Public Engagement in Responsible Research and Innovation

This study deals with the concept of Responsible Research and Innovation (RRI), with a focus on Public Engagement as one of its main dimensions and the roles identified within. By undertaking a broad review of the related literature as well as an empirical study, this work investigates problems of practical implementation. It describes origins and developments of Public Engagement in research and innovation and closes with options for future direction. The work presents the central role of practitioners identified within the discourse and encompasses suggestions and recommendations for Public Engagement processes as revealed by the empirical work with practitioners in the field. Finally, it describes consequences that could be obtained from the results presented. It raises issues and open questions on Public Engagement in Responsible Research and Innovation which would need extra attention.

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A Critical Reflection from the Practitioner's Point of View

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Public Engagement in Responsible Research and Innovation

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A Critical Reflection from the Practitioner's Point of View

It is important that one seeks to remain alert,
aware and transparent about the conflicts or tensions
that are created when theoretical ideals
are implemented in the complex realities of practice.

Fern Wickson

Content

Abstract

This study addresses the concept of Responsible Research and Innovation (RRI) which has rapidly gained recognition in the last few years and has recently been formulated and promoted as a guiding principle and policy concept by the European Commission. The RRI concept is based on the changing role of science in society. The societal significance of science and research, as well as Public Engagement into research processes is increasingly of importance. This new understanding of science comes with a shift in society's values, which will be accelerated and amplified by the implementation of RRI. Which effects for science and society and for different societal actors this will have, however, is not yet clear.

Furthermore, it is unclear, how an involvement and collaboration could be meaningfully established. After decades of experiences with Public Engagement practices in different contexts, critiques and doubts of a meaningful implementation are still being debated. This necessitates reconsidering some of the approaches and underlying ideas behind the participation processes. As Public Engagement is an integral part of the RRI concept, these considerations have to be tackled if the concept is going to be successfully implemented. The work consists of both critiques, which have been formulated in the literature from different perspectives, as well as recommendations revealed in the material. With the help of participative research methods, the empirical part of this work generates results to complement and countercheck these critiques.

Social change, which will be initiated by the RRI concept, also means that tasks and roles have to be newly defined and formulated. One of these roles, which has been widely neglected so far, is the role of those who are in charge of carrying out the engagement processes. As there is as yet no standard designation, they have been called practitioners in this work. Accordingly, the need for greater recognition of the role of practitioners is addressed, as is the need for further research on their work in the in-between-zone of science and society.

Practitioners are already leading engagement processes, even though there is not yet a clear definition of their role. To do this, they rely on existing concepts and structures as references. Based on empirical work with practitioners, these concepts and strategies are constantly being explored and analysed. The results show their perspectives and experiences as well as the possibilities and limits they perceive in their work and how they deal with them.

The results clearly show that there are no commonly accepted

norms as yet which enable clear formulations of roles and behaviours. Engagement processes are often carried out in ambiguity and overstrain. Furthermore, clearly identified actors are missing within the discourse. Although the position of »the public« should actually be regarded as essential, if anything, their missions are unclear, their range of activity is narrow and their role is minor. Practitioners, however have a multifaceted and multitasking role. They do not only act as moderators at the actual deliberations, but are also responsible for the whole engagement process. They have to fulfil a complexity of tasks and obligations and different expectations. The role of the practitioners can thus be regarded as being central in the discourse, even though it is characterised by insecurity and role conflicts. Despite this, practitioners perform their tasks with motivation and empathy. They have experiences and ideas and suggest certain conditions, attitudes and requirements for constructive Public Engagement processes in RRI. At the same time, however, they ask to carefully consider if processes are worthwhile and if there is a true readiness and willingness for engagement, which is not always the case.

Results also show that Public Engagement within RRI is still limited and many of the required changes and understandings of roles have not yet been established. These results intend to contribute to a critical reflection of the discourse on Public Engagement in RRI and consequently to more precise recommendations and considerations for future implementation.

Executive summary

This study deals with the concept of Responsible Research and Innovation (RRI), with a focus on Public Engagement as one of its main dimensions and the roles identified within. By undertaking a broad review of the related literature as well as an empirical study, this work investigates problems of practical implementation. It describes origins and developments of Public Engagement in research and innovation and closes with options for future direction.

Part 1 begins with a look back on the changing relationship of science and society as it has evolved over time (Chapter 3 — Science and Society). It shows how societal concerns have increasingly gained importance for science and research and how roles and attitudes have changed accordingly. It describes this participatory turn towards new forms of science and research governance and explains the rise of the normative concept of Responsible Research and Innovation at its present stage.

Chapter 4 — The RRI Concept in Brief — introduces the theoretical concept of RRI. As there is no standard definition or understanding of the concept, the chapter shows some of the more commonly used understandings and main elements of Responsible Research and Innovation. The chapter also gives an overview of current interpretations and their connection to other concepts.

Public Engagement is more than just one of the six key dimensions of the RRI concept. Chapter 5 — The Importance of Public Engagement within the RRI Concept — describes how Public Engagement can be regarded as the core dimension of RRI and how it reflects the actual trend of the democratisation of science.

To be able to understand Public Engagement and its main requirements, Chapter 6 — Participation — is dedicated to describing the approach of participation in general. It gives an overview of understandings, offers concepts for classification and different theoretical backgrounds on which the idea of Public Engagement in RRI could rely on.

Chapter 7 — Reflective Practices for Responsible Research and Innovation –shows how reflexivity as a requirement of modern society is embedded in the RRI concept. It explains which role Public Engagement could play to question and reflect on actual findings or trends in research and innovation and also to contribute to finding alternative approaches.

Public Engagement in research and innovation can already look back at decades of experience and it has become even more popular these days as actual trends in the relation of science and

society have previously shown. Much critique and difficulties, however, have been formulated since the beginning as well. Based on a literature review Chapter 8 — Public Engagement in Research and Innovation — looks at the current situation of Public Engagement in research and innovation practices and compiles a variety of different perspectives and critiques. With the description of as many aspects as possible, it offers a broad assessment on the field. The subchapters describe the main challenges as they occurred within the literature study. At the end of the chapter, a summary of recommendations are provided for consideration if Public Engagement processes intend to be applied.

The empirical work of Part 2 gives an overview and a general description of the applied methodologies. Chapter 9 also contains detailed descriptions of the data collection and analysis process.

Part 3 comprises results obtained in the course of writing this work. Chapter 10 contains narrative descriptions of results of the empirical work. Subchapters are structured according to the outcomes which emerged from the data analysis. Chapter 10.1 describes the general discourse of Public Engagement in research and innovation and shows its main components. Chapter 10.2 presents the central role of practitioners identified within the discourse and chapter 10.3 encompasses suggestions and recommendations for Public Engagement processes as uncovered in the empirical material.

In chapter 11 — Conclusions — empirical results are related to findings of the literature review of chapter 8 to show where and how actual critiques could have been confirmed and where they could have been enriched with more details. It also summarises further aspects to be considered.

The closing chapter 12 describes consequences that could be obtained from the results presented in the previous chapter. It raises issues and open questions on Public Engagement in Responsible Research and Innovation which would need extra attention.

1 Introduction

1.1 The Emergence of RRI

Since 2008, high-level policy meetings and research groups, projects and networks around the world have begun to address the conceptualization and institutionalization of Responsible Research and Innovation, in short: RRI. In 2010, it became a strategic principle in the European Research programme Horizon 2020. The changing relation between science and society, new modes of knowledge production and perceived risks of emerging technologies, such as nanotechnologies have made it necessary to reconsider common understanding of shared values and responsibilities and to better address current societal challenges. The RRI framework is expected to provide a new approach »ensuring that responsible choices can be made in the future, through anticipating and gaining knowledge of possible consequences and building capacity to respond to them« (Stilgoe, Owen & Macnaghten, 2013, p. 1570). In this modern era, it has become apparent that new technologies have to be aligned with societal needs and values. Ethical, legal and social issues need to be addressed early on and have to be assessed not only by experts, but also with the engagement of all stakeholders, including users and citizens. Based on experiences and insights of the Science in Society (SiS) programme of the European Commission, a preliminary working definition and outline for such a new understanding was drawn by von Schomberg who is (as of 2013) based at DG Research and Innovation of the European Commission:

> *»Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability,*

sustainability and societal desirability of the innovation process and its marketable products(in order to allow a proper embedding of scientific and technological advances in our society)«

(von Schomberg, 2011, p. 9). This definition has been discussed and further developed from here on.

In the same year as this definition was outlined, a roundtable was held at the S.NET (Society for the Study of New and Emerging Technologies) conference with academics and policymakers from Europe and the US, at which panellists described RRI as a »current state of affairs where there is an implicit or explicit wish for institutional, behavioural, moral, interpretative, academic or thought-process improvement« (Randles et al., 2012, p. 170). It soon became obvious that RRI not only encompasses a few outlines or recommendations for action, but requires a paradigm shift and major changes of attitudes of societal actors. As positive as such a new endeavour might sound, it is, however, difficult to implement. So how to put the concept of RRI into practice is one of the key issues.

Although many definitions exist in the meantime (e. g.: von Schomberg, 2011; von Schomberg, 2013; European Union, European Commission & Directorate-General for Research and Innovation, 2013; Owen, Macnaghten & Stilgoe, 2012; Sutcliffe, 2011; Stahl, 2013; Stilgoe et al., 2013; Klaassen, Kupper & Broerse, 2014), it is still unclear how to define it definitively. There is lack of unity as to how it should be assessed, how to evaluate and the exact quality of criteria to apply to it. Numerous open questions feed the lively debate around it. It needs much more discussion and also experience for all stakeholder groups to tackle the concept and assess its usability and appropriateness. For many, what RRI amounts to is difficult to define (Asveld, Ganzevles & Osseweijer, 2015) and the goals of RRI have to be made clear (Randles et al., 2012). Early critics have already rejected the academic discourse (Sutcliffe, n. d.) while others blame it for being a superficial political appeal which runs the risk of instrumentalisation (Owen, Macnaghten & Stilgoe, 2012). As RRI remains overly vague, others fear that »the interpretive flexibility of RRI will be so broad as to render the concept meaningless« (Wickson & Carew, 2014, p. 256). While the concept is seen as having an advantage because of its »aggregative aspect«, this is at the same time also its biggest disadvantage because of its »all encompassing character« (Callon & Lacoste, 2012). The conceptualisation of RRI thus is another key issue.

Meanwhile, however, in the European research area at least, attention to RRI has become manifest in the funding of large-scale,

multi-institutional projects under the 7th Framework Program and Horizon 2020 (e. g.: ResAgora, GREAT, RRI Tools) and in building up a network between them (RRI-ICT-Forum).

A new scientific journal — The Journal of Responsible Innovation — was established to »help manifest and broaden this network by providing a platform to articulate and discuss the many unsolved questions surrounding RI, and by inviting new and surprising perspectives from scholars and practitioners who take an interest in reflecting on and debating RI« (Guston et al., 2014, p. 3).

The concept is not only reflected epistemologically and politically but also practically. Still, there is only little empirical research available, especially that which addresses other stakeholder groups besides just researchers. Practical implementation of RRI in different areas, for example in the financial sector (Asante, Owen & Williamson, 2014) is also not widely available. How RRI could really be implemented needs much more analysis. How could it be of practical value and how could it be translated into day-to-day practice are questions that need further exploration. Although there is general agreement about its main characteristics, still »the RRI concept has to be practical and feasible« (Owen et al., 2012, p. 758). »It is easy to agree with all of the principles that have been put forward, but although the principles are here, the practice is the problem« (Randles et al., 2012, p. 176). »There are seldom any specific guidelines as to how scientists can adapt these attitudes in practice« (Glerup & Horst, 2014, p. 39). Accordingly, new skills need to be managed and elaborated for all stakeholder groups. »Moving public engagement upstream is by no means self-evident, and that it is not only a matter of involving stakeholders and citizens upstream; experts also need to move upstream« (van Est, 2011, p. 645). To discuss common values and responsibilities requires methods and formats for reflection and deliberation for all actors.

1.2 The Relevance of (Self-)Reflection and Reflexivity

Scientists are not typically asked to anticipate future societal effects of their work. Clearly, each EC funded project has to fill in a rather comprehensive section on the expected impact of the work in their application forms. Research projects are also increasingly required to identify the potential beneficiaries of their work (Shove & Rip, 2000) and develop strategies for knowledge transfer and pathways to impact. However, mostly these descriptions address the expected (positive) outcomes and describe an added value that the proposed work will deliver.

But reflections, particularly on non-intended effects, are rarely undertaken. Reflection is not (yet) viewed as an integral part of scientific work. Many other more important issues need to be addressed within a scientific career. As Owen and Goldberg found in their study, when research grant applicants were asked to fill in a risk register and to assess their work on expected future impact it showed that only »few potential impacts on the wider natural environment [...] were identified in the risk registers and no future societal impacts were identified at all« (Owen & Goldberg, 2010, p. 1702). Studies like this and others have revealed that researchers are rarely encouraged to self-reflect. »Towards the end of many interviews however, some acknowledged that they simply have never been asked to consider these kinds of questions« (Eden, Jirotka & Stahl, 2013, no pages). What is needed is to »step into the helicopter« (Schuurbiers, 2011, p. 784) to look at one's own work from a distance. A look from the outside and feedback also help reflection. »Researchers are not accustomed to viewing their decisions from a normative perspective or discussing the normative aspects of decisions explicitly. Such broader issues were brought into focus by routinely asking different kinds of questions than those usually encountered in the midst of laboratory research« (Schuurbiers, 2011, p. 777).

Unfortunately, not many reflection tools are available as yet. Quality standards and codes of conduct should »stimulate the reflection of the relation between one's own values and that of external parties« (Asveld, Ganzevles & Osseweijer, 2015, p. 585) and there are self-reflection initiatives to motivate individuals to reflect on the impact of their work, e. g. a »Hippocratic Oath for individual scientists« (Sutcliffe, 2011), but even fewer ask organisations for self-reflection.

While taking Responsible Research and Innovation seriously, however, »as a higher-level or meta-responsibility«, one must point out »the need for the incorporation of reflexivity into RRI itself« (Stahl, 2013, p. 714). That means, all stakeholders should be engaged in (self-)reflection activities that stimulate critical thinking and foster a responsibility mindset.

1.3 Public Engagement

The idea of science with and for society (as it is called within the EC programme) seeks a democratization of science and research. Theoretically, this idea is not new. »While theorists such as Beck have opened the discussion to a more democratic restructuring

of science and technology, they have said painfully little about what such a critical or reflexive mode of inquiry would actually look like« (Fischer, 1999, p. 297). As a result, there is a strong need to look for new ways of engagement that lead beyond technocratic expertise. But already in 1999, however, the question remained unsolved as to how civil society could »meaningfully« (Fischer, 1999) participate in complex technologies and expert decisions.

Despite this, there has been a gradual change in public attitudes and »the public is more and more unwilling simply to defer to expert judgements. Instead, the public increasingly takes to itself the right of adjudication between rival forms of expertise« (Durant, 1999, p. 316). Additionally »the fact that much scientific research is today dependent on public funding makes it difficult to argue against a public voice in questions of science and technology« (Fischer, 1999, p. 296).

In fact, according to the special Eurobarometer on European citizens' general attitudes towards science and technology, more than half of the respondents (55 %) have a feeling that »public dialogue is required« (EC, 2013) and ask for shared responsibilities and engagement. This also suggests »that the concept of RRI needs to be communicated more broadly not only to institutions and individuals within the scientific community but also to organisations and individuals within civil society« (Eden, 2014, p. 130).

Jasanoff is no longer concerned with the issue »whether the public should have a say in technical decisions, but how to promote more meaningful interaction among policy-makers, scientific experts, corporate producers, and the public« (Jasanoff, 2003, p. 238). The interim evaluation report, compiled by the Science in Society programme of the EC, reported that increased Public Engagement in science and technology is widely accepted as a desirable outcome. But still the question remains as to what is meant »by ›public‹ (e. g. civil society organisations, public representatives, individual citizens) and how they can engage effectively and efficiently« (Fraunhofer ISI & TechnopolisGroup, 2012, p. 41).

It remains a great challenge to find ways of effectively engage stakeholders, especially from civil society and to cope with contradictory positions as well (Stahl, 2013, p. 713). At what stages of innovation the public should be involved and how must be clearly defined. And also commonly agreed quality standards for Public Engagement processes are required (Dautzenberg, 2014, p. 2 f).

Furthermore, »we know rather little about whether the public are as keen on participatory dialogue as those who advocate it as

key to democratic governance« (Stilgoe, Lock & Wilsdon, 2014, p. 7). Many surveys still focus on researchers' perceptions of stakeholder engagement. But more »insight is likely to be gained through comparing the perceptions of researchers with those of stakeholders themselves« (Phillipson et al., 2012, p. 64).

Therefore, »the reactions of the Member States and stakeholders like business enterprises, research institutions and civil society will be a first important test for a future Communication or Recommendation from the European Commission« (European Union, European Commission & Directorate-General for Research and Innovation, 2013, p. 51). The concept is now being scrutinized by all stakeholder groups. Future options for policies and further implementation will rely on assessment outcomes of the groups. Collecting feedback from all groups, including civil society actors is thus an urgent matter. The role of those who are undertaking the processes — the practitioners — is central in this discourse. This work, therefore, considers this group as one stakeholder group, which represents the main target group of this empirical research.

There is a general consensus on what the RRI concept endeavours to achieve. Although there are still many unsolved questions, there are at the same time possibilities for shaping and putting the concept into practice. »It is thus by no means certain that RRI will be successful. At the same time, one can see that RRI has spawned a lively debate and that it offers an exciting opportunity to think about new research concepts, innovation and governance« (Stahl et al., 2014, p. 815). The work at hand seeks to contribute to this debate.

2 Research Question and Methodology

This work is situated at the very start of the implementation phase of the RRI concept, which is also meant by the European Commission as a means to gather feedback from all stakeholders before it will be revised and further elaborated. There is, however, not yet a common understanding about who these different stakeholders are. One current model is the one introduced by the RRI Tools project (one of the EC funded projects on RRI), which defines five stakeholder groups of the RRI discourse. These are researchers, policy makers, science educators, business and industry and civil society organisations (Garcia, Zuazua, Perat & Lopez, 2016). It is agreed that these groups or other »societal actors and innovators should be involved along the whole research and innovation process«, as the most prominent definition of RRI states (von Schomberg, 2011, p. 9). All elements of the RRI concept (see chapter 4) emphasise the involvement of a wide range of stakeholders. And one of the six dimensions of the RRI concept is explicitly called Public Engagement. This dimension can even be regarded as one of the core elements of the RRI concept (see chapter 5).

It is not yet clearly defined, however, which actors and roles are foreseen to allow for a successful implementation of this ambitious goal. A closer look is required at the complex structure of the construct of Public Engagement in Responsible Research and innovation. To be able to picture the discourse of Public Engagement in RRI, the main players must be identified as well as a clear understanding of their positions and roles within the discourse.

According to Linton (1945), roles are situated within the social system where they become institutionalised clusters of normative rights and obligations. Their structural account locates a position

in society, in which a standard bundle of rights and duties associated with an ideal type of this position has to be described. Every role also brings a number of different partners and reference groups, which in sum is called the »role-set« (Merton & Sztompka, 1996). Each of the groups has their normative or anticipatory expectations of how a role should be played. All these expectations constitute the role. In the context of Public Engagement in RRI, these roles and expectations must be identified.

Furthermore, when expectations are in disagreement, »role conflicts« (Linton, 1945) can occur. Divergent and even contradictory expectations can cause »role-stress« and »role strains« (Goode, 1960) when the participants feel overstrained by multiple demands. It is also interesting to look at the ways in which these persons come to take their role of the other (role-taking), construct their own role (role-making) and anticipate their responses of others to their roles and how differently people actually play their roles (role-playing), as has been defined by Goffmann (1956). Additionally, the partners and groups have social control on how the roles are carried out. With their sanction, in reaction to the role-plays, they co-create the formulation of the role. This process of socialisation, as well as imitation and adoption work, usually helps participants to learn roles. According to Parsons (1951), social systems can only function if socialisation processes have developed common values — and thus allow actions to mutually make sense. Some roles, however, especially newly defined ones, can only be constructed in the course of already carrying out the role. This is often associated with considerable initial uncertainties (Prisching, 1995). Such insecurities might occur within the new concept of RRI and its requirement of Public Engagement. Conflicts of interest, ambiguities and insecurities can be expected. Until roles are clearly formulated and accepted, it will take time to become familiar with a new role (»empathy«) and dealing with ambiguities will continue to be a challenge (»tolerance of ambiguities«) (Goffman, 1956).

Ultimately, the question is how new roles can be identified. Within the discourse of Public Engagement in RRI, how to recognise that someone is holding a role and what the attributes and actions related to this role are must be clarified. What are the so called »masks« (Goffman, 1956) used to perform the role? Goffman differentiated four levels of perspectives to look at these; the technical — considering its effectiveness or invalidity, political — considering actions and resulting rewards or sanctions, structural

— considering the different positions and social relations of persons and groups, and cultural — considering moral values and norms. Additionally, he considered the dramaturgical approach to describe the different performances within the ensemble of an institution (Goffman, 1956). An institution could be described as a social construct, composed by a set of role expectations, which refers to certain behaviour of its members. It compiles rights and duties to achieve clear and generally accepted goals (AG Soziologie, 1996).

New roles only can be integrated in the process if norms and values of a common culture find acceptance. If these basic values change, the whole value system undergoes a change. This will consequently induce social change.

The concept of RRI and its inherent requirement of Public Engagement imply a paradigm shift, which stimulates a process of change that, in the long run (if implemented successfully), will cause social change. This change is currently being undertaken by the interaction of the persons and groups involved in RRI. As RRI is not yet a clearly elaborated concept, the institutionalisation and role definitions are also unclear. It can, however, be assumed that the implementation of a new value system in the form of a normative concept such as that of RRI will cause some difficulties and changes.

The work at hand seeks to investigate the current statues of this intended change, the positions and roles to be identified and the effects, which have been observed thus far. It looks at what has been initiated and what consequences can be expected.

2.1 Main Research Question

The primary question to be formulated is: What are the effects and the limitations within the practical implementation of the introduction of Responsible Research and Innovation and more specifically of Public Engagement as being one of its main constitutional requirements?

As to functions and roles, it is important to consider, which elements can be identified and which role descriptions are there. Which attributes are they given? One stakeholder group, in particular, whose role has not yet been sufficiently recognised but who is meant to carry out the Public Engagement activities — referred to as practitioners in this work — will be the main focus.

2.2 Operational research questions

For the practical theoretical and empirical work, the following questions as guidelines have been applied:

— Which experiences and critiques of Public Engagement activities in research and innovation have been discussed so far and how could they be of use for Public Engagement in Research and Innovation endeavours?
— What are the main gaps and difficulties to be addressed?
— Which framework conditions, methods and strategies exist that enable Public Engagement processes in the field of research and innovation?
— Which possibilities and limits do practitioners perceive in their work and how do they deal with these?

2.3 Applied Methodology

Theoretical Part

This work seeks to contribute to the current debate on Public Engagement in Responsible Research and Innovation and compile as many aspects as possible as currently available in the literature by bringing in practical points of view to the discourse.

This work compiles a comprehensive literature review of relevant articles and studies in the realms of STS, RRI, participation and Public Engagement, as well as related EC documents and project reports. The review leads to a collection of perspectives and critiques to allow for a broad assessment of the field and the description of as many aspects as possible as are currently available within the discourse.

There are, however, some limitations to the volume of the work and the applied methods. In particular, the desk research cannot be regarded as a comprehensive structured literature review consisting of systematically screening defined segments, sources, keywords or time frames. This work strives more towards a variety and multiperspectivity of sources, which have been collected via the snowball principle of recommendations and references. Some aspects might have been omitted in this way.

Empirical Part

The empirical study applies a qualitative methodological approach based on Grounded Theory, with data collection methods of the realm of Participatory Evaluation and Action Research. The techniques applied aim for direct involvement with the practitioners, to relate to their specific real life experiences and to be able to get

an insight into their minds. Grounded Theory is used to explore the subsurface of Public Engagement activities currently being undertaken, the expectations and perceived limitations. For this work, conditions of the group of practitioners rather than the individual aspects have been examined. To this end, participatory evaluation workshops with target group members were used for data collection.

PART I
Theoretical Part

3 Science and Society — a Changing Relationship

We are technological beings.
Bernard Stiegler

The image of technology as a passive tool to serve human needs has already been revealed as being illusory. Instead, technology could be considered as an active force created by us, for the world around us. According to the philosopher Bernard Stiegler this is not new: »Ever since the first ape grasped a stone to smash a nut, technology has helped shape who we are. It shaped our activities, our emotions and even the contours and capacities of our bodies. Our hands would not have evolved as they did, if it were not for the tools that we have wielded« (Guston et al., 2014, p. 1). Technological innovations and later science and science-based technologies have been influenced by mankind, and at the same time have influenced mankind's advancement. These innovations have »transformed ways of thinking and ways of living across the globe« (Durant, 1999, p. 316). Rip, has spoken about a long lasting »settlement« between science and society, which has gone through certain phases over time (Rip, 2014). Some have also spoken about a contract between science and society (Gibbons, 1999), which is now under scrutiny to be reviewed as the »complexity of a societal problem requires moving beyond the sole reign of scientific expertise« (Jahn, Bergmann & Keil, 2012, p. 3).

3.1 Brief History

In its rather short history, the field of science has undergone some fundamental changes. It was only in the late 17th century that scientific disciplines became differentiated, so that the social role of a scientist could evolve (Weingart, 2005). With the development of new instruments and processes, scientific experiments moved from public and semi-public places where curios audiences could watch

them, to more distinct locations. Hence scientific phenomena could no longer be demonstrated, it had to be reported. Reports had to be written not only for colleagues in the field of science, but also for the public. With this increasing popularisation of science as a means of communication with broader public audiences »the first clear distinction between science and a non scientific public was drawn« (Marschalek, 2008, p. 16, transl. i. M.). Newly created magazines »propagated the manifold and practical potential uses of science« (Weingart, 2005, p. 17, transl. i. M.); the world was looking forward to scientific progress and technological innovations. Scientists could speak for »new and promising science (from astrophysics to cancer research) and for the importance of scientific approaches in improving the lot of mankind« (Rip, 2014, p. 4). As long as science did not interfere in society it could »just do« (Rip, 2014).

However, by the 20th century, the downsides of research and innovation had also been demonstrated and the ›ivory tower‹ of science became contested. Two world wars, grave technical accidents and »mounting societal debates about contentious developments required broader societal reflection and involvement« (Stahl, 2013, p. 709). The scientific progress of the last two centuries made people change their thinking. It became obvious that »mankind was able to change its fate — at first indirectly and unintentionally« and that »the future could be actively shaped by today's actions« (Cuhls, 2003, p. 94). After World War II ended, the ›endless frontier‹ of scientific research as it had been formulated by US president Roosevelt's advisor (Bush, 1944) »was seen as the means by which nations would ensure their peoples' future health, prosperity and security« (Grand et al., 2015, p. 1). And between the 1950s to the 1980s there was a strong belief in a linear view of innovation (Callon & Lacoste, 2012). But in the second half of the 20th century, when science and innovation had become more and more intertwined »and as the power of technology to produce both benefit and harm had become clearer, debates concerning responsibility broadened« (Stilgoe, Owen & Macnaghten, 2013, p. 1568). Also, the purely economic value of science has been seriously questioned (Biggins, 1978). People's beliefs and innovation regimes have changed a lot in the past decades, from being strictly »focused on technology, with engineers and researchers considered as the sole initiators of the innovation process, operating with a ›one best way‹ view and with low preoccupations about what people want« towards a »new regime of distributed, participatory innovation« (Callon & Lacoste, 2012, p. 22).

3.2 Changing Roles and Attitudes

As put by Durant very neatly »the genie of the information society is well and truly out of the bottle«. In our modern, globalised world, for him »there is simply no way back to a quieter, less communicative, more deferential world in which nobody questions the judgements of scientists because nobody either knows or cares very much about what they are doing« (Durant, 1999, p. 317). The vast increase of data collection and dissemination enabled by modern communication technologies has opened up the field to a knowledge-based society, which is now able to transform all this information into resources. Years of science communication and education, »together with more deliberative forms of public engagement, will be essential to building up the knowledge-based society as promoted by the Lisbon strategy« (EC, 2007, p. 17). The model of an autonomous, deterministic science and technology has given way to a new understanding of co-evolution and co-production of society and technology. Science is no longer perceived as being outside society, but it has moved towards a »recontextualisation«, becoming an integral part of society again as it had historically been (Siune et al., 2009, p. 11). A (re-)newed dynamic interaction between science and society has begun in which societal actors have also taken on new roles. Post- normal science, as described by Funtowicz and Ravetz (1993) which can be identified through its increasing contextualisation, also demands »new rules for its regulation that move beyond the narrow confines of expert committees« (Burgess & Chilvers, 2006, p. 714). This idea of an »extended peer community« for new forms of knowledge production has also been reflected in later concepts, such as the suggested »agora of public deliberation« in Mode 2 research (Gibbons, Nowotny & Limoges, 1994) or increased calls for reflexivity (as described in chapter 7). It is no longer solely about creating new knowledge, but about new ways of dealing with the incalculable of not knowing. Knowledge production and the production of not knowing were related to decisions, which had to be taken commonly. These decisions would have to undergo assessments according to democratically identified values. This »democratisation of science« should finally involve science in the public discourse (Weingart, 2005).

3.2.1 From PUS to PES

There was (and there continues to be) a long way to go to this intended democratisation of science (Callon et al. 2012). According to Wilsdon and Willis (2004) this shift is taking place in three phases:

Phase 1: Public understanding of science
Phase 2: From deficit to dialogue
Phase 3: Moving engagement upstream

3.2.1.1 **Phase 1 Public Understanding of Science (PUS)**

Throughout the post-war period already, and ultimately in the 1980s, the concept of ›public understanding of science‹ came into prominence (Durant, 1999). As Eurobarometer studies or annual surveys of the US National Science Foundation regularly »uncovered gaps in people's knowledge of scientific facts«, this »mission to inform« was the initial response of scientists to »growing levels of public detachment and mistrust« (Wilsdon & Willis, 2004, p. 17). According to this information deficit, scientists were seen as knowledgeable experts, and ›the public‹ was characterised as having inadequate knowledge (van Est et al., 2012). In this understanding the relationship between scientists and the public was conceptualised as being educative: »The scientists' main purpose for communicating was to school a scientifically illiterate public« (Grand et al., 2015, p. 2). This ›deficit model‹ was conceptualising the public as ignorant and science as unchanging and universally comprehensible. Another argument however, was that the people »deserve« and »need« to know about science (Durant, Evans & Thomas, 1989, p. 14). Only a few years later, the journal »Public Understanding of Science (PUS)« was launched, opening a discussion forum about if and how the public should be concerned with science. Subsequently, for more than a decade, the language and methods of PUS emerged globally, but at the same time drew critics. The sharp distinction between those with specialist or expert knowledge and the generalist or local knowledge of the public with experiential or common-sense knowledge tended to polarise the discussions, in which experts provided facts, whilst members of the public would contribute values (Burgess & Chilvers, 2006). Critics also recognised this, as this distinction was only aimed at enforcing public compliance with normative impositions which were only »scientifically clothed« (Wynne, 2014) (see more in chapter 8.3.5).

After all, »instead of lubricating understanding, scientists gradually discovered that PUS was clogging the cracks and pores which might have allowed genuine dialogue to breathe« (Wilsdon & Willis, 2004, p. 17). Furthermore, with growing concerns (e. g.: the BSE crisis, GM crops), the relations between science and society became clouded. But still, it wasn't until 2000 that PUS was suddenly »washed away, when an influential House of Lords report detected

›a new mood for dialogue‹« (Wilsdon & Willis, 2004, p. 17) (see more in chapter 8.1). Out went PUS, in came PES.

3.2.1.2 **Phase 2: From Deficit to Dialogue**

In the mid-1990s, the interest in public participation and consultation in science and technology gradually grew (van Est, 2011). Parts of the scientific community began to express concerns »at what they took to be the unacceptably large gulf that existed between science and the rest of society« (Durant, 1999, p. 314). Science and technology have an impact on almost every part of our daily lives, but there occurred ambivalences about science in the wider society, which »has led to calls for a more open dialogue between scientists, policy makers and the general public« (EC, 2013, p. 3). Consequently, in the early years of the millennium, a perceptible shift from public understanding of science (PUS) to Public Engagement in science (PES) took place (EC, 2007). Finally, a new language of science and society has been born and with it »a fresh impetus towards dialogue and engagement« (Wilsdon & Willis, 2004, p. 17). Bucchi et al. have identified »linguistic shifts« in documents and funding schemes: »from ›public awareness of science‹ to ›citizen involvement‹, from ›communication‹ to ›dialogue‹, from ›science and society‹ to ›science in society‹« (Bucchi & Neresini, 2008, p. 457). The relations have shifted from a deficit model — in which the public was negatively »defined as ›those-who-do-not-know‹, to a participatory model — in which the public is invited to take part in the scientific enterprise« (Bensaude Vincent, 2014, p. 240).

3.2.1.3 **Phase 3: Moving Engagement Upstream**

Upstream Public Engagement (see more in chapter 8.3.4) starts with processes where the public are expected to learn and deliberate about questioned issues and policymakers to learn about their preferences. This means that citizens should be consulted early enough so that their views are capable of influencing outcomes before new policies are set in place. Therefore it is crucial to involve the public »before an issue or technology becomes controversial, when opinions become polarised and hardened and polices are predetermined« (Cobb & Gano, 2012, p. 97). Already within the context of research, ethical questions could acquire meaning. Only when such issues arise from the bottom up, a perceived need to think about them would also become more apparent (Schuurbiers & Fisher, 2009).

New sciences and emerging technologies like biotechnology

or nanotechnologies raise contradicting expectations. They are more controversial, because of their increased pervasiveness into people's daily life and the social infrastructure, which also raise a number of ethical, legal and social issues (von Schomberg, 2011). They have the potential to fundamentally change social evolution and push economic development, but also to cause irreversible damage to the environment or to society (Pfersdorf, 2012). But such implications of new technologies are often unforeseen, and solely »risk-based estimates of harm have commonly failed to provide early warnings of future effects« (Stilgoe, Owen & Macnaghten, 2013, p. 1570). Instead, just because they are mostly embedded in fields of conflicting interests and are highly complex, there is a need for multi-actor decision processes. Therefore, »the interrelation between technological path creation and its multiple societal aspects is as close as never before« (Scholl, Petschow & Ferdinand, 2012, p. 2). This has led to calls for more participatory and deliberatively motivated engagement activities. Until now there has already been »lots of practical experimentation with public dialogue and social reflection by scientists. But there is still a long way to go« (EC, 2007, p. 10).

3.3 The Loss of Trust and the Rise of the Public

Better access to information about scientific issues together with an increasing awareness, has also led to increasing public scepticism about scientific expertise (Durant, 1999). Previous »techno-disasters« have resulted in a loss of public trust (Sutcliffe, 2011). Studies have revealed that the public is not opposed to science and technology in principle but is rather experiencing a crisis of confidence in government and its regulation of science and technology (Burgess & Chilvers, 2006). However, although Eurobarometer surveys suggest that citizens have more trust in scientists than in policymakers (Eden, 2014), the Eurobarometer survey in 2010 »pointed to some degree of negativity about the potential benefits of science, and its impact in some areas of life« (EC, 2013, p. 3). But citizens are not only becoming »more sceptical and less deferential«, they are also becoming increasingly active and interested (EC, 2007, p. 19). For Wynne an increasingly mobilised, informed, and effective public is questioning the normative commitments it had previously been presented as pure or »innocent science« (Wynne, 2014). In general, citizens seem to have a growing and widely acknowledged stake in science, research and innovation (Siune et al., 2009). People now want to know which problems are

being solved, how they would improve existing solutions, and that developments have been thoroughly thought through in terms of social or environmental benefit and risk and they want to have clarity on what were the benefits to them or to society as a whole (King & Sutcliffe, n. d.).

Emerging technologies nowadays allow questions to be asked about formerly unavailable choices: Questions formulated could be as follows: »What kind of role do we want technology to play in our lives? How do we want to live? How can technology and our choices about it support us in leading that life? […] What kind of society do we want to create, and how can technology help us do that?« (Guston et al., 2014, p. 4). And people should have a say in answering those questions (Jasanoff, 2003).

The affected »public« increasingly wants a voice in the governance of science and innovation. Thereby with a »waning of the authority of expert« a »rise in the inclusion of new voices« has taken place and »over the last two decades, particularly in Northern Europe, new deliberative forums on issues involving science and innovation have been established, moving beyond engagement with stakeholders to include members of the wider public« (Stilgoe, Owen & Macnaghten, 2013, p. 1571). By the end of the 20th century, the Dutch government for example, even came to equate Public Engagement with citizen participation (van Est et al., 2012). The so called technocratic modes of appraisal in complex and uncertain decision contexts have come under criticism and calls for a greater plurality of knowledge and values in the assessment processes have been growing (Burgess & Chilvers, 2006). For example, although after the cold war the public had a right to decide about funding an atom bomb, it had »no legitimate stake in limiting scientific freedom and professional judgment about research aims and methods« (Taylor, 2007, p. 163). Experts have been criticised for being blind to the complexity of real world problems. New forms of Public Engagement that address the chances, risks and governance demands of ever more complex and intertwined technologies are needed (Scholl et al., 2012). The involvement of laypersons has been combined with the expectation that alternative rationalities may be articulated (Bogner, 2012).

Simultaneously, new critical voices can be heard. With »the birth of the blogosphere«, citizens can not only express their reluctance of technologies but also show that they could »ask tough and illuminating questions, exposing significant errors and elisions« (Horton, 2010, p. 143). With easy access to knowledge on the

internet, it has become suddenly »easier than ever for unengaged members of the public to become interested stakeholders, and for passive consumers to become concerned citizens« (EC, 2007, p. 19). Social media have revealed an enthusiasm for engagement among those interested in science. More and more the public has become »unwilling simply to defer to expert judgements« (Durant, 1999, p. 316). Instead, the public increasingly takes to itself the right of adjudication between rival forms of expertise. In 1999, Fischer had already found in academic literature »numerous examples of citizens being capable of much more participation than commonly assumed« (Fischer, 1999, p. 297). At the same time, Giddens said: »The communications revolution has produced more active, reflexive citizenries than existed before« (Giddens, 1999, p. 73). A year later, the report of the House of Lords on science and technology declared »a new mood for dialogue«, a new »humility on the part of science in the face of public attitudes, and a new assertiveness on the part of the public« (›House of Lords — Science and Technology — Third Report‹, 2000). This new development implied that scientific researchers needed to do more than »simply tell people what they were doing; they also needed to listen to people and respond, even if they considered their antagonism, fears or hopes to be ill-founded« (Grand et al., 2015, p. 2). It also implied a clear »shift to the citizen« (Cavallaro et al., 2014).

When asking the citizens there »appears to be an appetite amongst EU citizens for greater engagement with those well-qualified scientists themselves« (Eden, 2014, p. 129). As shown in the Eurobarometer study of 2013, more than half of Europeans (55 %) believe that public dialogue is required when it comes to decisions about science and technology. And on being asked on the level of involvement the most common response was that citizens should be consulted and their opinions considered (39 %) (EC, 2013).

3.4 Science — a Social Institution

No longer »could science get away with only accepting credit for its glorious achievements« but it also had to respect the responsibility for its misapplications. These days, »in the Information Society, scientists who refuse[d] to talk about their work in public are far more likely to be presumed to have something to hide than they are to be presumed innocent« (Durant, 1999, p. 317). This understanding describes a change in the scientific profession. To be disinterested and not to care for the consequences of scientific developments is no longer an option. A transformation had taken place

in science from being »something engaged in by disinterested seekers after the truth« into a social institution (Glerup & Horst, 2014, p. 38). As has been formulated by a former Vice-Principal of the University of Edinburgh, we are seeing a change from »science as a private enterprise to science as a public enterprise« (Horton, 2010, p. 143). This transformation of science into a new type of social institution implicitly requires that the ethical dimensions of research should become part of the science ethos (Schuurbiers, 2011). To understand and to give life to the social role of science not only requires an understanding of science, but also an understanding of society. It, therefore, needs social analysis (Biggins, 1978). Research and research programmes have explicitly endeavoured to seek solutions to today's societal challenges (European Union, European Commission & Directorate-General for Research and Innovation, 2013) and have underlined the importance of addressing societal needs and ethical questions in research and development. The European research area has accordingly been streamlined to address the »Grand Challenges«, as included in the Lund Declaration (2009). Furthermore, all stakeholders need to work together with civil society (COM, 2010). Indeed there is an observable shift in the way governments, foundations, civil society organisations and corporations work together when looking for these solutions (Cavallaro et al., 2014).

Science nowadays had to serve societal needs and has been prompted to solve present problems. A recently presented study, which had been carried out within the web of science (David Kaldewey of the University of Bonn. WZB Tagung 8. / 9. 10. 2015, Berlin) has been able to observe a linguistic change from the word ›problems‹ into the word ›challenges‹, which seems to implicitly assume that science and technology would also be able to solve those.

3.5 Blurred Boundaries and Shared Responsibility

In their epochal work »See-through Science«, Wilsdon and Wills summarised as follows: »As we have seen, the science community has travelled a long way in a short time. In less than 20 years, the style of its conversation with society has changed from the patronising tones of ›public understanding‹ to the warmer banter of dialogue. Now it is changing again, to a more honest and reflective mode of listening and exchange« (2004, p. 56). Indeed new co-evolutionary, co-production processes have been »redefining the meanings of science and the public, knowledge and citizenship, expertise and democracy« (Bucchi & Neresini, 2008, p. 476).

A rising emphasis on a responsible development of the knowledge economy seems to be the latest manifestation of a longer historical trend reimagining the relationship between science and society. This trend has been observable through a range of developments, the implementation of practices such as technology assessment, the increasing institutionalization of Public Engagement activities and the research on ethical, legal and social aspects in technology development (Wickson & Carew, 2014). Once it was finally acknowledged »that interactions between science, civil society and the wider public can generate new forms of social intelligence and create mutual benefits by stimulating new directions for innovation« (EC, 2007, p. 10), the need to renew the social contract between science and society was expressed. This new social contract should ideally replace the outdated post-war contract, which had »granted public support and a large autonomy to scientists, while the public was supposed to passively receive the ›benefits‹ of scientific and technological advancement in return« (Bensaude Vincent, 2014, p. 240). Some STS scholars have pleaded that science should even move beyond a contractual relationship with society and »join in the quest for the common good« (Mitcham & Frodemann, 2000). This would also mean »to give up a well-established division of labour that reflects a consequentialist framing of responsibility« (Stilgoe et al., 2013, p. 1569). This understanding of responsibility has usually been concerned with the products of science and innovation or particular impacts that were later found to be unacceptable or harmful to society or the environment. But the new shared »moral labour« (Rip, 2014) reflects an understanding of responsible choices that could be made in the future, »through anticipating and gaining knowledge of possible consequences and building capacity to respond to them«. This means a reframing of responsibility and new approaches which aim at opening up scientific governance (Stilgoe et al., 2013).

Jasanoff describes this development as a »constitutional moment in which the rules of governing science and technology are being fundamentally rewritten, altering the relations between citizens, experts and the state« (van Est, 2011, p. 639 cited after Jasanoff 2011).

