative orientation. We have not for this report, prescribed a 'preferred' normative orientation since under conditions of **de-facto** governance, the normative goals of the actors is an object of study rather than a condition specified by the researcher. Hence our first line of questioning to all the cases was 'what are the (contested) normative goals of the actors and how are these goals discursively embedded into responsibility 'claims' and the material interests and motivations of the actors?'

That notwithstanding we have found transversally across the cases that in order to affect well-doing as both **constructive** (in terms of quality of) and **productive** (in terms of transformative) interactions towards **responsibilisation**, a system-level **capacity** and a collective actor-level **capability** to participate in responsible research and innovation, is an essential pre-condition for well-doing. We would therefore at this early stage of learning from the cases, make capacity-building and capability-building a design feature of the RRI Governance Framework.

Capacity-building means ensuring that the resources (financial, organisational, and social and human capital); and the means (in terms of re-designing institutions and incentive structures) are present so that capacity-building rri is facilitated not hindered. An over-arching governance task then, is to build this collective capacity at the system-level to enable all actors to pro-actively participate in the normative goal to make research and innovation processes and product outcomes more responsive to societal cares (depicted as a spectrum of social, ethical and ecological needs that we do not top-down prescribe) and more reflexively responsive and anticipative of downstream technology-society conflicts and crises that nevertheless cannot be, by their very nature, a-priori entirely anticipated nor entirely mitigated. The vision is to build a system-level capacity to participate and address the spectrum of governance challenges that we have identified above. This means, in terms of the specific context of an RRI Governance Framework for Europe to progress capacity building according to the twinned normative goals and strategic objectives:

- to orientate the totality of the science, research and technology development process (in Europe) to build and sustain the embedding of societal and ecological cares into research processes and practices and

- to orientate the innovation system of Europe towards addressing societal challenges as a competiveness strategy in a multiplicity of ways that are not top-down prescribed.
- But rather to facilitate the bottom-up system-building and design of institutions and incentive structures, by collectively oriented, reflexive, and values-driven institutional entrepreneurs who are alert to, and seek to institutionally minimise 'late-lessons' scenarios .

Capabilities-building: As highlighted in a number of the cases, capabilities-building is a feature of Well-Doing which first assumes the formation of reflexive actors across the research and innovation spectrum, who are normatively oriented to integrate societal responsiveness into every day work practices and procedures as a learned capability. The cases, in particular the 'good university' ASU case; the participative grass-roots mobilisation case; and national training through RATA in the Netherlands case show how capabilities-building actors is a pre-condition for constructive interaction in 'well-doing' as it capabilities-builds actors to enable them to become fully contributing participants in responsible research and innovation processes. Such capabilities can be brought about partly through formal training and learning, and partly through experiential learning. However, capabilities-building through formal learning must be deeply rooted and long-term (career-length) if it is to be transformative. Capabilities-building for actors operating in all types of organisations (civic society and NGOs, policy and political administrations, businesses and public and private research organisations) is important for system-level capabilities building. Capabilities to be encouraged cover a spectrum of reflexive and collective-working skills, and the embedding of values-driven design into research and product, processes, and services design, aimed at developing skills in collective reflexivity at the science-society, technology-society and economy-society interfaces; and includes the building of collective values-driven entrepreneurial skills. Crucially, capabilities-building from below would need to be intentionally inter-twined with organisational and system level re-incentivisation captured above under the term capacity building, brought about through a range of governance instruments.

Inclusive Interaction

A second key feature for transformation is the nature of the engagement of actors. Responsible research and innovation is associated with broad inclusion and access. However, we have seen in a number of cases that governance mechanisms are more likely to be transformative if they include the diversity of actors in a way that engages them in direct debate or joint activities. This can be seen in many of our cases, such as Xenotransplantation research including ethics experts working with hard scientists, the standard setting committees in the participatory guarantee scheme. In cases in which heterogeneous interaction is limited, there seem to be limits for the learning about divergent positions and a build-up of a minimum shared understanding of the nature and direction of responsibilisation. Examples here would be the synbio roadmap excluding certain perspective from the core group responsible, the shortcomings as for genuine and broad learning in the RATA process or the deliberations for the bioethanol regulation which, in line with the traditional political process, was organised through separate hearings and written contributions, and ended up in a compromise whereby positions of many actors has not changed. Equally, the early bottom up community in the garage innovation case had a strong culture of debate internally, but struggled to link up to the external discourse and positions so far have not really opened up to each other. The online deliberation as key instrument to organise broad societal debate in the Danish foresight exercise also showed the limitations of broad inclusion without taking care of broad representation

(as not all actor groups are equally active online) and without real joint debate about preferences, as the closure of the debate was delegated to a small expert group representing core stakeholders of the science system.