3.6 New Forms of Science and Technology Governance — the Rising of RRI

Three major trends are accompanying this shift as summarised by Banthien et al.: First, political and administrative decision-making is becoming more open and transparent. Second, policy-circles,

previously rather closed are breaking up and new actors, increasingly from civil society, are becoming involved. This means that also the basis of policy relevant knowledge is getting more inclusive and expertise is becoming »democratised«. And thirdly as already described above, there is a tendency to interactivity: New forms of decision-making are emerging where top-down approaches are to be superseded by mutual receptivity. The common cause of these trends lies in the increasing complexity of the societal and scientific frames for science and technology policies (Banthien, 2003). As has already been stated, a rather long time ago, it has finally become obvious that »the most important problems facing society need political solutions rather than scientific ones« (Biggins, 1978, p. 56). This shift also reflects the insight that it is not »technology as such which influences society and therefore should be shaped according to society's needs, expectation and values, but it is innovation by which technology and society interact« (Grunwald, 2011, p. 16). Because when the issues become more and more complex and there are »high levels of uncertainty, indeterminacy and strongly divergent interpretations of facts and values, the net of potential participants needs to be cast much wider« (Burgess & Chilvers, 2006, p. 718). This also reflects an awareness of an often »unpredictable nature of innovation, its interaction with society, and the need to put in place processes to understand this and feed back into decision making« (Owen & Goldberg, 2010, p. 1702). We now know that different scientific and technological choices will have different impacts on society and the planet, and therefore the implicit assumptions that frame these choices have to be discussed (Steinhaus, 2013). The discourse has to be opened up to new questions, one of the most relevant being »which future do we want science and innovation to bring into the world« (Owen et al., 2012). This is seen as the departure point for responsible innovation (RI). The first role for RI now is »to create spaces for an inclusive discussion of envisioned applications and impacts, opening these up to broader deliberation in the context of values, empowering social agency in technological choices (cf Stirling 2008), which are in turn made more publically accountable (cf Jasanoff 2003). Why do it? How is it framed? What future could it bring? Is this desirable? What are the motivations? Who will benefit?« (Owen, 2014b, p. 114).

To answer these questions, a participatory turn towards a wider and more inclusive praxis where the public and other stakeholders get a role and a say, are increasingly in demand. For the EC it has

become »a pivotal element« for »improving its legitimacy and particularly in trying to tackle the Societal Challenge with a more societally relevant and desirable research and innovation approach« as (Olesen, 2015) has reported. Accordingly, calls have arisen for more reflective and deliberative roles for a broader set of actors, »so that the purposes, motivations and possible ramifications of innovation are taken into account early on and can inform decision-making about choices that must be made in the here-and-now« (Guston et al., 2014, p. 3).

However, it has also become obvious, that societal needs and ethical aspects in research and innovation have only been insufficiently considered so far. As put together by an expert group in their interim report of the Science in Society programme, a diagram (as shown in figure 1) shows all underlying causes that would not yet support the idea of Responsible Research and Innovation (RRI).

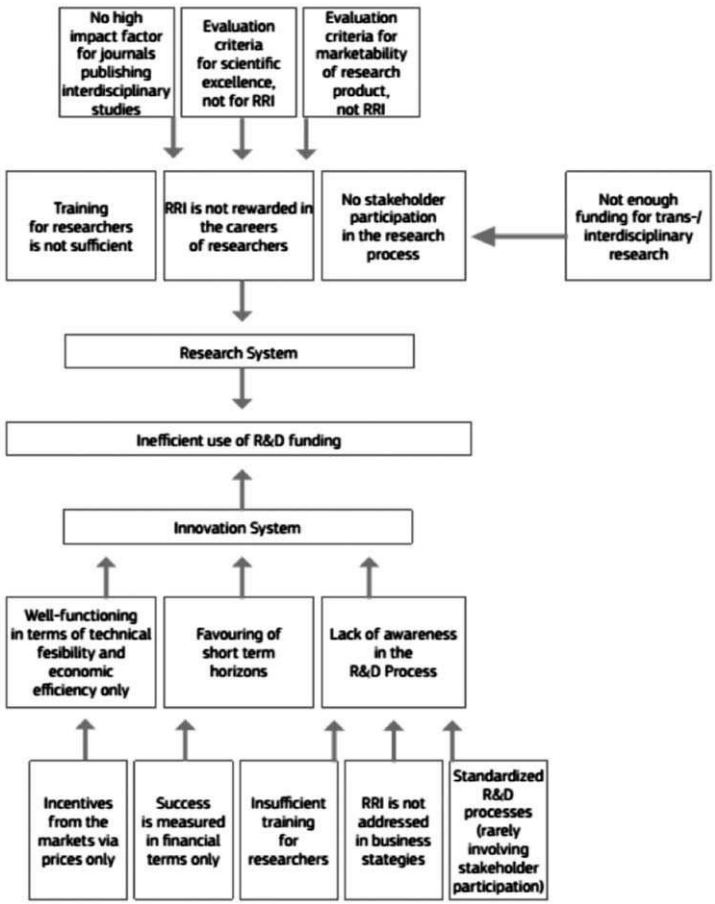


Figure 1:
Overview on the underlying causes of not fostering RRI standards (Source: European Commission, 2013, p. 18)

This diagram makes clear that, besides the formulation of a new concept, many fundamental changes need to be undertaken. RRI implies changing roles for the various actors involved in science and technology development and embedding them into society. RRI will also be part of a broader institutionalization process. »It will be shaped by it, but shape it as well, also by making it more reflexive« (Rip, 2014, p. 7). RRI will thus reinforce »its embedding in an evolving division of institutional and moral labour in handling new technology in society« (Rip, 2014, p. 8). For Rip this means that the emergence of RRI indicates that a next phase of the settlement between science and society is nearing.

4 The RRI Concept in Brief

An acceptable innovation
is not necessarily a responsible innovation.
Michel Callon

Responsible Research and Innovation is a theoretical concept, which is quite new and still rather vague. However, there do already exist many interpretations and understandings. This chapter does not provide a full compilation about existing definitions, but shows the most commonly used understandings as are being currently discussed. It describes its main features and requirements. It also gives an overview about understandings and interpretations and connecting options to other existing concepts.

4.1 The Emergence of RRI

Following the changing relationship between science and society as described above, some argue that many of the ideas and principles underpinning RRI could be already traced back to the Enlightenment (Stahl et al., 2014). However, of course the history of the term RRI began much more recently. The general conceptualisation of RRI first appeared in the US, when an initiative to strengthen nano-technological research was promoted. After this, the European Commission followed in 2004 with its communication ›Towards a European strategy for nanotechnology‹ (COM, 2004). With this, RRI began with a declared aim to identify and address uncertainties and risks related to emerging research areas beginning with nanotechnologies, then moving to environmental and health sciences like synthetic biology and later expanding to computer sciences, robotics, informatics and ICT (Eden, Jirotka & Stahl, 2013). From these beginnings a broader discourse has started which now comprises policies as well as academic contributions (Stahl, 2013).

In 2001, the Directorate-General for Research and Innovation of the European Commission launched its action plan »Science and Society« as a common strategy to connect science and citizens. Within the 7th EC Framework Programme in 2007, Science and Society became Science in Society (SiS), with the main objective being »to foster public engagement and a sustained two-way dialogue between science and civil society« (European Union, 2012, no pages). From 2010 onwards, SiS has been focused on developing a new framework, which will further elaborate the collaboration of science and public actors, but also address the grand societal challenges Europe is facing today. These aspects need to be encompassed in one approach. It entails that »societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society« (European Union, 2012) and to connect research and innovation with the futures in which they play a part (European Commission, 2013). In the context of Science with and for Society (SwafS — http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-swfs_en.pdf, retrieved 2nd March, 2016) programme of the European Commission, the idea of RRI has finally become an integral part for the orientation in the European research area and RRI was implemented as strategic principle in Horizon 2020 programme.

A great number of initiatives have consequently been undertaken. »These initiatives include

— considering societal needs and ethical aspects in research funding programs, e. g. through public and stakeholder dialogue;
— developing criteria for the early appraisal of research and innovation, e. g. technology assessments;
— establishing processes to better integrate societal needs in research and innovation, e. g. trans-disciplinary approaches in sustainability science;
— setting up advisory bodies such as councils on ethical aspects of new technologies

These activities, and the rationale behind them, fall under the umbrella of ›Responsible Research and Innovation‹ (RRI)« (European Commission, 2013, p. 12).

4.2 Definitions

Various actors and initiatives have in succession proposed definitions for RRI in the past few years (e. g.: EPSRC — Framework for Responsible Innovation), Jacob et al. 2013; Owen et al. 2013; Sutcliffe, 2011, European Union et al., 2013, Owen et al., 2012, Sutcliffe, 2011, Stahl, 2013, Stilgoe et al., 2013, Klaassen et al., 2014) the most prominent probably by von Schomberg, which reads as follows:

> *»Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)«*
> (von Schomberg, 2011, p. 9).

This definition, which has been critically discussed, however, underlines the intention of ensuring acceptability, sustainability and desirability of both, the innovation process and the (marketable) products of innovation. And it requires the mutual responsiveness of various societal actors (Stahl et al., 2014). Lastly, a product dimension and a process dimension has to be considered under the conceptualisation of RRI. Stilgoe et al., in their work of developing a framework on RRI, integrated the prospecting aspect and offered a broader definition in developing a framework of RRI. This framework has originated from a set of questions that emerged within public debates about new areas of science and technology, questions that public groups typically ask of scientists, or would like to see scientists ask of themselves and has been summarized in the following definition: »Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present« (Stilgoe et al., 2013, p. 1570). Recently, conference participants of the Science in Society-Responsible Research and Innovation conference in Rome 2014 agreed on the following common understanding: »Responsible Research and Innovation (RRI) is the on-going process of aligning research and innovation to the values, needs and expectations of society« (SiS-RRI Conference, 2014).

Another recent account of RRI is argued for by van den Hoven (2013). Responsible Innovation should be understood as »an activity or process which may give rise to previously unknown designs either pertaining to the physical world (e. g. designs of buildings and infrastructure), the conceptual world (e. g. conceptual frameworks, mathematics, logic, theory, software), the institutional

world (social and legal institutions, procedures and organization) or combinations of these, which when implemented expand the set of relevant feasible options regarding solving a set of moral problems« (van den Hoven, 2013, p. 82).

Timmermans and Stahl (2014) have identified eight different definitions. But all of them have associated RRI as a process or as an activity. Mainly three framings have been offered so far. RRI was either framed as »a process aimed at R & I«, or »a requirement to the R & I process«, or as »part of the R & I process« (Timmermans & Stahl, 2014, p. 37).

Hence, a common understanding of only one definition and its main characteristics is still a work in progress, however, although all the definitions proposed so far »differ in the terminology they use, the orientation they adopt, the depth of description they provide and where they place emphasis… they do have overlapping features that suggest a loosely agreed set of core characteristics« (Wickson & Carew, 2014, p. 255). »All express a need to develop greater democratic accountability within the innovation lifecycle. In this way, stakeholders would be obliged to justify the reasons for a particular research strategy, project, outcome, product or service by identifying and discussing both the potential negative as well as positive societal consequences« (Eden et al., 2013, no pages). Furthermore, although the concept of Responsible Research and Innovation is a relatively new one, in many respects it could be seen as a natural extension of other discourses, for instance, the discourse on computer ethics (Stahl et al., 2014). To combine all these understandings and to build on established discourses, different definitions and agreed core characteristics, one of the currently EC funded projects for supporting the implementation of RRI — the RRI Tools project (https://www.rri-tools.eu) produced a working definition to be discussed with different stakeholder groups across Europe:

> *»Responsible Research and Innovation is a dynamic, iterative process by which all stakeholders involved in the R & I practice become mutually responsive and share responsibility regarding both the outcomes and process requirements«*
>
> (Klaassen, Kupper & Broerse, 2014, p. 4).

Accordingly it offers a framework of understanding which encompassing three different axes:

— The expected outcomes
— The process requirements
— The policy agendas (the EC key dimensions)

4.2.1 Expected outcomes

The RRI Tools consortium has developed a thematic categorisation of three categories of RRI outcomes (see figure 2):

Figure 2: RRI Outcomes (Klaassen, Kupper & Broerse, 2014, p. 4)

The learning outcomes mean empowered and responsible actors of all stakeholder groups and also structures and organisations which create opportunities and support for actors to bear responsibility. The R & I outcomes must be ethically acceptable, sustainable and socially desirable. It needs continuous meaningful deliberation with societal actors.

Solutions to societal challenges address the seven Grand challenges as defined by the EC (e. g. health and demographic change, food security, climate action).

4.2.2 Process Requirements

Taking into consideration the AREA-Framework (Anticipate, Reflect, Engage and Act) (ESPRC — Framework for Responsible Innovation) and its expansion, Stilgoe et al. have developed a framework on RRI with four main dimensions (Stilgoe et al., 2013). The RRI Tools consortium (with Stilgoe as partner) elaborates the following eight aspects which are divided into four clusters of requirements (see figure 3):

1. Diversity and inclusion
2. Anticipation and reflection
3. Openness and transparency
4. Responsiveness and adaptive change

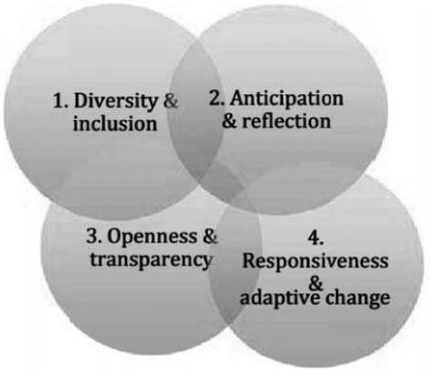


Figure 3: RRI Process requirements (Klaassen, Kupper & Broerse, 2014, p. 5)

In the following section, descriptions and some considerations on each aspect are put together for a better understanding and illustration of each cluster.

4.2.2.1 **Diversity and Inclusion**

RRI should involve a wide range of stakeholders, already early in the development life cycles of innovation and technology to broaden and diversify the sources of expertise and perspectives. »In this respect, inclusive practices should lead to diverse practices. Alternately, diverse practices are more likely to be inclusive« (Klaassen et al., 2014, p. 5). For Stilgoe et al. »diversity is an important feature of productive, resilient, adaptable and therefore responsive innovation systems« (Stilgoe et al., 2013, p. 1573). As innovations should primarily serve societal needs, societal complexities and ethical problems should be anticipated by involving stakeholders (Taebi et al., 2014).

4.2.2.2 **Anticipation and Reflection**

Anticipation means both, »understanding how the present dynamics of research and innovation practices shape the future, and envisioning the future« (Klaassen et al., 2014, p. 5). It prompts one to ask oneself ›what if?‹ questions. Therefore anticipation »involves systematic thinking aimed at increasing resilience, while revealing new opportunities for innovation and the shaping of agendas for socially-robust risk research« (Stilgoe et al., 2013, p. 1570).

In order to act proportionally, reflection is also required. Reflection concerns both »definitions of the problem(s) at issue, commitments, practices, and individual and institutional values, assumptions and routines« (Klaassen et al., 2014, p. 5).

For Stilgoe et al., reflexivity asks researchers and innovators to think about their own ethical, political or social assumptions to enable them to consider their own roles and responsibilities in research and innovation as well as in public dialogue. Reflexivity should raise awareness for the importance of framing issues, problems and the suggested solutions (Stilgoe et al., 2013).

4.2.2.3 Openness and Transparency

These are the main conditions for accountability, and for the public to establish trust. But more openness does not necessarily leads to more trust, therefore »the information has to be tailored to the needs of stakeholders in order to make sense to them« (Klaassen et al., 2014, p. 5).

4.2.2.4 Responsiveness and Adaptive Change

»Responsible innovation requires a capacity to change shape or direction in response to stakeholder and public values and changing circumstances … it must be situated in a political economy of science governance that considers both products and purposes« (Stilgoe et al., 2013, p. 1572). Responsiveness refers to the flexibility »when it becomes apparent that the current developments do not match societal needs or are ethically contested« (European Commission, 2013, p. 58). Therefore, responsiveness can be seen as a »condition for adaptive change« (Klaassen et al., 2014, p. 5).

The European Foundations Award for Responsible Research and Innovation (which closed in November 2016) relied on these four clusters as assessment criteria: http://www.efc.be/news/call-for-proposals-for-the-european-foundations-award-for-responsible-research-and-innovation/?hq_e=el&hq_m=3936409&hq_l=7&hq_v=c8723a3cda (accessed September 21, 2015).

4.2.3 Policy Dimensions

The EC has identified six key components (the six »keys«) for the RRI framework (European Union, 2012), as shown in figure 4. RRI Tools have re-ordered and re-formulated these keys into policy agendas. They should be seen as powerful policy agendas with their own potential to realise the defined process of requirements and outcomes.

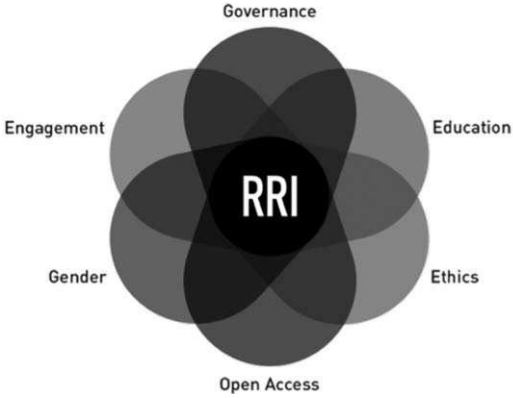


Figure 4: Key dimensions/policy agendas (Klaassen, Kupper & Broerse, 2014, p. 5)

4.2.3.1 **Governance**

The EC defines governance as the umbrella for all the other dimensions (European Union, 2012). For RRI Tools, they need to have governance arrangements that are »robust and sufficiently adaptable to unpredictable development« and that are »familiar enough to align with existing practices«, »share responsibility among a large variety of actors« and also »provide instruments to foster this shared responsibility« (Klaassen et al., 2014, p. 6). RRI should be supported by governance that facilitates research and innovation processes and achievements, which follow particular normative principles, objectives and outcomes (Res-AgorA-Project 2013). For the EC expert group, the focus of governance has accordingly shifted to »reaching consensus in a network of relevant stakeholders« … Therefore it needs an »active participation of all relevant stakeholders in developing a responsible research and innovation policy« (Strand & Spaapen, p.19). For von Schomberg »the challenge is to arrive at a more responsive, adaptive and integrated management of the innovation process« (von Schomberg, 2012, p. 13).

4.2.3.2 **Science Education**

Citizens should be better equipped with knowledge and skills to be able to participate in research and innovation debates, but also to »take responsibility in the research and innovation process«. »Creative thinking calls for science education as a means to make change happen« (European Union, 2012). The numbers of researchers should increase, scientific vocations should be promoted (Klaassen et al., 2014).

4.2.3.3 **Ethics**

RRI »must respect fundamental rights and the highest ethical standards« (European Union, 2012a). »The ultimate goal in this field is that human being, animals and other objects of research are duly protected« (Strand & Spaapen, 2015, p. 36). This dimension also entails »the ethical acceptability of scientific and technological developments« and »research integrity: the prevention of unacceptable research and research practices« (Klaassen et al., 2014).

4.2.3.4 **Open Access**

»Share results to advance« — this means free online access to the results of »publicly-funded research (publications and data)« (European Union, 2012). »Free and earlier access to scientific work might improve the quality of scientific research and facilitate fast innovation, constructive collaborations among peers and productive dialogue with civil society« (Klaassen et al., 2014).

4.2.3.5 **Gender**

»Gender equality«, in the context of RRI policies should mean both: the promotion of »equal participation of men and women in research activities« … »and integration of gender perspectives in research and innovation content (Strand & Spaapen, 2015, p. 28).

4.2.3.6 **Public Engagement**

It means joint participation »of all societal actors — researchers, industry, policy-makers and civil society«. »Moreover, mutual learning and agreed practices are needed to develop joint solutions to societal problems and opportunities« (European Union, 2012). The RRI processes should be »collaborative and multi-actor«, (including educators), who »work together during the whole research and innovation process in order to align its outcomes to the values, needs and expectations of European society« (Klaassen et al., 2014, p. 6) (See more details on RRI and Public Engagement in chapter 5)

The European expert group (Strand & Spaapen, 2015) has defined two more dimensions:

— Sustainability
— Social justice (inclusion)

Considering all three axes as described above, the RRI Tools consortium and its advising experts reached the agreement that those two dimensions were already subsumed under the headings of process requirements or outcomes or the other policy agendas and

were, therefore, not separately elaborated.

As there are no routines or established best practices as yet for actors to fall back on (Krabbenborg & Mulder, 2015), the RRI Tools project has started collecting and assessing »promising practices« of RRI to make the »translation« from theoretical notions of RRI to practical RRI standards and tools (Klaassen et al., 2014, p. 6). However there is still much room for interpretation of the concept, including critiques on practicability and meaning. The following sections should provide some considerations as expressed by different actors.

4.3 Interpretations

As described above, there still exist different definitions and understandings of the RRI concept, between and also within respective stakeholder groups. It needs much more discussion and also experience for all stakeholder groups to tackle the concept and assess its usability and appropriateness. For many, what RRI amounts to is difficult to define (Asveld et al., 2015), and the goals of RRI have to be made clear (Randles et al., 2012). Initial reactions have already rejected the academic discourse (Sutcliffe, n. d.), while others blame it for being a superficial political appeal which runs the risk of instrumentalisation (Owen et al., 2012). As RRI remains overly vague, others fear that »the interpretive flexibility of RRI will be so broad as to render the concept meaningless« (Wickson & Carew, 2014, p. 256). It must be remembered, however, that RRI is explicitly a »normative concept« (Timmermans & Stahl, 2014, p. 21).

The term RRI — Responsible Research and Innovation functions as a »buzzword«, which means that the word comes first, and stakeholders and actions follow afterwards. As RRI was introduced in a rather top-down manner, without having a clear and stable profile, now the research community and societal actors »are being explicitly invited to populate the term with meaning« (Wickson & Carew, 2014, p. 257). Bensaude Vincent explains that »buzzwords are prescriptive but not imperative. They peacefully recruit people through more subtle ways, as they spread from mouth to mouth, from paper to paper, from institution to institution. Their performances increase as the number of people who catch them and include them in their own agendas increases« (Bensaude Vincent, 2014, p. 246). Similarly, RRI could also be seen as quasi-object which is »defined by its capacity to generate a collective by circulating from hand to hand. Like the ball in football or rugby creates a collective and generates interesting stories for the duration of a

match, successful buzzwords have the capacity to assemble people and create the grand narratives that shape the cultural landscape for a few years … In this respect they are epoch-markers and they play a key role in cultural history« (Bensaude Vincent, 2014, p. 248f). According to Rip »RRI appears to mobilise various actors and will already for that reason have effects« (Rip, 2014, p. 1).

RRI is often described as representing a new mode of research governance (Stahl et al., 2014), or a new socio-technological regime (Longen, Hoffmann & Weyer, 2015). But it is also regarded as an upcoming paradigm shift, which will offer new mental models. This means the frames and references that define how we view the world. Owen (following concepts of innovation management) has mapped the innovation space according to four dimensions: product, process, position and paradigm (which are shown in Figure 5).

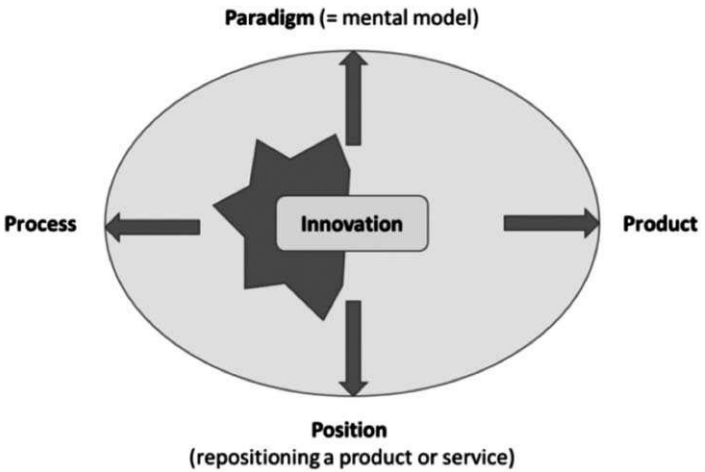


Figure 5: Locating RRI (dark blue) within the innovation space (light blue). (Source: Cavallaro et al., 2014, p. 14, modified after Owen, 2014a)

Owen regards RRI foremost as a process innovation, »as it proposes different ways of organising, funding, undertaking and engaging with innovation and research leading to this«, He sees RRI as a process which is building on foundations (e. g. technology assessment, stakeholder and Public Engagement, anticipatory governance etc.) and evolutionary in nature. »It integrates many of these foundations and aims to embed them into the policies and processes of innovation. In doing so this RRI re-positions and reframes these antecedents. Fundamentally, by repositioning these (e. g. within Horizon 2020) it offers a new mental model for innovation policy and its delivery, a potential paradigm shift that

may present profound opportunities for Europe« (Owen, 2014a, no pages). Implementing RRI could also mean a paradigm shift in the perception of who is responsible and what is responsible or what is irresponsible research and who should be involved in research and innovation processes.

The development of governance frameworks, however, is still in the making and is the main objective of current EC projects, as for instance the Res-AGorA project (Lindner, Goos & Kuhlmann, 2015). For Grunwald, RRI extends a general model and philosophy of technology assessment by incorporating perspectives of applied ethics and science and technology studies. Responsible innovation can be regarded as a »radicalisation« of post-normal science, but »closer to social practice, being prepared for intervention and for taking responsibility for this intervention« (Grunwald, 2011, p. 17). RRI as a nascent concept is considered as being a »monolithic concept« that will undergo more differentiation of different fields and areas of application in the coming future, as it was for instance the case in technology assessment (Ralf Lindner, ITA conference 2014). RRI is therefore »an amalgamation, culmination, or latest manifestation of various activities and fields of practice, a singular universally accepted definition of RRI has yet to fully crystallize« (Wickson & Carew, 2014, p. 255). For Rip, RRI is an ongoing patchwork with some patterns but no overall structure« (Rip, 2014, p. 2). For him, this »temporary coherence« could later diverge again when »patchwork dynamics reassert themselves« (Rip, 2014, p. 2). In evolving further, it will be likely that there will »be more than one flavour of RRI« as Stahl already anticipates. But he also hints at differences which could be characterised as »strong« and »weak« RRI (Stahl, 2013, p. 713). However, »there are highly interesting and complex discussions hidden within the concept of RRI« (Iatridis & Schroeder, 2016, p. 5) when looked at more closely.

The concept is seen as having an advantage because of its »aggregative aspect« which is at the same time its biggest disadvantage, because of its »all encompassing character« (Callon & Lacoste, 2012). RRI is considered as an »umbrella concept seeking to bring together and unite the different areas of focus, dimensions of interest and actors … seeking applicability across both public and private actors engaged in research and innovation and their governance and regulation« (Wickson & Carew, 2014, p. 256). RRI could thus constitute a »convenient way to refer to the different problems that innovation can foster, especially in relation to social consequences […] Responsible innovation is, in a way, a collective

statement: an expression that gathers together a variety of communities, groups and viewpoints around a shared concern« (Callon & Lacoste, 2012, p. 20). Responsible innovation for Taebi et al. could best be conceptualized as an »endorsement of the relevant public values during the innovation process« (Taebi et al., 2014, p. 118). National platforms, e. g. the »Plattform RRI Österreich« are currently discussing RRI, carrying out common understandings of the concept. In Austria, RRI is seen as a broad approach for critical reflection and the further development of research and innovation and the opening up of science towards society and its needs (Föger et al., 2015 transl. i. M).

Some, therefore, regard RRI as an attempt for social innovation ranging from discursive and cultural innovation to institutional and practices innovation. Thus for Rip, it is the »roles and responsibilities of actors and stakeholders in research and innovation« (Rip, 2014, p. 2) that are being innovated. Following definitions of social innovation, as with technological innovations, a social innovation is new and uncertain, and distributed. It is created by new combinations of social practises (Hochgerner, 2012). To get »taken up, institutional changes and sub-cultural changes (where different actors have to change their practices) are necessary« (Rip, 2014, p. 8). This is part of larger processes and it is »creating openings in existing divisions of moral labour, not just of scientists and technologists, but also industrialists, government actors and society actors« (Rip, 2014, p. 9).

RRI takes a broader view of the entire research and innovation lifecycle (Eden et al., 2013). For Stahl, RRI is meant to address »the gap in time between the initial phases of research strategy formulation to the point at which individuals and organizations regularly use products and services based on research output« (Stahl et al., 2014, p. 815).

RRI also introduces a new broader understanding of responsibility which includes more societal actors for shared liabilities. The EPSRC statement of commitment to RRI (EPSRC, n. d.) stresses that »this is a collective responsibility, where funders, researchers, stakeholders and the public all have an important role to play and which goes beyond considerations of risk and regulation« (Owen, 2014b, p. 116). For Stahl, the novelty of RRI »lies in the fact that it coordinates existing responsibilities and improves the conditions of their successful discharge or execution« (Stahl, 2013, p. 712). He defines RRI as a »higher-level responsibility or meta-responsibility that aims to shape, maintain, develop, coordinate and align

existing and novel research and innovation-related processes, actors and responsibilities with a view to ensuring desirable and acceptable research outcomes« (Stahl, 2013, p. 712).

In order to discuss these, he suggests »viewing RRI as a space constituted by activities, actors and norms« (Stahl, 2013, pp. 710–711). Figure 6 (as shown below) illustrates two separate attempts to graphically represent this space. Communicative spaces (already mentioned by Habermas (1996) were also described by Westhues et al. who were encouraging communicative spaces in successfully implementing their participatory processes (Westhues et al., 2008).

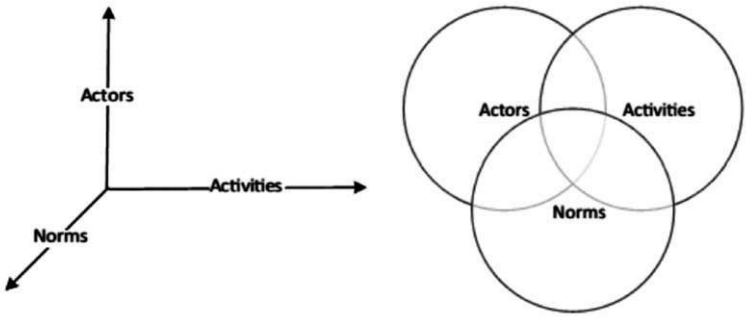


Figure 6: Two different attempts to graphically represent the space of RRI (Stahl, 2013, p. 710)

With the evolvement of RRI, new processes, new institutions and new spaces also emerge (Burgess & Chilvers, 2006). RRI creates spaces and processes to explore innovation »in an open, inclusive and timely way« (Owen, 2014, p. 116). RRI can thus be seen as space for interaction and platform for reflection (Krabbenborg & Mulder, 2015, p. 475). Eden even suggests framing RRI not under the aspect of responsibility, but it could rather »be framed as a ›problem space‹. In this way RRI might be seen as a resource for innovation rather than a constraint« (Eden et al., 2013).

RRI is now in the process of being established and needs to provide practices, common understandings and quality criteria against those it could be evaluated. New curricula (as e. g. currently offered at universities of Wageningen and Delft) are being launched and open calls within the Horizon 2020 programme (SwafS) are asking for practical implementation and recommendations for all stakeholder groups.

5 The Importance of Public Engagement within the RRI Concept

Responsible innovation should not just welcome diversity;
It should nurture it.
Jack Stilgoe

Public Engagement is not only one of the six key dimensions of the RRI concept as previously described, but it is also often regarded as being its core feature. The following chapter describes its meaning and how it is reflected in RRI requirements and understandings.

5.1 The Core Dimension of RRI

As shown in the previous section, RRI is a complex concept encompassing many dimensions and process requirements, aiming at a range of different outcomes. However, »public engagement is the heart and spirit of RRI«. This statement given by Mikko Rask, as one of the Public Engagement 2020 project partners, puts a widely agreed understanding down to an essence: Public Engagement is the key feature of RRI. The project even regards it as the basis of RRI as figure 7 shows.

Figure 7: Engagement as basis for RRI
(Source: http://engage2020.eu/news/webinars-in-engage2020/)

It is described as the »first key« (of six) of RRI, as introduced under the headline »choose together« by the EC (European Union, 2012). The interim evaluation report of future options for science in society actions (FraunhoferISI & TechnopolisGroup, 2012) study affirmed the central importance of Public Engagement for Responsible Research and Innovation. »Contributors supported the idea that efforts should be made to raise the competencies of the general public to enable citizens to better engage with science and technology, and that social platforms should be promoted as a means to broaden the interest of civil society in science and technology and to enable their greater input into agenda setting« (FraunhoferISI & TechnopolisGroup, 2012, p. 41).

Sutcliffe's wordcloud on RRI terminology for her report on the RRI concept, clearly shows with the most often used word — which is »public« (see figure 8) — the important role of the public within the RRI context.

Figure 8: Frontpage of »A report on Responsible Research & Innovation (Sutcliffe, 2011, p. 1)

When looking at an understanding of RRI activities or collecting associations, Public Engagement would be the first aspect to be mentioned. Collecting best practise examples on RRI (as done within the RRI Tools project) showed that almost all — 87 % — of the selected practices focus on Public Engagement. (They were followed by science education 55 %, as compared to governance and ethics which were addressed in about half of the practices (48 %), open access was addressed in 39 % and gender only in 19 % of the collected best practises on RRI) (Kupper et al., 2015).

A RRI Tools stakeholder consultation across Europe, discussing opportunities and obstacles of RRI identified the cluster »bringing science and society closer« as the core opportunity, »highlighting the need for a two-way exchange between science and society and

the possible contribution(s) of society in the way science is done« (Smallman, Lomme & Faullimmel, 2015, p. 21).

The very first definitions and frameworks that attempted to sketch the RRI concept emphasised the importance of Public Engagement, which is after all reflected in all dimensions (see chapter 4). Public Engagement and to take into account the public interest are seen as commitments to openness and transparency. Inclusion means broadening the understanding of with stakeholder engagement towards inclusion of the wider public. Responsiveness is reacting to new knowledge, perspectives and views which entails collaboration with societal actors, and finally reflexivity, mirroring one's own and institutional activities and assumptions which is not meant to be private self-critique, but is now becoming a public matter (Stilgoe et al., 2013). As RRI needs to engage with the possible consequences of research and innovation, »parts of the definition includes the public engagement of different stakeholders, a group which includes researchers and research funders as well as civil society and policymakers« (Stahl, 2013, p. 709). Assessment and Public Engagement approaches were seen as a »mechanism that considers technical risk issues and associated uncertainties, but that could also provide opportunities for identifying as yet unforeseen effects (economic, societal, and ethical) as these emerge« (Owen & Goldberg, 2010, p. 1705).

One effect of the changed relation of science and society (see chapter 3) was that citizens now resumed a new role within the RRI concept. Their active participation in the dialogue between science and society was defined as a key point of the European science and innovation strategy. EC communications stressed that if citizens and civil society were to become real partners in the debate on science, technology and innovation, it was not enough to simply keep them informed, but they must be given »the opportunity to express their views in the appropriate bodies« (Cavallaro et al., 2014, p. 17 after EC 2002).

Moving away from an ideologically based participatory movement of the 60s, Public Engagement had now become a new more pragmatic approach. As defined by the PE 2020 project Public Engagement constitutes activities with a »distinct role for citizens or stakeholder groups in research and innovation processes. Characteristic to such processes is that they involve new types of interactions between ›laymen‹ and ›scientific actors‹« (Maiukait-Žvinien et al., 2014, p. 8). The involvement and, even more the engagement of end-users and the society in general was seen as »a necessary

path towards the implementation of RRI, making innovation with and for end-users and society more effective, ethical and societally desirable« (Cavallaro et al., 2014, p. 36).

Finally, this idea of active knowledge exchange and stakeholder engagement, already during the process of knowledge production itself, »revives a long-established discussion regarding contrasting ways of conceiving of the relationship between science and society« (Phillipson et al., p. 57). Consequently, the RRI framework articulated the six key action points or policy dimensions, in which the first was defined as »›upstream‹, inclusive, and transparent engagement of all societal actors, researchers, industry, policymakers and civil society in science governance decision-making«. Engagement was defined as »a mutually beneficial interaction« in contrast to involvement (Cavallaro et al., 2014, p. 14). As research and innovation needed to be beneficial to all stakeholders, who should therefore also be involved in all aspects of RRI, the concept was meant to »move beyond the researcher and expert-centred view of research and innovation and therefore explicitly seeks to include a broader set of stakeholders« (Stahl, 2013, p. 710).

Responsible innovation requires »identification of the relevant public values«. Such values must be drawn »from the experience of the public«, in other words, by »deriving or extracting them from public debate« (Taebi et al., 2014, p. 119). In articulation of a key question — ›what kind of future do we want science and innovation to bring into the world‹ (Owen et al. 2012) — one of the objectives for RRI is »to create spaces for an inclusive discussion of envisioned applications and impacts, opening these up to broader deliberation in the context of values, empowering social agency in technological choices« (Owen & Goldberg, 2010, p. 114). And as the editors of the new Journal of Responsible Innovation put it: »How do we want to coexist with the other inhabitants of planet earth? What are our duties toward them, and toward future generations, with the innovations we choose to introduce or forego? Such questions require public debate and reflection about the desirability of these technologies« (Guston et al., 2014, p. 4). It was seen as doubtful that any group of experts could manage the uncertainty and ambiguity concerning societal impacts in a responsible way. »For this reason, current approaches to public engagement and deliberation involve a broader scope of stakeholders explicitly including laypeople without specific expert knowledge« (Scholl, Petschow, & Ferdinand, 2012, p. 4).

RRI includes the »consistent, ongoing involvement of society,

from beginning to end of the innovation process« (Sutcliffe, 2011, p. 3). Therefore, responsible innovation requires a capacity to change in response to stakeholder and public values and circumstances as they emerge (Stilgoe et al., 2013). In moving »towards a system of public engagement«, despite the use of participative methods in the R&I system, it needs a supportive community of practitioners (Engage 2020, 2015, p. 3). One of the RRI challenges is now to be innovative and inclusive for the involvement of the public within all stages of research and innovation (Sutcliffe, 2011).

The EC Science in Society work programme has already reinforced the societal dimensions (Siune et al., 2009), and implicitly set the beginning of Public Engagement in research. The new European Research and Development Framework Program, Horizon 2020, now explicitly includes Public Engagement in its approach in order to achieve Responsible Research. Public Engagement is becoming an integral part of innovation trajectories. As formulated by Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science: »After ten years of action at EU level to develop and promote the role of science in society, at least one thing is very clear: we can only find the right answers to the challenges we face by involving as many stakeholders as possible in the research and innovation process« (European Union, 2012). This also »demands that institutions of science and technology become more responsive to societal needs, issues, and concerns and include these issues in decision-making processes (Krabbenborg & Mulder, 2015, p. 453). In January 2015, EC policy makers (policy officers, heads of operational units and other EC staff) participated in a two-day training on Public Engagement. The objective was mainstreaming an understanding of what Public Engagement is and how it could match the needs in RRI. The organisers reported great support and demand for similar events. For them this »support shows that the participatory turn towards a wider and more inclusive praxis where the public and other stakeholders get a role and a say is in demand. It is a pivotal element for the EC in improving its legitimacy and particularly in trying to tackle the Societal Challenge with a more societally relevant and desirable research and innovation approach« (Olesen, 2015, no pages).

It can be concluded that Public Engagement is now inevitable. However, for some projects or research approaches, stakeholder participation might not be relevant (e. g., basic research). In such cases, it is suggested that the other policy agendas (e. g.: gender, open access) still ought to be addressed, and at least »at

institutional level some sort of public engagement should be performed« (Malagrida, 2015, p. 5).

5.2 The Democratic Model

Participation in technology and innovation is related to understandings of democracy. With emerging new technologies, participatory democracy was ever more questioned. Increasingly unwilling to leave the political and moral questions in the hands of scientists and engineers, citizens and public interest groups called for more democratic approaches to technology policy development (Fischer 1999). For Durant, this »growing interest in an alternative, ›democratic model‹ … seeks to assimilate the relationship between science and the public to the terms of pluralist democracy« (Durant, 1999, p. 315). As it stands today, the RRI concept is meant to meet this requirement. For Stahl it is the reference to democracy that explains Public Engagement as one of the key aspects of RRI (Stahl, 2013). To »associate all the actors from which the success of the innovation shall depend« could be »called a movement of democratization« (Callon & Lacoste, 2012, p. 23). Von Schomberg, who provided the first working definition of RRI, describes two interrelated dimensions that he observed: the product dimension »and a process dimension reflecting a deliberative democracy« (von Schomberg, 2011, p. 9). The underlying rationale is »the idea that in a democracy, citizens should have a say in decisions about technological developments that will affect their lives and society in significant ways« (Powell & Colin, 2008, p. 131). This is not to say that Public Engagement is synonymous with democracy, at least not directly (Grand et al., 2015). However, there are many arguments of a similar nature, highlighting the participatory and thus more democratic way of decision making in technological innovations. If we talk and think about emerging technologies »for the sake of responsible research and innovation, we can also ask about ›responsible representation‹« (Nordmann, 2014, p. 93), meaning integrating a wider range of stakeholders and the public. This means there would no longer be ›scientific issues‹, which only specialist scientists can properly address, but »public issues involving science« (Wynne, 2014, p. 64).

The concept and its implementation, however, are still in their infancy. And to truly realise Public Engagement as the core dimension within RRI, many challenges and recommendations as described above have to be addressed. When anticipating obstacles for implementation of RRI in general and for Public Engagement

in RRI in particular, European stakeholders unsurprisingly mentioned many of those aspects (as shown in figure 9), which are not as yet sufficiently solved:

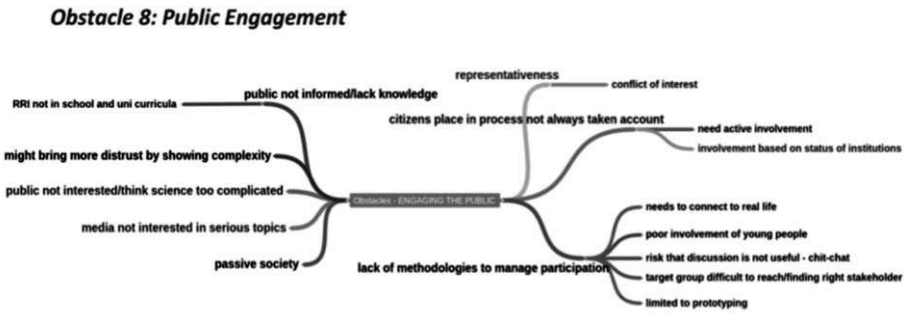


Figure 9: Public Engagement obstacles mentioned in European stakeholder consultation (Smallman et al., 2015, p. 57)

Participants described the »public as not being interested in science, not knowing enough about it, being too passive and not wanting to get involved; participants also expressed concern that the discussion won't be useful.« Also, the process itself was seen as a problem: »It is difficult to get a representative public; methodologies to manage participation aren't available; the target groups are difficult to reach; RRI topics aren't present in educational curricula; citizens' place in the decision making process is not always taken into account« (Smallman et al., 2015, p. 57).

One obstacle, which was not reported was the uninformed public. Only a few European citizens have already heard about RRI or have ever been involved in engagement activities. Given the results of the Eurobarometer on responsible innovation, »the concept of RRI needs to be communicated more broadly not only to institutions and individuals within the scientific community but also to organisations and individuals within civil society« (Eden, 2014, p. 130). The survey also shows that people, although they don't feel well informed, would agree to involve opinions of the lay public in decision making on innovation and technological development. Experiences revealed that uniformed persons are very well able to express their opinion on societal issues. It is not a question of understanding of the technology itself but of how it affects people's lives. »The public(s) are concerned primarily for what science »means,« rather than for how it »works« (Miah, 2005, p. 416). Or as it had been observed during in depth workshops on nanotechnologies with citizens: »Not the science, but rather the societal,

health and ethical issues were those they would like to discuss« (Marschalek et al., 2014, p. 147).

RRI is intended to »identify and accommodate public concerns when developing new technologies by engaging with a wide range of relevant actors in an interactive and transparent process«. It is unclear, however, how this process should look like (Asveld, Ganzevles & Osseweijer, 2015, p. 571). Ana Arana Antelo (Head of Unit B7 — Science with and for Society, DG Research and Innovation, European Commission, as in 2015) announced the introduction of »RRI test beds« in Europe (Lecture at Engage 2020 conference, November 9, 2015, Brussels) to ultimately be able to experience Public Engagement in RRI in practice and become more confident about what steps to take next. At the SiS-RRI Conference in Rome in 2014, (Science, Innovation and Society — Achieving Responsible Research and Innovation, http://engage2020.eu/) creating experimental spaces to engage civil society actors in the research process as sources of knowledge and partners in innovation (one point of the Rome declaration) were suggested.

There seems to be a long way to go, however, to move from a purely normative (that simply allows those affected by decisions to participate) or instrumental (which intends to reduce conflicts and rebuild trust) view »to a more substantive one, clearly emphasizing the large benefits to research and innovation systems« (FraunhoferISI & TechnopolisGroup, 2012, p. 42).