Intermediation and moderation

There are constellation in which direct, immediate interactions as just outlined above, are not reasonable or feasible. The two most obvious are cases of open confrontation with incompatible interests and values involved and cases in which the geographical or epistemological distance is too big. In the first case of "hot" contestation and irreconcilable clash of interests, a moderating organisation can build up trust, collate data broadly, organise discursive processes and in doing so enable conversation. This moderator needs to be seen as neutral as regards the content and outcome of the conversation and needs to have the strategic intelligence and resources to inform and guide the process. The fracking case is again a good example, as in the case of the UK there was no moderation, with the state taking position early in the process, while in Austria the state, composed of different agencies neutralising their perspectives, played the role of a neutral moderator, taking decisions at the end of the process. In the second case, actors that are to be mobilised by a rri governance instrument, are, for a variety of reasons, not able or willing to connect and communicate. This has to do with the heterogeneity of framings and perceptions, with limited capabilities and capacities or with a lack of awareness or interest. Depending on the situation, intermediation can provide linkages between instruments and actors, between diverse communities, can translate from transnational down to local contexts and adapt issues to local contexts, explain, educate and mobilise. Again, intermediators must be credible and their function and own interests must be transparent. One case in point is the Italian NanoLab which provided a link to local SMEs and by doing so reached out to a much broader actor landscape in an accessible way.

Robust, inclusive and contextualised knowledge

As governance processes in many situations deal with uncertainty about the current or future consequences of scientific and innovation practice, they need to be underpinned with appropriate evidence and knowledge. Knowledge is robust and trusted not only if it is scientifically robust, but also if, in addition, it is

a) contextualised to the specific local situation – i.e. the specific conditions of a specific location are represented in the knowledge claims made – and

b) it is sourced from the variety of stakeholders. It is not only scientific knowledge, it is also practice and experience knowledge that should inform the governance process, and the various sources are to be made transparent.

Again, the UK Synbio case and the review of Synbio assessments are cases in point, both show that the knowledge informing the roadmap was often limited to scientific expertise rather than taking account of experiences and worries of laymen. In the fracking case, opponents of fracking claimed that much of the scientific expertise claiming fracking was not harmful for the environment was not actually derived from analysing the local situation. In those cases, the credibility of the knowledge and with it of the whole governance process was questioned.

Meso- level alignment, bridging, boundary objects and alignment

Through our experiences reflecting upon the findings from the cases with our RES-AGorA partners, and co-learning with external experts, we have come to appreciate the significance of the meso-level in rri processes. That is the middle level populated by actor organisations representing collective interests such as research funding organisations, business, industry and professional associations, and large and influential organisations such as multi-nationals, organised value chains. Or alternatively, organised 'grass-roots' networks participating (with others) in social innovation .

We conclude that the meso-level is a significant locale to target rri development; and that actor collectives that reside at the meso-level would be pertinent target audience for the RRI Governance Framework. We have also begun to think about the role that rri interventions play at this level as a boundary object. By this we mean a site of multiple interventions aimed at bridging between groups as a means of achieving a dialogue and collective action at the intersection of specific groups, (such as Universities, government policy, business and civil society actors) tasked with creating shared and collectively formulated visions and action-plans towards the achievement of stated responsible research and innovation outputs and outcomes.

Coupled to this tentative conclusion (which will be further tested through the Stage 3 cases and the WP4 stakeholder workshops) we hypothesise from the portfolio of cases that when multiple governance instruments are co-created or intentionally or unintentionally operating in an aligned manner, mutually re-enforcing each other and performing together a system 'steer' (such as an Act, a voluntary standard, financial and institutional incentive structures, a system of training and human capital support etc.) then this alignment of governance instruments is more effective in terms of productive transformation towards specified normative goals, than undue or atomised focus on one governance instrument alone (such as the EU Code of Conduct for responsible nano-sciences and nanotechnologies). However the emergence and development of a plethora of rri governance techniques, methods, technologies and instruments that we witness currently may be taken as creating a fertile ground of creative governance experiments and demonstrations at the local level, a bottom-up phenomenon of micro-level experimentation consistent with the tentative hypothesis of an emergent phase in the institutionalisation of responsible research and innovation, albeit whether this emergent phase continues to some form of collective maturity or stalls, or splinters into a patchwork of variety, is an open question.