6 Participation

The involvement of even
very marginalised groups is possible.
Hella von Unger

To be able to discuss Public Engagement, one has to become clear about the general understanding of participation. Although there do not exist congruent definitions, it is still important to classify and locate the engagement activities within a wide spectrum of options. The following chapter seeks to provide a general introduction and presents concepts for classification. It also describes the embeddedness of the approach in different theories and concepts.

6.1 General understandings

Public participation is often used interchangeably with Public Engagement. Other terms sometimes used are public involvement, community involvement, or stakeholder involvement.

In general, it is a political principle or practice. It may also be recognised as a human right. After being discussed and implemented in the context of environment protection and sustainable development, international declarations have begun considering public participation as a fundamental right such as the Rio Declaration in 1992, and later, the Aarhus Convention, which came into force in 2001. It encompasses three fundamental pillars:

— Access to information: any citizen should have the right to get a wide and easy access to environmental information.
— Public participation in decision making: the public must be informed over all the relevant projects and it has to have the chance to participate during the decision-making and legislative process.
— Access to justice: the public has the right to judicial or administrative recourse procedures

(UNECE, 1998)

Generally, public participation seeks and facilitates the involvement of those potentially affected by or interested in a decision. Public participation may thus be regarded as a way of empowerment and as vital part of democratic governance (Principles of Public Participation, n. d.). According to the World Bank definition, participation is »a process through which stakeholders influence and share control over development initiatives, decisions and resources which affect them« (Rietbergen-McCracken & Narayan, 1998, p. 4, cited after World Bank, 1994). Public participation is the process by which an organization consults with interested or affected individuals, organizations, and government entities before making a decision. Or as defined by the international association for public participation, it is a »two-way communication and collaborative problem-solving with the goal of achieving better and more acceptable decisions. Public participation prevents or minimizes disputes by creating a process for resolving issues before they become polarized« (IAP2, n. d.).

The international organisation of Public Engagement has summarised seven core values for the practice of public participation, which best describe its main principles:

— Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
— Public participation includes the promise that the public's contribution will influence the decision.
— Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
— Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
— Public participation seeks input from participants in designing how they participate.
— Public participation provides participants with the information they need to participate in a meaningful way.
— Public participation communicates to participants how their input affected the decision.

(IAP2, n. d.)

However the term participation is often used in a very general fashion, and is presented almost as »an end in itself« (Jasanoff, 2003), »without any critical discussion of the precise aims to be achieved and the methods to be used to achieve these ends« (Felt & Fochler, 2008, p. 489). Participation is a ›buzz word‹ (Bensaude

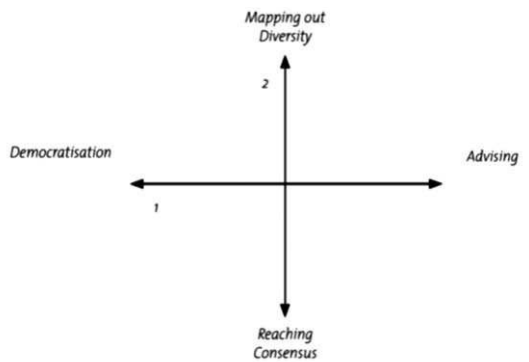
Vincent, 2014), a term that embraces a wide range of possible meanings.

For common understanding, the German strategic dialogue for research and innovation published in its guidelines (Dautzenberg, 2014) some definitions and explanations:

Participatory processes describe an entire process of public participation, which includes formats and instruments of participation. These can vary in extent and volume and are influenced by some contextual determinants. Formats are the methodological frame of the process, such as workshops, planning cell, citizen panel, Open Space, or mediations. Instruments are techniques to be applied within the formats. Instruments are for example: Metaplan, Funnel, Cascading Dialogue or Fish Bowl. The degree of participation is the product of breadth of participation (= proportion of participants of all actors) and depth of participation (quality and intensity of participation) (Dautzenberg, 2014 transl. i. M.).

6.2 Classification of Participation

Many different actors adopt the language of participation, but with different and sometimes contradictory motivations and objectives. Misunderstandings and disappointed expectations are often grounded in unclear or not well-defined objectives. »The objectives are the sponsor's reason(s) for carrying out the participatory event« (Slocum, 2003, p. 12). One way to classify the objectives were presented and applied by Asselt et al. It is a scheme which structures the objectives into two axes: (1) Aspiration/Motivation axis and (2) Targeted Output axis. (see figure 10).



1: Aspiration/Motivation axis
2: Targeted Output axis

Figure 10: Categorisation of Objectives for Conducting Participatory Methods (by van Asselt et al., 2001, in: Slocum, 2003, p. 12)

The four poles have the following meaning (van Asselt et al., 2001, p. 8f):

— Mapping out diversity — participatory methods that seek to uncover a spectrum of options and information. They enable a group to disclose information (making tacit knowledge explicit) or test alternative strategies in a permissive environment.
— Reaching consensus — participatory methods that seek to define or single out one option or decision. They enable a group to reach an informed decision on an issue.
— Democratisation — participatory methods that enable participants to employ their own knowledge to create options for tackling (policy) issues that directly concern them. The output has weight in the decision-making process (it can be binding)
— Advising — participatory methods that are used to reveal stakeholders' knowledge, values and ideas that are relevant to the process of decision-making. The output is used as input to the decision-support process

(Note: The authors found in their study on different participatory formats that the upper left quadrant that aims at democratisation through mapping out diversity remained empty. Participatory processes organised by stakeholders themselves mobilising many people might be put there.) Participation projects and activities could be positioned on such a scheme for better understanding of their purpose and expected impact.

There exist many other forms to classify public participation activities and methods, for instance Rowe and Frewer (2000), Bucchi and Neresini (Bucchi, 2008), or Gujit (2014). Actual projects which are undertaking research on formats and effects of public participation are creating new typologies. For a more accurate classification, the PE 2020 project (www.pe2020.eu) developed a new model according to which participatory activities could be positioned. It uses the continuum from communication to participation, but distinguishes between formalised and non formalised activities (Maiukait-Žvinien et al., 2014).

After screening and classification of analysed activities, the PE 2020 project team arrived at a revised classification, according to the following five categories:

— Public communication — the aim is to inform and/or educate citizens. The flow of information constitutes one-way communication from sponsors to public representatives, and no specific mechanisms exist to handle public feedback (examples

include public hearings, public meetings and awareness raising activities).

— Public activism — the aim is to inform decision-makers and create awareness in order to influence decision-making processes. The information flow is conveyed in one-way communication from citizens to sponsors, but not on the initiative of the sponsors as characterizes the ›public consultation‹ category (examples include demonstrations and protests).
— Public consultation — the aim is to inform decision-makers of public opinions on certain topics. These opinions are sought from the sponsors of the PE initiative and no formal dialogue is implemented. Thus, in this case, the one-way communication is conveyed from citizens to sponsors (examples include citizens' panels, planning for real, focus groups and science shops).
— Public deliberation — the aim is to facilitate group deliberation on policy issues of where the outcome may impact decision-making. Information is exchanged between sponsors and public representatives and a certain degree of dialogue is facilitated. The flow of information constitutes two-way communication (examples include ›mini publics‹ such as consensus conferences, citizen juries, deliberative opinion polling).
— Public participation — the aim is to assign partly or full decision-making power to citizens on policy issues. Information is exchanged between sponsors and public representatives and a certain degree of dialogue is facilitated. The flow of information constitutes two-way communication (examples include co-governance and direct democracy mechanisms such as participatory budgeting, youth councils and binding referendums). (Maiukait-Žvinien et al., 2014, p. 22).

Such schemes should help understand that participation can take different forms, ranging from information sharing and consultation methods, to mechanisms for collaboration and empowerment that give stakeholders more influence in decision making and control.

One famous way of visualising the different forms and levels of participation was Arnstein's ladder model of 1969 (see figure 11):

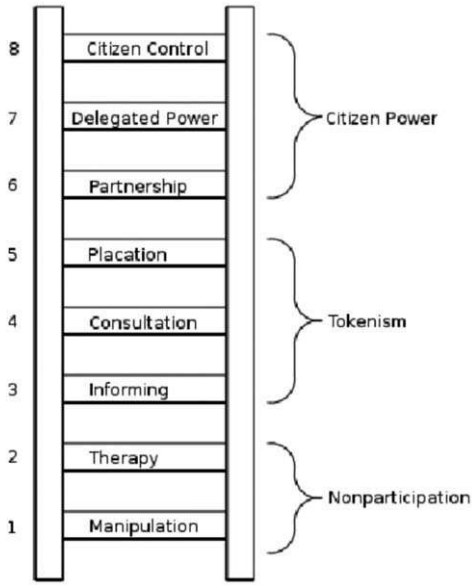


Figure 11: Arnstein's eight rungs on the ladder of participation (Arnstein, 1969, p. 2)

Arnstein identified significant gradations of citizen participation. Further up the ladder were levels of citizen power with increasing degrees of decision-making clout. For Arnstein there was a critical difference between »going through the empty ritual of participation and having the real power needed to affect the outcome of the process« (Arnstein, 1969, p. 2). For her, the implemented public participation process needs to give an answer to the question about how much potential influence on the decision or action will be provided to the public. The answer to this question should be critical to the design and success of the process.

This and other »ladder models« focus on the level of decision power (e. g.: von Unger, 2014). They are criticised for not considering further positive aspects and »neglecting the opportunities that are created by assembling different actors with specific experiences in a mutual exchange of knowledge« (Nitsch et al., 2013, p. 43). There are many other models which focus on other aspects of participation such as the different social fields of the persons involved, or the quality of participation, the diversity of actors involved or the different stages or phases of the process etc. (Nitsch et al., 2013). No matter on which aspect these modules might focus, there is no ideal of participation »but rather participation is greatly dependent on contextual factors«. »Striving for participation on all levels by all stakeholders might not be reasonable or could even constrain the evaluation process. Hence, for all stakeholders

taking part in participatory evaluations, it should be of prime importance to agree upon a certain concept of participation before deciding which type of participatory evaluation is to be followed« (Nitsch et al., 2013, p. 51). This recommendation from the realm of participatory evaluation (see chapter 9.2) seems to be applicable for participation in general as well.

It is thus important to be clear about the purpose of participatory approaches as »an essential first step towards managing expectations and guiding implementation« (Guijt, 2014, p. 1). It is also important »to be explicit about who will be involved, and why, when and how« … »These highlight the importance of clarifying how terms such as ›participation‹ and ›involvement‹ are defined« (Guijt, 2014, p. 4). All »participants should receive full and clear information about the aims of research and its likely impacts« (Pain & Francis, 2003, p. 53).

The International Association for Public Participation presented in 2007 a »spectrum of participation«, which shows the different levels of participation including the explicit goals of the process. It is also suggests which promises to the participants could be communicated accordingly (see figure 12).

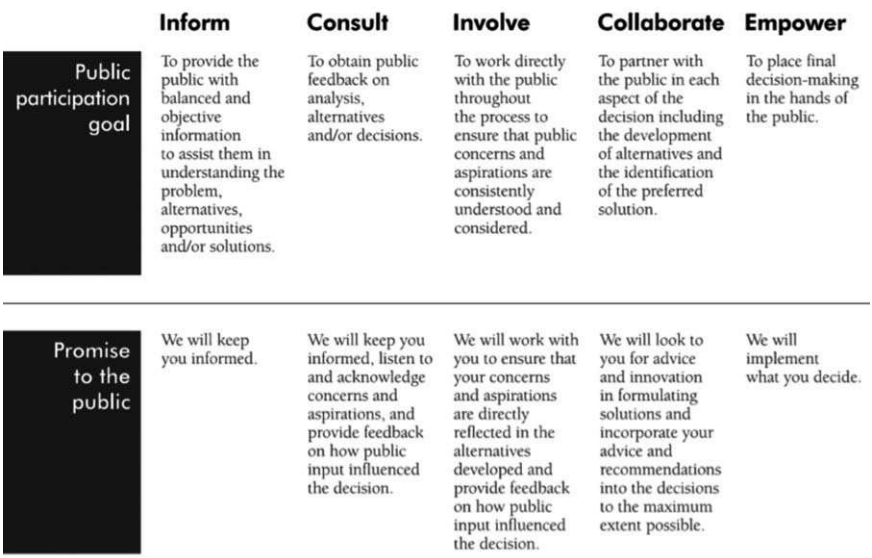


Figure 12: Spectrum of participation by International Association for Public Participation, (source: www.iap2.org/resource/resmgr/imported/Spectrum.pdf)

Within the spectrum of possible forms of participation with its different goals, it is necessary to transparently communicate which actions are promised to the participants. Such and other models argue that there is no polarity between two extremes. There is no dichotomy for instance between deep and shallow engagement, but that there is a continuum along a curve. Therefore it is necessary to be aware and explicit on which spot of the curve a participation activity is located.

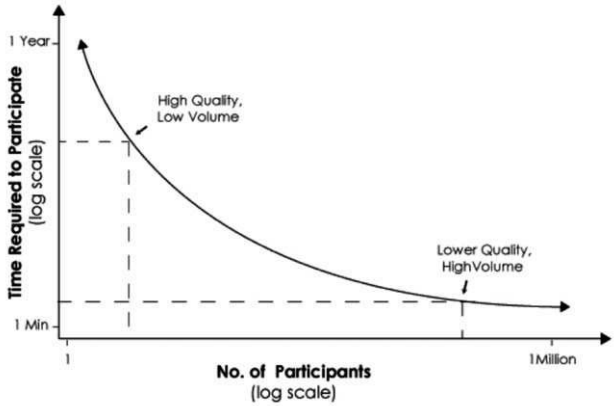


Figure 13: Time vs. number of participants (source: http://bangthetable.com/wp-content/uploads/2012/09/Time-vs.-no-participants.jpg)

This curve (See figure 13) illustrates different options for participation on axis of time and the number of participants. The less amount of time a participation activity takes, the more persons are able to participate. The fewer persons participate, the higher will be the quality of engagement. For the authors »everything along the curve has a legitimate place in the pantheon of community engagement objectives and methodologies. The important thing is to know what your engagement objectives are« (www.bangthetable.com).

However, although participation could take place on different levels and in different ways, still »the term ›participatory‹ should be avoided when the primary intention is traditional ›extractive‹ research for the purposes of gathering information« (Pain & Francis, 2003, p. 53)

6.3 Theories and Concepts

As there is a wide range of definitions and understandings of participation, there also exist many theory-based arguments for it, as for example the theories of Participatory Democracy, Pluralist

Democracy or Habermas' Communicative Rationality. There are many other conceptual frameworks in which participation or Public Engagement has a central role, such as Democratisation and Empowerment concepts (Lewin, 1946) or the concept of Social Capital (Putnam, 2001). Also Social Innovations (Hochgerner, 2012) require consciousness, motivation and engagement for innovative applications. Social Sustainability with its dimensions of equity, democracy and diversity seeks to »understand what people need from the places they live and work« (www.social-life.co). Especially in development work, the so called bottom up approaches, in which local communities are actively engaged in the development process in a participatory manner (Reed, Fraser & Dougill, 2006) have become common.

In recent years, when participation in science was being given more prominence (see chapter 3), it was based on theories of social-constructivism, post-modernism and post-normal science. They were inspired by the idea of democratisation of knowledge and the argument that science is socially constructed and should no longer have the monopoly of knowledge. This approach needed »to include multiplicity, admitting reasonable perspectives of stakeholders and the relevance of local and contextual knowledge« (van Asselt et al., 2001, p. 6). In the Mode 2 knowledge production (Gibbons et al., 1994) »science work(ed) to pursue societal goals and to create socially relevant knowledge« (Pfersdorf, 2012, p. 46). These new modes of knowledge-making, demanded new forms of public justification and increased participation, a Technology of Humility that »acknowledges from the start the need for plural viewpoints and collective learning« (Jasanoff, 2003, p. 240).

As technology, science and society became more and more interwoven, further participatory approaches had to be integrated in research and innovation. New formats were created, such as Community Based (Wallerstein, 2006), or Participatory Research (Fischer, 1999), or Reciprocal Research in which »participants are actively involved in all stages and it is they who determine what is to count as a ›gain‹« (Hugman, Pittaway & Bartolomei, 2011, p. 1279).

Another such inclusive approach is the concept of Transdisciplinary Research. Transdisciplinarity specifically emerged within the evolvement of sustainability science as an attempt to integrate the best available knowledge and create ownership for problems and

solution options (Wickson & Carew, 2014). It is a problem oriented approach which seeks solutions to »real-world problems« and the participation of actors who are experts of their »Lebenswelt« (Klein, 2001). In this case, »lay persons enter into formal interactions with experts as ›clients‹ and partners in problem solving« (Engage2020, 2014a, p. 1). According to a recently revised definition, transdisciplinary research is a »critical and self-reflexive research approach that relates societal with scientific problems« … »It produces new knowledge by integrating different scientific and extra-scientific insights« (Jahn et al., 2012, p. 8). This means the involvement of societal actors.

The Technology Assessment approach (TA) for studying science and technology also encompasses formats, which are explicitly participatory. Constructive technology assessment (CTA) is »a new design practice in which impacts are anticipated, users and other impacted communities are involved from the start in an interactive way, and that contains an element of societal learning« (cited after Rip 1986 Owen et al., 2012, p. 1700). With emerging technologies, CTA has gained in currency as citizens should have been engaged more directly in debates about benefits and risks (Genus & Coles, 2005). Another form, Participatory Technology Assessment (PTA) is also a well-known area of civil society participation. It applies methods and procedures of assessing socio-technological issues that actively involve various social actors. The »aim is to include social, ethical and political aspects and thus broaden the perspective of the traditional TA« (Banthien, 2003a, p. 12). A new attempt of integrating previous forms of technology assessment and problem-oriented research is Realtime Technology Assessment (RTTA). It »attempts to anticipate how research and research-based technologies will interact with social systems« (Guston & Sarewitz, 2002, p. 94) by creating opportunities for researchers and members of the public to reflect on their values.

Another further elaborated reflexive approach is Midstream Modulation. It is »a framework for guiding intervention-oriented activities in the laboratory that aims to elucidate and enhance the ›responsive capacity‹ of laboratories to the broader societal dimensions of their work« (Fisher, Mahajan & Mitcham, 2006, p. 487). Midstream Modulation has been applied in a range of laboratories around the world as a form of Sociotechnical Integration Research, or STIR (Schuurbiers, 2011).

Midstream and real time approaches mean the involvement of extra-scientific actors during the research and development process, whereas Upstream Public Engagement refers to a »new governance vision in which citizens and civil society organizations (CSOs), right from the early stages of research and development trajectories, engage in dialogue with technology developers, such as scientists and industrialists, about the (tacit) assumptions, meanings, values, and consequences of new science and technology for society« (Krabbenborg & Mulder, 2015, p. 453). Public debate is thus meant to »take place ›upstream‹ in the scientific and technological process« (Stilgoe et al., 2013, p. 1571). (See more in chapter 8.3.4).

As the citizen has become the new reference point for upcoming questions on scientific and technological development, the citizen's role undergoes a »radical transformation in the policy making process« (Cavallaro et al., 2014, p. 17). Citizens are now »scientific citizen(s)« as described by Felt (2003) who have to be informed and actively involved in technology assessment, but also to carry shared responsibility.

Citizens are not only involved in assessment procedures but increasingly in the innovation process itself. New formats such as living labs or science shops allow for Co-design and Open Innovation approaches that involve citizens in the development processes. The involvement could be passive (demand-driven innovation) or active (user-driven innovation). One format is value-sensitive design which allows the possibility of designing particular ethical values into technology (Friedman & Egolf, 2005).

To illustrate the different modes of active users' involvement, the ProGreSS consortium created a four-quadrant rectangle, as shown in figure14. The right part »comprises activities that identify opportunities, collect data, apply pattern recognition and generate concept ideas« whereas activities of conceptualizing and prototyping are represented in the left part of the diagram (Cavallaro et al., 2014, p. 15).

Another broad concept increasingly being applied, which actively involves citizens, is Citizen Science. It refers to the general Public Engagement in scientific research activities »when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources« (Socientize Consortium, 2014, p. 8). The result of this »open, networked and

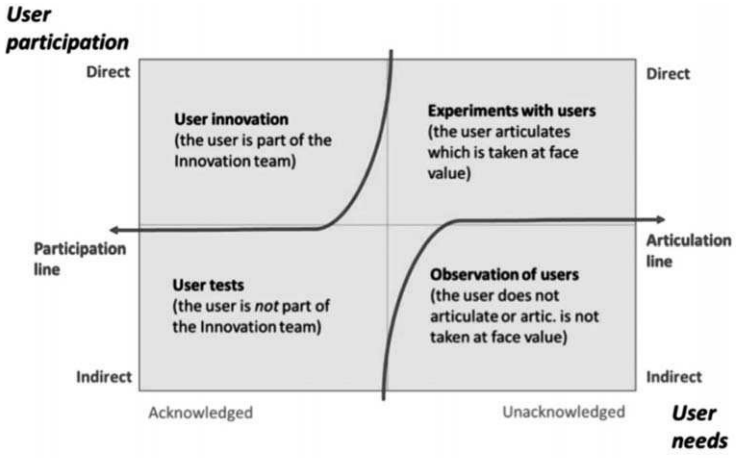


Figure 14: Modes of user-led innovation by ProGReSS Consortium (Cavallaro et al., 2014, p. 16)

transdisciplinary scenario« should be »a more democratic research based on evidence and informed decision-making« (Socientize Consortium, 2014, p. 10).

Participation or Public Engagement finally plays an important role in today's scientific and technological developments, which is also greatly acknowledged within the RRI concept. The approaches and principles described above can be found as guiding norms of the RRI concept (see chapter 4). But RRI seems to have been thought out even a few steps further. Such as, for example, the concepts of demand-led and user-driven innovation have features in common with RRI, but societal desirability is not explicit in these two cases. In contrast, it is a key criterion in the RRI concept (Cavallaro et al., 2014). The involvement of the public plays an important role within the RRI concept (as described in detail in chapter 5). It is explicitly mentioned in the principle of »inclusion and public engagement«, but also in the required »problem orientation« and research policies of »anticipation« and »responsiveness«, which clearly ask for communication and involvement of the public. Consequently, the RRI concept and its meaning for the European research policy for some reads as a sign of a movement towards a »public engagement friendly European Research strategy« (Hennen, 2015, transl. i. M.). However, many questions as to how to meaningfully implement these principles and ideas remain open.

7 Reflective Practices for Responsible Research and Innovation

To act responsibly means
to act in an inquiring and reflective way.
Katinka Waelbers

Reflexivity is a requirement of modernity, and also an important aspect of RRI. The following chapter clarifies the concepts of reflection and reflexivity and puts it in context to the RRI requirements. Public Engagement could play a significant role for reflective practices in Responsible Research and Innovation by connecting insider and outsider knowledge for questioning and reflecting discoveries and also finding new approaches and alternative courses.

7.1 Reflexive Modernity

Reflexive modernization is determined by a common state of »not knowing«, insecurity and an increasing individualisation of all areas. Old certainties, distinctions and dichotomies are fading away. The idea of the normal family, the normal career and the normal life history are suddenly called into question and have to be »re-negotiated« (Beck, Bonss & Lau, 2003). This loss of traditional forms of community causes deficits in social integration which lead to the »emancipation of the individual« (Beck, Bonss & Lau, 2003, p. 15). But individuals alone are often overwhelmed in finding their ways through many options and making decisions. Reflection and reflexivity thus are becoming increasingly important for consultation processes, self-considerations and learning environments. Although the terms reflection and reflexivity are often used interchangeably, still they have different meanings.

For Lash, the individual of the first modernity is reflective while that of the second modernity is reflexive. For him, the idea of reflectivity belongs to the philosophy of consciousness of the first modernity. »To reflect is to somehow subsume the object under the subject of knowledge. Reflection presumes apodictic knowledge

and certainty. It presumes a dualism, a scientific attitude in which the subject is in one realm, the object of knowledge in another« (Beck et al., 2003, p. 21 cited after Lash 2001).

The word reflexive within reflexive modernity as discussed by many other social theories as well, does not mean that people today are more conscious. On the contrary, it signifies not an »increase of mastery and consciousness, but a heightened awareness that mastery is impossible« (Latour, 2003, p. 36). The term now seems to acquire new significance within the evolving relationship of science and society (see chapter 3). Reflexivity is both, a sociological diagnosis as discussed by many notable theorists, as well as an actual research strategy, which explicitly addresses the positioning of the researchers themselves within the research and development processes. Accordingly, the field of emerging technologies requires reflexive approaches and critical reflections of developments and innovation.

To be reflexive, participants reflect their interactions via »introspection« as they occur, with an inward gaze that helps to learn to reflect on one self as a means of self-development. Reflexivity hence is a personal attitude on the basis of the ability to take account of the issues and practices which can be defined as an »ability to recognise our own influence, the influence of our social and cultural contexts on research and the type of knowledge we create and the way we create it« (Fook & Askelang, 2006, p. 45).

In the reflective mode, on the other hand, participants reflect on various elements (verbal, nonverbal, feelings, and thoughts) following the action. In that sense, reflective knowledge has to do with normative states in social, economic and political realms. It concerns »a vision of what ought to be« (Coghlan & Brannick, 2005, p. 7). Roughly, what is commonly understood by reflection is meant »to move people away from routine thinking towards reflective action, involving careful, critical consideration of taken-for-granted knowledge«. Reflection is therefore a process which focuses on »changing and improving practice« (Kessl, 2009, p. 312).

In research processes there is place for both reflexivity and reflection. In the last decade, many voices have been asking for augmented reflective activities. The different societal subsystems are becoming increasingly transgressive, which is leading to mutual interdependencies between science and society and also to a reflexive change of institutionalised roles and norms. These subsystems claim that »scientists have to become more reflexive about the social impacts and implications of their research, and publics have

to become more conscious of the ways in which science and technology affect their lives« (Felt & Fochler, 2008, p. 490). »As long as scientists are not considering how their own practices are affecting society, science cannot be understood as socially responsible« (Glerup & Horst, 2014, p. 38). Therefore, science is »challenged to not only consider the societal impacts the knowledge produced, but even reflexively take into account the influence society has on the production of knowledge« (Felt & Fochler, 2008, p. 491). Consequently, new modes of governance are needed, which encourage scientists in becoming more attentive to the societal context and their own responsibilities to the societal influence on, and the societal consequences of their work. In order to be socially responsible it is seen as »a kind of self-awareness, an ability to foresee the consequences of their own practice« (Glerup & Horst, 2014, p. 38). Reflexivity could thus be seen as a prerequisite for accountability (Jahn et al., 2012). Beck et al. (2003) have asked how reasonable decisions could be made under conditions of uncertainties. Some considerations thus suggest that innovation in general is a legitimate topic for normative reflection, deliberation and evaluation (Guston et al., 2014). It demands openness and leadership within cultures of science and innovation. »Reflexivity asks scientists, in public, to blur the boundary between their role responsibilities and wider, moral responsibilities« (Stilgoe et al., 2013, p. 1571). A sort of meta-reflection is now often undertaken internally, by the actors themselves and »a reflection on fundamental principles can also be seen in practical fields as diverse as organizational theory, technical engineering and legal thought« (Beck, Bonss & Lau, 2003, p. 17). But still there is a long way to go. For Rip, »if natural scientists are ever to become reflexive about their own research, about intended outcomes and unintended consequences, they must learn how to tell stories in which they themselves play a role (in contrast to the style of presentation with passive verbs, where no author is visible, and the laboratory world is taken to speak for itself)« (Rip, 2009, p. 667). Such considerations could be a substantial part of scientific and technological research, and »making these considerations explicit may contribute towards more socially resilient scientific practices without jeopardizing the science« (Schuurbiers & Fisher, 2009, p. 427).

Not only scientists, but also the entire science system is becoming more reflexive regarding its nature and societal contexts. Science has to reflect on its role in and impacts on society. For the European Commission, as described in its Science in Society

programme »this is not only a philosophical exercise«, but an essential step in realizing science in society which also »contributes to the development of new research fields such as risk studies, impact studies, Technology Assessment, STS studies, and applied ethics« (Siune et al., 2009, p. 14). Also in its promotion of upstream engagement the defined aim was »to encourage institutional reflection, to get decision makers to question their own assumptions and consider a wider range of alternatives« (EC, 2007, p. 23).

This new need for institutional reflexivity also »fundamentally challenges who should be doing engagement and why« (Stilgoe, Lock & Wilsdon, 2014, p. 7). It also needs comprehensive studies to gain an understanding of researchers' »perceptions of how they critically reflect upon their research outcomes or how they may or may not engage with the wider public« (Eden et al., 2013, no pages). In her essay about technology of humility, Jasanoff already suggested that rather than seeking monocausal explanations, it would be »fruitful to design avenues through which societies can collectively reflect« (Jasanoff, 2003, p. 242). Open reflection and public debate should be encouraged (Eden et al., 2013). For Guston and Sarewitz, R&D enterprises themselves must build up a reflexive capacity »that encourages more effective communication among potential stakeholders, elicits more knowledge of evolving stakeholder capabilities, preferences, and values« (Guston & Sarewitz, 2002, p. 100). For Rip reflexivity is important, but the »primary consideration should be the ongoing coevolution of science, technology and society, and how to modulate it« (Rip, 2009, p. 667). Engagement in science and research should, according to Unger (2014), help to critically reflect and influence social, political and organisational contexts. Reflexive science is, thus, »not the endpoint of a transformation but a continuous process of observation, reflection, reaction and adaptation« and opens up ways to go forward (Siune et al., 2009, p. 15).

7.2 RRI and Reflexivity

Reflexivity is also considered in two respects within the RRI concept. On the one hand, it is addressed by its key dimensions (see chapter 4.2.3), and on the other hand when understood as a »meta responsibility« (Stahl, 2013) it needs to be reflexive in itself as well. If one considers RRI as an emerging discipline with a community of scholars and practitioners developing around it, many suggest that it should be reflexive regarding its own research practice. »It has to ensure that RRI activities are embedded into RRI research

itself, to the same standards that other scientific disciplines might be expected to embed them« (Eden, 2014, p. 130). There is a need for the incorporation of reflexivity into RRI itself. For Stahl, RRI as a meta-responsibility should be of a reflective nature. That means it should be part of RRI »to consider and reflect upon its own assumptions, presuppositions and required consequences« (Stahl, 2013, p. 713). For him it is not so much a lack of options but rather the danger to re-invent already established activities and processes. Only »active reflexivity« should help to avoid this trap.

For Eden, the aim of RRI requires deep reflection about the different choices to be made. Not only, regarding the directions of research investments, but also to ensure that potential societal impacts are seriously considered, identified, discussed and addressed (Eden et al., 2013).

The first work on a responsible innovation framework carried out for the EPSRC network already brought to the surface two dimensions that should support the concept: Anticipation and reflection (Owen, 2014b). Both aspects are now explicitly mentioned as process requirements within the RRI framework description. Anticipation should prompt one to ask »what if…?« questions to consider what is known, what is likely, what is plausible and what is possible. Anticipation thus »involves systematic thinking aimed at increasing resilience, while revealing new opportunities for innovation and the shaping of agendas for socially-robust risk research« (Stilgoe et al., 2013, p. 1570). This should help not just to predict, but to create »imaginaries of the future« and consequently »shape« a desirable future (Stilgoe et al., 2013, p. 1571). Upstream Public Engagement (see chapter 8.3.4) should involve anticipatory processes in which possible and desirable futures are collectively discussed. The focus on acceptability and desirability means »that RRI must actively reflect on its normative underpinnings« (Stahl et al., 2014, p. 815). Reflexivity should thus be a »key feature of any process« in which different disciplines and other stakeholders are required to work together. This is another reason that the RRI concept could never work as a »tick-box«, as Owen argued, »however attractive and easy it may be for some« (Owen, 2014b, p. 115).
The RRI requirement of ›responsiveness‹ too is linked to reflexive capacity. Asking research and innovation processes to be responsive requires anticipation and reflexivity (Stilgoe et al., 2013). Besides the »self-critique« of scientists themselves, Wynne is arguing for a need for an »institutional reflexivity« (Wynne, 1993). Reflexivity at that level means »holding a mirror up to one's own

activities, commitments and assumptions, being aware of the limits of knowledge and being mindful that a particular framing of an issue may not be universally held« (Stilgoe et al., 2013, p. 1572). As described in more detail by Schuurbiers (2011), this is called »second order reflexive learning«. That means reflection »on« the research system, which includes the value-based socio ethical premises that drive research, methodological norms and epistemological assumptions. Therefore the »background theories and values of the research system themselves become the object of learning«. These second order reflections do not necessarily lead to directly observable changes in practice, but to »critical reflection on the broader socio-ethical context« of the work (Schuurbiers, 2011, p. 783).

First order reflective learning, however, means reflection »within« the research system. Such forms of reflection »involve compliance to one's internal responsibilities towards the research community, such as the responsible conduct« (Schuurbiers, 2011, p. 772). To support this reflection, also atypically encountered issues should be brought into the labs, asking »questions about the normative dimensions of lab practices, about researchers' personal moral concerns, about the possible longer term ethical, legal and social implications of research, and so forth« (Schuurbiers, 2011, p. 777). This was also discussed within the Lisbon workshop on Public Engagement in 2007. It was acknowledged that talking about science and innovation was still dominated by questions of scale, like how much and how fast. But talking about directions, meaning the outcomes to which innovation processes are being directed, was still not yet sufficiently achieved. Within an oft suggested competitive race metaphor, in which choices we are presented are those of faster or slower, forward or back, but with no option to change the course, »more attention should be paid to consider the plurality and diversity of possible directions« (EC, 2007, p. 11).

The RRI framework and related dedicated activities are expected to bring in such issues and to support reflexivity on and within the research system. Besides external scrutiny of third parties (such as evaluators), »research needs to develop internal reflexivity« (Stahl, 2013, p. 710). The RRI concept could thus function as a »lens« through which »researchers may obtain a better understanding of the grand challenges that humanity and most societies face and may be encouraged to consider how their research can contribute to addressing these challenges« (Stahl et al.,

2014, p. 816). RRI could thus be understood as a reflection process that is never complete.

7.3 Motivation for Reflection

How to encourage and support reflection is a regularly discussed question, especially in the upcoming RRI debate. In the US, the National Science Foundation in 2001 asked scientists to address the connection between their research and its broader effects on society. As in practice, the responsibility for satisfying the broader impacts criterion had been taken only by education and public outreach professionals, which called attention to the fact that it was the scientists themselves who needed support. The target was therefore, formulated such that society should work »with scientists to help them reflect on and articulate the broader effects of their research«. And this should be done by »instilling a critical spirit of reflection in scientists and engineers« (Frodemann & Holbrook, 2007, no pages). As Owen demonstrated in their experiment with demanded risk registers (see also chapter 1.2), an approach based solely on risk assessment had its limitations as there were »no reflections on purpose and motivations« […] »But it prompted applicants to think about the broader impacts and implications of their proposed research« (Owen, 2014b, p. 114). According to Schuurbiers, policies indeed play a role. Although calls for ethical reflection may have at best been a tangential effect on research practices as researchers would »perceive the broader socio-ethical context of research as peripheral to their work« (Schuurbiers, 2011, p. 771). Therefore, as suggested by Stahl, it is «desirable to integrate mechanisms of explicit reflection into projects« (Stahl, 2013, p. 710). Standards and code of conducts should also help to stimulate the reflection of the relation between different value systems. Asveld et al. argue that this does not only hold true for institutions but also for individual actors. For them »reflexivity can thus be expected to contribute to trustworthiness among actors by stimulating awareness and communication about each other's values« (Asveld et al., 2015, p. 585).

But questions of responsibility should not solely be asked from a personal perspective. Techniques such as Constructive Technology Assessment (CTA) (see chapter 6.3), could help researchers also to »reflect upon the institutional dynamics« (Eden et al., 2013). In concrete upstream engagement events, the space for interaction could be facilitated in a way »that it becomes a platform for technology developers and civil society actors to reflect on and even

experiment with possible new roles, responsibilities, and collaborations« (Krabbenborg & Mulder, 2015, p. 475). For example, consensus conferences are seen as useful mechanisms because they »foster individual and collective learning and have the potential to transmit public values between and among peers, scientists, experts and practitioners« (Cobb & Gano, 2012, p. 104). As participants had confirmed in Felt and Fochler's study, the public could extend the reflective learning processes: »I believe that the scientists are so much into their field that they can't be objective about it anymore. And the public may raise many questions, and also opinions, which they cannot even imagine (PI, 275)« (Felt & Fochler, 2008, p. 497). However, »organizers need to be constantly reflexive about their roles in these power dynamics« (Powell & Colin, 2009, p. 340).

In general, approaches with an explicit commitment to reflexivity — as it is for instance the case with critical participatory action research (PAR) — should be applied (Westhues et al., 2008). Integrated multidisciplinary approaches which promote continuous reflexivity and participation were found to be the most fruitful (Owen et al., 2012). Accordingly, as it has not yet taken place, RRI would »need to be rewarded in the careers of researchers, raising awareness for the ethical dimension and societal impacts of research« and needs to be »emphasized in education and training programs« (European Commission, 2013, p. 17). However, to internalise a reflexive approach is a process that needs encouragement and time. A telling remark came from one participant of Schuurbiers' study: »It's good to think about what your research can deliver for society.« […] »Does it change my thinking? Yes. Does it change what I do on a daily basis? No« (Schuurbiers & Fisher, 2009, p. 426). For Rip this needs not be a message of despair, as practices and particularly when there are also external incentives might change over time (Rip, 2009).

8 Public Engagement in Research and Innovation

Public engagement in scientific research has gone viral.
Patrick L. Taylor

The shift in the relationship of science and society, as described in chapter 3, even amplifies the recurrent call for Public Engagement these days. However, the subject of Public Engagement is wide, a broad range of actors is involved, but clear definitions are still lacking. Formats and approaches vary and purposes and expectations differ between actors and groups. There is much critique formulated on many engagement processes, although in general, most would agree on its positive outcomes and impact. This creates a difficult and paradoxical situation, which has been the focus of much research as well.

The following chapter looks at the current situation of Public Engagement in research and innovation practices, related policies and research state of the art. Based on literature in the field, it compiles a variety of different perspectives and critiques. With the description of as many aspects as possible, it contains a broad assessment on the field. To conclude, it summarises results and recommendations to be considered when Public Engagement is applied.

8.1 No New Concept

Although mechanisms to engage lay citizens in science and technology have become »in vogue worldwide« (Powell & Colin, 2009), the call for it is definitely not new. To integrate lay people or non-scientific persons into research activities was already taken up by a variety of participatory approaches (see chapter 6). We can now look back at about 20 years of »experimentation« (Burgess & Chilvers, 2006) in the field of involvement of societal actors in technological innovations which has been focus of science and technology studies (STS) as well. But while public participation in the

mid 1980s mainly referred to the involvement of organised civic society groups, by the beginning of the 1990s the interest in public participation and consultation in science and technology had grown and the meaning of Public Engagement was broadened to include individual citizens (van Est et al., 2012). The fact that much scientific research was dependent on public funding made »it difficult to argue against a public voice in questions of science and technology« (Fischer, 1999, p. 296). This »participatory turn« (EGE The European Group on Ethics in Science and New Technologies, 2015) has resulted in greater efforts towards Public Engagement. The term can cover a wide array of actions now, ranging from interactive public understanding activities to deliberative processes. One rather prominent label associated with the phenomenon is ›citizen science‹. But although widely used as an umbrella term, citizens science is only one part of Public Engagement in research and innovation which can have many forms, »including the gathering and volunteering of data, the participation of non-experts in analysis and scientific experimentation, the lobbying efforts of interest groups, public input into research and project funding, as well as in the formulation and regulation of policies« (EGE The European Group on Ethics in Science and New Technologies, 2015, p. 23). Yet over these last twenty years, there has also been a huge growth in informal engagement activities such as science festivals and online spaces for science communication and engagement. It also brought in for the first time »a more symmetric, though not necessarily more equal, notion of communication. An achievement of these two decades has been to shift attention to the ways in which ›the public‹ has been constructed in Public Engagement. A public imagined as ignorant and hostile was the impetus for many of the science communication activities in the 1980s and 1990s« (Stilgoe, Lock & Wilsdon, 2014). But new ways of knowledge production have increasingly involved the wider public.

The starting point now is that »scientists and the public can learn from each other, that both have access to knowledge as well as having political and normative values that are relevant for scientific choices« (Siune et al., 2009, p. 51). This ›sharing knowledge‹ has become one of the goals of the European Union Lisbon strategy for the ›European knowledge society‹. In March 2000, the European Union adopted the ›Lisbon Strategy for Growth and Jobs‹ to become the world's leading knowledge-based economy by 2010. One of the dimensions formulated as part of the strategy was sharing knowledge, which gave »a particular attention to the development

of new channels and innovative approaches for communicating and discussing science, research and technology« (EC, 2007, p. 8). The phrase Public Engagement itself was institutionalised at the first conference organised by the European Union in Lisbon in 2007. In a consultation workshop, Portuguese Presidency Conference on the future of ERA in Lisbon, 8–10 October 2007, for the future of the European Research Area (ERA) which brought together 350 participants from across Europe, Public Engagement in science was discussed (EC, 2007). The European Union had been advocating participatory approaches in scientific research already since the 1990s, and the phrase ›public engagement in science‹, ›public engagement with science‹, ›public participation‹ or ›public involvement in science‹, »appeared in English publications in the 1990s and its frequency has grown regularly in the past two decades« (Bensaude Vincent, 2014, p. 241). Communication and Public Engagement became the two dimensions through which the European Commission wanted to ensure an »inclusive ERA policy development«, which also meant a radical transformation of the citizen's role in the policy making process: citizens now became »scientific citizens«, moving from »public understanding of science« to »public engagement with science«, from science and society to science in society (Cavallaro et al., 2014, p. 17). (See also chapter 3).

In policy documents, ›involving civil society‹ was already promoted by the EC in the 2001 Science and Society Action Plan (which was reinforced in 2012). The Lund declaration in 2009, with its goals of identifying and responding to the Grand Challenges, recommended activities that should involve stakeholders from both public and private sectors (The Lund Declaration, 2009). At that time, the term had already become familiar across all related communities, such as research institutions, civil society organisations and think tanks (Bensaude Vincent, 2014). The European funding mechanisms of that period within the 7th Research Framework Programme, which facilitated the involvement of civil society organisations, were seen as »a step in the right Direction« (EC, 2007).

Simultaneously, Public Engagement tools and instruments have been significantly developed in Europe during the last 30 years. Examples of participatory fields of research and development include technology assessment and foresight, risk studies, social studies of science and technology, the sociology of the public understanding of science as well as studies in deliberative democracy (Maiukait-Žvinien et al., 2014).

It is somewhat common sense now that Public Engagement is

inevitable. According to Jasanoff, the issue is »no longer whether the public should have a say in technical decisions, but how to promote more meaningful interaction among policy-makers, scientific experts, corporate producers, and the public« (Jasanoff, 2003, p. 238). This is all the more significant since she demonstrated in her comparative political study of biotechnology in the United Kingdom, Europe and North America, that where Public Engagement was insufficiently available formally, it would occur informally, through public protest or consumer choices or movements such as environmental activism. For clearer understanding, Bucchi and Neresini categorized Public Engagement activities according to their structure in formalised (sponsored) and non-formalised (spontaneous) procedures and visualised them as shown in figure 15:

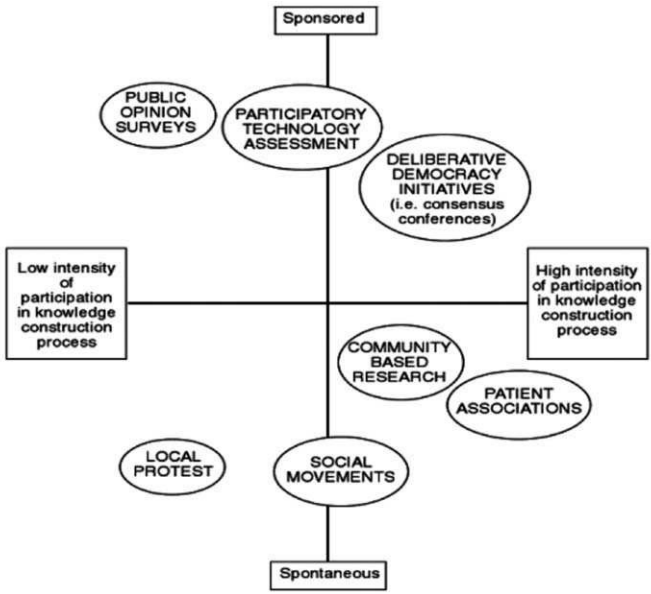


Figure 15: Map of Public Participation in Science and Technology (Bucchi & Neresini, 2008, p. 462)

Regardless of the form, at last »the participatory turn towards a wider and more inclusive praxis where the public and other stakeholders get a role and a say is in demand« (Mainstreaming of Public Engagement in Horizon 2020 Workshop, March 10, 2015, no pages). Thus, over time, the rhetoric has shifted from understanding to engagement. This movement finds its expression also in the definition of the UK's National Co-ordinating Centre for Public

Engagement (NCCPE), which defines »engagement as ›a two-way process, involving interacting and listening, with the goal of generating mutual benefit‹« (Grand et al., 2015, p. 2). In launching the RRI concept the European research directorate acknowledged: »After several years of research on the relation between science and society, we evidenced that we need to involve civil society very upstream to avoid misunderstanding and difficulties afterwards. We need to discuss science related societal changes with society« (DG Research workshop on Responsible Research & Innovation in Europe, 2011, p. 2). As expressed in its 2020 vision for the European research area (ERA), the Science in Society programme even perceives itself as having »a potential role in bridging the gap between the EU and its citizens« (Siune et al., 2009, p. 68).

8.2 High Aspirations

A lay member can play
a valuable role on an expert committee.
Lord Justice Phillips

A growing interest in Public Engagement in science and technology as described above also raises high expectations. The following chapter describes aspirations from different perspectives and a variety of expected benefits and impact on an ambitious endeavour.

Public Engagement activities often have »lofty« goals. Meanwhile, not only has the »lure of engagement« (Kleinman, Delborne & Anderson, 2011) become very attractive, it can also be seen as a solution suitable for multiple purposes. One of the most important arguments is the alignment of societal needs and values with the directions of scientific research and funding (Grieger et al., 2012). Research should be better associated with expectations and priorities of the society and thus be able to better »respond with more sustainable, desirable and acceptable solutions to the societal challenges we are facing today« (Malagrida, 2015). Or as put by the EC: »In order to optimally align innovation with societal needs and values, early engagement of producers with users and stakeholders is also of paramount importance. Both current innovation practices and expert assessment frameworks are in need of improved conditions for early communication and dialogue« (von Schomberg, 2011, p. 9).

In the light of previous failures in the implementation of new technologies, research and innovation now must also obtain societal approval. Recommendations for action, as recently worked

out in a Strategic Dialogue in Germany, suggest that Public Engagement should contribute to better acceptance, relevance and legitimacy of research and innovation (Dautzenberg, 2014). This is in line with EC arguments: »Early societal intervention in the Research and Innovation process can help to avoid that technologies fail to embed in society and or help that their positive and negative impacts are better governed and exploited at a much earlier stage [...] An on-going public debate and monitoring public opinion is needed for the legitimacy of research funding and particular scientific and technological advance« (von Schomberg, 2011, p. 10). In fact, the public — including the voices of those who are affected by the developments — should show that there is a »willingness to take the interests of these parties into consideration« and will therefore increase »trustworthiness« (Asveld et al., 2015, p. 585). As STS research has already showed, it is »widely recognized that increased participation and interactive knowledge-making may improve accountability and lead to more credible assessments of science and technology« (Jasanoff, 2003, p. 243). The rationale behind this is a better and more robust knowledge in order to address current challenges facing today's society. »Only by integrating all forms of knowledge including up to now insufficiently considered local knowledge and ›practical experiential knowledge‹, in addition to expert and scientific knowledge, we will be able to build a truly knowledge-based society« (Steinhaus, 2013, p. 2). Public knowledge has clearly gained importance. Not only in its first meaning, which was referred to as knowledge about the public. But also the second sort of public knowledge – what the public knows. It is this »that tests the credibility of scientific advice ... It emerges from dialogue between experts and non-experts, and if it is listened to, it contributes to socially-robust science« (EC, 2007, p. 19). Thus, as formulated within the Lisbon workshop on Public Engagement, these forms of more democratic governance of science can no longer be seen as barrier of success for Europe's progress in the global knowledge economy, but in fact as a »different form of advantage ... which might lead to new — and potentially preferable — innovation paths« (EC, 2007, p. 11).

Isolated groups, experts, or politicians alone are no longer seen as being capable to provide solutions for complex issues, whereas »unified« stakeholders and their common decisions quite possibly (Pfersdorf, 2012, p. 53). A broader range of expertise might lead to better outcomes, as more evidence in the form of lay knowledge, public perceptions, and preferences is being considered as part of

the decision-making process (Emery, Mulder & Frewer, 2015). Accordingly, lay persons are seen as a means of »counteracting an exclusionary and socially disengaged policy tradition characterized by invocation of the objective authority of scientific expertise« (Irwin, Jensen & Jones, 2013, p. 128).

Another expected effect of Public Engagement, as often argued, is the improvement of skills of all actors (Shirk et al., 2012). Encounters and deliberations should lead to »mutual education« (Frodemann & Holbrook, 2007). Engagement processes could enhance new knowledge and »create a more scientifically-aware population that is then capable of participating more directly in science policy issues« while »both scientists and decision-makers are being given the opportunity to reflect on research in a broader societal context« (Grieger et al., 2012, p. 63).

Engagement should also strengthen community feeling and public ties and thus shared responsibilities within society, as is the case, for example, in public jury service. This could »broaden participants' public identities and heighten their sense of political efficacy« (Cobb & Gano, 2012, p. 105). In their study on Public Engagement experiences after a consensus conference, Cobb and Gano found that although people often could not see the political impact of the activity, they appreciated other positive impacts they had gained. This was also proven by Kleinman et al, who found that consensus conferences at least for a limited number of people could »cultivate democratic citizen skills« (Kleinman, Delborne & Anderson, 2011, p. 225). Engagement processes could also contribute to the development of social capacities of individuals, for building community and the protection of collective interests (Kleinman, Delborne & Anderson, 2011).

Consequently, not only direct impact on the decision making of engagement processes is decisive, but the many promising side effects that can be expected. Public Engagement could be seen as »a vehicle for increasing openness and transparency, as a means for maintaining support for the use of public money for research, enhancing citizens' discussion of scientific issues, incorporating public concerns and skills in research or even encouraging more students to take up specific subjects such as the sciences« (Grand et al., 2015, p. 4). If done well, there seems to be a growing belief that »the quality of outcomes can justify the input« (Burgess & Chilvers, 2006, p. 725).

With its growing popularity, Public Engagement appears to be an indispensable element of today's society. Also for the public,

as taxpayers and (co-) funders of research and innovation, it is acknowledged that it is important »to do more to bring the public in and enable sharing, financially in that some of the money from corporate IP goes back to the public« (Randles et al., 2012, p. 176). Or as the EC MASIS report on cutting edge issues has stated: »Knowledge and research are too important to be left to the experts alone, issues of public interest are at stake, and research activities need to be justified and shaped in compliance with publicly voiced interests« (Siune et al., 2009, p. 19).

Knowledge, as Francis Bacon famously observed, is power. If »today's enormous scientific-knowledge-that-is-also-enormous-power is to be harnessed democratically, it is essential that it should be subjected to close and careful public scrutiny« (Durant, 1999, p. 317). In her widely acknowledged pamphlet, Arnstein equated citizen participation with citizen power. For her it was »the redistribution of power that enables the have-not citizens, presently excluded [...]. In short, it is the means by which they can induce significant social reform which enables them to share in the benefits of the affluent society (Arnstein, 1969, p. 2).

Political climate and national identity could also be related to Public Engagement. However, the influence of the general political climate on motivations for engagement and the impact of activities need to be explored further (Cobb & Gano, 2012). Just as the linkages between national identity building and the specific design of Public Engagement events must also be explored, as for instance, the case in Denmark where »consensus seeking is positioned as a political and ideological goal to strive for« (Krabbenborg & Mulder, 2015, p. 455).

8.3 Critiques and Barriers

> *It would seem to me far too harsh to characterise ›engagement‹ as a failure (even if there have been many specific failures along the way).*
> Alan Irwin

Although Public Engagement in research and innovation is gaining currency and constitutes a definite element of the RRI concept, it still faces criticism and has given rise to a range of difficulties. The following sections compile these critiques and barriers as articulated in the literature to identify those areas, which are currently under debate.

Despite the high aspirations of Public Engagement, criticism is

continuing to grow and many questions still remained unsolved. While one can hope to have found »the solution« with Public Engagement, one might also have the feeling of having »inherited the problem« (Delgado, Kjølberg & Wickson, 2011, p. 826, oE). This quote recently cited in STS literature reflects the ongoing and critical discussion of Public Engagement. In any case, STS scholars recommend to »mind the gap« between the theoretical ideals of Public Engagement and the realities of their implementation in practice (e. g. Nisbet, 2010 or Jasanoff, 2003). Critiques come from other groups and actors too, including researchers who might not see the benefits of time-consuming activities conducted with ignorant laypersons. Or from policy makers, who would not be willing to allocate budgets for engagement activities. And last but not least, from public participants themselves who might not be interested in topics which are irrelevant for them or who are less willing to invest their time if they cannot see any immediate benefit of their engagement.

This chapter summarises critiques and unsolved issues from across different perspectives and experiences. It cannot provide a comprehensive mapping but is rather a description and compilation of experiences that might be useful for inferring information and considerations for future Public Engagement endeavours.

8.3.1 What is Public Engagement in Research and Innovation?

When criticising Public Engagement in research, the discussion immediately reaches the point when it is asked what it actually means. There exist various understandings and forms and the range of meanings is wide, reaching from involvement in agenda settings, via deliberative formats on ethical and social aspects, the integration of laypersons in specific projects and innovation processes, all the way up to decision-making and policy-forming. However, after decades of practical implementation, there is still an ongoing quest for a commonly accepted definition. Holliman et al. recently »uncovered a lack of shared language about engaged research, a finding which underpinned much of our subsequent efforts, including the development of a definition of engaged research« (Holliman et al., 2015, p. 15). There are many different definitions being offered, most of which assume that engagement in any case should go beyond traditional one-way education or outreach efforts, but should rather signify two-way interactions with citizens. For example, Rowe states that »public participation may be loosely defined as the practice of consulting and involving

members of the public in the agenda-setting, decision-making, and policy-forming activities of the organization or institutions responsible for such functions« (Rowe, 2004, p. 89), while another definition states that Public Engagement might be seen as an »interactive and iterative processes of deliberation among citizens and between citizens and government officials« (Powell & Colin, 2009, p. 326 cited after Phillips and Orsini, 2002).

Similarly, there are many different roles through which non-scientific participants may become actively engaged. The Engage 2020 policy briefs — describing how citizens could be engaged in future research and innovation processes — outline the following possible active roles for non-scientific participants in research processes:

— Setting R&I agenda — national programmes and policies and research programmes
— Supervising and assessing R&I — discussing ethical aspect, possible risks and benefits, supervise research processes and evaluate the results in the light of community members' needs
— Actively initiating and funding research that serves their own needs (as already being the case in medical research)
— Shaping the research and innovation process — citizen could cooperate in defining specific research questions for problem-oriented research
— Gather data — citizens as observers and co-researchers
— Dissemination — helping spreading the knowledge and bridging the gap between science community and wider public. (Engage 2020, 2014b)

Workshop participants discussing Public Engagement activities within European research policies (with representatives from all stakeholder groups) agreed on the following different levels of engagement, encompassing all stages of the innovation process:

1. The process of agenda-setting, the discussion about the most important focal points in the research funding policy
2. The programm setting, on the framework programms and specific programms (e. g. social ecology)
3. The concrete level of individual research projects
4. The design of evaluation and monitoring

(Workshopdokumentation: Welche Werte zählen in der europäischen Forschungspolitik? Responsible Research and Innovation — Verantwortungsvolle Forschung und Innovation in der nationalen Förderpolitik am 23. Juni 2015 im NABU Bundesverband Berlin, 2015, transl. i. M.)

Outlines, handbooks and academic literature offer various typologies and classifications to enable the positioning of the different roles and levels and the numerous ways of how to carry out the specific activities (e. g.: Warburton, et al., 2008, Burgess & Chilvers, 2006, Dautzenberg, 2014, Gene Rowe & Frewer, 2000, see also chapter 6). Despite all these efforts, there is still no agreement on a common understanding. Delgado et al. (according to other STS scholars) assume therefore that »the lack of clear definitions of PP/PE may relate to a lack of agreement on how inclusion of the public should take place in practice« (Delgado, Kjølberg & Wickson, 2011, p. 827). This still needs to be explored. Meanwhile, an even wider understanding has developed, as shown not only in the outlines as described above but also, for example, in very recent definitions such as the following: »Engaged research encompasses the different ways that researchers meaningfully interact with various stakeholders over any or all stages of a research process, from issue formulation, the production or co-creation of new knowledge, to knowledge evaluation and dissemination« (Grand et al., 2015, p. 14). Or as defined by Davies which states: »Engagement, then, is any two-way interaction between research and its publics: beyond this there are ›myriad ways‹ in which it can be carried out« (Davies, 2013, p. 67). In short, engagement varies along a continuum from the provision of information through to the delegation of decision-making power to publics and stakeholders. This means Public Engagement in research could mean many things along this continuum, and there would still be room for finding more ways to interpret it.

8.3.2 Who is the Public?

The next question that arises is: Who exactly is the public to be engaged? The heterogeneous and dynamic nature of ›the public‹ has already been highlighted, and »the myth of a singular public that is simply out there waiting to be addressed must finally be laid to rest« (Siune et al., 2009, p. 61). At the same time, it is also clear that it is not possible to directly involve all members of the public in techno-scientific development processes (Jasanoff, 2003). But then critics ask: who should be engaged?

Grand et al., lead an inquiry into which groups researchers have actually been engaged with and received a huge variety of responses ranging from school pupils to health professionals. For them »this diversity highlights the challenge of identifying the publics in engaged research, and the need for resources to support the processes of public formation« (Grand et al., 2015, p. 13). Civil

society does not exist »as such, nor is there a particular defined set of stakeholders who have to be involved in a participatory process per se. In other words, the identification and selection of participants always depends on varying factors, such as the problem at stake and the purpose and the design of the process. Thus, the civil society that is ultimately involved will vary accordingly« (Banthien, 2003, p. 8). In none of the offered definitions or concepts (including the RRI concept), have any actors or stakeholders been explicitly excluded. So »there seems to be no limit to who can be involved in RRI« (Timmermans & Stahl, 2014, p. 41).

As engagement activities are mostly interactive, usually group-based approaches (Walls, Rowe & Frewer, 2011, p. 242) are used, with so called »mini-publics« (Stilgoe et al., 2013, p. 1571), so as to define who is relevant for engagement or for representing societal needs and concerns. Recruitment and selection procedures of participants are based on the assumption that it is unrealistic to expect wide public understanding and deliberation but it is possible to derive a sense of what informed and deliberative publics would advise from a smaller group. While some argue that this could be a very critical point, especially when it comes to acceptance of a technology in question (Genus & Coles, 2005, p. 438), others rely on common norms of democracy: »Although the small panel of lay people involved in a consensus conference, for example, cannot represent the society, in a sense it ›simulates‹ an informed public sphere, which — according to the common understanding of democracy — forms the foundation for decision making processes in the system of representative democracy« (Engage2020, 2014b, p. 2). It is, however, recommended »to involve stakeholders who have distinct perspectives« (Geist, 2010, p. 147).

Decisions about recruitment reflect what organizers think must be ›represented‹ in a mini-public, in some cases considering what are demographic proxies for diversity of perspectives on the issues that are being deliberated (Burgess, 2014). On the other hand, if »concerned« citizens are not being addressed, the danger of speaking to just the ›usual suspects‹ would »miss the diversity of what the public think« (EC, 2007, p. 19).

One could also ask who, in fact, accepts taking part in engagement activities. As we will see in the subsequent section, it is extremely difficult to find willing participants, while critics ask who would volunteer in engagement processes. Are those who participate just »cranks« as spotted by Burgess and Chilvers (2006), persons who already have an opinion or certain interest on the

topic, but definitely do not represent the general public? This leads to another crucial question: Which public, in fact, is welcome to participate? (Delgado, Kjølberg & Wickson, 2011). This describes the paradox as analysed in the STS discourse of achieving representativeness in practical engagement exercises. On the one hand, citizens should be interested, concerned and informed, which tends to include interest groups or stakeholders. On the other hand, this goes against the requirement of engaging a ›neutral‹ majority of the general public. Many participatory exercises explicitly aim to engage people who don't have strong opinions on the issue at hand and have not been involved with any stakeholder group thus far. They should be »innocent citizens« as they are called by Irwin, or »ideal participants« who are only »guided by reason« (Irwin, 2006). Here, the »aim is to exclude people with ›pre-formed,‹ uncriticizable and unchangeable positions« (Kleinman, Delborne & Anderson, 2011, p. 225). Organized citizens with strong opinions (especially if they are critical) may be too threatening to institutional control, and it is difficult to imagine academic or political institutions readily giving up this control (Powell & Colin, 2008). »Whereas publics, though representing no body other than themselves, are potentially representative of civil society as a whole« (Burgess & Chilvers, 2006, p. 725). Often, NGOs and Civil Society Organisations are only invited into engagement processes as so called ›third parties‹ but often they are not equipped or really willing to do so (Krabbenborg & Mulder, 2015).

Forms of steered engagement are called ›invited participation‹ a term, which seems to be well established meanwhile. It essentially means a form of Public Engagement initiated and organized from the outside rather than by concerned citizens themselves (Bogner, 2012). There is an ongoing discussion on ›invited‹ versus ›uninvited‹ forms of participation (Bogner, 2012), questioning steered engagement processes that per definition select those who participate and engage persons who are not informed or interested to begin with. But if an ignorant public without any pre-opinions should be represented in the engagement process, are they considered qualified enough to join the deliberations? Fischer raised this question already in 1999, as to whether there could be a way of »meaningful« participation in this age of complex technologies (Fischer, 1999). If citizens should also be included in decision-making, some have suggested that they must have some specific knowledge of the technology in question (e. g. Jasanoff, 2003). It was even argued that the increasing number of well-educated people offers

more possibilities to recruit »people able to understand, to discuss and possibly to contest produced knowledge and the official knowledge institution« (Neubauer, 2013, p. 12). Others would argue that it is the citizens' general knowledge about techno-scientific institutional relations or citizens' local knowledge and »practical experiential knowledge« (Steinhaus, 2013) that would complement the results. Or it is argued that there are also members of the scientific community who themselves are cast as representatives of particular social values and viewpoints (Irwin, Jensen & Jones, 2013). In contrast, critics and recently also participants themselves stated that their expertise was insufficient to allow them to make a fruitful contribution. Furthermore, if participants really required certain knowledge, it needs experts' inputs and the provision of information, which again implies framing by experts through the selection of materials and inputs. Thus, citizens would gain a wider spectrum of information but they still just remain the audience (Fischer, 1999).

8.3.3 Volunteers wanted! — The Reluctant Public

> *It is often more or less explicitly assumed that participation a priori is to be seen as a positive development, and hence will be asked for and welcomed by citizens.*
> Ulrike Felt, Maximilian Fochler

The idea of Public Engagement assumes that citizens are, in theory, interested and eager to become critically engaged in scientific issues but this is not always the case. Sturgis suggests »we know rather little about whether the public are as keen on participatory dialogue as those who advocate it as key to democratic governance« (Sturgis, 2014, p. 40). As previously mentioned, with invited versus uninvited forms of engagement, it is often a challenge to find persons who are willing to follow the invitations for engagement. »Empirical evidence points to considerable reluctance by ›non-aligned‹ members of the public to get involved in participatory processes, especially technology assessments dealing with complex, highly technical and specialist issues that seem remote from people's everyday lives« (Burgess & Chilvers, 2006, p. 718). Motivating citizens to participate in discussions about high technology raises distinctive challenges (Kleinman, Delborne & Anderson, 2011). It is difficult to find willing and interested participants (Grieger et al., 2012). At a stage when the general public is still not aware or concerned with an issue, it is hard to convince them that it might be of relevance to them. »In

the busy daily lives of citizens, self-organised action around future, hypothetical concerns certainly seems unlikely« (Delgado, Kjølberg & Wickson, p. 839). Especially in the fields of biomedicine or nanotechnology, almost »desperate efforts« can be observed to get people interested in engagement procedures. As there is often not any pre-existing interest, attention has to be drawn to the subject first (Bogner, 2012). At the embryonic state of nano-scale sciences and engineering, for example, how could »stakeholders be identified when the stakes are not yet elucidated and allocated?« (Guston & Sarewitz, 2002, p. 107).

Public Engagement activities see themselves increasingly confronted with the problem of »stakeholder fatigue« (Delgado, Kjølberg & Wickson, 2011). Public Engagement processes often meet constraints that have already been documented — most significantly it is time and money. Job, family, and children are all constraints when optional participants are weighing their decision to participate in civic life. Additionally, (US) studies have revealed that »there is a decline in the amount of free time« people have (Kleinman, Delborne & Anderson, 2011, p. 223). Another reason is that, often within the processes, there are also intense demands made on the citizens involved (Burgess, 2006).

A further reason for reluctance is the self-image of the citizens, who might not be aware that they could have a say (King & Sutcliffe, n. d.) or that their opinion could be relevant. This was recently verified in the NanOpinion project: »When people felt that they had not enough knowledge they also refused to give their opinion. When visitors said they had no knowledge or no opinion about the topic then they also had ›consequently no willingness to answer questions, because one believes one has nothing to say about it‹« (Marschalek et al., 2014, p. 39). In our society, in which an ideology of expertise still figures prominently, »it may be that prospective participants begin by imagining that debates over high technology are best left to those who are highly trained« (Kleinman, Delborne & Anderson, 2011, p. 228). Citizens themselves thus may be reluctant, not because they are not interested in participating in public discourse, but they do not feel sufficiently representative to have their views taken up in decision-making, as found by Felt and Fochler (2008).

Furthermore, participants of their study »did not seem to have any trust that government would take up their advice and act according to their interest, but rather feared that they would only play a legitimatory role and their statement might be ›misused‹ by

other actors« (Felt & Fochler, 2008, p. 497). When persons feel they are being exploited and perceive the interests between them as diametrically opposed, they may also be reluctant to get involved. »Such reluctance may exist between competing companies, or between companies and NGOs where companies suspect NGOs of seeking to twist the facts in order to press their specific point of view on the public at large and NGOs suspect companies of trying to trick them into supporting something they actually oppose« (Asveld et al., 2015, p. 580).

8.3.4 Timing — Moving Upstream

As mentioned above, the continuum of Public Engagement is wide; however there seems to be considerable consensus on the importance of including citizens already at an early stage of research and technological development. »Early PP/PE is therefore thought to enable a more reflexive and socially robust techno-scientific development« (Delgado, Kjølberg & Wickson, 2011, p. 834). Or as formulated by the EC: »Early societal intervention in the Research and Innovation process can help to avoid that technologies fail to embed in society and or help that their positive and negative impacts are better governed and exploited at a much earlier stage« (von Schomberg, 2012, p. 10). Research should be »›responsible by design‹ and thus account for societal risks, benefits and impacts right at the beginning« (FraunhoferISI & TechnopolisGroup, 2012, p. 26). It cannot be ignored that it is crucial to involve the public before an issue or technology becomes controversial, before »opinions become polarised and hardened and polices are predetermined« (Cobb & Gano, 2012, p. 97). This was called for already more than ten years ago when »most of the literature on the impact of technology on society focused on ›back end‹ impacts and, thus, was often not useful as a practical guide to avoiding ›front end‹ mistakes. There is very little work focusing on communication patterns at the very beginning or even anticipating major scientific and technical change and its impacts, to better allow us to understand, prepare for, and avoid conflict, opposition, and backlash — hence, ›early warning‹« (Guston & Sarewitz, 2002, p. 103). For research that attempts to be responsive (as it is the case in RRI — see chapter 4.2.2.4), which means responding to new knowledge as it emerges and also to emerging perspectives, views and norms (Stilgoe et al., 2013), it still has to be determined how to extract this knowledge at the earliest possible stage.

Negotiations within research processes or engagements

activities with non-scientific actors are distinguished in „three different research vantage points« (Thompson, Lucas & Hall, 2012), which are referred to as upstream, midstream, and downstream research. These different streams are differentiated according to the main questions related to research decisions. Midstream would ask how research is to be carried out, whereas an upstream policy question is asking what a research project should be carried out and downstream whether to adopt processes or products after its development. These three streams are visualised in figure 16.

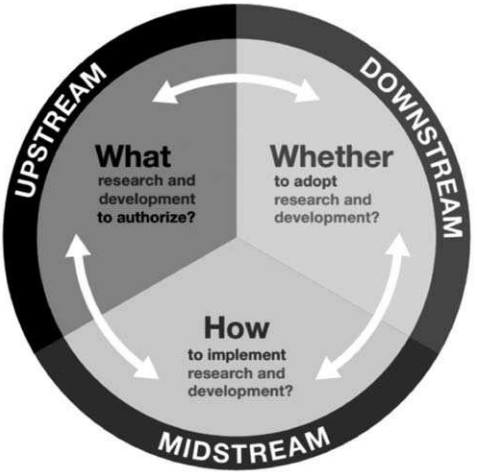


Figure 16:
Stages in the governance of science and technology (Schuurbiers & Fisher, 2009, p. 425)

As already stated during the Lisbon workshop on Public Engagement in science, there has been a wave of interest in moving Public Engagement upstream — meaning to an earlier stage in the processes of research and development decisions. »There is a sense that earlier controversies have created a window of opportunity, through which we can see more clearly how to reform and improve the governance of science and technology« (EC, 2007, p. 17). But still there is only little analysis and limited understanding of the value and role of stakeholder participation during the earliest phases, as for instance, mentioned by Human and Davies (2010) in the case of resource planning. It is yet not clear how to put upstream engagement in practice meaningfully. The »question of how far ›upstream‹ it makes sense to go« or the question of what exactly »upstream« means in practice remains open to contest. It is also criticised that the concept of upstream engagement is »based on a linear, unidirectional and oversimplified image of science-society relations« (Delgado, Kjølberg & Wickson, 2011, p. 834). Furthermore, the question had been raised, how upstream engagement would

even be possible before an issue even has become an issue of public matter (Latour, 2004). This question leads to the well-known ›Collingridge dilemma‹ »implying that ethical issues could be easily addressed early on during technology design and development whereas in this initial stage the development of the technology is difficult to predict« (von Schomberg, 2011, p. 8). This dilemma creates a double bind situation. One is the »information problem«, where societal consequences cannot be reliably predicted until the technology is already in use and the second is the »power problem« where it becomes difficult to change developments once technologies are already embedded in society (Eden, Jirotka & Stahl, 2013). To cope with this dilemma »moving upstream therefore entangles a preference for generalised topics for discussion while creating an avenue for experimentation with invited forms« (Delgado, Kjølberg & Wickson, 2011, p. 840).

According to Schuurbiers and Fisher, midstream signifies the phase of the research and development »before scientific results are translated into products or services, but after authorization and funding decisions have been taken«. In other words, this is the phase, which takes place within the research laboratory, at the drawing board or wherever decisions about the conduct of research are made. It is »a means to evaluate and adjust research decisions in light of societal factors while the research process is taking place« (Schuurbiers & Fisher, 2009, p. 425). However, only few such exercises have taken place as yet, and as presented by Schuurbiers and Fisher these »lab-scale« midstream modulation exercises only involve social scientists so far.

Furthermore, as already being discussed within the Lisbon workshop on Public Engagement in science, alongside this »growing enthusiasm for early dialogue about science and technology, there is a need for honest evaluation of its value and impact«. It seems rather clear that engagement processes make a difference for the people directly involved in dialogue processes it can reveal how they think — whether they are scientists, policymakers or members of the public. However, »if the aim is to affect just those people in the room, such initiatives seem awfully expensive. It is important that the ripples spread further, to the decision makers, institutions and systems where the power lies« (EC, 2007, p. 23).

Critiques also come from STS' side: Rip is seeing reductions to create tractability. The focus on upstream aims is at securing acceptance — »while the real challenges might be downstream«. For him, »These reductions can close down broader reflexivity, and

definitely shape development, for example through evolving narratives of praise and blame. One example would (be) the acceptance of versions of due process argument: Was there upstream interaction with society? OK, enactor, then you cannot be blamed for what happens afterwards« (Rip, 2014, p. 9). Also, for Wilsdon et al. it needs to open up to new questions rather than just »moving the same set of ›downstream‹, risk-based questions to an earlier point in the research process«. For both of them, it is not about positioning Public Engagement where it will be most effective and thus restricting Public Engagement to a specific point in the process, but to »opening up innovation to alternative trajectories and possibilities« (Wilsdon, Stilgoe & Wynne, 2005, p. 38).

8.3.5 **Noble Motives**

As described above science and society interaction has been moving on from the outdated deficit model towards an inclusive and mutual communication model, which should be based on partnership. Whereas the deficit model still honoured the scientific over other forms of expertise, the new democratic model acknowledges the existence of multiple (and perhaps even occasionally conflicting) forms of expertise, and seeks »to accommodate them all through open, constructive public debate« (Durant, 1999, p. 315). The democratic model should thus establish a relationship of equality between scientists and non-scientists and emphasis on dialogue between experts and lay people. It sees a wider range of factors, thanks to knowledge, including »values, and relationships of power and trust, as having an important part to play« (Durant, 1999, p. 315). New dialogue formats, however, are criticised for their »catchy rhetoric«, although there are in fact only few successful examples that could be pointed out. For Schuurbiers and Fisher »this is partly because it is often unclear how broader considerations can be brought to bear on actual ›bench work‹ in ways that add value to both science and society« (Schuurbiers & Fisher, 2009, p. 424).

Thus the new mode has already come under critique for being old wine in new bottles, as some well known elements and approaches of old public understanding of science (PUS) approaches can still be found in current activities. For example, EC funded outreach and engagement projects (e.g. on nanotechnologies, such as the NanOpinion project still have to find out what the public knows by testing some basic scientific understandings in the form of a quiz, as it has been done in previous studies. It is not a new idea that science affects society, neither has it recently arisen with

the emergence of nanotechnologies, but was already mentioned almost 30 years ago with the argument that people »deserve« and »need« to know about science. The prospects of »informed public debates and decision-making« continues to be questioned »when a large proportion of the public is confused about the relevant facts« (Durant et al., 1989, p. 14). This argument, brought up by the director of the science museum in London in 1989, is a reminder of current debates and doubts about capable citizens (as described in chapter 8.3.2).

As already mentioned above, disagreement continues on forms of ›invited participation‹. From a critical standpoint, invited participation functions as a governance tool to avoid conflicts (Bogner, 2012). Invited forms have been criticised for trying to institutionalise or ›tame‹ Public Engagement activities (Stilgoe, Lock & Wilsdon, 2014) or becoming no more than a process box that one has to click when applying for funding (Wilsdon & Willis, 2004). The forms of invited engagement and the increasing institutionalisation of Public Engagement activities still have the impression of top-down activities in which social scientists and other experts from powerful institutions are primarily responsible for initiating, organizing, and facilitating the events (Powell & Colin, 2008). There is still a focus on knowledge transfer, rather than on knowledge production and engagement activities are »being biased towards facilitating academic ›push‹ rather than user ›pull‹« (Phillipson et al., 2012, p. 56). Many other STS scholars have argued that, despite the current enthusiasm for Public Engagement, most of what occurs under this banner continues to focus on »downstream« issues meaning to confront participating citizens with ultimate topics such as risk, and thus to »leave untouched the wider purposes and imaginations embedded in scientific research and policy« (Davies, 2013, p. 66).

STS authors have also argued that the activities often miss the possibilities for plural framings and real dialogue because of their goal of achieving consensus (e. g.: Irwin, 2006). For Felt and Fochler accordingly, »an engagement of the public in an innovation governance would need to ask not only about the risks of technoscientific discoveries, but also to discuss the more basic values, social assumptions and visions of society driving this very innovation process« (Felt & Fochler, 2008, p. 491). Therefore, it is not advisable for the experts to frame a question and organise an engagement process to provide the answer. This would only be the deficit model in a new guise as Wynne has argued (2014). For Wynne (although he admits that he cannot give any evidence for it) this attitude

originates in a »deeper implicit scientistic dogma over what ›the public issue‹ is, or should be« (Wynne, 2014, p. 62) and he seems to be in agreement with geneticist Sir Walter Bodmer, who »seamlessly defined public understanding of science with public compliance with those normative choices woven into ›science‹« (Wynne, 2014, p. 64).

STS scholars claim that new approaches of engagement represent a response to a new type of deficit model — a public deficit of trust. Genus and Coles in analysing limitations of engagement processes, found in the GM debate that the approach »though innovative, was more about application of a ›deficit model‹ approach to better inform citizens ignorant about GM and the winning back of public trust regarding food safety after the BSE crisis, than about allowing the public to influence public policy early enough in development to make a difference« (Genus & Coles, 2005, p. 437). Rip is arguing that promises are being made, like in the case of GMO for example to address the hunger in developing countries. But if such a »promise is contested, a subsidiary argument kicks in: people don't understand the promise of the technology so we have to explain the wonders of the technology to them« (Rip, 2014, p. 6). And this appears to be the equivalent of the well-known deficit model. It seems to be that the transition from public understanding of science (PUS — see more in chapter 3.2.1) to dialogic ›engagement‹ has not yet been a straightforward one. As Irwin puts it in his review of 20 years PUS: »We can safely conclude that, despite all the ›from deficit to democracy‹ talk, no such easy shift has been made« (Irwin, 2014, p. 73).

According to Stirling's concept of three motivations for Public Engagement (Stirling, 2008), for Delgado et al. (2011) the restoration of legitimacy and public trust are motivated by the instrumental rationale, in which a particular predefined end should be achieved. The other two rationales are: The substantive and the normative. The substantive rationale should lead to (substantively) better results, for example, for decision-making. In contrast to the instrumental, the outcome is not pre-defined, on the contrary the result should emerge through the engagement process. The normative rationale could be seen as just »the right thing to do« … »In this case, it is the process rather than the result that is in focus and the motivation is based on a particular normative commitment (e. g. often an ideal of democracy)« (Delgado, Kjølberg & Wickson, 2011, p. 830). Along these different rationales, they identify a »framing battle« about competing rationales for citizen

involvement, which are explicitly or implicitly in use. It has to be considered that citizen engagement per se may not be the goal, but rather a particular outcome (Powell & Colin, 2008). Identical framing assumptions apply to engagement processes. Decisions are made about the type of process used, the participants, the information provided. Be it consciously or subconsciously, debates are framed in the right way. So are the reports that are written and also the questions which were chosen to answer, as for example ›is it safe?‹, rather than ›is it necessary or desirable?‹ As formulated by Wilsdon: »You can get the results you want if you frame the debate in the right way« (Wilsdon & Willis, 2004, p. 40). Or as Oliver Escobar from the Citizen Participation Network put it: »We don't do public engagement, we do ›public making‹« (Engage 2020 conference, Brussels, 2015).

Stirling was already describing the tension between democratic openness and technocratic closure. He argued that on the one hand, Public Engagement exercises should be able to open up deliberation between different views, but on the other hand close down dialogue by emphasising the importance of consensus and decision-making (Stirling, 2008). It also depends on what is promised by the engagement process. Some of the declared goals just seem to be exaggerated. The stated approach of »opening-up« encompasses a pluralistic policy advice (in technology assessment) which »poses alternative questions, focuses on neglected issues, includes marginalized perspectives, triangulates contending knowledges, tests sensitivities to different methods, considers ignored uncertainties, examines different possibilities, and highlights new options« (Stirling, 2008, p. 280). But when seen in practice, these »comprehensible pleas for openness and pluralism have often only remained programmatic declarations so far« (Bogner, 2012, p. 513). Thus engagement activities are often just seen to being implemented as rhetoric fig leafs with hidden rationales behind them, as mentioned above, or for politicians who are »no longer able to keep the lid on Pandora's Box« as Burgess and Chilvers put it (2006, p. 724). It has to be carefully investigated whether the engagement activities are not »intended to empower citizens to have a voice in decision making, but paradoxically, to quell potential public resistance to and assure acceptance for the technology« (Powell & Colin, 2008, p. 130).

Substantial critique is being formulated in general on invited occasional engagement activities. These forms of laypersons participation, which are organized by professionals and are carried out

under controlled conditions, are seen to be disengaged from public controversies, or the experiences of people directly affected and are thus considered artificially created activities, isolated from people's real world. As Bogner analytically defined in his work on what he has called ›lab participation‹: »The criterion of lab participation is its abstractness, its isolation from political and lifeworld contexts, and its methodologically controlled design« (Bogner, 2012, p. 512). This is in contrast to an acquired understanding of engagement in which »›participation‹ should not be reified as a circumscribed, static event — nor, in the perspective of certain institutions sponsoring participatory activities, as a prerogative that can be switched on and off at will« (Bucchi & Neresini, 2008, p. 467).

As Irwin and others have already argued, invited forms of Public Engagement not only predetermine who might be a ›relevant‹ participant, but they also carry implicit assumptions about how citizens should participate. Irwin (2006) calls it »formalized mechanisms of voicing«. According to Horlick-Jones et al. (2007), exercises are often designed as »civilised« debates targeted to achieve consensus. Organisers inevitably impose frames and meanings on to participants. This »closes down possible alternative framings and opportunities to question fundamental issues (such as the role of science and technology in society)« (Delgado, Kjølberg & Wickson, 2011, p. 834). As already discussed within the Lisbon workshop on Public Engagement, certain reservations were expressed: »If done disingenuously, engagement runs the risk of manipulating the public, which is worse than ignoring them« (EC, 2007, p. 23). It seems that Public Engagement activities »are emphatically not marked by conflict or overt disagreement« as studies observed »a drift to the ›middle ground‹: the impression given is of friendly but somewhat toothless discussion« (Davies, 2013, p. 66). For Stilgoe and others the way that these discussions are conducted thus becomes another means of closure (Stilgoe et al., 2013). Also for Bogner »deliberation norms become established which lead to the exclusion of those participants who cannot or do not want to fit in with those norms«. For him »lay expertise thus becomes a copy of expert expertise, and it is inevitably a copy of slightly inferior quality. But this ›expertization‹ process raises the question of whether it provides any added value« (Bogner, 2012, p. 519). Invited engagement activities under expert control could be thus seen as »expert reassurance« rather than mutual exchange and engagement (Stilgoe, Lock & Wilsdon, 2014). What is missing is the involvement of »a wide spectrum of participants and viewpoints«

as one way in which processes would differ »from consensus-based approaches, which typically avoid less tractable issues and work with participants selected (at least in part) for their ability to work well with others and accept a common recommendation« (Gregory et al., 2003, p. 1293).

Such mainstreaming of opinion misses minority viewpoints that could be more valuable for policy-making than viewpoints on which there is substantial consensus, as Taebi et al. for instance, described in their example of one important marginal perspective on the impact of shell gas (Taebi et al., 2014). Too often, the emphasis in the discussions is focused on ›consensus‹, and thus ignores the diversity of views that might be able to define a particular issue (Stilgoe, Lock & Wilsdon., 2014). Those consensus-driven processes »cannot accommodate stakeholders with significant differences or deep-seated conflicts« (Gregory et al., 2003, p. 1293). Critique was also formulated within the Lisbon workshop on Public Engagement: »Too often, even within processes designed to engage the public, the choice we are presented with is advancement or not, faster or slower, but with no real option to change course« (EC, 2007, p. 18).

With regard to mainstreaming opinion, STS scholars also found that »the existing archetypical and deep-rooted cultural narratives influence public responses« (Krabbenborg & Mulder, 2015, p. 455) and thus innovative or minority viewpoints would have to be cautiously extracted. Furthermore, as regards empowerment through engagement activities, such steered lab situations might not have a long-term impact nor lead to self-organisation within society: »Although these exercises may help citizens gain group deliberation experience, they are unlikely to prepare them for ›real-world‹ political participation, which is long term, seldom controlled or facilitated, and often contentious« (Powell & Colin, 2008, p. 129). It must also be considered as to whether »engagement exercises sponsored by powerful institutions facilitate genuine citizen engagement and build capacities among citizens to engage without institutional support« (Powell & Colin, 2008, p. 129).

8.3.6 What is it Good for?

Public Engagement activities are cost and time intensive, and it is not only funders who are asking about their benefits. As already discussed in chapter 8.2, with high aspirations come high expectations. But if and how they can be fulfilled by Public Engagement activities is a recurring question. After more than a decade of

experimentation, criticisms continue to be expressed about the »efficacy and efficiency of these processes« (Burgess & Chilvers, 2006, p. 724). The most serious yet often neglected critique, however, is the consideration of the impact of engagement activities.

One main problem is that there are still only very rare empirical studies on impact available. There is a lack of credible evidence to »measure and demonstrate the policy impacts of Public Engagement (PE) in science and technology« (Emery et al., 2015, p. 422). Credible outcome-based evaluations of Public Engagement initiatives, that assess the soundness of the achieved outcomes, are missing (Engage 2020, 2014a). One reason which makes it so difficult to measure outcomes, is the absence of defined goals. As Powell found, only a »few academics and governments attempting to ›engage in Engagement‹ are clear about their goals and desired outcomes, and whether or not the processes they facilitate are likely to meet these ends« (Powell & Colin, 2008, p. 127). One cannot assume that all engagement activities are meant to engage in decision-making. Although the relation of the Public Engagement exercise to the established decision-making structure should be the central issue, (Engage 2020, 2015) engagement activities often remain rather superficial and with no real attempt to influence policies. Grand et al. found that »the most common definitions of ›Public Engagement with research‹ focused on the dissemination, communication or presentation of research« (Grand et al., 2015, p. 10). Phillippson et al. investigating 21 research projects in the UK confirmed that, »most stakeholders were involved as research subjects (inputting information and assisting in data collection) or as event participants (receiving and giving feedback on project findings)« (Phillipson et al., 2012, p. 61).

According to Emery et al., another reason that makes it difficult to assess is that it is unclear whether this deficiency of measurable impact represents the failings of Public Engagement on policy impacts or whether it simply indicates that tracing influence on policy impact is very difficult to measure. Although there can be found »anecdotical evidence« (Emery et al., 2015) of policy impacts arising from public, there is no understanding of the causal relationships between Public Engagement and its potential influence on policy making. It is difficult to track engagement outputs once they have entered the policy realm, given the long periods of time between the activities and the decisions, but also the manifold other potential influences on political decision-making. Therefore, according to Emery et al. (2015) more comparative or systematic

attempts to examine the relationship between procedures and impacts are needed.

Despite the increasing numbers of activities and the growing attention given to public participation, there is no consensus in academic literature about their usefulness (Cobb & Gano, 2012). Although many process evaluations of engagement activities have been carried out, not many substantial investigations within the wider political context have been undertaken. With the increase of engagement activities, also more academic case studies of engagement practices had to be undertaken, providing a range of data with more or less the same results. For Stilgoe et al. »the literature risks becoming a litany of engagement case studies and evaluations« (Stilgoe, Lock & Wilsdon, 2014, p. 6). After years of reviewing such works, Irwin also confessed that such studies would only invariably reach »familiar conclusions concerning the limitations of the exercise in question« (Irwin, 2014, p. 72). But that means, »the how trumps the why, and there is insufficient systematic reflection on what all this activity has achieved« (Stilgoe, Lock & Wilsdon 2014, p. 5). Also Bogner criticizes that »up until now, there has been hardly any empirical investigation of whether lay participation procedures are capable of providing the desired rationality gains« (Bogner, 2012, p. 513). Wynne questions »how we can aim seriously to make sense of publics in responding to ›science‹, if we neglect to examine what it is that those publics experience — epistemically, materially, normatively, and institutionally — in its ambiguous and changing name« (Wynne, 2014, p. 60). Only few engagement activities have been »rigorously examined for their successfulness« (Cobb & Gano, 2012, p. 98) or »to what effect« they had been undertaken (Stahl, 2012, p. 1). Interestingly, as formulated by Felt and Fochler, such widely applied engagement practices have »not induced much theoretically informed reflection on the role of these processes in governing science« (Felt & Fochler, 2008, p. 491).