Annex - The programme of case studies and empirical work (WP3)[21].

In May 2014, ResAGORA is approximately two-thirds through its programme of case studies and empirical work (WP3). This WP is led by the Manchester Institute of Innovation Research (MIOIR) at the University of Manchester, UK and involves learning from a diverse portfolio of case studies to sketch a landscape of responsible research and innovation 'situations' and extrapolating corresponding governance challenges. Each case-study individually contributes unique findings but crucially, the body of case-work taken together provides the means to reflect upon and extract transversal lessons to inform governance situations and challenges. The body of case work also contributes reflections to enable the further refinement of the Research Model and conceptual tool-box, also feeding knowledge and context into the development of the User-interface Tool and ultimately the 'building blocks' of the RRI Governance Framework.

The breadth and diversity of the case-study portfolio is highly significant for its contribution to the iterative development of the Research Model, analysis of research and innovation governance challenges, and creating a body of transversal case-study learning as critical input to the development of a RRI Framework for Europe. The level of investment in WP3, fully involving and acknowledging the involvement of all partners; and multiple aspects of the RES-AGorA project to which the case studies and empirical work contributes; is a hallmark of the RES-AGorA project.

We achieved this by organising the case study programme in 3 iterative stages.

Stage 1 – Pilots.

This stage was guided by a simple Research Heuristic (led by UTwente) and was intended as a preliminary learning stage to better understand the heterogeneity of research and innovation situations with a focus on actor constellations (*who?)* actor-understandings and contestations of responsibility and orienting normative stances (*what?)* , and governance arrangements combining the organisation of actor constellations with governance instruments, devices and techniques *(how?).* A differentiated feature of the pilots was they focussed on 'de-facto' responsible research and innovation – being the already existing 'de-facto' base of effort and investment in instruments and organisation of responsibility in diverse research and innovation governance situations. Situations varied from the governance of emergent science and technologies (eg nanotechnologies, synthetic biology) to particular sites and scenes of controversy and contestation (fracking) to innovation system transition (biofuels in the USA), and from single organisation contexts (Universities) to multi-organisation structures (governing value chains or policy-initiated expert groups). Further, the cases were selected and internally 'commissioned' in the Pilot stage according to the techno-scientific domains where RES-AgorA team members had existing expertise, vis health and medical, agro-economy, and energy and environment contexts.

Ten pilot case studies were undertaken in the second half of 2013, listed below

[21] This text is taken from the Briefing Document 3 for the ResAGORA Stakeholder Workshop in Copenhagen May 28/29 2014.

Table 2: Overview of pilot cases

Partner	Case Name	Meta-case 'Situation'	Techno-Scientific Domain	Notes
Fraunhofer 1	Integration of RRI in policy advice– the case of synthetic biology assessments	Hybrid For a and Policy	Cross-overs Health, medical + Food & Ag (synbio)	Techniques and content of RRI instruments– Technology Assessments.
Fraunhofer 2	RRI governance in Research Infrastructures	Physical facilities siting.	Cross-overs (Material Sciences)	Location decisions. Local –global controversies of science, location, economic development, science clusters and spill-overs.
IHS 1	Fracking in Austria (and Beyond)	Hybrid For a and Policy. Siting controversy. Positions and reasoning of Proponents and Opponents.	Energy and CC	Local-Global controversies of science, location, inclusion, and governance instruments.
IHS 2	Xenotransplantation Research: A case of attempted self-governance	Hybrid For a and Policy	Health and Medical	
U.Twente 1	Nanosafety governance in the Netherlands	Public policy initiatives and distributed fora	Cross-overs (Nano)	Tracing an expert group/national govt strategy and implementation
Padua 1	Responsibilisation phenomena relating the EC Code of conduct	Public policy initiatives and distributed fora	Health and Medical (Nano)	Instrument: Building Responsibilisation of the EU CoC . Timing over 2 Stages.
Padua 2	*Occupational health protection in standardisation experiences as an example of self-regulation.*	Voluntary/soft law regulation instruments/CSR & hybrid for a	Health and Medical	Standardisation experiences as self-regulation.
IFRIS 1	Linking responsible research and innovation on the farm: the case of participatory guarantee systems.	Value Chains	Food and Ag	Transformational Normative positions & Distribution of responsibilities down value chains. Timing over 2 stages.
IFRIS 2 (Moved to Stage 3)	'Unhinged' participation : The GM Vines Experiment in France	'Unhinged participation'	Food and Ag	'Unhinged cases' allow us to integrate situations where the supposed