Furthermore, what impact on policies and decision-making processes engagement activities could achieve is still underrated. The legitimacy of Public Engagement should not only be seen depending on its inputs, but also on its outputs, in particular its impact on governance. But »the suspicion is that such exercises do not sufficiently challenge, and so serve to reinforce, incumbent power structures« (Stilgoe et al., 2014, p. 6). Therefore their impact on policymaking has attracted substantial critique (Stilgoe, Lock & Wilsdon, 2013). Actual studies reveal, for example, that it had »not been clear how the results from engagement efforts have been

used in governance strategies and actual policy decisions« (Grieger et al., 2012, p. 64), or then: »it remains widely unclear how findings from public deliberation influence the (social) shaping of these technologies, for example, concrete innovation/funding policies, commercial R&D strategies and so on« (Scholl et al., 2012, p. 4). »The few evaluations of recent engagement efforts indicate that these exercises have had no discernable political or other societal impacts« (Powell & Colin, 2008, p. 128), and there is »perceived lack of any connection to policy« (Cobb & Gano, 2012, p. 101).

For Wynne these »mushrooming commitments to public citizen engagement in ›science policy‹ [...] is something of a mirage« (Wynne, 2005, p. 68). It might seem that Public Engagement is becoming more of an obligation, which keeps many members of society engaged in the process but with little effect, as though participation would carry more weight than its impact. This »relentless drive« for participation has been mentioned by Cooke and Kothari (2001) as »the new tyranny of engagement«. For Irwin et al. (2013), engagement activities often only offer the appearance of openness and dialogue, but in fact is a source of legitimation for a pre-decided policy conclusion. Consultations may only confer legitimacy without having any influence (Burgess, 2014). As criticised in the MASIS (Monitoring Activities of Science in Society in Europe) report, precautions must be taken so that public participation does not lose its connotation of deliberative democracy and becomes more and more a means of involving users in the design of new products, driven by economic rather than political needs (Siune u. a., 2009).

Often, the usefulness for the participants themselves is not always clear. Even after intensive collaboration with scientists, as initiated in the study by Felt and Fochler, »especially the citizens found it hard to grasp what this idea of public participation might actually mean« (Felt & Fochler, 2008, p. 496). Often, participants are let alone after the engagement activity and are no longer informed on the outcomes afterwards. »Notably absent in virtually every dialogue to date is any attempt to feedback to participants and to wider society about how the input was used, how it influenced the process under discussion and why the chosen cause of action was taken, particularly if it is contrary to the views elicited through the involvement process« (Sutcliffe, 2011, p. 12). Cobb and Gano found that there are just a handful of studies which have directly examined what citizens think about the merits of taking part in engagement events (Cobb & Gano, 2012). If the

goal was empowerment, for example, for them it would be interesting to find out if participants would act or think differently to non-participants. As they found in all studies of efficacy, however, that such information was compiled and recorded only until the end of the engagement process, not beyond. Furthermore, as Kupper et al. examined, the involvement of all of stakeholder »declines in the evaluation phase« (Kupper et al., 2015, p. 15) and thus their perspectives are no longer sufficiently considered. Similarly, Nitsch et al. found in their literature review of reported engagement cases that the participation in the initial phase (e. g. data collection) was »rather high whereas participation processes in the later evaluation phases (reporting and dissemination of results) were generally referred to the least« (Nitsch et al., 2013, p. 50).

Furthermore, there has been significant criticism formulated on the »limited capacity for empowering social agency in technological choice and the modulation of innovation trajectories« (Stilgoe et al., 2013, p. 1572). Powell and Colin after a year of intense collaboration and support for a self-organised citizen group stated: »Even if the group is highly organized and efficacious, that may not be enough for it to affect science and technology policy in meaningful ways given sociopolitical and institutional barriers« (Powell & Colin, 2008, p. 340). Also Kleinman et al. reported that, several members of one observed consensus conference had went on to form a biweekly group that continued to meet, discuss and speak but they admitted that without ongoing assistance of one of the organizers, »these panellists may not have remained engaged« (Kleinman, Delborne & Anderson, 2011, p. 237).

Critiques also raise the question if influence on research governance is really carried by the intention of the initiators or the motivation of citizens to participate. Or do engagement activities stimulate interest rather than offer possibilities for decision-making? For Bogner, with regard to the above-mentioned lab participation, it »is not to channel a desire to participate or to pacify protest but rather to mobilize people who are potentially interested in an issue but have no interests of their own in connection with it. The citizens do not primarily want to make policy, exert influence or get any particular opinion more widely accepted; rather, they want to inform themselves« (Bogner, 2012, p. 511). At least some studies show that participation is still seen as worthwhile by the participants who could gain information, or gained other kinds of impact that satisfied them, for instance: »gaining unmediated access to scientists was seen as a way of having at least some influence« (Felt

& Fochler, 2008, p. 497). STS scholars are now looking increasingly at the ›social intelligence‹ and unintended consequences generated by engagement activities, that may be challenging or irrelevant to the particular institutions invested in the exercise, but are nevertheless important (Stilgoe, 2007). But there would to be an urgent need to develop criteria for mapping and evaluating and »making sense of these spillovers« (Stilgoe, Lock & Wilsdon, 2014, p. 7). Future developments will show, if little impact is enough or if, as Jasanoff has already criticised a while ago, new participatory forms »may reach neither far enough nor deeply enough to satisfy the citizens of a globalizing world« (Jasanoff, 2003, p. 237).

Another question also recurrently raised is how the engagement of small groups of laypersons could counterweigh actual technology developments as it is, for example, currently the case in nanotechnologies. Powell and Colin, for instance, calculate as follows: If there was a market for nanotechnology-based products of about $ 3.1 trillion in 2015, »there is little evidence that public bodies or citizens anywhere in the world have had any meaningful input in these developments« (Powell & Colin, 2008, p. 341). The aforementioned »mini-publics«, which are typically brought together for dialogue exercises, »look microscopic against the backdrop of global science and its governance« (Stilgoe, Lock & Wilsdon, 2014, p. 11). Lövbrand et al. (2011) also see a »fundamental problem of scale« and processes seem legitimate only for the people who are involved in them. For those interested in broader questions of science and democracy, this could constitute a fundamental problem, »unless we take a wider view of the governance experiment of which engagement is a part […] and view engagement in its wider political context« (Stilgoe, Lock & Wilsdon, 2014, p. 5). It seems as it was recently compiled in a critical review within the STS community »that we have over-promised on what such public engagement exercises can deliver« (Stilgoe, Lock & Wilsdon., 2014, p. 11).

8.3.7 Difficult to Assess

As indicated above, it has proven difficult to give a precise answer to the question of what public participation is good for. Even if the analysis was restricted to only one perspective, for example, the policy-maker's perspective which might differ from the perspective of civil society groups, it has to be acknowledged »that there exists a wide range of different problem settings« (Banthien, 2003, p. 26). The question with regard to conditions under which we can

consider a participatory process to be good or successful, is challenging. »How might general lessons be drawn from comparisons across context specific exercises? And how should one assess the success of PP/PE exercises, i. e. using contextual or general criteria (see Rowe and Frewer, 2000, 2004, 2005)« (Delgado, Kjølberg & Wickson, 2011, p. 836). Many projects and programmes have carried out criteria and schemes for the assessment of public participation. (E. g.: Rowe & Frewer, 2000, Rowe, 2004, Maiukait-Žvinien et al., 2014). In general, these criteria concern either the processes of participation themselves, or their results. In both respects, the assessment is often relative to the particular perspective of various actors. Alongside such subjective standards of evaluation, there are a number of general, normative criteria, such as fairness and openness to be considered. Schemes provide classifications that differ by various aspects, for example, by process design or by areas of action. The TAMI framework, which was developed in the context of technology assessment, offered a matrix as shown in the table below (figure 17) with nine types of impact. 23 roles or functions can be arranged according to these types of impact.

Impact Dimension **Issue Dimension**	**I.** **Raising** **Knowledge**	**II.** **Changing** **Attitudes /opinions**	**III.** **Initialising** **Actions**
Technological / scientific aspects	**Scientific Assessment** Technical options assessed and made visible Comprehensive overview of consequences given	**Agenda Setting** Setting the agenda in the political debate Stimulating public debate Introducing visions or scenarios	**New R&D Policies** New action plan or initiative to further scrutinise the problem decided New orientation in policies established
Societal aspects	**Social Mapping** Structure of conflicts made transparent	**Mediation** Blockade running Bridge building Self-reflecting among actors	**New Decision-Making Processes** New ways of governance introduced Initiative to intensify public debate taken
Policy aspects	**Policy Analysis** Policy objectives explored Existing policies assessed	**Re-Structuring the Policy Debate** Comprehensiveness in policies increased Policies evaluated through debate Democratic legitimisation perceived	**New Policies** New legislation is passed Policy alternatives filtered Innovations implemented

Figure 17: The TAMI framework (source: Banthien, 2003, p. 30
after TAMI — Technology Assessment in Europe: between Method and Impact)

Renn provided another example of an optional assessment with respect to the connection of the political and the societal sphere, which focuses on the interdependencies between the different societal subsystems. The table below shows these interdependencies (see figure 18). In this framework, civil society plays an important role not only by direct interaction with the political system, as many forms of civil society participation do not include direct interaction between civil society and the political sphere. But »still, they can also have an indirect impact on political decision-making«. Accordingly, for Banthien et al., it is wrong if processes are evaluated only according to their direct impact. Because »even if no direct impact can be discerned, dialogue and participation can contribute to a valuable culture of problem-solving, for example by changing attitudes within civil society and public authorities« (Banthien, 2003, p. 68). One of the possible criteria recommended was, for example, to ask if new relationships could have been established (Richmond, Peterson & Betts, 2008).

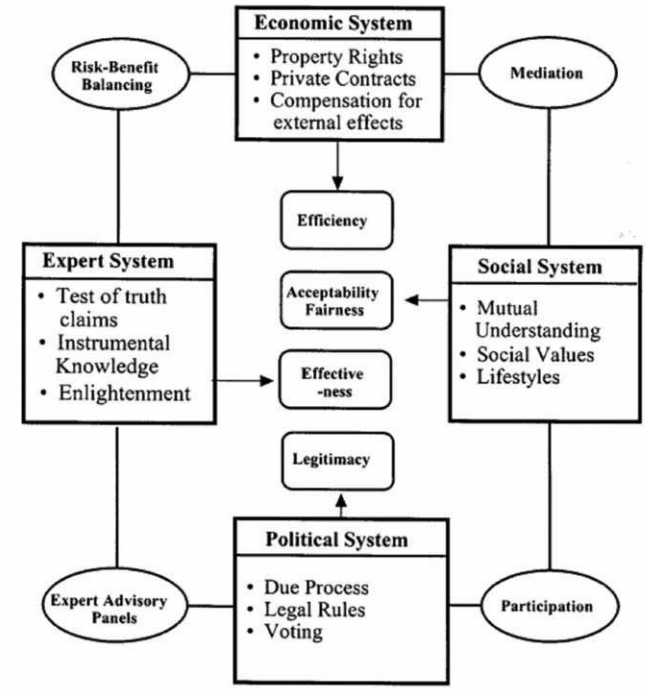


Figure 18: Four central systems of society
(Banthien 2003, p. 69, cited after Renn, 2002)

However, the main problem as has been identified continues to be that questions about evaluating the effectiveness of new governance practices and the extent to which engagement processes are »fit-for-purpose« are under-explored and that mostly systematic evaluations of the impact of public participation exercises have not yet been applied (Burgess & Chilvers, 2006). In a study within the Open University on if, how and why researchers undergo Public Engagement activities, from »171 researchers surveyed approximately half (53 %, n = 92) gave no response to the question about what they saw as a successful activity and what criteria they used to make this assessment« … »Only five responses mentioned some form of formal or semi-formal evaluation« (Grand et al., 2015, p. 13). In general, the study identified that only very few strategically evaluate their Public Engagement activities. Walls et al. confirmed that »only a few studies have critically examined engagement exercises to see what they achieve and whether they deliver what their proponents claim they deliver« (Walls, Rowe & Frewer, 2011, p. 242). »Examples of successful public engagement projects are arguably rare and hence, demonstrate the need for careful analysis and evaluation« (Grieger et al., 2012, p. 63).

As empirical data is lacking, especially on effects and impact, there have been calls for additional as well as more rigorous evaluations. A need for honest evaluation of value and impact of Public Engagement has been expressed (EC, 2007). However there are »many theoretical and practical difficulties that exist in doing this« (Walls et al., 2011, p. 241). Beyond theoretical disagreements, there is also the question of which of the anticipated outcomes are most important to measure and how they should be measured. As there are no standardised procedures, cross-case comparisons about effects of taking part in deliberative processes are unreliable (Cobb & Gano, 2012).

8.3.8 Good Idea, but …

Although the idea of public participation in research processes has gained significance, its practical and meaningful implementation is far from every day business, especially in some industry sectors as, for example, in Information Systems (IS) where public participation and engagement are currently not strongly reflected (Stahl et al., 2014). Apart from some standardised techniques, there are no standard approaches or formal regulations for mandatory engagement processes. Often those who attempt undertaking engagement activities, in fact, face several limiting factors. Some of those

factors as described in a publication by the EC on future options for more responsible innovation are:

— Insufficient funding for stakeholder participation
— Research processes not stipulating the inclusion of stakeholders
— Lack of awareness

(European Commission, 2013)

And as the CONSIDER project (Civil Society Organisations in Designing Research Governance) published in January 2015, even in research projects that were meant to be collaborative, the percentages of involvement are very low: As for instance »… only one in four EU funded collaborative research projects involve civil society representatives« (CONSIDER video — see figure 19).

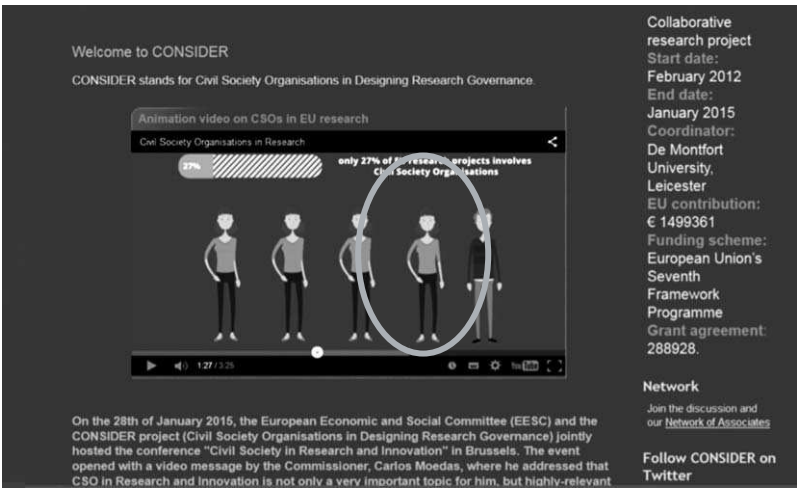


Figure 19: CSOs engaged in collaborative research, animated video by CONSIDER, retrieved October 19, 2015

And »only 30 % of project coordinators indicate that CSOs are involved from the start of the project« (Stahl, 2012, p. 3). When asked with which public groups they would not engage, Grand et al. found that there is hardly any resentment among researchers towards groups with which they would not collaborate. But when asked with »which groups they would like to work, responses were very often the same as responses to the question of which groups they had engaged with« (Grand et al., 2015, p. 13). That means the researcher either had no idea as to how to engage other groups or how to access others than those they had already been engaged with.

In general, often the idea of involvement is appreciated but only few are also attempting or already implementing it. Accordingly,

»only few have any experience or training in it« (Powell & Colin, 2008, p 132). »Even in countries who had a strong commitment to carrying out research with and for society, it was acknowledged that this process is still in development and further lessons need to be learned« (Steinhaus & McKenna, 2014, p. 12). The situation in the business and industry sector is worse. A study based on interviews with managers in twelve innovation-based companies found very low levels of awareness of the need for Public Engagement and even lower levels of action. For Wilsdon and Willis this means that the sector where Public Engagement would be most urgently required is barely engaged with this agenda. Therefore »when attempts are made to have a dialogue with the public about new innovations they tend to occur long after the key business decisions have been taken« (Wilsdon & Willis, 2004, p. 48). They argue that the idea of public dialogue in science and technology have not really spread yet.

Concerning policies and public funding, mainly only the EC working programmes outline Public Engagement. Besides the EC framework programme, which is perceived as »the sole vehicle for accelerating efforts«, there is »no or insufficient funding available on a national level« (Steinhaus & McKenna, 2014, p. 13). In the case of Austria for example, according to the MASIS report »as regards program development the inclusion of citizens is not foreseen by the Austrian Research promotion Agency« and regarding »the inclusion of stakeholders in research itself the Austrian Research Promotion Agency is also very cautious« (Grießler & Wolfslehner, 2015, p. 22).

Public participation indeed is not always welcomed. One reason is the aforementioned argument on the limited capabilities of citizens that would make deliberations impossible. Resistance is also recurrently formulated in basic research. »There is still a perceived tension between the understanding of academic excellence (in curiosity driven research) and social relevance, leading to some resistance amongst academics to the idea of engagement« (Steinhaus, 2014, p. 13). An attitude that is regularly adopted is that basic research is in principle neutral and the »question of responsibility only becomes relevant when scientific findings are transformed into applications. At that point researchers have to start the dialogue with the public« (Grießler & Wolfslehner, 2015, p. 25). In the study of Emery et al., one policymaker argued that: »The mainstream thinking is that public engagement can hamper scientific excellence […] or could hamper innovation« (Emery et al., 2015, p. 436). Powell and Colin found that some scientists are »not

particularly enthusiastic« about engaging with lay citizens and some are even »quite apprehensive« (Powell & Colin, 2008). These fears need to be addressed, as it was done in the MASIS report: »While every citizen might be regarded as a stakeholder in science for normative reasons, it does not imply that he or she should actually be asked, or have the right, to participate in the workings of science. Thus, there is no reason for the defensive reaction of scientists« (Siune et al., 2009, p. 17).

It seems, for successfully implying public participation, still more persuasive efforts would be needed, as Fischer had already stated a while ago: »Moreover, in contrast to the dominant technocratic view that sees modern life as too complex to accommodate participation, the application of participatory inquiry offers innovative experimental possibilities. Although no panacea, it shows that there is much more room for exploration than the leaders of the techno-industrial system either recognize or are willing to concede« (Fischer, 1999, p. 301).

8.3.9 How to put it into Practice?

Despite the existing uncertainties and difficulties, a considerable number of engagement activities have already taken place. Some of them have been replicated many times. One prominent example is the originally Danish Consensus Conferences which had shown that engagement techniques could »travel well« (Einsiedel, 2008) although its generalising approach was also criticised. »Participatory models are therefore increasingly travelling across cultures, justified on the basis of a general (Western but globalised tendency) to portray PP/PE as a universal element of good governance« (Delgado, Kjølberg & Wickson, 2011, p. 835). Many more models are being created and tested. Attempts at upstream engagement (see chapter 8.3.4) »led to some creative experimentation with invited forms of engagement« (Delgado, Kjølberg & Wickson, 2011, p. 839). This »proliferation of participatory approaches« opened questions on »greater clarity about the methods of participation, the purposes for which they are used and the criteria against which they might be evaluated« (Stilgoe et al., 2013, p. 1572). There are no standards for consistently undertaking Public Engagement activities or for generating outputs from it (Emery et al., 2015). As there are no clear outlines, there is room for experimentation.

Furthermore, it is also not clearly defined who should carry out the activity. Should the researchers themselves discuss with the public? Or does it need intermediaries, such as science

communicators who could »exactly because of their intermediary position at the science-policy-society interface (cited after. Chilvers, 2013), do more than ›just‹ organizing a public engagement event« (Krabbenborg & Mulder, 2015). Or what about Civil Society Organisations, — who could be controversially perceived as either »providing valuable independence and oversight or malicious scare-mongers« (Sutcliffe, 2011, p 107). In addtition, STS scholars and social scientists in general play an important role as »convergence workers«, mediators between science and society (Rip, 2009). But they have been criticised as well »not only for their multiple roles in science policy, producing (and contesting) meanings in theoretical debates, but also by acting as practitioners, organisers and evaluators of engagement exercises« (Delgado, Kjølberg & Wickson, 2011, p. 827).

Activities are also conducted by professionals, or ›experts of community‹ who moderate these interactions ›by the book‹, using ›best practice‹ proven designs. For Felt and Fochler, their expertise has a crucial effect on how Public Engagement is played out and how these professionals conduct the activity, »and whether it might contribute to a more democratic/inclusive dealing with techno scientific innovation or whether it remains a purely legitimising effort, mainly shifting responsibility, which raises more questions than it solves« (Felt & Fochler, 2008, p. 492). Justifiably, those who carry out the engagement activities are under scrutiny concerning their abilities. The question is what is the required expertise? For Felt and Fochler, it »needs to be both conscious and critical of the visions of science, society, governance and participation it stages, and that it needs to take the performativity of these methods seriously rather than being committed to a naïve ideal of neutrality» (Felt & Fochler, 2008, p. 498). Some suggest that citizens themselves should be empowered to conduct the activities, but again the question of capabilities arises. For example, Powell et al. found that while attempting to encourage participants to lead the discussions, not only had they underestimated the fact that most of their participants did not »naturally« know how to facilitate group communications in inclusive and democratic ways, but the research team itself had not been prepared for »teaching« these skills (Powell & Colin, 2008, p. 334). Therefore, to answer the question on who should carry out the processes is of great relevance. (New insights will be undertaken in this work — see part 3).

There is another question, which often comes up when conducting an engagement activity especially on emerging technologies. This is if the one who is leading the activity should also be

knowledgeable in the topic being discussed or if an expert should at least be present during the deliberations. The role of experts in Public Engagement in general is not an easy one. While some would argue experts could stimulate the discussion with interesting input or that they could answer the questions which arise during the discussions and also make sure that information given within the activity was scientifically sound, others perceived that experts influenced the discussion also in a negative and intimidating way (Marschalek et al., 2014). It is also criticized, as described by Felt and Fochler, that although Public Engagement is meant to be a dialogue between scientists and citizens, it is the scientists who »are often involved in public engagement designs in very reductive roles«, that is so to say they are viewed as experts to consult for some technical questions rather than a real discussion partner in a »true dialogue« (Felt & Fochler, 2008, p. 492).

According to the above-mentioned variety of models, goals and roles, there is also much critique on formats and scopes of engagement activities and its different settings. Complaints have been formulated concerning allocation of time, the composition of groups, the provision of resources, or about moderation. Therefore much effort is taken to set up best practice examples and to standardise the activities. But these »benchmarking« efforts are criticised as being decontextualized one size fits all solutions. Furthermore, Felt and Fochler observe an »increasing dominance« of single methods such as the often-applied consensus conference. For them such a »methodological authority« sidelines other available methods, and hence »reduces practical experiences with other designs« (Felt & Fochler, 2008, p. 491). Apart from that, Public Engagement has often just become »proceduralised« and it is not unusual one had lost sight of the problems to which it had been offered as a solution (Stilgoe, Lock & Wilsdon, 2014). Furthermore, as public dialogue has become more and more institutionalised, it seems that there occurs more interest in its efficiency than in reflexivity (Stilgoe, Lock & Wilsdon, 2014). Danger can also to be expected »from demanding too much, in a topdown mode, too fast, with too little understanding of participatory development and its implications« (Guijt, 2014, p. 18).

Different actors have conflicting interests concerning decisions being debated. However, the engagement methodologies that are applied are not always specifically designed to deal with these interests (Banthien, 2003). Power relations are often neglected. As already criticised in 1978, for example, when calls for more social

responsible research were growing in Australia: »the movement relies, unconsciously or consciously, on a naïve ›democratic pluralist‹ model of society which implies individuals have, effective if not exactly equal power, opportunity and influence, and in which decisions are reached by consensus following reasoned public debate, rather than through the political processes resulting from the conflicting aims of different socioeconomic groups« (Biggins, 1978, p. 58). More than thirty years later, Stilgoe et al. once again point out that processes of inclusion would »inevitably force consideration of questions of power« (Stilgoe et al., 2013, p. 1572). As »much of this activity, even if it takes place outside a formal laboratory, seems to do little more than replicate existing power relationships between scientists and publics« (Stilgoe, Lock & Wilsdon, 2014, p. 9). Considering the character of invited participation, also »control over the framework for engagement constitutes an important source of power« (Powell & Colin, 2008, p. 316). Even though citizens may engage in structured deliberation, when exactly they will have input, or on what, and how, is determined by the organizers. For Arnstein, »participation without redistribution of power is an empty and frustrating process for the powerless. It allows the powerholders to claim that all sides were considered, but makes it possible for only some of those sides to benefit. It maintains the status quo« (Arnstein, 1969, p. 2).

As most of the engagement activities are group-based activities, the group discussions as such are often questioned as well, mainly for not sufficiently considering power inequalities and effects of group dynamics. Also, the »effects of power that are produced/reproduced within the interactions between laypeople tend to be neglected« (Bogner, 2012, p. 514). Present studies also arrive at smilar conclusions and criticise that »inequalities among social groups are often magnified« (Burgess & Chilvers, 2006, p. 724) or that »decisions about controversial or large-scale technology often reflect the dominant position and choices of certain central actors, rather than the mutual interaction and learning« (Genus & Coles, 2005, p. 435). There are seen potential issues on participant bias in stakeholder workshops and also »biased participants«, that those »who tended to be vocal, could dominate discussions« (Human & Davies, 2010, p. 653). Or when »some attempted to ›strategically‹ influence the worldviews of others participants are unwilling to subordinate pursuit of their own goals« (Genus & Coles, 2005, p. 439). This was already criticised in 1969 by Arnstein when she observed that ›nobodies‹ in several arenas are trying to become ›somebodies‹ with

enough power to make the target institutions responsive to their views, aspirations, and needs« (Arnstein, 1969, p. 3).

Discussions were also biased, as Davies found, when during the discussions »scientific knowledge ultimately remained dominant. Lay publics were unable to successfully challenge this continual privileging of technical expertise« (Davies, 2013, p. 66). It is justly argued that, »meaningful dialogue requires a shared body of essential facts« (Gregory et al., 2003, p. 1293) as problems arise when the stakeholders have unequal expertise. Although »the public« itself might not be regarded as being less competent than the experts it »is more or less under the cultural or intellectual control of the experts« (Miah, 2005, p. 411 cited after Turner 2001). Lay voices were observed as being marginalized because they had to argue along the lines of »sound science« (Bora & Hausendorf, 2006). Does this mean that as a consequence aspirations for ›ideal speech situations‹ or the ›myth of best argument‹ have to be given up in context of Public Engagement activities? (Burgess & Chilvers, 2006). Scholl et al., in their foreword of the special edition of the International Journal of Emerging Technologies and Society on Public Engagement in science, stated that »although the quantity and quality of communication between science and the public has increased over the past years, the contributions in this special issue indicate that the relevant social systems may still be too isolated« (Scholl et al., 2012, p. 1).

8.4 Practical Considerations and Recommendations for Future Public Engagement Activities on the Basis of Previous Studies

The previous chapters have been ordered so as to allow a better understanding of the actual discourse on Public Engagement in research and innovation including critiques and thus hints for improvement. The chapter below compiles some conclusions drawn from these experiences. Both sub-chapters (chapters 8.4.1, 8.4.2) should offer findings to be considered for meaningful Public Engagement as is currently being discussed within the RRI discourse. The first section of the chapter focuses on practical considerations as to how to conduct or implement engagement processes.

The second section discusses Public Engagement on a more general level, concerning Public Engagement in research and innovation in the wider societal, political and institutional context.

This chapter cannot provide a comprehensive overview on how to implement or conduct successful Public Engagement activities, but it does put together suggestions and ideas on Public

Engagement in research and innovation, as provided in prevailing literature. They include recommendations based on reviews and studies and aspects that are in need for improvement.

8.4.1 Recommendations for Carrying Out Public Engagement Processes in Research and Innovation

8.4.1.1 Purpose

> *The discussion on* how *to engage frequently obscures the more fundamental discussion of* why.
> European Commission,
> Science in Society Work Programme 2007

As described in chapter 6, the most important aspect in any participatory activity is clarity of the actual purpose, goal or aim of the activity. This aspect entails all other related aspects and decisions to be taken within the process. The purpose needs to be »well defined« and has to be »transparently communicated to all involved« (Grieger et al., 2012, p. 63). Engagement does not just happen, but is a »highly structured activity« (Burgess, 2014) that needs to be sure about its scope and topic. It must be indicated and participants have to know from the very beginning what will be done with the results carried out (Walls et al., 2011). Activities, therefore, have to address the decision-relevant questions (Fischer, 1999). Not only expectations and aims must be defined, but also the limitations of the engagement process (Dautzenberg, 2014). This is important especially for policy makers so as to allow them to make a judgment on the credibility of the engagement activity practitioners and their ability to to communicate the limitations of their work better (Emery, Mulder & Frewer, 2015). This should also answer questions on »how much is enough« in order to successfully or adequately engage the public, especially in light of limited resources and time (Grieger et al., 2012, p. 72). According to Jasanoff, each participation process should pay attention to these central questions: »what is the purpose; who will be hurt; who benefits; and how can we know?« (Jasanoff, 2003, p. 240).

It, therefore, appears crucial that Public Engagement activities are evaluated for their stated goals and also to the extent to which they achieve these stated goals. Furthermore, they have to be evaluated for the extent »to which the goals were appropriate and sufficient according to both the participants and organizers involved« (Grieger et al., 2012, p. 65). Last but not least, it should be clear from

the very beginning, what the »harvest« of all efforts will be. According to Corrigan, harvesting means »taking what has value from the process« (Corrigan, n/a). This needs a clear framework so as to make sense and to avoid being just a collection of words and ideas.

8.4.1.2 **Commitment**

The engagement activity has to have relevance or has »to make a difference« as the INVOLVE team puts it (see chapter 8.4.1.5, figure 20), which in turn needs the commitment to evaluation and learning from the experience (Grieger et al., 2012). In general, a commitment to take up the results of engagement projects must be established. That means that the scope of the engagement activity should be made clear to all participants. It has to be made clear already in the planning phase how organisers »wish to use the result and what form the report should take« (Burke, 1998, p. 54).

To complement this, topics of the processes could be circumscribed: Engagement activities are considered as having been more successful when the challenges where choices could be made are defined and frames are used to facilitate the activities (Burgess, 2014). As Jones reported, for instance, from the nanotechnologies discourse: »These inputs also helped to provide a more concrete framework for the public dialogue, allowing the public to be presented with a menu of six possible areas of application of nanotechnology to medicine and healthcare. This clearly allowed there to be a more focused and engaged discussion than has taken place in other public engagement exercises« (Jones, 2008, p. 578). However, attention must to be paid as the ›framing‹ of the topic could also represent a fundamental constraint and thus have crucial consequences for the outcomes (Irwin et al., 2013). The process must be as open-ended as possible (Powell & Colin, 2009). Organisers »must be willing to handle the complexities of logistical arrangements and the potential conflicts that may arise« (King & Sutcliffe, n. d., p. 199). In general, the scientific communities should be »well-defined and receptive« (Stilgoe, Lock & Wilsdon, 2014). One way to define such a community, as suggested by Emery, is through its integration into a research program. The engagement outputs will then be research outputs (Emery et al., 2015).

8.4.1.3 **Involvement**

Whom to engage is frequently a topic of debate (see more details in chapter 8.3.2). Whatever the case, careful attention has to be paid in the selection of participants. The composition of the groups is based

on different argumentations. Often, the involvement of a variety or a wide range of different stakeholders is requested to guarantee for high diversity or inclusiveness of the group or to avoid gender or age bias (Creek et al., 2014). It is also commonly requested that the small groups of participants should be representative of the general public and reflect the »existing complexity of the specific context« (Human & Davies, 2010). Some suggest working with agents of change and look for »actors who have mandates to set changes in motion, like directors of universities and firms« (Krabbenborg & Mulder, 2015, p. 476). For Fischer, the »key affected parties« have to be included (Fischer, 1999). The involvement of decision-makers in the design and implementation has also increased the influence of deliberative events as Burgess (2014) has analysed. Emery et al., who found that direct involvement of policymakers within the engagement activity itself, helped towards better integration, also approved this. The involvement should take place as direct face-to-face involvement with the public or through involvement in an advisory or steering group (Emery et al., 2015).

Also, the acquired level of engagement needs to be defined within the spectrum of participation (also see chapter 6). Promises that can be given to the public have to be aligned accordingly. So too do the roles foreseen for the different stakeholders and the appropriate formats or techniques that are applied within the process.

Stakeholders need to be engaged in a way that delivers them meaning and also a sense of the designated purpose (Human & Davies, 2010). Within the engagement activities, the roles of the participants have to be made clear as well. It has also been suggested to involve »independent« roles, such as technology assessment style bodies (King & Sutcliffe, n. d.) or observers (Walls et al., 2011). For better planning and shaping the process, it has been argued to include the public already in the design and also in the evaluation of the engagement activity (Delgado, Kjølberg & Wickson, 2011).

Within the stakeholder management process, incentives for all parties should be considered. Participants often invest much of their time, therefore one should be careful »to make sure it is worth the valuable spare time of a member of the public« (Sutcliffe, 2011, p. 11). Organisers should think about »what is in it for each individual, knowing that people who are not truly motivated to participate may block the process« (King & Sutcliffe, n. d., p. 199). Kleinman et al. found that financial compensation was »a significant factor«. It not only served as an incentive for recruitment, but

it also played a significant role in ensuring the continued participation. »The stipend reinforced their commitment to participate as a kind of contract — exchanging time for money« (Kleinman, Delborne & Anderson, 2011, p. 231). Addressing the »stakeholder fatigue« and for motivation to participate, Guston and Sarewitz (2002) suggest »effective marketing« as already applied in other participatory processes such as blood donation or clinical trials.

Furthermore, although the idea of Public Engagement is not new, still newer forms of encounter and deliberation seem to be required. As context, issues and stakeholders involved differ, one has to think out of the box when applying engagement activities and be continuously creative in Public Engagement and work together in imaginative and creative ways (Owen & Goldberg, 2010). »Taking public engagement upstream requires us to be creative in the mix of formal and informal methods that are used to democratise science and infuse it with new forms of public knowledge« (Wilsdon & Willis, 2004, p. 56). Recruitment challenges organizers and facilitators of participatory democratic practice and more »creativity and experimentation« could be applied (Kleinman, Delborne & Anderson, 2011, p. 237). In general, there should be »more collective experimentation« with methods and approaches (Felt & Fochler, 2008). Existing toolkits of methods and techniques could be further developed and changed. As the author of a comprehensive toolkit suggests: »The methods are flexible and have been employed in many different ways. Feel free to change and adapt them to suit your purposes — be creative! Invent your own methods and techniques« (Slocum, 2003, p. 15).

8.4.1.4 Topics

Taking the activities upstream also asks for more collaborative definitions of topics. Already »at a point where research trajectories are still open and undetermined — should be the start of a process of ongoing deliberation and social assessment« (Wilsdon et al., 2005, p. 38). Engagement should help to shape the trajectory of technological development. For Wilsdon et al., taking engagement activities upstream does not mean allowing for better predictions of risks and impacts, but should rather lead »towards a richer public discussion about the visions, ends and purposes of science« (Wilsdon et al., 2005, p. 34). As described in previous sections, much critique has been mentioned when engagement activities only appeared to be consultations on pro and contra arguments, thus missing out more fundamental discussions. Engagement

activities thus should be part of a broader debate about public values (Wilsdon et al., 2005).

Opinions and presumptions obtained as a result could be taken up as input for further reflection and discussion (Krabbenborg & Mulder, 2015). Different perceptions of how society and quality of life will be affected under alternative scenarios should be integrated into the discussions. As a consequence, not only popular topics must be discussed, but according to Stilgoe, also issues and domains that are inconvenient, emergent or marginal (Stilgoe, Lock & Wilsdon, 2014). It needs appropriate conversations about the priorities and ends to which the technology should be directed, before questions about how to deal with the risks, benefits and consequences of its exploitation are discussed (Wilsdon & Willis, 2004). According to Wynne, the problematic presumption that scientific meanings or facts would »have natural proper authority over those of non-experts« (Wynne, 2014, p. 62) should be abandoned.

8.4.1.5 **Support and Guidance**

Considering Public Engagement activities as invited forms of participation (see chapter 8.3.2), it obviously needs adequately allocated funding, resources and also an appropriate time frame in relation to the defined goals (Grieger et al., 2012). Besides European, national and regional funders, also »non-conventional funding mechanisms«, such as unions or charities could be enhanced (Engage2020, 2014a). It also important to consider a supporting team and staff and mechanisms within institutions to support Public Engagement (Powell & Colin, 2009). This asks for flexible and dynamic institutional bodies (advisory groups, committees etc.) for civil society participation (Banthien, 2003). Moreover, participation procedures should be simplified and administrative obstacles minimized (Stahl, 2012). Public Engagement activities have to be organized, facilitated, and »nurtured« (Fischer, 1999). This was also emphasized by Celine Loibl in the review of the Austrian sparkling science programme (https://www.sparklingscience.at/) which engages young citizens in more than 400 collaborative research projects. The activities had not happened effortlessly, but rather all those aspects mentioned above had led to a successful implementation and uptake of the programme (interview January 18th, 2015). Scientists should be rewarded »on whether people affected by their research and innovation activities are actively involved in the process« (Engage2020, 2014a, p. 3). Many would agree that interventions must be promoted that support the development of

meaningful research collaborations (Grand et al., 2015), of support structures including toolkits as well as suitable environment and infrastructure (Engage 2020, 2014b).

Participation also needs ongoing, regular and systemic institutional support and incentives during longer periods of time (Powell & Colin, 2008). Emery et al. found that longer term engagement activities are more likely to lead to policy impacts through their slower process, whereas »project style« Public Engagement was recognized more as an »impediment« and respondents emphasised the need for engagement to be seen as part of a continuous process (Emery et al., 2015). As in action research activities, the relationship between researchers and participants »is based on a process and not seen as a single event« (Hugman et al., 2011, p. 1279). As suggested by von Schomberg: »Continuous public platforms should replace one-off Public Engagement activities with a particular technology and, ideally, a link with the policy process should be established« (von Schomberg, 2012, p. 16).

There is often a perceived lack of relationships between different stakeholder groups (Smallman, Lomme & Faullimmel, 2015), therefore to »work across silos« and to establish networking mechanisms which connect participants throughout the process and beyond, their cultivation is required (Engage 2020, 2015). Science and policy institutions should establish »stronger ties« and cooperation between different stakeholder groups (Engage 2020, 2014a).

Citizens' knowledge about the topic, as well as their individual and collective capacities to engage with other citizens, scientists, and policy makers should be built into the course of the activities. To this end, engagement projects should include capacity building and training for citizens. To provide training, support networks and dissemination of information should lead to »cross-country learning« (Engage 2020, 2014a).

Scientists and engagement organizers should also receive »hands-on« training in citizen engagement and community organizing (Powell & Colin, 2009). Public Engagement practitioners need to be trained experts to make the process more efficient and credible in the eyes of policymakers (Emery et al., 2015). This capacity building should go hand in hand with the definition of quality standards practices and behaviour (Burgess, 2014) for the implementation of engagement activities. Standards and guidance for practice are recommended (Dautzenberg, 2014). There have been attempts at implementing common standards but it might not be possible (nor desirable) to develop an all-encompassing taxonomy

of engagement processes (Burgess & Chilvers, 2006). There are, however, already many principles and key recommendations for engagement activities available, for example, by (Warburton et al., 2008) as shown in figure 20.

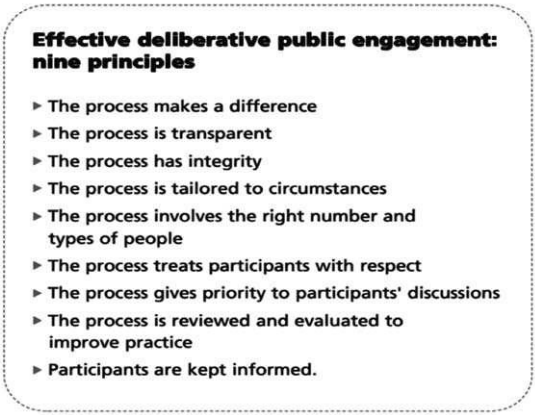


Figure 20:
Nine principles for Public Engagement by National Consumer Council UK, (Source: Warburton et al., 2008, p. 6)

A range of methods have already been developed and applied and are recommended for use and elaboration of further for specific contexts. There are many toolkits and handbooks available (e. g.: http://engage2020.eu/, Slocum, 2003), as well as guidelines and standards for engagement (Handler & Trattnig, 2011, AA1000SES, 2015, Banthien, 2003, Powell & Colin, 2008).

8.4.1.6 **Follow up**

Recurrent critique has been expressed on the premature closing of engagement processes. The engagement should not end with the activity, rather citizens should at least be informed about the outcomes and receive a clear feedback (Engage 2020, 2014b) after the conclusion of the activity. They should also be engaged in evaluation and further elaborations of the results. If it is not possible to engage the public immediately afterwards, the public should be informed and decision processes should be made transparently traceable. Walls et al. recommend the production of an »audit trail« (Walls et al., 2011, p. 257) to allow for insights on changes that were made and why they were made after the engagement process. Emery et al. found that audits of the final decision-making process revealed how decisions that had been made went unreported. Generally, the decision processes involving last-minute modifications were not reported. There clearly needs to be a system in place that could be retrospectively looking at past policies, and how evidence had or had not been integrated into them (Emery et al.,

2015). To guarantee that the outcomes of the engagement process are fed back into the R&I process and could thereby influence it, »public engagement should be applied iteratively with feedback loops« (Malagrida, 2015, p. 5). Critical arguments should be viewed as dynamic and processual, rather than used as final assessments (Irwin et al., 2013). To engage the public participants themselves to help make sense of the data would also give a fuller perspective of the work and create stronger commitment to the results (Corrigan, n/a). Gregory et al., in compiling their expert model on multiple factors of influence, found that the following aspects of the engagement process had been the most important for participants: »The most frequently raised topics were the accessibility of OHNC (Ontario Hydro Networks Company, note i. M.) staff (noted by 73 %), the responsiveness of the outcome (61 %), and the legitimacy (59 %) and transparency (50 %) of the process« (Gregory et al., 2003, p. 1298). Their applied expert model also illustrated »areas of agreement and disagreement« which is crucial in a process that seeks mutually acceptable solutions.

8.4.1.7 **Language**

Often mentioned but not yet regularly applied — also not yet within the RRI concept according to Sutcliffe (Sutcliffe, n. d.) — is a language used and applied for Public Engagement activities that would be relevant and understandable also outside of the academic world. The need to elaborate a shared language was expressed by many stakeholders within the consultation process of the RRI Tools project (Smallman et al., 2015). It needs a »communication strategy which targets population based on their lifestyle, preferences and literacy level« (Engage 2020, 2014a, p. 2).

8.4.1.8 **Practitioners**

Finally, careful consideration must be given to the persons who carry out the activity. They can be very influential in many ways. Not only in the way they carry out the process, but also in terms of the evidence that is used in policy as Emery et al. (2015) had found in their study. Concerning the interaction of Public Engagement practitioners with policymakers, it has been revealed that »informal interaction between policy makers and PE (Public Engagement, note i. M.) practitioners is potentially more influential than formal interaction« (Emery et al., 2015, p. 433). In their role of working »in-between spaces« of engagement, they have to »establish relationships and build trust and open communication

channels with policymakers«. Thus, their often overlooked informal skills have to be considered and a greater recognition must be given to the role of practitioners and their work in the more »hidden, in-between zones« of Public Engagement (Emery et al., 2015). Powell and Colin also emphasize the political capacities of practitioners and their manifold skills with which they need to address the various goals of an engagement process. They need abilities in terms of understanding of the policy context, the understanding of the political processes, the knowledge of which political actors and institutions to engage with, and their ability to communicate effectively (Powell & Colin, 2009). It takes many skills to »establish meaningful interactive processes and structures that can involve multiple stakeholders over time« (King & Sutcliffe, n. d., p. 199).

In a compilation of requirements for Public Engagement, the Open University summarised that it needs »staff who can actively listen by connecting meaningfully with people from different academic disciplines and roles, and with multiple external stakeholders. It also requires analytical and rhetorical skills to filter ideas and construct arguments that work in particular contexts. At times it requires flexibility, adaptability, tact and diplomacy; at others a progressive vision« (Holliman et al., 2015, p. 13).

However, the central role of the practitioners is not exhaustively described nor adequately recognised yet. The role needs to be defined clearly. This has been confirmed and further elaborated by an empirical study, details of which are been provided in chapter 10.2.