				« responsibility » behavior adopted by enactors is not acknowledged by other actors and may even trigger contestation. Take into Stage 3.
MIOIR 1	Governance RRI Biofuels	Unhinged, Countries/Value Chains/ Distributed Innovation system	Energy & CC and Food & Ag	Transformational normative positions over time/comparing countries. Links to Food & Agriculture (land use) IFRIS link
MIOIR 2	RRI in Russia: where society is silent and the state controls the floor.	National policy. Specific political system at the European periphery.	Various	State-dominated /Nation-state specific expression of responsibilities and their translation into governance and strategy.
MIOIR 3 + U Twente	The 'Good' University and the 'Good' scientist: de-facto governance and responsible research and innovation (rri)	Universities and Early Career Researchers	Various and Cross-overs (tba)	Organisations and de-facto governance. Comparing Univ Man; ASU; (with 2nd wave Univ Twente)
IFRIS + MIOIR	Discourse and Performativity of RRI: An analysis of Key-Actor Voices, Semantic Structures and Social Networks (CorText)	CorText bibliometric analysis	Cross-overs (all)	Stage 1 (pilots) Complete during Stage 2 + Stage 3
MIOIR + IFRIS (+ assisted by Fraunhofer)	'Voices'	In depth qualitative interviews (skype) with key actors of de-facto rri + videos		Stage 1 (5 interviews) Complete during Stage 2 + Stage 3

Stage 2 – Development.

The second round of case studies and empirical work was guided by the feedback and analysis of the Pilot cases, which input to the further refinement and elaboration of the Research Heuristic producing the Research Model, (see Briefing Note 2) including the further specification of key concepts of *Responsibilisation* and *Well-Doing* and a range of *descriptors* to create a conceptual landscape of research and innovation (combining material situations on one axis and governance instruments and procedures on the other). From this departure point Stage 2 would probe again the landscape of situations through a more targeted second round of specific empirical cases. The strategy for case-selection was more top-down and directed for the Stage 2 cases through a process

of internal commissioning, asking case-workers to provide proposals in accordance with a more prescriptive template. The Stage 2 case-study portfolio was finally generated though discussion between case-workers and the teams leading WP2 and WP3. Each Stage 2 case proposal had a particular search strategy directing it. We added explorations into new hybrid-fora (eg Bio-ethics Committees in Austria and Germany); we contrasted cases across countries (fracking in Austria was for Stage 2 was contrasted with fracking in the UK for Stage 2). In some cases the scope was narrowed (a study of a full range of syn-bio technology assessments was followed by a more in-depth study of the process of producing a syn-bio road-map in the UK for Stage 2) whilst the emerging standard, the 'participatory guarantee scheme (pgs) for alternative value-chain governance was widened to contrast the pilot case with a number of further pgs examples, looking to generate transversal generic and contrastive findings. A broad historical account of biofuels transition in USA was narrowed to look at the influence of particular governance arrangements and instruments and the influencing power of particular actors. A critical account of the development process of a particular governance instrument – the EU Nanocode, was narrowed to look at its application in a particular in-use context being toxicology labs in Northern Italy. Four specific new situations and contexts were added: cases of public deliberation in Germany; national science and technology funding prioritisation in Denmark; 'under the radar' garage innovation; and the role of users in defining responsible research and innovation, and in particular the inter-dependencies between market-construction processes and responsible research and innovation governance processes. Cases were beginning to differentiate between those which focussed on building systemic reflexive capacities and capabilities of responsible research and innovation and modes of institutionalisation in particular organisational settings (Universities) and those which focussed on individual regulatory instruments, events or situations.

Two longer-timescale projects of the WP3 portfolio got underway in parallel with the Stage 2 cases. The first, led by IFRIS, uses bibliometric and other text-analysis to describe the historical emergence and socio-semantic structures of different branches of academic, policy, and industrial perspectives on responsible research and innovation, beginning with its academic core and widening to include other actors, interpreted according to the collection and analysis of as complete as possible corpus of texts (academic journals, reports, and web-site and social media activity). The second complementary project - Voices – led by MIOIR undertakes in-depth interviews with key-players from academia, policy, politics, industry and civic society. Analysis of the Voices interviews will demonstrate how responsible research and innovation is differentiated according to heterogeneous normative visions, corresponding to clearly articulated differentiated sites of (current and future) strategy and action. The Voices project uses the concept of reflexive institutional entrepreneurship to interpret the interview material, and will shed light on the plurality of logics of action involved in the de-facto institutionalisation of responsible research and innovation.

At this point, the pilot and Stage 2 cases portfolio was combined as the WP3 team and the WP2 team began to abstract and extrapolate from individual cases to draw transversal lessons from the case portfolio, generating a set of *dimensions* to describe variety in governance situations; translating governance situations into corresponding governance challenges; and beginning to incorporate this holistic learning into the set of building blocks that will underpin the final Framework for RRI. This analysis will be incorporated into the main Deliverables of WP3, reporting on the case-studies (due end May 2014). As well as further deliberating and applying the concepts of

Responsibilisation and *Well-Doing in RRI*, the project began to develop the conceptual notion of *Deep Institutionalisation* (that which represents, or potentially represents, systemic transformative governance, and system-incentivisation) differentiated from shallow institutionalisation ('window-dressing' or 'responsibility-wash'). Though not intended as a dichotomy, this concept emerged when the full RES-AGorA team critically debated and contrasted the presentations from the portfolio of Stage 2 cases. The role of *champion actors, institutional entrepreneurs, goal-directed normative orientation, intentionality and unanticipated consequences, asymmetries of power, position and knowledge, and the combination and application of different governance instruments and mechanisms* also began to be discussed.

Stage 2 cases were undertaken between February and April 2014, preliminary findings were presented and discussed case by case at the RES-AGorA Paudua meeting 19-24 March 2014, and are currently being written-up by case workers. The Stage 2 cases are listed below.

Table 3: Overview of stage 2 cases

Authors	Title	Focus
Fraunhofer 1.	'Public deliberation and RRI'	Critical analysis of contrastive cases of public deliberation in Germany
U Twente 1	'Practicing RRI in NanoNextNL'	RRI programme in NL
TEKNO	'Setting research and innovation priorities for a desirable future'	Process of setting R&I national funding priorities in DK.
IHS 1	'Fracking in Austria and the UK – A comparative study'	Comparison to Pilot case
Padua 1	Anchoring research and technology transfer. The EC CoC and normative anchor points in laboratory practices in Italy	EU Nano-code in-use in toxicology lab in Italy.
U Twente 2	User-initiated or grassroots innovation'	Understanding users role in RRI
IFRIS 1.	The responsibilisation and regulation of garage innovation	'Under the radar' garage innovation
MIOIR 1	Following the micro-processes of changing governance arrangements: pursuing 'responsible' biofuels in the USA	Micro-level process focus to complement historical transformation account of Pilot study.
Fraunhofer 2	Integration of RRI in policy advice. A review of the UK synbio Roadmap	Focus on Syn-bio roadmap in UK to complement range of Syn-Bio Technical Assessments of Pilot study
IFRIS 2,	Linking responsible research and innovation on the farm: The case of Participatory Guarantee Systems	Like-type comparative cases of PGS to draw transversal generic lessons on alternative value-chains governance
IHS 2	Xenotransplantation	Extension of Pilot to understand 're-opening' of a quiet case.
IHS 3.	Bio-Ethics Committees in Austria and Germany	Supplementing pilots – different governance : Ethics Committees.
MIOIR/IFRIS 1	'Voices': Institutionalisation, Institutional Entrepreneurs and de-facto responsible research and innovation	Key-actors Voices : pluralities of Voices & correspondences of strategy, action, and future states of de-facto responsible research and innovation.
IFRIS/MIOIR 2	What does the 'responsible research' and 'responsible innovation' label stand for? A Scientometric analysis.	Cortext/Bibliometrics text-analysis to produce an account of historical emergence and socio-semantic structural maps of RRI actors.
IFRIS 3,	Unhinged public deliberation	Critical case on public deliberation.

MIOIR, IFRIS, UTwente, Fraunhofer	Critical Organisation-types, capacity-building, Institutional Entrepreneurs and responsible research and innovation …. The 'Good University', Multinational Corporations, Professional Assns & Charitable Foundations.	Building on the 'Good University' Pilot of Arizona State University. 2-3 contrastive university cases + Other Critical Organisation 'types' & – eg multi-national corporations; Professional Associations; Charitable Foundations Take into Stage 3 – gaps.

Stage 3 – Gaps

The strategy for Stage 3 is 'gap-filling' takes into account the portfolio of cases completed so far. There are a number of contenders for Stage 3 gap-filling and these are currently being discussed, considering the constraining factor of remaining WP3 time and resources.