8.4.2 Recommendations for Public Engagement in Research and Innovation in General

Whereas the previous sections discussed rmore practical ideas and recommendations for implementation of Public Engagement activities in research and innovation, the following chapter focuses on general preconditions and requirements that would probably allow for more willingness to apply Public Engagement processes and the application of its results.

8.4.2.1 Concept and Common Understanding

As already described in the previous chapters, much conceptual work on meaningful Public Engagement implementations is still needed. The variety of activities that are currently being undertaken, projects (e. g.: workshops and webinars as part of the Engage 2020 project) and literature demonstrate that more effort must be made to identify and explore the possible trajectories

for societal engagement methods and practice in the future (Engage 2020, 2015). By studying the engagement discourse as a series of »moves« on the part of the engaged parties consisting of arguments and counterarguments, Irwin et al. see options for learning of these patterns. After many years of experience and discussions that have taken place around public dialogue, they believe that it is time that these learnings are effectuated and the community becomes engaged in a ›higher order game‹ (Irwin et al., 2013, p. 131). As discussed within the Lisbon workshop on Public Engagement in science, after much focus on the ›hardware‹ of engagement — the focus groups, the citizens' juries etc., there is now a need for »a greater appreciation of the ›software‹ — the codes, values and norms that govern scientific practice, but which are far harder to access and change. These prevail not only within science, but also around it, in funding and policy worlds« (EC, 2007, p. 18).

8.4.2.2 **Culture of Change**

The most ambitious methods and activities for Public Engagement will not lead to fruitful implementation if there is no culture for change. This was also clearly demonstrated in a Pan-European stakeholder consultation engaging 411 participants, who discussed the main options and obstacles for implementation of the RRI concept and its key component of Public Engagement. Figure 21 shows results on the most relevant clusters of obstacles that have been identified. The biggest clusters were found to be attitudes and culture.

Figure 21: Overview of issues identified (Smallman et al., 2015, p. 44)

The cluster of attitudes included a resistance to change, especially in large systems or hierarchies. Also, a common tendency to short-term thinking was identified, especially in political cycles or governmental funding schemes. Furthermore, risk aversion was seen as an important issue as it gave rise to the possibility of creating a public controversy. Unwritten rules and norms of the respective culture were mentioned as possible obstacles and a lack of innovation culture, in general, as was a lack of a collaboration culture across stakeholder groups (Smallman et al., 2015, Marschalek, 2015).

Other studies have described culture as a key determinant (Siune et al., 2009) and many cultures have been identified as not being promotive for the implementation and uptake of Public Engagement processes. For the successful interaction between science and society, communication and sharing of information is needed, the commitment of the communities, and the considering of cultural contexts which allow for a reciprocal learning process (Richmond, Peterson & Betts, 2008). Meanwhile, there is a tendency towards policies, which aim to reshape the engagement culture. An example for such an initiative has been seen in the UK where »in 2012 the Research Council UK focused its efforts on making engagement a sustainable practice within universities by promoting culture where Public Engagement is seen as awarded and recognised in the research realm« (Engage 2020, 2014a, p. 2). There are appeals that offer advice to »abandon the head-in-sand hope of scientific seclusion« (Taylor, 2007, p. 164) and rather opt for Public Engagement being »engrained« into all democratic processes (Powell & Colin, 2008). This requires new ways of thinking and working for pursuing successful engagement processes (Engage 2020, 2015). A professionalization, more efficiency and effectivity will allow for the development of a culture of participation within society (Dautzenberg, 2014).

As it has already been defined in Public Engagement discussions according to the Lisbon strategy in 2007, the real challenge is to encourage a deeper and a more systematic engagement with civil society. »For public engagement to make a difference, it must become part of the routine practice of good science« (EC, 2007, p. 23). A culture which allows for multidisciplinary approaches with diverse stakeholders should lead to an »inclusive innovation process whereby technical innovators become responsive to societal needs and societal actors become co-responsible for the innovation process by a constructive input in terms of defining societal desirable products« (von Schomberg, 2012, p. 13).

An open engagement culture also needs to discuss the more »basic values, social assumptions and visions of society« (Felt & Fochler, 2008, p. 491), more substantive modes and formats of engagement are required. Accordingly, discussions should have the opportunities for dynamic expression and critical exploration. According to Jasanoff, in order to carry out a »civic epistemology«, adequate processes and methods to elicit what the public really wants are needed. »To bring these dimensions out of the shadows and into the dynamics of democratic debate, they must first be made concrete and tangible« (Jasanoff, 2003, p. 240). Therefore the public should be involved in the decision about »the questions and also about the way in which a particular issue will be approached« (Wilsdon & Willis, 2004, p. 41).

8.4.2.3 **Communities and Networks**

An engagement culture needs to be set up of supporting structures and measures to allow for collaborations, especially across discipline and stakeholder group boundaries and to leave the »silos« behind (Engage 2020, 2015). Successful engagement is dependent on strong connections between the various stakeholders and on suitable structures and mechanisms for Public Engagement as there is »a clear need to ensure ›full‹ public engagement throughout the entire research process« (Steinhaus, 2014, p. 14). A supportive community of practitioners is required to facilitate the connections between institutional actors and to promote a closer link to formal governance and decision-makers (Engage 2020, 2015).

In addition, informal interactions between groups, especially between practitioners and policy makers, must be supported. As informal interactions often are potentially more influential than formal interactions, personal relationships should be built where it is possible to »capture hearts and minds« and to draw attention to what a policymaker had called »the soft end of public engagement«. This would also facilitate the building of trust and the likelihood of »being listened to« (Emery et al., 2015, p. 434). A UK based study by Phillippson et al. confirmed the importance of informal networks and the transfer of people between research and practice. They suggest »that these mechanisms should be given much more systematic attention by research programmes and projects« (Phillipson et al., 2012, p. 61). An example of a network that facilitates the cooperation between citizens and the research community apparently is the living Knowledge Network (http://www.livingknowledge.org/livingknowledge/).

Institutions also play an important role, which is widely underestimated. As the focus often lies on concrete interactions between individuals, institutional arrangements and dimensions seem to be »completely bypassed« (Felt & Fochler, 2008, p. 497). Guston et al. believe it is necessary is »to build into the R&D enterprise itself a reflexive capacity that encourages more effective communication among potential stakeholders, elicits more knowledge of evolving stakeholder capabilities, preferences, and values, and allows modulation of innovation paths and outcomes in response to ongoing analysis and discourse« (Guston & Sarewitz, 2002, p. 100). The EC interim report on Science in Society (SiS) suggests »a dedicated unit and therefore a clear institutional ownership« which »assures a long-term commitment« (FraunhoferISI & TechnopolisGroup, 2012), as without a clear institutional and organisational responsibility, »there is a certain risk that the influence and impact of the SiS topics will decrease« (FraunhoferISI & TechnopolisGroup, 2012, p. 26).

Wilsdon et al. suggest drawing on management theories on open innovation models in companies which combine »external and internal knowledge into new architectures and systems« (Wilsdon & Willis, 2004, p. 50). For Burgess and Chilvers, it is necessary »to develop new institutions capable of dealing with substantial inequalities among social groups, not least in terms of their discursive capacities to engage with, and test, competing knowledge claims« (Burgess & Chilvers, 2006, p. 714).

8.4.2.4 Political Sphere

For the time being, most would agree that »one must not just focus on organizing more and better individual engagement events but also consider how the social and political context, in which the events take place, shapes the process and outcomes, and vice versa« (Krabbenborg & Mulder, 2015, p. 474). Nowadays, it is important for both engagement practitioners and policy makers to demonstrate policy impacts and the worth of Public Engagement and enhance its reputation and credibility (Emery et al., 2015). Public Engagement projects need to have some political weight to allow for real consequences, or, in other words, for a sharing of power (Powell & Colin, 2008). Powel et al. also report that a control mutuality, the degree to which parties agree on who has rightful power to influence one another, is an important factor for effective engagement. Public Engagement »must be substantive. It must not just inform decisions — it must shape them« (Wilsdon & Willis, 2004, p. 39). The public meanings attached to science and innovation should »be allowed

more space and influence in the political economy of science rather than their being discounted in the face of scientifically-defined problems and risks« (Stilgoe, Lock & Wilsdon, 2014, p. 8).

This, however, is a difficult endeavour; first, due to the perceived problems related to the manifold ways in which different realms of public and policy could influence each other, and secondly due to the problem of how to trace and find causal relations between Public Engagement activities and policy impact. For Emery et al., the concept of policy »resonance«, which has been proposed to account for these difficulties in recognizing impacts and to avoid implying a linear model of engagement, might be a useful term to overcome this problem. Rather than describing impact, they would describe the anticipated likely future effect of Public Engagement process instead (Emery et al., 2015).

Impact is difficult to measure, however there are indications and recommendations for a more probable uptake of engagement results in research governance. In their work, Emery et al. provided a conceptual model for examining and evaluating the policy impact of Public Engagement and identified three realms of Public Engagement-derived policy impact features. These are Public Engagement mechanisms, features of policymaking and institutions and features linking policymaking with Public Engagement. On Public Engagement features they found that »ultimately, policy impact will be heightened when the topic, scale, and timing of engagement are optimized based on the policy-contextual awareness of those commissioning and undertaking the public engagement« (Emery et al., 2015, p. 430). This means engagement activities, which are not initiated by policy need to be well timed in order to coincide with a relatively short window in advance of a policy decision. It is also important that the topic is framed for ensuring policy impact, which means in a manner that is relevant to the (actual) policy context. Within their comprehensive study, which involved policymakers themselves, they found that it was the policy-driven activities that were the most likely to lead to discernible policy impacts. In these cases, policymakers had a direct interest in the outcome of the research, and the engagement activity itself had been framed according to the policy context (Emery et al., 2015).

However, Emery et al. also raised the fundamental question if greater policy resonance would actually mean »better« Public Engagement. This question needs further exploration.

Meanwhile, there are suggestions to view impact itself in a wider context and open up the discussion towards more integrated

approaches. Irwin et al., in their work analysing the constant ›critical disappointment‹ in the area of Public Engagement, argue that this should not necessarily be equated with polarized positions of win-lose situations. They found that even the most controversial debates (such as the GM debate) »often continue to support the overarching goal of enhanced democratic engagement with science and technology« (Irwin et al., 2013, p. 122). Public Engagement thus could be seen as processes which »possess the capacities to criticize and justify«. Therefore, »public engagement should be seen, not entirely or even primarily, as concerned with reaching some agreed resolution, but also as a practice with rules, consequences and frameworks of its own« (Irwin et al., 2013, p. 130). In terms of politics and policy, rather than continuing along familiar tracks, for Irwin et al. it is »time to explore new paths with more creative and imaginative thinking about the underlying principles behind democratic engagement and about the practical forms that engagement exercises take« (Irwin et al., 2013, p. 133). For Emery et al., it is now time to shift the burden of achieving political impact. They suggest »that the onus of responsibility for maximizing the policy impact of PE rests with political institutions. This requires the implementation of the necessary procedures within policy making to increase the transparency of decisions« (Emery et al., 2015, p. 440).

Accordingly, for Public Engagement to reach its potential (especially within RRI) new policies are needed (Engage 2020, 2015). Participatory assessment practices involving European citizens are recommended (Siune et al., 2009) and can be found more and more frequently in research policies, such as the work programmes of the EC. As the public consultation for the interim evaluation report on the Science in Society programme has revealed, »research funding programmes could involve a greater degree of public input to their design and implementation, with the aim of increasing the public relevance and utility of the supported activities« (FraunhoferISI & TechnopolisGroup, 2012, p. 41). Experts in the field of Public Engagement have endorsed the findings of the public consultation and have also stressed the importance of continued action at EU-level. A fuller engagement by the public in science and technology processes is necessary »to ensure that appropriate pathways are followed and that continued high levels of investment in research and innovation are delivering the outcomes that society wants« (FraunhoferISI & TechnopolisGroup, 2012, p. 41). This need of ›full‹ Public Engagement means throughout the entire research process (rather than for example simple dissemination activities carried

out at project level). This implies »the need for (i) new tools and methods to foster public engagement at the work programme and individual project levels across all areas of Horizon 2020 and (ii) appropriate monitoring activities that can differentiate between the simple ›transmission of results‹ approaches and those involving full engagement with the public at all stages in the research and innovation cycle« (FraunhoferISI & TechnopolisGroup, 2012, p. 42).

Policies influence personal attitudes as well. After »vehemently arguing« within the EC science in society work programme »for a view of PE as a process that ›enriches excellence‹ and ›promotes innovation‹«, one can already observe a genuine and positive shift in attitudes toward Public Engagement. »This suggests that a greater consistency and procedural standardization within policy processes could be more important than attitudes of individual policymakers« (Emery et al., 2015, p. 436). However, the influence of the general political climate on motivations for engagement and the impact of activities must be explored further (Cobb & Gano, 2012). So too must the linkages between national identity building and the specific design of Public Engagement events, so as to find out if, for example, as it was the case in Denmark »consensus seeking is positioned as a political and ideological goal to strive for« (Krabbenborg & Mulder, 2015, p. 455).

8.4.2.5 Evaluation

As mentioned in previous sections, the effectiveness and worth of Public Engagement activities must be made clear. Therefore, it is important to allow monitoring and thus enable continuous improvement of engagement practices and their policy connections. In their study, both policymakers and Public Engagement practitioners suggested that there need to be better tools — quantitative and qualitative — to monitor the policy impacts of engagement activities (Emery et al., 2015). Evaluation must be applied at all stages of the process to provide essential information on the progress of projects, but also to allow for changes within the process (FraunhoferISI & TechnopolisGroup, 2012). Micro-dynamics of stakeholder and Public Engagement activities have to be analysed »to map the operation of power imbalances and framings in the way debate and conversation are facilitated and conducted« (Walls, Rowe & Frewer, 2011, p. 256).

Stakeholder engagement in research has yet to be subject to systematic evaluation (Phillipson et al., 2012). Evaluations on the benefits that engagement processes have had on research and innovation activities and processes, must be conducted and made

public (Engage 2020, 2014a). Stilgoe et al. suggest that it is of more value if a critical, evaluative research does not only look at particular dialogues, but at the broader view of dialogic governance (Stilgoe, Lock & Wilsdon, 2014).

This would mean that Public Engagement cannot only be judged by its exercises and thus simply carried out by existing evaluation approaches. For Emery, policy impact instead must be judged in its own right and weighed up against validated criteria for assessing the effectiveness of Public Engagement activities. Furthermore, evaluation should not only focus on the engagement activities but rather on political processes, which have not yet incorporated formalized evaluation criteria and methods (Emery et al., 2015).

Recent STS discourse has presented a new view on criticism as a »social phenomenon«, which should not be an ex post end point but rather »constitutive and performative«. This opens up a new way of thinking about criticism as a dynamic series of moves and countermoves. Criticism, »rather than voicing negative prospects and possibilities that must be overcome before meaningful action can occur, has potential value (and relevance) as a meaningful action in its own right« (Irwin et al., 2013, p. 131). Therefore, it is recommended that different forms and moves of critiques are empirically analysed and broader sociological analysis is carried out, which finally could also be presented in the form of critique.

It is also necessary to gather practice examples, »promising« practices as they were described by the RRI Tools project (Kupper et al., 2015). More stories are needed about the engagement process. Nitsch et al. suggest that organisers of all types of participatory research studies should be encouraged to describe and define engagement processes in more detail. These insights would not only constitute the most valuable source for learning from practice, it could also contribute to more awareness and understanding for different participation processes (Nitsch et al., 2013).

Finally, as has been mentioned repeatedly (Chilvers, 2008; Felt, 2008; Rowe et al., 2008) these considerations have »led some to argue for inclusion of the public in the design and evaluation of PP/PE exercises« (Delgado, Kjølberg & Wickson, 2011, p. 834). As Cobb and Gano have recommended as well, »citizens' voices should be given greater weight when evaluating participatory models« (Cobb & Gano, 2012, p. 99), public participation should consider an involvement at every stage of the research and innovation process.

PART II
Empirical Part

The empirical part of this work describes the qualitative approach and the methodologies applied. Data collection and analysis focus on finding answers to the following questions:

— Which framework conditions, methods and strategies exist to carry out Public Engagement processes in the field of research and innovation?
— Which possibilities and limits do practitioners perceive in their work and how are they dealing with those?
— What are their personal motivations to become engaged in a rather difficult field?
— Which suggestions and ideas for improvements do they offer to address the main questions on current engagement practices
— Why could Public Engagement be aspired, what are advantages, benefits, impact?
— When — at which stage of the research process — do practitioners perceive Public Engagement as most useful?
— How could engagement processes in research look like?
— What are main components?
— What are decisive factors for success?
— Who should get engaged?
— What skills, attitudes or preconditions does it need?

The following chapters describe all steps taken towards the formulation of results as presented in PART III — Results.

9 Methodology

This chapter describes the methodological approach for the work at hand. It also contains detailed descriptions of the empirical work, which was the basis for the qualitative data collection and analysis.

Overview of this chapter:

— Methodological approach
— Workshop documentation
— Qualitative analysis

Methodological Approach

9.1 **General Introduction of the Methods Applied**

The following work applies a qualitative methodological approach based on Grounded Theory with components of Participatory Evaluation and Action Research. In general, a qualitative approach is justified for research questions which focus on experiences and motivation of specific groups (Höykinpuro & Ropo, 2014). Grounded Theory, in particular, offers an effective way of finding out what the essentials really are in this very complex topic and helping to narrow down the research question according to the phenomena which can be found during data collection and analysis. The data collection methods that have been applied allow for close analysis of that which really characterises the problem, namely the practical implementation of Public Engagement in research and innovation, and who actually carry out the engagement processes.

Furthermore, some specific arguments are presented, which make these methods particularly useful in this context: In this new

field of RRI and its key dimension of Public Engagement there is a strong need for discussion and reflection. Concepts and strategies have not yet been standardised and practitioners have to find ways and means of operationalisation and implementation. Collective methods for knowledge generation (Burke, 1998) should be applied when a field is emerging and there are attempts for change. Clearly, the literature that has been reviewed has revealed many critiques and the subsequent need for adoption and change in this field. The rather imprecise normative concept of RRI (see chapter 5) continues to look for operationalised solutions and methods for implementation while practitioners have to undertake engagement processes already. For this reason, it was considered constructive to record their experiences and knowledge in a reflexive manner (see also more on reflexivity in chapter 7). The techniques applied also allow direct involvement with the practitioners, to gain access to their specific real life experiences and to be able to find out what they see and feel. For this study, the Grounded Theory is used to explore the subsurface of Public Engagement activities that are currently being conducted, what to expect from them, and perceived limitations. Descriptive analysis should show how practitioners perceive their own role, which concepts and structures they are relying on, but also which possibilities and limits they see. At the same time further, deeper analysis is searching for explanations in a wider context.

To position the study more in the field of evaluation was chosen for different reasons: Compared to research on a general level according to Olson and Jason (2015), evaluation tends to be anchored locally and is very much looking for practical goals. Based on some basic common understanding of this approach (see subchapter 10.2. below), participatory evaluation is meant to create new content for a certain field. In this case of the emerging field of RRI and Public Engagement as one if it's main features, potential questions and also feedback on current practices should be gathered to feed into the actual discourse. According to Action Research principles, data collection activities already allow close contact with those who are in charge and who could influence the way Public Engagement activities will be carried out in »in real-time« (Powell & Colin, 2009) and thus can potentially directly influence the further RRI concept development which is currently under debate.

Results of this empirical work will provide answers to the questions, which will arise as the process evolves. The results will show insights into the working experiences of the practitioners and how they perceive and handle challenges and opportunities. The work

also offers recommendations for future Public Engagement work in research and innovation processes. Recommendations should not necessarily be understood as hints for improvements of the work of the practitioners but rather for structural requirements and supporting mechanisms.

9.1.1 Limitations

The empirical work should offer persons affected by the process the opportunity to work on their personal experiences and expectations. The applied techniques are meant to support this process and especially evoke emotions, memories and critical reflections. It is possible, however, that also group dynamics and desirable behaviour might have influenced the results. Additionally, according to the understanding of Bradbury and Reason (2006), our realities are also »re-patterned« within participatory inquiries, which means that that those involved can to some extent only work within the parameters of their own limited understandings and experience. The aggregation of data and the common reasoning in interpretation teams tries to counteract this phenomenon.

26 persons participated in this empirical study, which provides a qualitative survey with a reasonable number. However, it must be remembered that the field of Public Engagement in research and innovation is huge and complex and formats and contexts can vary widely, thus workshop participants could only speak for a few.

Moreover, the two workshops took place in Vienna, but with participants from different parts of Austria. This limits the perspectives of the workshop participants although they were allowed to refer to their experiences in international and EC funded projects as well.

The following work focuses on so-called »invited forms« of Public Engagement in research and innovation, which are conducted on request of a client, mostly from the public domain. Uninvited, so-called bottom-up forms were not considered as they are not (yet) part of the RRI concept as it is currently promoted.

Finally, although originally intended, the perspective of public participants themselves is missing. Future studies which will accompany ongoing Public Engagement processes, may be able to bring more insights from the public participant's points of view.

9.2 Excurse Participatory Evaluation

Not only does literature provide various definitions for participatory evaluation, many of which are too vague, there exist many different

terms for it as well. In general, however, participatory evaluation means a methodological approach of inquiry in the family of participatory and action research which has its roots in the 70ies. At the time, methods had to be carried out as a direct response to international development programmes which often mismatched the real needs of their beneficiaries. To include them already in the planning and also in evaluation processes was believed to create development programs that were better suited to these groups' needs and that would be more effective. Thus, »stakeholders were no longer merely viewed as sources of evaluation data but also collaborators in the evaluation process« (Cullen, 2009, p. 1).

Many types of participatory evaluation approaches have been developed and applied, here are just a few: Stakeholder-Based Model, Practical Participatory Evaluation (P-PE), Transformative Participatory Evaluation (T-PE), Collaborative Evaluation, Deliberative Democratic Evaluation, Empowerment Evaluation, Responsive Evaluation or Participatory Research (Cullen 2009 gives a comprehensive overview). These are no longer applied only in development programmes, but in other contexts as well, where those who are affected should have a »central voice« (Guijt, 2014). There is still no consensus about definitions and various types and rationales (Nitsch et al., 2013). Meanwhile, the diversity of participatory approaches is growing, and there are different views on and different ways of doing each. »In practice, it is rare to begin and end within one rigid approach. Flexibility and adaptability in response to changing contexts are often essential« (Pain & Francis, 2003, p. 47).

Although there is (still) a need to clearly define participatory evaluation, on a deeper level there are some key common understandings, which are widely agreed. In general, participatory evaluation can be regarded as an overarching term for any evaluation that actively involves those directly affected, such as, for instance, program staff in decision-making and other activities. In this sense, participatory methods can be seen as both an expansion of decision-making and, in some circumstances, an opportunity to shift power dynamics and promote social change (Cousins & Whitmore, 1998). »Participatory Monitoring and Evaluation (M&E) is a collaborative process that involves stakeholders at different levels working together to assess a project or policy, and take any corrective action required« (Rietbergen-McCracken & Narayan, 1998, p. 191). It means involving stakeholders, particularly those affected by a given policy or programme, in specific aspects of the evaluation. It »seeks to honor the perspectives, voices, preferences and

decisions of the least powerful and most affected stakeholders and program beneficiaries (Zukoski & Luluquisen, 2002, p. 4). Therefore »›stakeholder participation‹ could potentially involve anyone with an interest (even a marginal one)« (Guijt, 2014, p. 4). As Rietbergen et al. have put it, such participatory approaches could take many forms and could involve different levels of participation, »but the key principles remain the same. Most important is the emphasis placed on the active roles played by the local stakeholders« (Rietbergen-McCracken & Narayan, 1998, p. 192).

Participatory evaluation is thus not a methodology, but an approach, which involves systematic inquiry with the collaboration of diverse stakeholders to meet the specific needs of those stakeholders. »These needs typically consist of taking action and/or effecting change. The strength of participatory evaluation lies in fostering an environment of partnership that facilitates identifying and addressing the important evaluation questions faced by a particular community or group of stakeholders« (Mercer, MacDonald & Green, 2004, p. 170). It is considering the »cultural context and recognizing the unique strengths that each partner brings to a project and valuing collaboration« (Richmond et al., 2008, p. 369). The inquiry provides dialogue which is defined as a means of mutual learning (Baur, Abma & Widdershoven, 2010).

Participation by stakeholders can occur at any stage of the evaluation process: in its design, in data collection, in analysis, in reporting and in managing the study (Guijt, 2014).

In principle, the different types are intended to provide different outcomes, but there could also be a combination of approaches. For instance, practical participatory evaluation refers to evaluation which intends to increase the use of results, and transformative participatory evaluation intends to foster social change (Connors & Magilvy, 2011). Whereas practical participatory evaluation »supports program or organizational decision making and problem solving«, transformative participatory evaluation »seeks to empower members of community groups who are less powerful than or are otherwise oppressed by dominating groups« (Cousins & Whitmore, 1998, p. 6).

Empowerment through participation in the process of constructing and respecting one's own knowledge is one of the key components of the approach. Based on Paolo Freire's notion of »conscientization«, it stimulates critical reflection that requires participants to question, to doubt, and to consider a broad range of social factors, including their own biases and assumptions (Cousins & Whitmore, 1998). A participatory approach to evaluation

could be described as an attempt »to involve all who have a stake in the outcome in order to take action and effect change. […] The strength of participatory approaches lies in their contribution to empowerment and social change« (Nitsch et al., 2013, p. 44). Last but not least, the method allows for a better »metacommunication«. To apply this method also conveys a certain attitude, »that the researcher is coming from a greater place of openness to broader participation in the research process« (Olson & Jason, 2015, p. 396). Therefore better metacommunication would lead to more respect for the research process, to greater participant investment, an increased attention to details, and also a more sustainable research relationship over time which in turn would increase the quality of outcomes (Olson & Jason, 2015).

9.3 Why Participatory Evaluation to Assess RRI aspects

There are several arguments for applying participatory evaluation in assessing RRI principles. First of all, the evaluation methodology should be consistent with its main program goal. In this case, it is the RRI concept with its core dimension of Public Engagement (see more in chapter 5.1). Following the RRI principles and key dimensions, also the assessment of the concept should involve those who are mostly affected or, in the case at hand, those who are actually directly involved in it. This is in accordance with the EC Horizon 2020 programme of science with rather than for society (SwafS), which says that a »meaningful participation of the public means doing evaluation ›with‹ and ›by‹ programme participants rather than ›of‹ or ›for‹ them« (Guijt, 2014, p. 4). As is often argued, »participatory monitoring and evaluation is not just a matter of using participatory techniques within a conventional monitoring and evaluation setting. It is about radically rethinking who initiates and undertakes the process, and who learns or benefits from the findings« (Zukoski & Luluquisen, 2002, p. 1).

Furthermore, participatory evaluation should be applied when:

— there are questions about program implementation difficulties
— there are questions about program effects on beneficiaries
— information is wanted on a stakeholder's knowledge of a program or views of progress (Zukoski & Luluquisen, 2002, p. 3)

All three preconditions are applicable for the case of RRI: it requires expansive implementation and the uptake by all stakeholder groups, »the public« and societal actors are directly and indirectly affected and also there is still little knowledge on society's views on RRI. Participatory evaluation facilitates both in that »we learn

about the project and the community just as the community learns about itself« (Richmond et al., 2008, p. 374). It helps carrying out latent needs of those affected and to explore the value systems of stakeholders (Mercer et al., 2004). Information is generated and debated collectively, and thus participatory processes include moments of differing views and contestation (Guijt, 2014).

RRI is about innovation and changing trajectories towards our common future. But according to Scarinci et al., most of the traditional evaluation methods would not capture the »spirit of change« in people (Scarinci et al., 2009). On the other hand, the process of participating in an evaluation gives ownership of the information to those most involved rather than receiving (and resisting) an outside evaluation (Cullen, 2009). Stakeholders are »much more likely to support the evaluation, and act on the results and recommendations, if they are genuinely involved in the evaluation process«. It thus »has the potential to reduce suspicion« and »increase awareness and commitment among stakeholders« (Mercer et al., 2004, p. 170). Consequently, a participatory evaluation method is appropriate for RRI purposes, firstly, to raise awareness and stimulate discussion about the RRI concept and secondly, to provide profound first hand results to be considered in its further development. Results of initial evaluation exercises can provide preliminary findings that could be the »groundwork for a follow-up assessment. These results, in turn, can be used to refine the key issues and generate new questions to address in subsequent rounds of monitoring« (Rietbergen-McCracken & Narayan, 1998, p. 194).

9.4 Techniques and Tools

As participatory evaluation is not a method, but an approach, there is no single method catalogue for usage. In general, participatory methods are »methods to structure group processes in which non-experts play an active role and articulate their knowledge, values and preferences for different goals« (van Asselt et al., 2001, p. 8).

There is a full range of different interactive, reflexive and stimulating techniques and visualisation tools that support the process. These include tools that place the emphasis on participants producing inclusive accounts using their own words and frameworks of understanding for e. g. »a range of exercises such as timelines, cartoons, matrices and pie charts« (Pain & Francis, 2003, p. 46), mapping, such as multi-criteria mapping (Burgess & Chilvers, 2006), or for instance a consensus-building tool called the Delphi method (Geist, 2010), decision-analytic techniques such as value trees,

influence diagrams, and meansends networks (Gregory et al., 2003), or the expert model diagram (Baur et al., 2010), just to name a few. See many more for example in (Slocum, 2003) and some more applied methodologies in: (Walls et al., 2011), or: (Olson & Jason, 2015).

9.4.1 Group Workshop Format

In order to learn about conditions for social groups, it makes sense to work with them as a group. Group works could lead to participants working together and commonly to discussing solutions and ideas that emerge in the process. According to Corrigan (n/a), such participatory group processes generate new knowledge, the group discovers together what is new, and also how they could bring a new system into being. For this reason, participatory meeting methods that help to reflect and enhance co-learning and relationship building and support creative talking and listening, are preferable. Techniques such as Open Space Technology, World Cafe, PeerSpirit Circle, and also Appreciative Inquiry are well known processes in this regard (Corrigan, n/a). The use of visual and dramatic forms of data collection are also recommended as these methods »often uncover important information that would not otherwise surface« (Burke, 1998, p. 53).

An appropriate format to apply these techniques are group workshops, for example, storytelling workshops (Baur et al., 2010). Workshop activities allow for a richer engagement of the stakeholders and provide a forum for debate and discussion of complex issues, and »if facilitated effectively, can prove to be a rewarding and educational experience for the participants« (Human & Davies, 2010, p. 646). Workshops can contribute to awareness and interest raising, engagement and empowerment and to wider commitment to the research (Pain & Francis, 2003). Workshop techniques have many benefits; people become familiar with the topic and with each other and can learn from each other. Group interactions also stimulate generation of ideas and solution-oriented thinking. Finally, results can be reflected and validated. These kinds of workshops »have to be carried out in a very structured way« and »need to be facilitated according to guidelines« (Creek et al., 2014, p. 12).

Workshops can be either carried out in homogenous or heterogeneous groups of stakeholders. The value of homogeneous groups is that participants are more likely to feel free to speak up as they are aware of this shared interest. »Creating homogeneous groups first, before joining in a heterogeneous dialogue with other stakeholders, is a central characteristic of responsive evaluation« (cited

after Abma et al., 2009; Abma and Widdershoven, 2005). A process of mutual learning and relational empowerment within a group of stakeholders can thus be fostered« (Baur et al., 2010, p. 243).

Workshops offer space for group activities. To work with the group helps to understand the »Lebenswelt« of social groups (Chorherr, 1994). In the following work, it is not individual aspects but conditions of the group of practitioners which will be examined. Therefore, participatory evaluation workshops with small groups are the most appropriate approach for data collection in this case. Two workshops, with 26 participants, were conducted for this study.

The applied techniques, including for instance, theatre scenes or drawings (see more detailed descriptions in chapter 9.6.4.3 and 9.6.4.4), offer the participants the opportunity to not only perform and demonstrate problems and concerns, but also to work on possible actions and solutions. The room for creative expression also allows room for hope that new and innovative options will be generated. To work with the different techniques on an emotional, creative and impulsive level also allows for gaining insight in a holistic way. Participants are not only asked questions on a cognitive level, but also with their entire cellular (Reiter, 2008) experience and knowledge. According to Höykinpuro and Ropo, oral narratives and drawings capture different issues. In their study, the drawings revealed »details and observations that usually escaped the oral or written story« (Höykinpuro & Ropo, 2014, p. 781). Applied techniques were inspired by different theatre pedagogical approaches and group games (e. g.: Boal, 1999; Diamond, 2013; Johnstone, Schreyer & Schreyer, 2014).

9.5 Target Group and Research Focus: A Process of Self-Reflection and Self-Selection

After reading the literature and observing so many critiques on Public Engagement which at the same time is facing such a growing demand within the policy on RRI, my initial idea was to take a closer look at aspects that would contribute to fruitful engagement activities in RRI processes; what would make them successful, what must be considered, the What, Where and the Whys and Hows of good engagement processes in research and innovation. The best way to find that out, I thought was to ask those who were directly affected and meant to be involved: the public itself. At that time, I had already learned that the public as such did not exist, so whom exactly should I be asking about it?

During my search, I discovered that the discourse was very abstract and held at a very high level. As a result, I could not find representatives of the public who were willing to participate in a discussion about the topic. Even at my first workshop, one participant with an academic background confessed that he »withdrew« from being »the public«, in other words, he did not feel qualified to represent the public anymore, but preferred rather to be part of an academic peer discourse. Even those citizens I approached, who had already participated in a Public Engagement process, did not respond to my invitations at all. Only those who had a professional stake in the topic or those who were affected by the topic, those who were already involved in ongoing projects, or those who were about to implement Public Engagement in RRI were willing to discuss the process with me. The workshop's participants had volunteered to join due to strategic interests and position. I found that they represented a certain role within the process. It became clear that I needed to address those persons who would be carrying out the processes, and I found that their position was central in the whole discourse. As a consequence, I had to work specifically with them. I will call them practitioners for further use.

As several Public Engagement processes have already been carried out and many others are still ongoing, I assumed that there must be strategies and concepts along which the practitioners were organising there work and I wanted to find out on which concepts they could rely on. I wanted to know how they carry out the processes or how they think such processes should be carried out. What were the potentials of such processes? What were important aspects? After there have already been several clues in literature, I found that even empirically, Public Engagement has proven to be a very difficult task and so I wanted to find out what exactly made it difficult. What were the constraints, what were the limits practitioners were facing and why? What were aspects which were regarded as being important by the practitioners but for which they have not yet found satisfying solutions? And finally, I wanted to know why they continued to engage in it, even though the role was difficult and seemingly had so many limitations.

I was able to involve suitable »practitioners« with relevant knowledge of the topic and I engaged them in interactive processes of data collection. The topic clearly appealed to those who really wanted to work on it or had to for reasons stated above, those who could particpate during their official work hours or even in their free time, or those who had a very special professional interest.

Based on my professional position and my background, I did not have too much trouble making contact with them. The fact that I had already been in touch with them also enabled me to to understand them better, although I remained mainly an observer in this participatory process.

Workshop Documentation

9.6 Description of Workshop 1

9.6.1 Frame and Recruitment

The first workshop took place on March 15, 2016, in Vienna, from 9.30 am to 5 pm.

The workshop was embedded in a RRI Tools project training activity. That means that participants were also invited to attend an information and training session in the afternoon on RRI and its policy dimension in general and on questions of the RRI Tools self reflection tool in particular. Results of the work only reflect the interactive morning session.

The workshop addressed those who were interested in the topic of Public Engagement in research processes. Participants were selected based on their eagerness to learn more about it or even contribute to its further development. An eagerness to discuss the concept of RRI was also important, as was eagerness to help implement Responsible Research and Innovation and to get in touch with other persons with this interest.

Personal invitations were sent to selected persons. Those who already had experience in Public Engagement were considered, such as those that had already participated in a citizen panel, those who were multipliers for the topic (such as educators or science communicators), the media, working with affected target groups in that topic (e. g. association safer internet for children), or being experienced with creative formats of engagement (such of interactive exhibition design or creative thinking). Rather than a snowball system, there were waves of personal invitations until the full number of participants was reached.

9.6.2 Participants

Nineteen persons participated, twelve women, seven men, with a wide age range from the mid-twenties to sixty. In detail, they came from: the Student's Union of Vienna University, the Department of Geography and Fuzzy Logic, Association on Safer Internet, a

consultancy company for socio-political topics, creative-coaching and science communication, the field of human-rights, CSO for Social Entrepreneurship, the Ministry of Education, Museum for Natural Sciences, Labour for Cultural Transformation, Community of Interest on Democracy, Open Science Vienna, Future Lab Ars Electronica centre Linz, Science Shop Vienna, Children's University and Interactive Exhibition Design. Notably, none of the persons who had already participated in citizens' panel — or from »the public«, so to speak, answered the invitation. The media was not represented either. The list of participants indicate that only those who are actually working on the topic and have to find ways for implementation of Public Engagement in science, actually participated.

Their motivations to participate were as follows: gaining new insights, bringing in knowledge from their specific target groups, informing from current applied research activities, working on a master thesis how to communicate something which is not yet fully known, being engaged in similar projects, dealing with RRI, engaged in national RRI platform, currently working on an exhibition on that topic, experience with ad hoc participatory formats and organiser of self organised activities (such as repair cafés), interested in open spaces, such as Otello which are closely collaborating with citizens, participatory processes from the view of a moderator, interested in new methods and tools for process moderation.

9.6.3 Location

The workshop took place in the roof-top seminar room of an integrative housing project for the homeless and students, easily accessible in the city of Vienna. The participants were invited for lunch and for beverages, but did not receive any reimbursement.

9.6.4 **Agenda**

Detailled Programme:

Technique	Question	Sub-question	Material	Time
Check-in circle	Welcome and introduction	Short self-introduction, your motivation to participate	Circle of chairs and centre	25
Intro	Introduction of the workshop, the hosts and the agenda			7
Association circle with ball	What comes to your mind when thinking of Public Engagement in research?	Give one aspect and throw the ball to another participant	Circle, Host taking notes on flipcharts	6
Appreciative inquiry	Memorable participation activities: What makes it memorable?	Which experience of engagement comes to your mind? What was a good thing, what was a bad thing? What are needs and values?	Work in pairs, fill in cards in 2 colours (good, no gos) with most relevant aspects	40
Images	How does a participant look like?	What are attributes, skills? Motivations? What is he looking for? What does he want? Benefits?	Works in 3 groups, Flipchart paper, pens, coloured pencils	15
Break				
Energizer	Warm up	Circle around one person in the room three times		1
Complete the image	Preparation for acting	Trying different positions and attitudes, changing scenes and meanings	Pairs who show changing pictures of two parts (two roles: moderator and participant)	5
Theatre work	How do I imagine an engagement situation/process from the perspective of a — Realist (what is possible?) — Critic (limitations and risks) — Visionary (everything is possible)	Who participates, who leads, what are roles, which setting?	3 small groups	65
Lunch				
Stages	— Research decision (programming) — Planning and development — Research and implementation — Evaluation — Report and dissemination — ???	1. At which stage do you think it is useful to engage the public? 2. At which stage would you personally become engaged?	Each participant to position at the appropriate stage sign on the floor	15
				180

Table 1: Detailed Agenda Workshop 1

9.6.4.1 **Technique 1: Association Circle on Public Engagement in Research**

Participants stood up in a circle, throwing a ball from one to another, each one who fetched it, talked ad hoc about one aspect of Public Engagement in research and innovation which came to her or his mind.

54 aspects were collected, the first mentioned aspects were: Empowerment, to ask non-experts, to ask everybody, the art of hosting, helplessness, who decides the rules, translation, who is not always welcome etc.

All words were noted on a flipchart, which was displayed in the workshop room afterwards.

9.6.4.2 **Technique 2: Appreciative Inquiry on Previous Experiences**

Base on principles of appreciative inquiry (Cooperrider & Srivastva, 1987), participants were engaged in pair-interviews and told each other the most memorable engagement experience they personally had or had heard of. They asked themselves: What was a good thing, what was a bad thing? What were needs and values? They then collected the most important positive and negative aspects on coloured cards. All cards were collected and displayed on a pin wall and finally clustered (as figure 22 shows).

Figure 22: Collected and Clustered Aspects on Cards

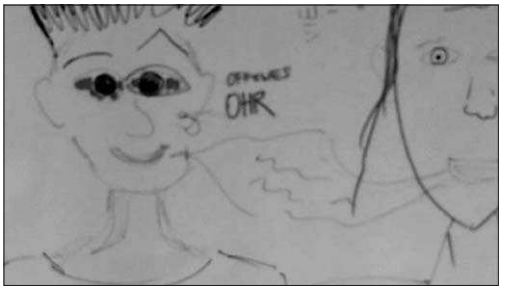
These were the main clusters/themes: Process (like: »joyful dynamics«), New Roles and new space (like »bringing together different milieus«), Results and Effects (like: »something new is evolving«), Attitudes (»taking seriously«) and Reasons/Motivations (»get rid of one's own inner barriers or mental block«).

9.6.4.3 **Technique 3: Drawings — Images of Participants**

Workshop participants were grouped in small teams and were asked to draw participants of Public Engagement processes or activities in research and innovation. The questions were: What does a participant look like, what are attributes, skills, motivations, what is he/she looking for, what are benefits for them? Each team presented one drawing on a poster; one poster was used double-sided.

— Drawing 1

This image focused on how to conduct the process: Offering different formats and channels, onlookers and guests, upside down, different perspective (like hanging on a tree). Being friendly, smiling, nice, having fun, having open eyes and ears, allowing a flow of speech, having inside and outside views, with questions and an interest to find suitable answers. Being open-minded and patient until things come up, sceptical and curious, ready to give. Image 1 shows two sections of the first drawing created by the participants.



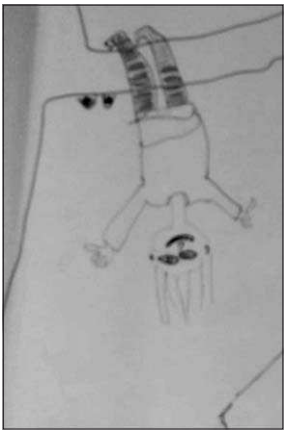


Image 1:
Sections of Drawing 1

— Drawing 2

The second drawing (see image 2) used a refrigerator metaphor. Some explanations given by the authors were: »As long it is closed, you don't know what is inside« — it needs to be opened, explored. A fridge contains everything you need as long as you know what you really want (something fresh, ripe ideas, basic food etc.) — everything is there (within the participants), it just needs to be gathered. However, you might not always find in the fridge what you need to prepare a whole meal, for example, rice. It needs ALL good ingredients for a nice meal. Processes and components should be brought together.

»Cool rationality«, wishes and feelings are kept on ice, as they are often regarded as being negative. But they could become defrosted within engagement processes through activating methods and thus become part of the process.

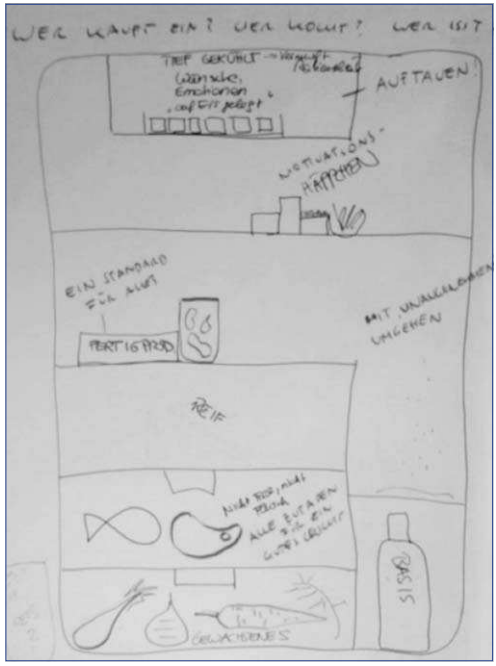


Image 2:
Drawing 2

— Drawing 3

The third drawing summarises aspects, which were first collected on the other side in one statement: »Be present!« (see image 3) and shows a very simply drawn stick figure. It says: »I am there and … «

And the collected aspects were:
»I have the time to participate
I engage myself
I am ready to listen and to build my opinion
and perhaps to change it
I have my standpoints (generally in life)
I believe I can affect something
I am open for something new, I engage myself in the new
— I explore what is the new?«

Image 3:
Drawing 3,
front page

9.6.4.4 **Technique 4: Theatre Work**

The participants were asked to break into groups according to three different approaches relevant to their personal preferences: the critic, the realist, and the visionary. They had to create a theatre scene (with or without words), a story in pictures or one living sculpture. There were given 15 minutes time for preparation.

Scenes or sculptures were shown to the others afterwards. First the audience described what they had seen. Then the audiences interpreted what they had seen. Finally, the actors described what they had performed, what they wanted to show, and how they felt. A group discussion followed and main topics were written down on flipcharts. (For an in-depth analysis, written transcripts of audio records were used).

— Scene 1 (The Critic)

Description: A pantomime scene with five persons (see image 5): a poltician, a process moderator, three participants, all wearing paper coats with statements written on it: I am a politician, I want something. I am a process moderator, I have to implement something. I am a participant, I am overeager. I am a participant, I wonder why I am here, I am not interested. I am a participant, I would like to … but I can't get a word in edgeways.

There are two additional cards with the words: hidden agenda, financing and a dollar sign (see image 4).

The politician is standing on a higher position on a chair, whereas the moderator is kneeling in front of him, begging for money. The politician hands the money over, but also the hidden agenda.

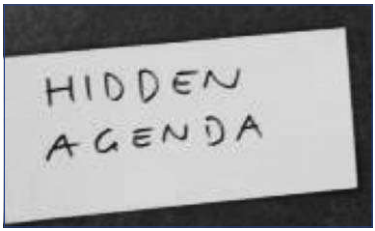


Image 4:
Text card

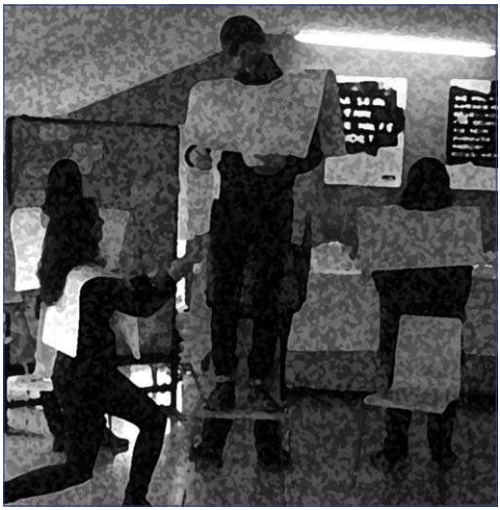


Image 5:
Scene 1
(The Critic)

The moderator starts the process and turns those participants around who were standing with their backs to the audience. The politician stands close and observes. The moderator is very busy trying to engage the particpants and to run the process. She also passes on the card with the hidden agenda. She makes particular

effort to entertain the participant who is not showing any interest. She acts like a clown in front of her. She is also busy with the over-eager particpant and follows her closely. The one who could not get a word in edgeways, loses interest after a while and retreats.

Finally, the moderator comes back to the policy maker and hands over her report (and the hidden agenda) with a smile. She seems to be relieved. The politician is wearing a serious look and takes it in the end.

Gender: the politician was male, the moderator female, the group of participants was mixed.

Explanation: The scene demonstrated the power a politician can exert; he had the first and the last word. But the participant, who showed resistance, was also able to exert power. She was able to block the process. The participants were isolated from each other. No one really listened to them. Motivation was lacking. The participants did not really have any monetary benefit (all of it was handed to the moderator).

The politician had a clear outcome in mind and had handed over his hidden agenda. He stood very closely to the participants and tried to intervene. He wanted to influence the process when he found what he had wanted had not happened. He tried to push the moderator away and to exploit the process. When receiving the final result, he acted like a critical client who checks if the job was done correctly. The exploitation did not fully work. It was not entirely clear if he could he really profit from the process.

There was no real communication, but only through cards. And there was no transparency. The hidden agenda was secretly passed on and »infiltrated« the whole process. The process was not left with an open end.

— Scene 2 (The Realist)
Description: A pantomime scene with seven persons (see image 6): One (female) moderator, six participants. One is dealing with his mobile phone, another one is holding a sign saying I am not part of it and cannot contribute. One is standing alone, averted. Others are vaguely related, sceptical. The moderator encourages the one with the mobile phone to take a picture, so the group starts moving, but it is difficult for the moderator to get them all aboard, she cannot take care of all of them, the group is fragmented. At the end the picture is taken, but not all of the participants are involved. Again, the moderator was female.

Image 6: Scene 2 (The Realist)

Explanation: The group did not succeed in making something together. Some were not directly involved, they remained in the background. There were processes in parallel going on. The moderator encouraged the one with the mobile to take a picture, to draw him in, and to convert his resistance into an active role. But she could not work with all of them at the same time. She could not involve all, some were frustrated.

— Scene 3 (The Visionary)
Description: A theatre pantomime scene with parts of text as well (see image 7). The statement of the actors before the beginning was: »This is a homogenous group.«

A group gathers on sofas around a small table. It is a nice and friendly atmosphere, flowers are nicely arranged in a pot and watered, and there are cakes and sweets. The actors sit on comfortable furniture, it is a nice bright corner of the room, and there are smiling faces. Participants join those who are already sitting, bringing some attributes with them, like »creativity« (which is written on a card).

They invite others to join in, too. One of the group is distributing cards with questions marks to the audience. Some of the audience who get a question mark join the group and formulate questions. Some receive a card with »time« and are able to join or refuse to join, they are not forced. One is asking who the leader is, but they say they are all equal. The group is becoming bigger and first voices are asking what this is all about, but it is not yet clear. It is also not clear if it has already started or when it will start or end.

Image 7:
Scene 3
(The Visionary)

Explanation: The group wanted to show an open, friendly and inviting atmosphere. Everything should be pleasant, there should not be any strict structures, it should not be too formal and everybody who was interested was invited to join. It turned out that some of the audience did not feel invited at all. On the contrary, they wondered why some explicitly received time or a question mark, while they did not. They could also not understand what the activity was all about and who was invited and who was not. They felt everybody as though should go there, a kind of peer pressure, but they did not feel part of it or did not want to be part of it. Some felt annoyed by the complete openness.

9.6.4.5 **Technique 5: Engagement at Different Stages of the Research Process**

Sheets of paper showing different stages of the research and innovation process were laid down on the floor (see image 8). The stage signs were put down in a linear way, in sequential order. These signs showed the following stages:

— Research decision (programming)
— Planning and development
— Research and implementation
— Evaluation
— Report and dissemination
— ???

Image 8:
Group Positioning along the Different Stages

The question marks were meant to define a new stage or something that would follow, or something not yet mentioned or open for discussion or just unclear.
Participants were then asked to position themselves next to questions at the appropriate stage sign on the floor. The questions were:

1. At which stage they find it most useful to engage the public
2. At which stage they personally would like to get involved

Description: The whole group was rather well spread over all different stages, demonstrating that Public Engagement is possible and conceivable at all stages, although there was a preference for the beginning phase. Although positioned in a linear way, the participants considered the process in a cyclical way, starting over after stage ??? (see figure 23).

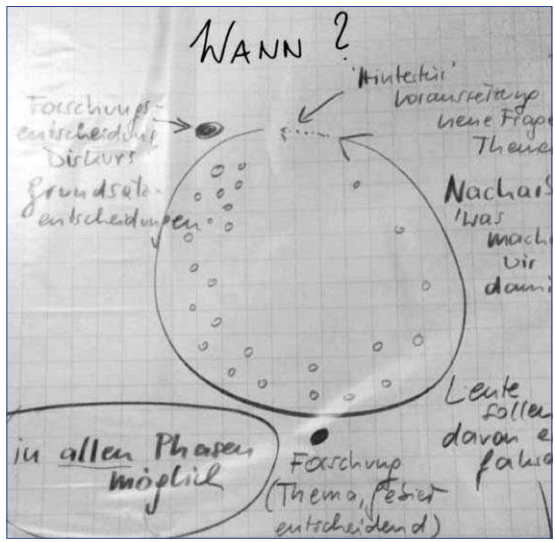


Figure 23:
Summary of Stages Discussion (Source: Flipchart protocol; Marschalek, 2016)

After question 2, some of the participants who either had a personal research agenda in mind or stood on ???, moved to the stage research decision.

9.6.5 Evaluation of the Workshop

Workshop participants filled in an evaluation sheet at the end of the workshop and were also engaged in a verbal feedback round, in which they were asked what they »liked« and what they »wished« for. Evaluation results are summaried below.

Activating effect:
The average statistical results show that the workshop had animated them to expose themselves to the topic of Science and Society. They also agreed that they learned about their own attitude, and they were able to find out more about their own needs. They also confirmed that new knowledge about Public Engagement was generated within the workshop. They stated that the workshop had animated them to become (even) more actively engaged in the topic.

Attitudes:
Asked about their estimations of the RRI concept in general, results show that participants thought that the topic was interesting and necessary. Two thirds thought it was important. One third thought that the topic was contemporary and also future-oriented. More than half stated that the topic was personally relevant to them. Although none of the participants thought that the concept was unrealistic, almost one third thought that it was still undeveloped.

Participants were also asked for a verbal feedback at the end of the workshop in the plenary.

General comments were:
There is still a need for a common definition of RRI.
Best practice examples and examples for practical implementation are required.
How can theoretical terms be implemented practically?
There was a wish that the RRI could be sustainable and that Public Engagement in science was common practice.
To define and understand how the paradigm shift and change within science and society would look like exactly.

Finally participants formulated what they liked in the workshop and what they wished for.

Like:
They liked the composition of the group, the interactive design of the workshop, the agreeable room and the nice location. It was useful for their work and had animated them into reflection.

Wish:
Participants wished that RRI would not be just a buzzword, but become sustainable, even common practice in 20 years. They wanted to integrate other participants (e. g. residents of the integrative house where the workshop was hosted) and they wanted more examples of citizens' engagement, best practice examples and an Overview of activities on that topic in German-speaking countries. They wanted to connect the public with the concept of RRI.

All the participants received a protocol with photos of all flipcharts and pin-wall as well as descriptive results a few days after the workshop.

9.7 Description of Workshop 2

9.7.1 Frame and Recruiting

The second workshop took place on May 17 2016, in Vienna from 19 to 22 pm.

The workshop was hosted by the Wiener Salon für Wandel (Viennese Salon for Change) — an initiative by a group who invites those interested to open discussions once a month on various topics of individual or societal interest, such as »self determined life«, »between chaos and structure«, »a new together of cultures«, and »room for good talks«. They offer an opportunity for an encounter with those »who want to shape societal change«. Participants are »invited into a dialogue, to exchange ideas, find inspirations and create new visions« (FB group at: http://wienersalon.com/). In their extended format Salon für Wandel and friends they are open for topics, which are brought in by outsiders. I was able to organise my workshop in this extended format. Invitations were sent via the salon mailing list — a list of salon guests or those who had shown interest and signed up for the list. The salon also has a facebook group, the invitation was posted there and was shared many times which also had the viral effect.

9.7.2 Participants

Seven participants (four men, three women) participated, the age range was between mid-twenties and mid-fifties. One female member of the salon team also took part and co-hosted the

workshop with me. The introduction round asked for background and motivation to come to the workshop.

The group of particpants included a freelance science consultant, with a special interest in scientific honesty and plagiarism, who was interested in new formats of engaging the public in science, an academic in the field of teaching and research who was interested in the topic, in open innovation strategy in particular, but had already formulated critiques on the methodology he encountered there. There was a graphic designer who is engaged in science communication visualisations and who is also a citizen scientist, a social scientist at an extra university research institution, who had organised a citizen panel on formulating research priorities and who was interested in appropriate methods and tools. There was a scientist who is currently engaged in a »sparkling science« project (research in collaboration with schools) and who is also the CSO of an environmental charity, a trainer working with the method of improvisation theatre, who had already been engaged in projects on that topic and who was asking what the method could contribute to the discourse of Public Engagement in research. One participant came from a science shop; he has been interested in the topic for many years. He had already participated in the first workshop. And finally there was the co-host, who is already engaged in participatory and evaluation processes and was interested in methods like improvisation theatre, psychodrama or the art of hosting.

The list of participants indicates that those came who actually have a strong interest in the topic Public Engagement in research and innovation, and responsible research. They are already working on that topic and participated as they wanted to find (new) ways of implementing Public Engagement in research and in RRI, in particular.

9.7.3 **Location**

The workshop took place in the roof top seminar room of an integrative housing project for homeless people and students, easily accessible in the city of Vienna. The participants were offered snacks and beverages; they did not receive any reimbursement, but were asked to contribute with a donation for the housing project.

9.7.4 Agenda

Detailed programme:

Technique	Question	Sub-question	Material	Time
Check-in circle	Welcome and introduction	Short self-introduction, your motivation to participate	Circle of chairs and centre	20
Association circle with ball	What comes to your mind when thinking of Public Engagement in research?	Give one aspect and throw the ball to another participant	Circle, Host taking notes on flipcharts	5
Appreciative Inquiry	Memorable participation activities Which experience of engagement comes to your mind?	What can you remember? What were positive aspects, what were negative aspects? What are needs and values?	Work in triples, active listening of »ears«, fill in cards in 2 colours with most relevant aspects	50
Break				
Energizer	Warm up	A-E-I, yes – no circles with different expressions, complete the image		10
Theatre work	Show a statue or scene of an engagement activity in research processes	Who leads, what are roles, which setting?		60
Closing round	Public Engagement in research and innovation -What does it really take?	What are the take home messages for you?		15
				190

Table 2: Detailed Agenda Workshop 2

9.7.4.1 Technique 1: Association Circle

Participants stood up in a circle, throwing a ball from one to another, each one who caught it, provided ad hoc one aspect of Public Engagement in research which came to her or his mind.

The words were written down on a flipchart, which was displayed in the room afterwards. 42 aspects were collected. The words first mentioned were: many people, co-creativity, steering, tax money, self-organisation etc.

9.7.4.2 Technique 2: Appreciative Inquiry

Groups of three persons (one group of two) were asked to sit together and tell each other their most memorable experience of participation within the area of research and technology. They were asked to think about which experience of engagement would come to their minds and also what had made it memorable. What had been positive or supporting aspects, what had been negative or hindering aspects?

The listeners were given instructions for acting as »ears« to carefully listen according to the following aspects:

— Active listening!
— Who was involved?
— What were important moments?
— Why was the process undertaken?
— What had led to changes?

They were asked to collect these aspects, define which aspects were positive and which were negative and write them down on two coloured cards.

Back in the plenary, the small groups presented their cards, gave short explanations and clustered them with the help of the moderator on a pin wall. The pin wall was on display throughout the duration of the workshop.

The clusters identified were:

— Burdens to the engagement process
— Tug-of-war between interests, expectations, group dynamics and dominant voices
— Role, commitment and expectations of the sponsor
— Moderation and methods
— Attitudes and preconditions
— Invitation policy: who is invited?
— Positive effects of engagement processes

The cards were collected and documented. The presentation and clustering was audio recorded and transcribed afterwards.

9.7.4.3 **Technique 3: Theatre Work**

As a warm up, the group did some exercises together. First, we started with a circle, trying out different ways of expressions, meanings and emotions when using the letters A, then E, then I and afterwards when using the words »yes« and then »no«. The next exercise was to »complete the image«. This is a sculpture work, which was carried out in pairs, and then in small groups, in which participants spontaneously changed their postures and positions and thus created new settings and meanings together.

Afterwards, the two groups were asked to develop living sculptures, short theatre scenes or pantomime performances of an engagement activity in research processes.

The two works were performed for the plenary and discussed by the actors and the audience.

Explanations and discussions of the scenes were audio recorded and transcribed afterwards.

— Scene 1

Description: A pantomime scene. A group of four persons gather in a circle, one of them holds a folder in his hands (see image 9). They start arguing. It seems that the one with the folder is trying to convince the others. It appears as though they are being asked to sign something in the folder. The others react differently, one signs immediately, one acts more negatively, and one acts rather sceptically. The discussions are emotional and the attitudes change over time, also of the one with the folder. Finally all of them sign the paper.

Image 9:
Theatre Scene 1

Explanation: The one with the folder was meant to be the expert who had to convince the others. But he had not expected that they would act so differently and that it would be such a hard job. The others did not like that the expert was not really listening to them, but as he changed his attitude they finally gave in.

— Scene 2

Description: A pantomime scene in two parts. In part one, three persons stand while looking at something. Each of them looks in another direction and acts differently. They don't look at each other and don't act similarly nor interact with each other.

In part two they move to another space and gather there in a circle, drinking and chatting with each other.


Image 10: Theatre Scene 2, parts 1 and part 2

Explanation: Part one represents something like fieldwork — a research process — in which all the participants work individually, not together. In part two, they come together informally — at the buffet — and finally talk with each other, interact and feel relaxed.

9.7.4.4 **Technique 4: Final Circle**

The moderator invited participants into a circle and asked according to the title of the workshop: Public Engagement in research and innovation — what does it really need? What are your new findings and insights?

Participants answered with individual statements of about two minutes in popcorn style. That means they could take a talking stick from the middle and rise to speak while the others were listening. The statements were audio recorded and transcribed afterwards.

9.7.5 **Feedback Workshop**

Participants appreciated the comfortable atmosphere and the setting of the workshop and all found the topic very important. The approach of the workshop was very exciting, and fun and entertaining at the same time. They could gain much insight, food for thought and take home information for further work.

All the participants received a protocol with photos of all flipcharts and pin-wall and descriptive results few days after the workshop.

Data Collection and Analysis

9.8 Process of Data Collection and Analysis

The data collection process was organised as a work in progress. First hand raw material was collected via participative workshops with target group participants (see full workshop descriptions in previous chapters). The workshops were recorded and documented (audio records, notes taken by observers) and artefacts were generated within the workshops (such as drawings, photos, moderation cards and flipchart protocols). For the purpose of analysis all these materials (including written transcripts of the audio records) were used as raw data. Interpretation sessions took place already after the first workshop. This work also helped to further develop and adapt the concept for the second workshop.

A descriptive analysis investigates and looks for indicators (Breuer, 2010), which consist of observations that the material shows at first glance. A further step towards in depth analysis looks for concepts that may be hidden within the material. These steps had to be altered with theory building and the analysis of further materials within a hermeneutical circle, which impacted the whole process.

The interpretations were not held alone (by myself as someone who has a deep knowledge of the topic), but mostly with friends or sociology colleagues who had no prior knowledge on the topic at all. We took advantage of their lack of knowledge to enable new and creative interpretations (Strübing, 2008). Together we tried to break down the material, using our experiences and intuitions. We considered ideas with thought experiments on its likely consequences. We took rounds in comparing and contrasting different kinds of raw data. For instance, we took the terms I had collected from the ad hoc association circle in workshop 1 and the aspects I had collected in the form of written cards and compared our assumptions. These rounds were used for very thorough investigations of the material and the creation of open codes. The first sets of theses were formulated accordingly. Interpretation protocols (mostly based on audio records of the interpretation sessions) and memos were written and further theses were extracted and formulated more precisely accordingly. The interpretation sessions that took place subsequently, looked at further materials and verified and reformulated the theses and extended the list of theses. To be able to look at the different facets of the phenomena and to achieve analytical diversity, we considered the multiperspectivity of the

data and their interpretations according to Schatzmann (1991). We also tried to take the perspective of the practitioners so as to be able to put into detail their options and alternatives of actions.

The interpretation protocols were then complemented by self-reflection memos, in which — based on the approach of introspection — my own attitudes, my knowledge and my personal experiences within this field were reflected. These memos were used as »Denkzeug« (Strübing, 2008) to verify the list of theses as well.

Based on principles of theoretical sampling (Corbin & Strauss, 1996), further interpretation sessions and data collection activities with specific foci were undertaken. Within the two data collection workshops much material could have been gained »as a reserve« (Strübing, 2008, p. 30 transl. i. M.), as it is often the case in field contacts to decide at a later stage at which materials should be looked at as the next step. Within the interpretation process, I decided step by step which material or which parts of the material to analyse in more detail (Breuer, 2010) in order to augment the consistency of the theses.

According to the concept of theoretical saturation (Glaser & Strauss, 1998), I was looking for examples of categories which could be repeatedly found within the material. Some of them appeared rather quickly, for some I had to dig deeper and complement my search with additional sampling.

By adapting the procedure introduced by Strübing (2008, p. 28), I applied a coding paradigm which would look for relational conditions of causes, phenomena, contextual conditions, strategies and consequences in order to determine the situation of practitioners. Based on this model, I was able to describe the situation and conditions of the field. The final list of theses and recommendations was created afterwards. Finally all the material was used for formulation of the results into narrative chapters using also direct quotes from the original raw materials. Examples of the literature and a personal discourse observation of Public Engagement in RRI (on conferences, expert workshops, media etc.) were used to complete and round out the presented results. Quotes in quotation marks are original tones as collected during the workshops (verbally or on artefacts).

When not marked as different resources — such as literature — all other statements stem from interpretation protocols and memos, originally German and translated into English.

The following abbreviations indicate the context in which they have been captured:

WS 1, 2	Workshop 1 or 2
APPI	Appreciative Inquiry
ASS	Association Circle
FB	Feedback Round
PIC 1, 2, 3	Pictures drawn
THE	Theatre Scenes
STG	Stages Exercise

PART III
Results

10 Empirical Results

The subsequent chapters comprise the narrative descriptions of results of the empirical work. They are structured according to the system which emerged from the analysis work. The first chapter gives an overview of the current discourse as it is perceived by the practitioners. The second chapter describes in more detail the central role of the practitioners; and the last chapter summarises ideas and suggestions formulated by the practitioners.

10.1 The Discourse on Public Engagement in RRI

Public Engagement in research and innovation as such is »not at all a trivial endeavour« as one of the workshop participants put it at the end of one of the workshops (WS 2, FB). It is a very high level discourse which is mainly held from the scientific point of view. The language and methods used are anchored in the scientific realm. There are common frames of understanding. Workshop participants who are all practitioners in the field of Public Engagement in science and research were able to understand and interpret aspects presented by others and easily communicate within these frames. There already exists a vocabulary within the field although there are still many uncertainties concerning specific meanings.

It is perceived as an ambitious aim which is difficult to achieve. But it is also an incredibly »big and exciting topic«, which cannot be discussed or solved »in one evening« (WS 2, FB). As the literature has already shown (see chapter 8.2) Public Engagement in Responsible Research and Innovation is an approach with high aspirations and high expectations from very different sides — »also within teams and from different disciplines« (WS 1, APPI). It should contribute to change, offer more robust results, and as often mentioned: It should

contribute to empowerment. However, the discourse does not really make clear who exactly should be empowered.

It asks »much from everything!« (WS 1, APPI). Within the engagement activities there are many tasks to fulfil, often too much is asked and the processes are often far too complex. Practitioners had observed »excessive demands« or »overstrain of participants« (WS 1, APPI). Although the engagement processes should be simple and easy accessible, the tasks and results that must be achieved are often complex and lengthy.

This and other contradictions practitioners encounter (as described in chapter 10.2.9) do not become obvious at first glance. Although exchange or dialogue is something commonly known, engagement processes do not happen by themselves, they require much effort and care. The processes are not easy to plan or to steer and many unintended situations can occur at any time.

»Would you really try that out?« (WS 2, FB), practitioners ask themselves facing all these difficulties. But in general they share a very positive attitude and appreciate the principle of participation and taking part in the first place which »is not self-evident« (WS 2, APPI). Public Engagement in research and innovation, however, is still in an embryonic stage, which means many uncertainties but also many options for experimentation and development.

Even though many methods and strategies applied are not new (also see chapter 8.1), Public Engagement in research and innovation is considered as an »approach with its own conditions« (WS 2, FB). For those who carry out these processes, they are »more than just another method« or »more than data collection«. This is because the kinds of processes they have in mind include much more. »They include the relationship work, the preparation and also the post processing work« (WS 2, FB). Some would even say that they could follow a more holistic approach, moving away from a functional understanding in which participants are only considered in their roles »towards an understanding of humans« (WS 1, FB). However one chooses to look at it, there is still much to be negotiated, discussed and settled in this field.

10.1.1 Science in Society?

The discourse on Public Engagement in research is located at the intersection of science and society. These two different realms indeed have undergone a changing relationship (as described in chapter 3), but their frequently quoted »blurring boundaries« are not yet really permeable. As previously mentioned the discourse of

Public Engagement is held from the point of view of science and research. The mode of expression »to engage« hints at an asymmetry rather than to a two-way dialogue. The often requested »encounter as equals« (originally: »auf gleicher Augenhöhe«) has not yet taken place. The engagement activities mainly invite persons of the public into the science system rather than visiting them in their very own environment. Even the visionary scene (WS 1, THE 3), which could have thought of every possible structure and format, suggested a process in which practitioners invited the public to their place (nicely prepared though) rather than going to them or even being invited by the public. Actually, society is composed of everybody and science is just one part of it, but in Public Engagement discourse, the science and research part is more dominant than the part of the public. It is the approach of the science and research system, its methods, its forms, and its vocabulary that dominates. The public is invited to come in but not the other way round. Only recently have there been suggestions articulated towards a counteridea of scientific engagement in public goods as in the PROSO expert workshop 11. 5. 2016, Vienna, http://www.proso-project.eu/news/expert-workshop-contemporary-experiences-with-societal-engagement-under-rri/ (retrieved 6th August 2016). Although the purpose of Public Engagement is not fully clear as mentioned at the beginning, it is the public who is displayed as being empowered, asked, supported, who receives the question and time cards to be able to participate (as shown in WS 1, THE 3). It is still the public whose deficits have to be overcome.

The two systems inherently have different conflicting aims. Within the discourse there is one »conflict« named (WS 2, ASS), in singular, not in plural, which indicates a fundamental conflict. It is difficult to moderate between those two systems and fields of interests.

The different parameters of the systems appear within the discourse and in the materials at hand:

— A pure and serious science and research system versus a hedonistic public, having fun, good food and a nice atmosphere
— Analytical reflection versus the directness of daily life
— Rationality versus emotions
— Strict formats and methods versus creative, uncontrolled processes
— Abstraction versus concrete experiences
— Knowing and not knowing, expert and non-expert etc.

The discourse has to deal with many bi-polar understandings in which actors have to position themselves, either to one or the other side unless a new space of encounter is created. There is the belief that the systems could stimulate and inspire each other and that they are dependent on each other. It is also perceived that Public Engagement has to empower science or augment its relevance and should lead to more robust results (as also described in chapter 8.3.6). But according to systems theory (Luhmann, 1995), systems naturally have to be isolated from their environment. Collaboration with the public is an additional task within the science and research system, it is not (yet) an inherent demand. It does not correspond to the objective and understanding of science which has to understand and investigate complex interrelationships, and not to simplify content. These contradictions of understandings and systems boundaries are noticeable within the whole discourse.

10.1.2 Processes and Framework

The empirical results showed the central meaning of processes and structures, which factors are most decisive and how they are perceived by the practitioners.

10.1.2.1 Output versus Impact

One of these factors is its high demand on output. Public Engagement activities are mainly oriented towards output rather than to achieve real impact. The engagement processes presented and discussed in the workshops in this study are so-called invited engagement processes. They are ordered and funded processes on behalf of public clients or policy makers. They are commissioned to provide a certain result. Although the purpose and expected impact is not always clear, the activities have to provide an output, which can be documented and reported afterwards.

Therefore, the activities come under pressure with regard to time and results. This was often addressed during the workshops and terms like force, effort, convincing, persuasion, or pushing were used frequently. As also discussed in the literature, processes are criticised for being functionalised or »proceduralised« (Stilgoe, Lock & Wilsdon, 2014, see more in chapter 8.3.5). They have to produce output at times, quite possibly at the expense of empowerment of the participants or an achieved reflexivity.

Those who carry out the processes work on order, they have to collect data, they have to achieve a certain aim, and they sometimes have to fulfil an educational or training task as well. They

have a serious work assignment, which has to demonstrate results (see more in chapter 10.1.2.1 below). They also have to evoke something new, which is not yet developed. Processes should provide solutions, though »not too creative solutions« (WS 1, APPI), as they could be then less robust and more weak.

Accordingly, moderators »fear they will not fulfil desires« (WS 1, APPI); they want to avoid processes, which don't produce results. They constantly feel the need for action and immediate reaction. Practitioners (as the educated members of our meritocracy) push themselves towards results and equally to the processes and the participants. Practitioners criticise »superficial processes« with »no concrete outcomes« (WS 1, APPI), or processes which are »too short or too closed« (WS 1, APPI). And the question is who to blame when there are no outcomes. The uninterested public? The restrictive sponsor? Application of the wrong method or themselves? And even though they want to engage and motivate, have fun and provide a nice atmosphere (see chapter 10.3 below), practitioners would not accept processes, which are »just for entertainment« (WS 1, APPI).

Within engagement activities, »group pressure« is mentioned (WS 2, THE 1), or exam-style situations in which the participants are put under pressure to perform or to fit in in order not to prolong or disturb the process and thus jeopardise its outcomes. A rejection of an expert or other prevailing opinion is considered as taboo and could lead to suspension of the particular participant. Some of the participants or their opinions might not be welcomed, and sometimes, »persuasive efforts« are undertaken to finally make them sign the experts' suggestion (WS 2, THE 1). This »expertization« (Bogner, 2012) and mainstreaming of opinion is also critically discussed within the literature (see chapter 8.3.5) and shown here explicitly by the workshop participants.

10.1.2.1.1 **Processes are not always welcomed**

The engagement processes depend on good will by the funders, and also on the participating individuals of »the public«. But although they have been commissioned, the processes and their outcomes could be rejected or not welcomed; results might be disregarded. Practitioners formulate their experience of insufficient commitment of sponsors, they speak about processes as a »fig leaf« or as »stage participation« (WS 1, WS 2, APPI), which means that engagement processes could be carried out as an end in itself without any effect. Which kind of impact such processes should achieve and how to measure it, is widely discussed in the literature

as well (see chapter 8.3.7). Whereas it is not clear how successful the processes could be and there is not enough evidence on the impact of engagement processes, practitioners become critical when there is no real interest or commitment from clients or policy makers, when there is »no will or intention for implementation« (WS 1, APPI). Practitioners also criticise when the results of the engagement activities have been downplayed or generalised to such an abstract level that results do not have any more substantial meaning. Practitioners wish for a declared interest in the process and the incorporation of outcomes.

10.1.2.2 **Consistent Ambiguity**

Although there are classifications and spectrums for describing different forms and levels of participation available (see chapter 6), the discourse on Public Engagement in RRI remains mostly vague and unclear. This confirms the assumption that role sets have not yet been completed and agreed upon.

Terms are interchangeable and are used inconsistently. Important vocabularies and attributions, such as »stakeholders« are not concisely used or understood. Or as recently stated in an expert workshop: The »term engagement is rather unprecise and characterized by interpretive flexibility« (Bauer, Bogner & Fuchs, 2016, p. 7). Participation as such is already used without much thought to meaning, a word that seems to fit in many contexts without explicit specifications or rules. It is considered as something which should be applied »in case of doubt« (WS 2, THE 1).

Ambiguity appears to be the red thread throughout the discourse, which leaves many factors undetermined:

It does not really become clear what exactly the aim of the engagement process is or what it makes a success. Practitioners formulated that they felt like they were in a game with unclear rules and it also it did not become clear for them over time »who sets the rules« (WS 2, ASS). How different roles have to be played and which expectations are related to them could not be defined.

The material shows that it is often unclear what exactly should be collected and in which quality. The results could be demonstrated in many forms, such as descriptive compilations or in depth analysis or as a summary of very general titles of carried out clusters. But as stated in a panel discussion (»Vom Elfenbeinturm ins Kaffeehaus — wie viel Öffentlichkeit braucht die Wissenschaft?«, May 11th, 2016 Österreichische Akademie der Wissenschaften, Wien) by a former participant of a huge engagement

process, the efforts required and time-intensive deliberations often are not proportional to the results which are finally presented. This particular participant resigned and dropped out after the first two rounds of deliberations. One of the panelists, who happened to be one of the organisers of that particular process, agreed that the results had to be more and more generalised until only very broad and rather insignificant categories remained.

A question that is also frequently asked in the literature is still open: For whom are the processes carried out? Who should take part and who should benefit? Who should become empowered by it? Furthermore, there is no legal right for getting engaged. Thus, it needs someone to actively decide who participates or not.

As it was also shown in the workshop within the visionary theatre scene: Although the workshop participants could have implemented any idea, the process they had performed was shown as very vague. The shown scene could not make clear who was invited, who got resources and who did not, or what was the matter of deliberation (WS 1, THE 3). Apparently, the workshop participants do not yet know how to fruitfully set a process in motion, although they already have many ideas and high demands.

It also was not clear when the activity started or ended. Aspects of that question were addressed throughout the workshops. Practioners were asking: Is the task accomplished by handing over the result? (WS 1, THE 1). Or in which way should the process be documented afterwards? »Who is on the picture?« (WS 1, THE 2). When is the process terminated? Does it include dissemination and the implementation of results after a process had ended? Questions like these raised within the workshops suggest that certain rights and duties have not yet been institutionalised as social roles would require (Linton, 1945).

As described above, processes are result-oriented. But it often remains unclear who is applying the results. Or what will happen afterwards with the results. »Will there be a follow up?« (WS 1, APPI) practitioners asked themselves or were asked by their participants. Results could feed in new programme lines or the formulation of new research questions as envisaged by the practitioners in discussing options for public participation in different stages of the research and innovation process (WS 1, STG). But this cyclical approach (as shown in figure 30) is not yet a foreseen part of the designed processes. The application of results is not yet a commonly agreed expectation of the processes.

Besides the questions on what happens with the results, there also seem to be a lack of transparency in many ways. Additionally, practitioners have to deal with a number of unknown factors, such as the composition and the conditions of the participating group(s), their prior knowledge, their interests and expectations. Practitioners are therefore looking for security and clarity. Poorly defined conditions obviously offer spaces of freedom but also create feelings of uncertainty and helplessness (see chapter 10.2.9.1).

This incomprehensiveness can be noticed within the entire discourse. This indicates that Public Engagement in Responsible Research and Innovation is a new field still in the process of development, which will only be gradually established (see also chapter 10.2.10 below). It does, however, also offer many possibilities. This also hints at the entire concept of RRI which is not yet decided but in the process of negotiation and structuring.

10.1.2.3 **Roles and Actors**

Generally, the actors are missing within the discourse on Public Engagement in research and innovation and in the RRI concept in general. Actors and roles are not named or clearly defined. Consequently, they are just named »actors« sometimes. As already discussed in the literature (see chapter 8.3.2) saying »the public« does not really indicate with whom the processes should be carried out because the terminology can vary widely under this umbrella term: Different »stakeholders« or »stakeholder groups« should be engaged, or the »civil society«, or »CSOs«, or just »citizens«, or »societal actors« in general. Within the workshops, the practitioners used all the terms interchangeably, sometimes just as a code word representing many other different meanings. Also, new terms were found in the empirical material, which were created in distinction to that what could be signified, like »non-scientists«, or »non-experts« due to lack of a more precise terminology. In order to avoid clear attributions, especially within the discussion on Public Engagement processes, societal actors were often just called »participants« (of the activity or process).

Although it has been considered problematic for years now, »the general public is the main addressee of engagement activities« (Bauer et al., 2016, p. 12), as recently stated by an expert group on this topic. Also, the wording within the discourse makes much use of subjunctive forms and passive (it should, could etc.) without naming concrete actions or actors. There is a lack of clearly defined roles throughout the examples shown; it does not become

clear who is doing what. Explanations often remain impersonal and nouns are mainly used to describe situations. For example, the workshop participants said: »There is rejection in the room« in interpreting the scene which was performed, without naming any of the (four) actors. Or they perceived a »persuasive effort« which left open to interpretation who needed to be persuaded here by whom (WS 2, THE 1). Or the fridge metaphor as presented in the pictures that were drawn, which did not specify any person but raised the questions: »who buys, who cooks, who eats?« (WS 1, PIC 2).

Only few roles were explicitly described during the workshops. The policy-maker only appeared once. Besides the role performed of the expert, researchers as such were not shown or addressed at all. The processes were mainly shown with the public and the practitioners. The following sections show how roles and attributes were portrayed within the workshop activities.

10.1.2.3.1 **The Role of »the public«**

As already mentioned, Public Engagement processes in general lack clearly defined target groups. At the same time it also remains unclear what the role is of the participants invited to be part of the engagement processes, and what are their tasks?

Interestingly, although their role is still so vague, there are many expectations of them. Within the empirical material »the public« is shown as a passive group of people, with no individual shape or conviction, but with great demands of their capabilities. On the one hand, they are the ones who are »not knowing« (WS 1, ASS), who are portrayed childishly in a neutral form of a stick figure (WS 2, PIC 1, PIC 3). But on the other hand they have to meet demands, which are rather contrary to this portrayal. Practitioners express high expectations of the (social) skills and competences of their participants, their readiness to participate, to listen, to have interest and also to dedicate time etc., but at the same time highlight the necessity of offering low entrance threshold — because the processes have to be accessible for all. This is in line with the attribute often cited in the literature of the »innocent citizen« (Irwin, 2006) who participates without any own interests or demands, but fulfils all requirements necessary for the often complex processes. Public participants have to be qualified, but without personal or individual interests. Within the material, they are portrayed either as being no longer human (WS 1, PIC 2) or very reduced, neutral, without sex, face, hands or ears (WS 1, PIC 1, PIC 3). They seem to be interchangeable, arbitrary.

The pictures show the participants smiling (WS 1, PIC 1, PIC 3), being of a good nature. Within the process they cover the roles of extras or other minor roles. Although they are central to the process and in one scence the moderator had to put all her efforts to motivate and engage them, she called them »staffage« (in the meaning of decoration) afterwards (WS 1, THE 1). Listing a range of rather demanding skills which are actually rarely met, practitioners summarised their requirements on participants as just: »be there« (WS 1, PIC 3) as they wanted to express that their presence alone would be sufficient.

A non pro-active role of the participants is consistently shown. They are uninterested, unmotivated or rejecting. They are shown as those who have to be motivated or convinced, they are not actively demanding nor asking. Practitioners have to deal with their »lethargy and laziness« (WS 1, APP1).

Participants have to respect the formal structures. It is only the act of resistance that they could perform actively. They can contribute as requested or decide not to contribute. But they could ask for something, some »goodsies« perhaps, to become convinced. Practitioners could serve »small appetizers« for motivation (WS 1, PIC 2). If public participants could not have a say, they would at least appreciate other benefits.

They are also shown as being isolated, working on their own. They do not interact with each other (at least during the formal activities) (WS 2, THE 2). They are heterogeneous groups with no coherence among them — which was demonsrated in in all the theatre scenes that were performed. Even the small group in the workshop who wanted to show a homogenous group in their theatre scene failed (WS 1, THE 3).

The participants are portrayed as not having the opportunity to tell their own stories or making demands. Generally, they are not heard or struggle to be heard. They are insignificant, those who are not listened to, those who are not asked why something did not work. In one case only, the expert was asked afterwards how he could deal with the situation and which solution he could have found to the problem, which turned out to be the diversity of the individual attitudes of the participants, which was unable to handle (WS 2, THE 1).

It does not seem to be clear which role is being asked of the participants. As those who are affected with all their emotions? Or as critiques with their cognitive skills or knowledge? Often, the

processes appear as teacher-student relations or show other power gaps. Some performances of resistance seem to confirm this imbalance. Only by being resistant were participants able to gain any power within the process (WS 1, THE 2).

10.1.2.3.2 **The Role of Policy Makers**

The role of policy makers is presented as being marginal, although powerful. The policy makers are not part of the process, but have influence. There is no encounter as that of equals. In one theatre scene, the policy makers' position was shown as being elevated, he was standing on a chair. (WS 1, THE 1). The role of politics is often mentioned as being powerful, influential, even manipulative, undertaking interventions to the processes from the outside. Policy makers are considered to have a hidden agenda (WS 1, THE 1; WS 1, APPI) or pursuing their own desires. Often the processes have to be undertaken according to predefined research questions (WS 1, APPI) or predefined results. The role of the policy maker is shown as being uninterested and unhearing. Workshop participants experienced no political will or intention for implementation (WS 1, APPI). They also experienced inadequately dedicated resources (WS 1, APPI) by funders which could condemn the processes to fail as well.

Moreover, it is often not clear who the client is. Who is the person or what is the institution that could respond? And who should consider results? It, therefore, often remains unclear who really steers or who determines the rules (WS 1, ASS). Workshp participants have to struggle with the questions on who finally decides (WS 1, PIC 2).

10.1.2.3.3 **The Role of the Expert/Researcher**

The role of the expert was only presented and discussed once within the workshops. The expertise shown was not in the field of methods or processes, but in a specific content or issue, that needed approval. The expert presented in the scene defined his position by a sign, saying »expert« and an identifiable »requisite« (in this case: a folder). Still he had to undergo a process of recognition. To achieve this, he had to try out several attempts and »persuasive efforts«. He needed a »strategy« to arrive at a result (WS 2, THE 1). The figure was presented as arrogant and superior, with no routine in such a process. The direct contact with the different participants had overburdened him. Still, he had the most prominent position within the scene. The expert was equally regarded as researcher or scientist. He was the only person who could have been

easily identified in his designated role. The positions of the public participants could not be identified or clearly named. Elsewhere, public participants were indicated as »non-experts« (WS 1, ASS).

The moderators did not refer to themselves as experts in the workshops at all. Accordingly, often a poor view of oneself and their position could be observed. This was interpreted as a sign of their subordinate role perceived by participants in the actual discourse, showing that they did not have a clear position.

10.1.2.3.4 **The Role of the Moderators**

The role of moderation was tackled many times in different ways. Obviously, workshop participants knew this role best. They could vividly perform it in theatre scenes, and have a lively discussion about it and their experiences of different contexts and target groups.

They highlighted the multifaceted and multitasking role and displayed a figure which is central within the process, but without having much authority or decision-making power. They were portrayed as being stressed, torn, under pressure, being everywhere at the same time, (over)reacting, motivating, playing the clown, being submissive, hectic, tense and at the end of the process relieved or resigned and overall as not being taken seriously. This was explicitly shown in scene 1 and 2 which were meant to show the realistic and the critical perspective on things as they stand at present (WS 1, THE 1, THE 2).

They expressed difficulties and challenges associated with this role in particular, but also concerns and expectations on the entire engagement processes.

The professional context of the task also became clear including profiling their own role in this field with poorly defined parameters.

The role of the moderator was related to many open questions which are central to the discourse. These concerned the purpose and different interests within the processes, the invitation and composition of the groups of participants, the methods applied, the way processes are carried out, the results expected and also the unintended ones, the application of the outcomes and the relevance of Public Engagement and in RRI in general, which requires moderated processes, and thus, finally the role of moderators themselves. In this way, the role conflicts became apparent. Many different expectations with different demands of the interest groups caused intra-role conflicts and the moderators' inner struggles point at their inter-role conflicts.

In conclusion, preliminary results already showed the central role of the moderators, which needs to be explored further. They can be regarded as not only moderating the actual deliberations but also being responsible for the whole engagement process and thus playing an important role within the discourse of Public Engagement in RRI. As there is no commonly agreed wording, for now I will call them practitioners, meaning those who are put in charge — mainly by public funders — to put Public Engagement processes within the Responsible Research and Innovation concept into practice. In the following sections, I will throw light on their specific position.

10.2 The Central Role of the Practitioner

Although not yet clearly assigned, practioners already play their roles with multiple tasks. In view of the changing role of science in society as described above, practitioners have a bridging function between these two realms. They are intermediaries who have to ensure communication in both ways, but they also work in or even create an intersection of the two realms in which new knowledge should evolve. This also means much responsibility (see chapter 10.2.4 below), which puts much burden and pressure on them.

The practitioners are those who carry out the processes. They organise the activities and collect data and afterwards prepare the results. They are the ones who plan, prepare and facilitate the process. They have to operationalise the process which means finding practical solutions for a normative concept. They have to transform imprecise ideas into clear structures and quickly implement them. They have to find ways to put a specific process to work and apply appropriate methods for different contexts and target groups.

In that sense, the role of the practitioners is central, although often underestimated or neglected and not yet clearly described. Consequently, they »have to become clear about their own role« (WS 2, FB). They have to identify themselves as (group of) practitioners with certain profiles and skills. Within their boundaries of work (see chapter 10.2.10 below), they have to define their own position within the discourse and distinguish themselves from other roles related to it, such as science communication, the media or outreach and dissemination activities. Apparently, they are quite anchored within the science system (which is wholly relevant to my workshop participants). However, in the Public Engagement processes they have to work with groups outside of the science system to which they often only have limited access. This could cause difficulties as

well (see chapter 10.2.9.1 — a vulnerable position — below).

These and other difficulties are familiar to them because they have already gained much experience. As shown within the empirical material, they accepted their role as those who should engage the public, as collectors, as translators. They are already undergoing the process of role-taking (Goffman, 1956) and also fulfilling the role, although there is not yet a clear understanding about it. According to Prisching (1995), this is one of the reasons for the uncertainties they feel which they express constantly. They also accept the challenges related to the task, they regard it as their difficult task. Accordingly, they ask themselves, for instance, »how to deal with resource scarcity« (WS 1, APPI). At the same time, they also see many advantages and positive aspects of the engagement process and are interested in new ideas and improvements.

For this central role, obviously the person who is carrying out the task is important. Practitioners believe that it needs a grounded personality, and a »standing« (WS 1, APPI) to be able to fulfil the assigned role, but also for the person to be a good host for the public participants. They already »mask« (Goffman 1956) their accepted role with behaviour and attitudes which they believe are appropriate and they also profile the role as one not just anybody would be able to cover.

10.2.1 Translation and Intermediation

As mentioned above, there needs to be an exchange between scientific and societal actors. It requires translation work that the two can work together. In discussions on Public Engagement in the context of RRI, language is often mentioned as a big issue (Smallman et al., 2015). Workshop participants highlighted its importance as well: It is necessary that the practitioners translate and transform information from one realm to another. They have to find a »level of understanding as a common ground«. This should be within the deliberations of daily life and »simple communication«, which is easy to understand needs to be applied. Highly complex topics need to be »simplified« (WS 1, WS 2, APPI), and daily life communication and common sense (WS 1, PIC 3) in turn need to be abstracted and generalised but without losing their particularities. Still, much scientific jargon dominates and due to their origins in the science system, practitioners often orient the terminology they use here. They critically reflect on how to be able to improve this, especially in the work with non-academic participants or specific target groups, such as youngsters (WS 1, FB). This

complex task was also identified by Yoshizawa (2012) as »not so trivial« to be carried out. This might be not only a question of language but as there are no commonly agreed and established norms as yet, no sufficient mutual understanding as described by Parsons (1951) is as yet possible.

Practitioners also have to mediate between parties and between conflicting interests. They have to make sure that parties »accept the standpoint of the other and perhaps partly give up their own standpoints« (WS 1, APPI). They have to acknowledge group dynamics and consider power imbalances. Practitioners often feel overchallenged by this demand as shown many times throughout the workshops. Practitioners apparently suffer from role-stress (Goode, 1960) because of this multitude of expectations and demands.

Listening has been regarded as an important aspect of communication as well. Active and careful listening was mentioned as a decisive factor of the success of an engagement activity by the practioners. They formulated the limits of their work in which careful listening could not be achieved within the activity. But they also criticised if no one really listened to their results although much effort was made to arrive at them. Why »would you ask thousands if no one is willing to really listen to just a few?« (WS 2, APPI). However, they know about the difficulties of listening and critically reflect on their own capabilities, which for example, were required during the exercise of appreciative inquiry (see chapter 9.6.4.2).

Finally, the discourse also needs its own language (WS 1, APPI). There is not yet a clear and precise, commonly agreed terminology. The wording is very abstract and full of »jargon« (WS 2, APPI). Therefore, the practitioners struggle with their own understandings, but also with translations and explanations in both directions.

10.2.2 Experiences and Strategies

There is, however, a framework of discourse within which strategies and tactics are applied. Practitioners can talk about their experiences, within the workshops they are able to understand what others are presenting and relating and they can associate with what they watch in the theatre scenes based on their own experiences. They have already tried a lot, they are knowledgeable but would like to improve the methods and processes, for which they have good ideas. They have many suggestions on how to put it into practice (see chapter 10.3) but often do not have the opportunities or confidence in the outcomes.

To undertake Public Engagement processes, a clearer framework is needed (WS 2, FB). Knowledge and opinions cannot be just gathered, it needs debate, interaction and analysis for understanding. This act has to be steered and accompanied. In using a fridge metaphor as drawn by workshop participants (WS 1, PIC 2), one could regard a fridge as a supporting strategy that helps and gives room so that one is not forced to act immediately; it gives security to be able to store and keep things, even through a longer period of time.

This requires comprehensive competences and keen insights of methods (WS 2, FB). Practitioners are constantly looking for formats that are accepted and also doable as well as techniques within different contexts. They need to find their own decisions and finally also their own way of doing.

10.2.3 Applied Formats

There are many connecting openings to other disciplines and realms and settings (also see chapter 6) — however, Public Engagement in research and innovation is »a field on its own« (WS 2, FB). It is not just another method of qualitative research, it has other conditions, and there are different accompanying questions related to it. Therefore, also the role expectations and descriptions of all actors involved need to be redefined accordingly.

For the moment, applied formats and techniques are still oriented to the scientific realm; they have seminar and working group or training characters. They are very formal, well-structured with clearly defined working tasks and clear outputs. The formats are (still) using scientific approaches and wordings, as they were, for instance, also named »laboratories« and »experiments« (Bogner, 2012). Workshop participants are very familiar with these formats, but watch out for more as well as different ones. The discourse is about cognitive knowledge mainly. The spoken and mainly written word dominates the processes and applied techniques are anchored here mainly. But they are undergoing some change now. For easier accessibility, creating more interesting activities and also deriving results on levels other than just the cognitive, new techniques have recently found their ways into engagement processes, e. g. from improvisation theatre. (One of the workshop participants is already working on the establishment of this technique in that particular discourse.). Furthermore, the fun factor is being articulated more in the whole science in society discourse (including citizen science, see chapter 6.3), if citizens are expected to dedicate their time and efforts. Here, a new trend towards more compelling

formats seems to be emerging.

One has to be clear and sure that the implemented format is not one size fits all (also see chapter 6.2). Practitioners are in search for new and appropriate tools. It needs a »very very good set of methods« as there is still a »huge new field to plough« and »much to learn and to develop« (WS 2, FB). Practitioners are very ambitious about finding, adopting or creating the most appropriate techniques, as one of the workshop participants put it: »We have to develop come hell or high water« (WS 2, FB). This might express the importance and urgency of a much needed recognition of the role of the practitioners and the tools to be used.

Practitioners know about the quality of informal encounter as it allows for unstructured, not steered discussion. They wonder how to integrate this in the processes as well (WS 2, scene 2, FB). They are considering how to deal with difficulties and other unpredictable inconveniences in light of applying results. They know that inconveniences are part of the process and therefore have to find ways to overcome these. Besides many applied techniques, practitioners provide much »invisible work« (WS 2, APPI) which is not described explicitly. Practitioners seem to suffer somewhat from the often cited housewife syndrome. The output of their work does not show all the tasks and efforts which were necessary to achieve it. There are no commonplace implicit assumptions of all the tasks related to the role of the practitioners so far.

The best and most and appropriate formats do not help, however, if efforts and outcome don't match, if purpose and impact does not become clear and if those who were selected to participate are not motivated or interested in taking part.

10.2.4 Complex Tasks

To engage the public which means to engage all (the whole population) indeed sounds like a very big task. Accordingly, another leitmotif throughout the material is the perception of the public as a mass of »so many people« (WS 2, ASS). They also address either both genders or unisex (WS 1, PIC 1, PIC 3). As long it is not clearly defined with whom exactly the processes should be carried out, practitioners have a formless mass of people in mind. They feel they have to »ask everybody« (WS 1, ASS). Also in the literature (Wickson, Delgado & Kjølberg, 2010) and in ongoing EC projects (e. g.: PROSO), it is recurrently discussed how »the public« or the whole population could be represented in a small engagement activity.

Based on the symbol of a fridge as it was presented within the workshop (WS 1, PIC 2) one could apply the metaphor of food and eating. Practitioners showed the image of a refrigerator (see chapter 9.6.4.3) displaying commonly known elements, including ice cubes in the freezer. Although everybody has a fridge and many ingredients can be found within the fridge, it still takes a lot until a proper meal is prepared. Practitioners could be seen as those who manage this process of transformation, everything which has to be done from planning to »serving« (WS 1, PIC 2) and achieving an agreeable result. This process could be compared with the complex task of cooking. It requires experience and routine, but also creativity and sometimes improvisation. Practitioners need skills, experience, strength and endurance.

A fridge also needs permanent and continuous care and attentiveness. Without sufficient attention things could be forgotten or could spoil. Also, not everybody can take things out at any time, someone has to take the role of a manager. Practitioners seem to look after this form of quality management.

A fridge is a room which is only of temporary use within a cooking process. Practitioners make use of such temporary artificial rooms for carrying out engagement processes. They also coordinate what is being bought, what will be served, who is collaborating etc. As such it could be a process of shared labour, but often it remains unclear, who is contributing and who finally eats, who is allowed to decide and who are beneficiaries of the processes. Uninvited guests could show up, or those who come might not be in the right mood for the foreseen techniques. This makes the task sometimes even harder. Accordingly, practitioners often express that they perceive their task as being difficult and complex.

Additionally, not everything that is needed for cooking can be found within a fridge. It needs a kitchen. It also needs further ingredients and equipment, framework conditions, times and tools which have to be provided. Therefore, practitioners have to coordinate and look for additional requirements — apply for funding, finding the right formats, select and invite participants and create the space for the engagement processes. Processes are diverse; all components have to be brought together as it needs all good ingredients for a nice meal.

Practitioners have to fulfil their task, sometimes under not such ideal conditions or then scarcity of resources. (For instance »campaigning with low budget« (WS 1, APP1). It needs good collaboration of all, meaning of the very different systems and persons.

Practitioners also highlight the importance of working relationships. Engagement activities not only offer space for »encounter« but also for »focussed approach« (WS 2, THE 1). Getting in contact requires activity intended specifically for such a purpose by the practitioners. They decide how much contact and what kind of working relationships will result from the process. During thorough processes of constant collaboration, practitioners and participants could »become a family« (WS 2, FB).

Another aspect, which is quite literally a load on practitioners' shoulders, is the responsibility they carry. One of the very first associations verbalised within the workshop was »tax money« (WS 2, ASS). Public Engagement processes and publicly funded research programmes are financed by tax payers. Practitioners have to work on behalf of public money, of politics and of the public itself. Processes have to serve the common good. Because of this, practitioners carry much accountability. With tax money the process has to be dealt with in a fair, careful and also transparent manner. Tax money should not be wasted, consequently processes have to be useful and thus demonstrate results (see also chapter 10.1.2.1). Practitioners feel pressure and expectations on them, sometimes processes are scrutinized, also concerning the techniques applied and if they work or don't work properly. They have to achieve »persuasive efforts« — an in vivo term which was regularly used within the discussions. They are on a »mission«, it is definitely a job, and it is part of the job to convince others of something in a professional context (WS 2, THE 1) — be it just to take part in the process.

Often it is the practitioners who have to convert the collected data into something of meaning. They are talking about their activities as only »collecting cards« (WS 2, ASS) or producing flipcharts, but they also have to work in an impact-oriented manner, even though they have no power or influence on the impact achieved. Nevertheless, they have to deliver reports and content (see chapter 10.1.2.1).

10.2.5 Involved Personality

As already mentioned the person who carries out the process is of central meaning. In analysing the empirical material, three different aspects of how the practitioners are involved and make sense of the processes became apparent and which strategies they apply to accomplish their task. To handle the different parts of the task they make use of three aspects of their personality:

— Practical approach
— Personal involvement
— Meta level and reflexivity

As facilitators, hosts, intermediators (see also chapter 10.2.4) practitioners bring in their experiences and practical knowledge. The techniques applied are part of a lived practice. Their work can be empirically described and analysed. They need to have strategies, techniques or »recipes« (WS 1, PIC 2) for carrying out the processes. The cooking metaphor also stands for the practical part of their work. This allows for trying out new things, but also asks for dealing with inconveniencies or unexpected incidences and it also encompasses the needs to consider very mundane matters such as room, facilities, catering etc. With this knowledge they undergo a certain professionalization. They reflect and document the applied techniques and their experiences and contribute to a shared pool of knowledge and from a long-term perspective to a new discipline (also see chapter 10.2.10). Actual projects and platforms seem to be proof of this ongoing quest for more and innovative practical methods (e. g.: RRI Tools, Engage 2020) which is already addressed in actual EC calls as well: such as the SwafS (Science with and for society) call (http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-swafs-2016-17.html, retrieved July 9th, 2016).

Public Engagement processes are in a wider sense community work. As in other professions, which operate in social contexts, professionals are also involved more personally. They are affected as members of the public concerned by the topics being discussed and also as professionals who have to fulfil their difficult task and be successful in their own profiling. Practitioners demonstrated much of their personal involvement in the processes as well. The expressions used to convey emotions, either directly e. g.: »stress« (WS 2, THE 1), »helplessness« (WS 1, ASS), feeling »relieved« (WS 1, THE 1) or indirectly e. g.: »too many people« (WS 2, ASS) expressing an overwhelming mass of people or »egg-laying, milk-bearing woolly sow« (WS 1, ASS) mean an overstrain on participation as a-good-for-all method and further point to the intra and inter-role conflicts of the practiotioners.

The engagement processes often imply an emotional entanglement of the practitioners (also see chapter 10.2.6 emotions). Even if emotions are a not intended part of the processes, practitioners have to cope with much on an emotional level during the activities. It is not uncommon for them to feel frustrated at times. For

instance, when they are not able to achieve any change, or when there is no positive development.

The engagement processes described above are not grass roots developments but applied techniques within a normative claim. They are built on theories (also see chapter 6.3). Practitioners have to work on this theoretical level as well. They reflect processes, activities and roles on a metaphysical level and have to practically interpret and understand what is undertaken. They make constant use of the analytical level accordingly.

Within the workshops, these three levels were always addressed and were included in all activities. The three levels were an integral part of their interpretation and construction of the discourse. However, these levels could also contradict with each other and practitioners indeed struggled with clashes between, for instance, emotional expression and intellectual demands or personal desires and practical limitations.

10.2.6 Emotions

Besides their own emotional involvement practitioners have to handle emotions of others as well. As results have showed so far, participating in engagement processes is not an easy task and requires skills and also adaptability. In the literature, it has been criticised that there only seem to be rather »civilised« debates (Horlick-Jones et al., 2007), (also see chapter 8.3.5) which, in order to achieve consensus, harmonise emotions towards structured results. Accordingly, public participants have to be addressed with prudence and rationality. Emotions should not be allowed too much room. In the picture of a fridge (WS 1, PIC 2), emotions were »kept on ice«. They were frozen into little cubes that could be defrosted when required.

Seemingly it is the task of the practitioners to »defrost« those little pieces, to enrich the process with emotions so to speak, but such that they are steered. Practitioners try to handle emotions in controlled doses. To channel and harmonise emotions, it needs the work of practitioners, although this is not explicitly mentioned. It is then a difficult and often contractionary task to address these emotions while trying to avoid the risk of not being able to steer them anymore. They have to overcome the contradiction of stimulating emotions while at the same time being able to control them. They have to search for techniques which could do both.

Emotions, however, are an inevitable part of the processes. Naturally, when regarding the public as an amorphous mass, it is not expected that it will have emotions, but individuals that make up

this mass do. Processes are often emotionally discussed and participants could feel affected by the topics discussed. The previously described boundaries also become obvious by way of emotions. Feelings of pressure, incomprehension or frustration because of mechanisms of exclusion may be encountered frequently.

10.2.7 High Demands

As the literature has showed, there are high aspirations and many expectations of (see chapter 8.2) the engagement processes and thus of the practitioners. Expectations have to be met by a high quality of the processes; the question of how they are carried out becomes essential. Evidently, it is the practitioners who have to maintain these quality standards. In their central role of those who have to organise, to »cook«, and to invite people, they feel great responsiblility to be a good host. However, it »does not need champagne necessarily« (WS 2, AAPI), that would be an exaggeration. Spoken in the metaphor of cooking, they would like to serve a proper meal, although they are sometimes forced — due to limited resources — to revert to »ready to eat products« as shown in the picture of the fridge (WS 1, PIC 2). They do, however, believe in »not one standard fits for all« and warn against »mindless copying« (WS 1, APPI). As they feel responsible for the participants, they would like to guarantee for rules and quality standards. They advocate high standards of the participants, whose mandate they are actually under, those who are paying in fact. They have to fight for conditions and resources, which are not yet self-evident or even established.

To undertake the deliberations of processes, they express attitudes and requirements that should be considered. First of all, by speaking about themselves, »a good moderator« (e. g. WS 2, FB, WS 1, APPI) is needed. As mentioned above, they have reflected on how to find the appropriate format for the specific question and target group (see also chapter 10.2.2 above). Overall, they believe in encounters of mutual reciprocity. To allow an acting of equals, appropriate techniques (e. g.: circle) that support this are needed. Practitioners highlight the importance of good etiquette of dialogues, such as careful listening and taking participants seriously, their different opinions and concerns; but also to acknowledge the »readiness of participants« to »appreciate the participants in an appropriate manner« (WS 2, FB). They would like to »find out what participants bring with them« (WS 1, APPI). Being »aware of the heterogeneity in groups« (WS 2, FB) the parties deliberating should be balanced, and instead of dividing conflicting interests, their

differences should be made fruitful. They are following the approach of homogenization, but not to bring all into one line but to make everybody feel to be equally part of it.

Desirable mind-sets were repeatedly mentioned, such as »recognition«, »appreciation«, »openness«, »gratitude — also for critique« and last but not least »transparency« as a very important aspect. Practitioners would like to create appealing processes, including a buffet and a nice atmosphere. They demonstrated a vision of a feel good situation, which offers space and everybody is integrated into the process (WS 1, THE 3). However, they believe that these conditions are not the aim; they are just framing the scene. They feel responsible that participants would also come away feeling that »they could have contributed to something to a greater whole towards a desirable future« (WS 2, FB).

They stand up for engagement processes in the sense of empowerment. They believe that if the concept of RRI has to be taken seriously, one also has to fight for »co-decision« and »co-responsibility« (WS 1, APPI). For example, they don't want to conduct processes just on »peanuts« (WS 2, ASS). They reject meaningless »stage participation« (WS 2, APPI); the process should not be allowed to become an end in itself. Accordingly, practitioners ask that a Public Engagement should not be implemented carelessly, they consider rather what they could promise to participants and »what to give back« to them (WS 2, FB). As mentioned previously, this is due to the fact that practitioners regard participation not only as data collection process, but consider the whole process, including the relationship work (WS 1, FB). They also reflect on who benefits from the processes, how the processes could be exploited and if the process would really lead to »honest effects« (WS 1, APPI). They regard their task as a kind of »reality check« (WS 2, ASS). They see it as just one part of their role, to critically reflect the produced knowledge, to question whether the new knowledge is more robust and also to check whether the research and innovation results are of relevance (WS 1, APPI). This is because, in the end, they feel strongly about contributing to substantial changes. They want their processes to create a positive effect for all parties involved (see chapter 10.2.11).

10.2.8 Self Reflection

Consistent with these demands, practitioners believe that they »still have much to learn« (WS 2, FB). They have high demands of themselves and are in constant critical evaluation of the processes. Often, they are very self-critical and devalue their own work. They

admit making mistakes, confess that processes might have been »meant well, but have not been carried out well« (WS 2, THE 1) and they blame themselves when there are no outcomes.

This is the reason they want to exchange experience and insight with others. They have to optimise their sets of formats and their own behaviour. They want to observe, get to know what others are doing; they want to try out something new, reflect and question what has happened; read about theories and get more suggestions for methodologies (WS 1, FB). This is also the reason they came to the workshops. One of the participants even attended twice, he was at both of the workshops. Obviously, practitioners need to find (new) ways to play their role and how to develop it. According to Scott's (1971) process of internalisation, after learning what the norms are, individuals go through a process of understanding as to why they are of value or why they make sense, until finally they accept the norm as their own viewpoint. Practitioners too are currently in this process of internalisation.

Fulfilling their complex tasks, as described above, they have to be able to deal with paradoxes and contradictions. For instance, they should be able to evoke emotions and at the same time be able to control them, and their own, too. As they are involved with their personality on three levels (see chapter 10.2.5) they have to reflect on their own emotions and also be able to analyse them.

Processes and outcomes are often polarised. Intermediating between groups and interests, practitioners also have to ask themselves how to document aspects neutrally without categorizing them as positive or negative. They ask themselves: »Am I open and independent?« (WS 1, FB). Could they as moderators still be open for results? Or does this make the difference, which requires practitioners be hosts rather than moderators?

Practitioners, however, cannot always conduct the engagement processes in a manner they wish for. They also have to accept when conditions, for instance, don't allow for long and intensive processes. And due to restricted frameworks, they have to sometimes carry out processes in ways that are against their own better judgement. This and other dilemmas practitioners encounter and have to deal with are described in the subsequent section.

10.2.9 The Dilemmas of the Practitioner

As described by Prisching (1995), roles that are located at the intersection of an individual and society have two aspects: repression and freedom. Apparently practitioners are forced to play their

role, facing pressure and expectations, but at the same time they have the opportunity for self-realisation. Furthermore, there is a constant interplay of inside and outside within which new social structures are built. The dilemmas perceived by practitioners seem to indicate this process. Practioners thus encounter various forms of role conflicts which they have to address constantly.

10.2.9.1 **Engagement as an Intended Powerful Tool Versus a Sensed Powerlessness**

— A Strong Belief

Naturally, those who carry out engagement processes believe in what they are doing. Moreover, practitioners in general have a very optimistic attitude and talk about many positive effects on all levels. They trust in the »wisdom of the crowd« (WS 2, ASS). They believe that every topic is doable; they could work on each of its contents. Public Engagement is possible at any stage of the research process, even though much depends on the context (WS 1, STG). They see many options for Public Engagement; what is decisive is the research topic or area and how it is of relevance for certain groups. Principally, they can see all sorts of positive effects – intended and unintended ones. They also appreciate the often unexpected »side products« of Public Engagement processes (WS 2, APPI).

For individuals …

… the process could have an »activating effect« (WS 1, APPI). It could stimulate an »interest to participate«; »create awareness« (WS 2, APPI) and provide a good experience. Within the processes, practitioners often meet »lay persons with passion« (WS 2, APPI) who appreciate the opportunity to participate. People could become involved personally. To invite individuals to take part could have an effect of »re-integration into public life as well« (WS 1, APPI). This aspect was also shown in studies on social inclusion via science communication (e. g. The »Wissensraum« in Vienna (Pilotprojekt des Vereins ScienceCenter-Netzwerk in drei Wiener Bezirken April bis November 2013, 2014). Participation could create meaning and a »sense of belonging« (WS 1, APPI).

By »bringing together different backgrounds«, processes could contribute to »mutual learning«. They offer »new perspectives« and could also help to »get rid of ones mental block« (WS 1, APPI). Practitioners mention many kinds of learning effects, including »intergenerational learning«. Engagement processes could be a »learning journey« for all (WS 2, APPI).

For research results …
… Public Engagement processes could contribute to an »augmented extraction of results« and also to »better transparency of results«(WS 1, APPI). They could help for »new discoveries or the confirmation of findings«. There could be many »not so surprising and surprising results« (WS 1, APPI). In general, it could be of relevance for each research field (practitioners mentioned many). If there is an intention for implementation and if one looks at the »honest« effect (WS 1, APPI), engagement processes could make a major contribution.

The process itself …
… could have many positive outcomes. The engagement activities with small groups could also have a »multiplication effect« (WS 1, FB) and reach out to a wider range than initially assumed. The »joyful dynamics« and collaborations, a »happiness to participate« and a »creative stimulating processes« contribute to an »energy« in which »something new« could be developed (WS 1, APPI). The »passion of participants leads to a good quality« of results (WS 2, APPI). Processes could invite people into a »cultural dialogue« (WS 1, APPI).

A successful engagement process could be regarded as an innovation process in itself, as something new that is evolving on all levels.

For the science and society relation …
… processes bring in »new actors«, and thus lead to new perspectives. They create »spaces of encounter« and bring together different persons and backgrounds. They »allow for changing roles of lay persons and experts and vice versa« (WS 1, APPI). The processes have to find ways to deal with issues such as »complexity versus simplification« and thus could contribute to a better mutual understanding. And they could establish forms that are not yet »valued in conventional performance profiles« (WS 1, APPI). Finally, they could »challenge existing conditions« and contribute to a »break up or redistribution of power relations« (WS 1, APPI).

— A vulnerable Position
There seems, however, to be an inherent weakness that contradicts all these beliefs. Apparently, practitioners have found many ways to express a kind of helplessness. In their position caught between

two sides, they perceive themselves as lonesome, having no support system to sustain them. They do not yet have an established position, no discipline of their own or even a system (see more in chapter 10.2.10). Within the process they do not have much authority. Accordingly, it might not be a coincidence that the practitioners' role was performed only by females within the theatre scenes in the workshops.

Directly and indirectly practitioners are looking for help for their »unbearable task« as one of the moderators had impressively put it in discussing the theatre scene that was performed (WS 1, THE 1). They do not only want to exchange and share experiences as mentioned before, they also want to share responsibility and gain troubles halved. Indeed, they carry much responsibility (see chapter 10.2.4 above) but only have few options for action. This is a delicate situation, as they might be feeling desperate at times (inside), but still cannot really speak about their difficulties because of their own profiling work in the field (outside).

To work with »the public« makes them also feel alone in front of a (hostile) »mass«; they are only a few in contrast to the majority of so many, of »all«, a vast and unmanageable unit which once initiated could be untameable, unstoppable. Practitioners sometimes just feel small in the face of this huge mass of the public.

They are, however, fully aware that they cannot invite a wider public until they have found ways of how it could be heard. They have to ask themselves how they should deal with heterogeneous groups (WS 2, THE 1), how to bring the different viewpoints, attitudes, opinions and interests together. They could be painfully surprised or overstrained by the individuality of their participants. This was shown and discussed several times, especially in the theatre scenes within the workshops.

To engage »the public« also means that practitioners have to work with other backgrounds with which they are not familiar with and whose language and idiosyncrasies they might not understand. Such intercultural encounters can also cause uncertainty and fears of rejection.

Located in an in-between-zone within an area that is still developing, still full of uncertainties (see chapter 10.2.9.2), one can feel helpless and even powerless. Practitioners do not the rules, nor do they exactly know who really lays down the rules within the »top down« processes (WS 1, APP I). Sometimes they feel like a chess piece as though they are being controlled by others. They also feel influenced by »predefined research questions« (WS 1, APP I), or

»hidden agendas« (WS 1, THE 1), or other desires and »direct influence e. g. from the pharma industry« (WS 1, APPI). They are afraid to be manipulated or inclined to one side; the often ask themselves »who is doing the participation?« (WS 1, APPI).

10.2.9.2 **The Position in a Field of Tension**

Practitioners have to deal with this and other dilemmas. They have to deal not only with conflicting fields of interests and parties, but also with lots of contradictory demands and conditions. The practitioners feel and express this intra-role-conflict, which is caused by the different expectations of their reference groups.

Below there is a list of those, which have so far became apparent in the empirical material:

— A high level discourse versus low thresholds and easy accessibility
— Volunteers that have been invited versus high demands on skilled participants
— The »Art of Hosting« (e. g: http://www.artofhosting.org/what-is-aoh/) versus demanding working tasks
— Allowing fun versus processes for entertainment only
— Uninterested participants versus highly motivated (and over engaged) ones
— »Innocent« participants versus certain interests
— Complexity versus simplicity
— Pre-defined research questions versus openness to what participants bring with them
— Emotional involvement versus rational discussions
— Acting on behalf of all (the whole population, task money) but only being able to work with a few
— Raising awareness and collecting opinions at the same time
— Too many people (overstrain) versus more opportunities (diversity)
— Freedom of opportunities versus too many options and a lack of clarity
— Inner conflict between one's own demands and outer opportunities or conditions
— Clear frame and structure versus informal encounter
— Belief in (open) processes versus output orientation
— Trustful that it will produce relevant outcomes versus pressure of expectations and results
— Processes of learning versus processes of decision making

Furthermore…

— Practitioners would like to trust and believe in the idea that creating space and an opportunity for encounter could be sufficient. They would like to create an atmosphere where there is room for maneuver; in which informal encounter is possible and processes are open; but the processes have to be structured; it does not work without an agenda; roles have to be defined, abilities to act have to be created; activities and reflections have to be initiated.
— They have to deal with and meet participants within their daily life and Lebenswelt, but they work only with a very small part of it which requires abstraction and generalisation.
— Practitioners are aware of the challenges of top down approaches but are working on behalf of clients. They can formulate critique, but they have to find ways how and where to address them.
— They are simultaneously between systems and within both systems. They are part of an affected public but they are also part of the scientific system. It seems that they work on behalf of the one system but emotionally belong to the other. As it is a high level scientific discourse they are accordingly addressed as academics true to their role. They are personally involved and at the same time work on establishing a new discipline.

10.2.10 **An Emerging Profession**

Carrying out Public Engagement processes is an art of its own. Practitioners accept their role but still need to formulate and shape it. Practitioners therefore express the wish for professionalization. At present, they are building up communities of experts (e. g.: PCST — Network for the Public Communication of Science and Technology, http://www.pcst.co/conference etc). As the RRI concept is still in progress and in the phase of establishment (see chapter 4), it is also essential for the dimension of Public Engagement to be elaborated and accepted in that specific field. The role of those who carry out Public Engagement processes has to be clearly defined. Skills have to be described, sets of appropriate and tested methods have to be brought together and still much empirical work has to be carried out to answer open questions in the field. If Public Engagement in research and innovation is to become a widely accepted practice, it will also need many practitioners who will be able to conduct the processes. They seek recognition and acceptance of their work and its theoretical and methodological

background. They also want to achieve incentives within the scientific community for Public Engagement. Practitioners who are contributing to this process of establishment also have to define their own position and disciplinary boundaries (Gieryn, 1996). How to really engage parts of the public in research processes is not only the question of a few who are already carrying out processes but will probably become a scientific discipline with its own curricula, methodologies, publishing channels and conferences. There are already many examples which indicate this trend (like for example the 8th annual S.net conference on »The Co-Production of Emerging Bodies, Politics and Technologies«, http://www.uib.no/en/svt/92313/s-net-Conference-2016). Thus, practitioners are pioneers in a rather new field but at the same time need to shape their profile in this field, which is continuously growing and increasingly competitive.

Additionally, practitioners have to ensure high quality standards. When understanding Public Engagement as being an integral part of RRI (see chapter 5), only if the engagement processes prove to be successful can they also contribute to the continued existence of the concept of RRI and thus the continuity of Public Engagement processes therein. Therefore, practitioners have to be advocates of this respective field and simultaneously advocates for themselves. As the role of the practitioner is central in the discourse, it is their own role which becomes central. High demands on the quality of the work go hand in hand with high demands on themselves.

This also appears to be an ongoing navel-gazing process with constant questioning and (self-) reflection, which has been observed on many occasions. How they could manage the processes, their difficulties and fears or helplessness was verbalised several times during the workshops.

10.2.11 **Further Motives**

As already previously described (see chapter 10.2.9.1), practitioners seem to have a strong belief in Public Engagement processes and their positive outcomes and they are also at the same time defining their own role and probably a future discipline or profession; however there appear to be more motives which drive practitioners towards carrying out their complex task responsibly.

The idea of integrating many also means more options, bringing in more ideas. Public Engagement processes could create interplay of many, gaining results which could not be achieved alone.

Practitioners have experienced that many aspects of engagement activities are »inspiring and stimulating« (WS 1, APPI). They believe in the added value which is being created, meaning also the personal development of all participating parties including themselves.

In discussing relevant issues, deliberating with conflicting parties and making underrepresented voices heard, practitioners also contribute to a dynamic growing democracy. Engagement experiences could also function as role models for new societal paradigms.

However, there are many uncertainties and critiques and engagement processes that need particular attention. Practitioners understand themselves as advocates of the public, to protect their interests and their integrity. The carried out activities and techniques they apply should contribute to establishing and »safeguarding quality standards« (WS 2, FB) of Public Engagement processes.

Many of the formats thus far applied are part of creative processes and there is still room for many more to be developed and adopted. The search for these different techniques needs much creativity. As practitioners have to find or create appropriate methods for different cases and target groups, Public Engagement activities also offer a vast and interesting field of experimentation. Practitioners like to create; they are evermore eager to something new, or even something mysterious. They appreciate surprising outcomes. To »experiment« — which is a term from the scientific realm — in a lab situation, is for the purpose of creating and finding something with an unknown outcome. But that needs clear structures and rules and practitioners hope to set these up.

With their work, they want to contribute to finding and formulating new research questions. But it is not only the immediate outcomes of the respective engagement processes they are after. With many of the expressions used in the workshops it also became clear, that practitioners want to find and develop something greatly relevant, something substantial. They appreciate being part of this which is big and new and constructive. They have ambitious aims, they want to build »skyscrapers« (WS 2, ASS) which are visible, meaningful, which could offer new perspectives. They have a vision of something that will eventually become reality. The final result could be memorable and also bring much prestige. The processes could enable the goal of »together shaping the future« (WS 1, APPI). In this way, they could help to add to a greater whole towards a desirable common future.

Within the discourse they understand themselves as contributing to a new understanding of science in society even as their work

goes beyond current borders. They like to take part in the further development of Public Engagement and the concept of Responsible Research and Innovation and want to shape and create how Public Engagement is considered and applied. In this sense, they can be regarded as pioneers.

10.3 Practitioners' Suggestions for Operationalisation

Practitioners already have several experiences and opinions on what makes engagement processes satisfying and more fruitful. In addition, they already have an idea of how to perform their role. Their suggestions might help to develop the role of practitioners and to shape Public Engagement activities.

The following section compiles these requirements, which have been explicitly formulated or were extracted from the empirical material. According to the levels of perspectives as identified by Goffman (1956), these »masks« could be arranged as follows:

a. Technically

— Keep it Simple

»Less is more« (WS 2, APPI). Activities and tasks should not be too complex and have to be doable. Participants and processes should not be overburdened. Comprehensiveness should be maintained. Possibilities and conditions have to meet expectations and promises.

— Adequate Resources

Obviously, engagement processes require certain time and money. But the resources provided should be able to match expectations and offers as well. Therefore, clear conditions and sufficient provision of resources are needed.

— Time

Adequate time has to be given to the process in order to let it grow and develop. Things need time to ripen (longer processes). Participants need to have the time to participate.

— Clarity and Transparency

In general, practitioners have a strong wish to steer or then towards more clarity on who steers and who decides what. According to the different possible levels of participation (see chapter 6.2), the scope and limitations of the processes have to be transparent and agreed upon. In order to be able to communicate effectively with their public participants, practitioners need to know to which extent the work will be considered and accordingly what they could promise to them. Therefore, the aims of the activity have to

be made explicit. The clear formulation of questions is decisive, so it is clear form the outset what question precisely the activity will revolve around. It also needs transparency of the methods and techniques being applied so as to be able to achieve clear and traceable results in the end. It has to be made clear why the engagement process is being undertaken. Accordingly, it also needs a clearly defined commitment stating how results will be taken up and the will for implementation. How these decisions will be taken must be made clear.

In general, transparency is the key. Everything should be visible — the whole process itself has to be transparent to allow all actors to understand why certain steps were undertaken including the follow up.

Furthermore, clear tasks and roles for all participating individuals or groups are needed. The invitation policy has to be made transparent as well as clear information on who was selected to participate and who was not.

Finally, a good and transparent documentation of the process is needed, guaranteeing a flow of information, outside and within the process, including among participants.

b. Structurally

— Small Groups of Individuals

As in established methods of qualitative research, engagement processes could also benefit from the question of representativeness and work with only small groups or individuals and reflect on single opinions. Different opinions could be described and made visible as an end in itself. Working with few also means working thoroughly (also see curve of engagement, chapter 6.2, figure 13) which is preferable to huge, superficial processes. In order to avoid group pressure, the idea of aiming at consensus and widely agreed results should be reconsidered. As the processes cannot be carried out with all, a careful stakeholder selection (see chapter 10.4.1) is needed. Working with gatekeepers who know specific groups or working with key informants and sub-groups could be helpful.

— Flexibility

Activities need to be organised in a way which still allows flexibility. Inconveniences are not predictable, therefore, structures are needed which give enough room and allow for engagement with different kinds of difficulties occuring at any time. Processes should also be more open for unintended results and new ideas. Practitioners aim for more open questions and issues to be

discussed and to avoid pre-defined research questions.

— Facilitation

The group discussion processes should be held without any coercion. They should also enable more responsiveness to others' perspectives. Diverse opinions should be allowed. Deliberations should take place in a friendly, agreeable atmosphere, which also allows for fun.

— Language

The very important and oft mentioned issue of translation must also be addressed. It is not only about different native languages, but also different levels of language. There are language barriers between those of different backgrounds and groups, but also between the science and society realms and also between moderator and participants. Furthermore, participants may lack the rhetorical skills to express themselves. Accordingly, non-verbal techniques should also be considered.

— Acquaintance

Public participants also welcome added value of the process, corresponding to the motives of practitioners as previously described. Deliberations could offer room for improvement of relations and also a chance for a personal encounter.

c. Culturally

— Appreciative Attitude

Practitioners attach much importantance to how engagement processes are carried out. It is not only about the appropriate technique being applied in a specific context; it is also a general attitude which practitioners consider as being extremely helpful. Besides the aforementioned clarity and transparency, engagement processes could be regarded as being more than just participation on a certain level. As described more precisely in chapter 10.2.7, practitioners consider certain mindsets such as »appreciation« as being most favourable for achieving a richer outcome.

They compiled some more helpful attitudes in addition to these:

— being present
— open the door, explore, be open for the new, ready to find out about the new
— engage oneself
— open eyes and ears
— be ready to listen
— sensitivity
— be ready to build or to change the opinion

— create a natural flow of speech
— inside and outside view
— come with questions and interest to find answers
— come with basic interest
— be open minded (and patient)
— be sceptical/critical
— be ready to give

— Story Telling
In order to make sure all voices of participants are heard, the chances to tell their own stories could be offered. Additionally, opportunities provided to bring in more of their own experiences could have an engaging and motivating effect.
— Listening
Accordingly, all participating parties should be allowed to speak and to be heard. Techniques of active listening could be supported.
— Participatory Techniques
Methods of expression other than discussion and seminar style formats could help to incorporate the tacit knowledge of participants so as to enrich the results. Different formats and channels, which correspond to preferences and skills of participants and allow for onlookers and guests as well, should be offered. Techniques like those, which are already well established in former approaches such as action research or rapid appraisal (also see chapter 6) or open space method could be implemented. Also new ideas such as improvisation theatre could be applied. Techniques (such as photo interview (Kolb, 2008)) which allow for expressing individual perspectives could be considered as well.

d. Dramaturgically
— »Space and Beauty«
New rooms of deliberations could be considered, rather than just sterile »labs« and seminar rooms. They could be in pleasant locations and nicely decorated. Also, the information provided and working materials could be presented such that they are visually appealing. Pleasingly prepared rooms and materials are an expression of admiration as well. A nice atmosphere in which participants feel good and invited should be created. An agreeable supply of refreshments, including a good but not oversized buffet should be provided, which makes participants feel appreciated without being distracted or manipulated.

— Informal Encounter
Spaces need to be created in which an encounter with other participants could evolve naturally rather than artificially. Common meals and other informal spaces for such an encounter could be planned to allow room for developing common levels of understanding and allowing for meeting as equals. This is particularly conducive to generating unintended results. However, it does require more thoughts on how to meaningfully interpret and document them.

e. Politically
— Bottom Up
Practitioners understand that the results obtained could contribute to the formulation of new research programmes or questions, which again need deliberation. Additionally, they are in favour of accompanying self-organised processes of public groups. Generally, the public could be engaged in the general discourse as well.
And finally, most importantly:
— Let it Grow or Drop it
In response to the output orientation of many Public Engagement processes (see chapter 10.1.2.1), practitioners wish for more trust in the process. They prefer »productive discussions rather than easy solutions« (WS 2, APPI).

However, it has to be considered if the intended results could not be obtained in another way, careful examination is needed to establish if the Public Engagement process fits within the given framework conditions, or if it is really beneficial to answer the question that initially was raised.

Those who order or initiate and those who carry out the processes should critically reflect on their own readiness and willingness for engagement and its specific requirements and ask if that is what they really want for themselves and for others.

10.4 Addendum: The Final Farewell to »the Public«

As the literature has shown, it is widely acknowledged that the myth of a singular homogenous public has already been unmasked (see chapter 8.3.2). Furthermore, the picture of participants of Public Engagement processes, who are innocent and open without own interests, but at the same time have excellent performance and can rationally reflect and control their emotions does not exist either. However, this construct of the public and its implicit standardisation is still very much in use.

Within the discourse of Public Engagement in research and innovation, public participants are not clearly described. The RRI concept does not exactly name them (see chapter 5) nor do many of the programs (see e. g.: EC SwafS call http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/swafs-09-2016.html) or projects (e. g. PROSO, Engage 2020) really tell who exactly should get involved.

There is not yet a precise terminology in use. Although there might be many expressions applicable and clear descriptions possible (von Unger, 2014), still, persons or groups of society are not named concretely. The attributes, which lead them to be recognised as »the public« distinguish them from those who are not within the science system. The idea of a naïve, innocent, clueless Caspar-Hauser-like public participant is the quest for someone who was not socialised in the system. The public are the non-experts, non-academics (Phillipson et al., 2012), the not-knowing. Ignorance is thus the first criteria for selection for representing the public. This still gives it the suggestion of the deficit model (see chapter 3.2.1.1). The public is perceived as being the other, the antagonist, the object. They are defined with their anti-position, those who are not interested, do not have anything at stake, who are not engaged, not predetermined, not experienced. They do not have an active role assigned to them either.

Finally, when asking persons of the public it is likely that no one would know about RRI or Public Engagement. Besides the few who already participated in engagement processes, there can be hardly any »public« found who feels the concept of RRI or Public Engagement is of relevance to them.

10.4.1 Selection and Invitation

Public Engagement processes are selective. Theoretically, Public Engagement means everybody could be engaged but as already noticed already a while ago (Jasanoff, 2003), obviously not the whole population can take part. Public Engagement processes in RRI and those found discussed therein are invited processes. Therefore there must be »policies of invitation« (orig.: »Einladungspolitik«). This has also been identified as big cluster in the empirical work (WS 2, APPI) which needs serious consideration.

According to the literature (see chapter 8.3.2) and the actual discourse, the question as to who should be invited is still a major issue: Random selection and thus uncertainty as to who will finally participate causes problems of arbitrariness. The snowball

principle brings about the problem of working with the »usual suspects«. This impression cannot be easily overcome even if it is explicitly addressed, as for instance, this recent example shows: In creating a »Festival for unusual suspects« the organisers seek »serendipity« between organisations and people who would otherwise remain unconnected (source: www.theunusualsuspectsfestival.com). The motto »bring your friends« creates biased pressure groups, and finally, an explicit selection causes questions as to who is invited and who is not invited.

As it has already been recognised, the processes can only work with »mini publics«. This clearly requires a selection process. It has to be made clear that compositions of groups are selective. It has to be stated, that the process cannot or does not want to engage everybody. Practitioners know about this delicate situation but at the same time, they also would like to be honest and transparent in this regard. »Obviously, we have to invite people. It is clear that we have to make a choice from this huge population. But how we are doing this is quite sensitive and has to be thought through »profoundly« (WS 2, APPI). As the highly ambitious performance of a visionary scene in the participatory workshop (WS 1, THE 3) demonstrated, there will always be those who are excluded. But the selection has to be argued and explained. People need to know and understand why they have not been invited. Also, not everybody wants to become directly involved. As studies have shown (e. g.: Marschalek et al., 2014), consumers and tax payers want to trust in regulations. They would like to believe in some representatives who look after their interests.

On the other hand, those who are invited would like to really feel welcomed. Nobody would like to show up just like that, an invitation as pre-condition to participate is necessary. The Art of Hosting of the practitioners on one side requires guests who need to be invited on the other side. Hosted participation could thus lead to interest and motivation among the selected participants.

10.4.2 Individual Approaches

Specific groups need to be addressed differently, such as adolescents, for instance. They could be regarded as interesting target group as well, having much energy as long as they are motivated, who are very eager to work with as long as they are taken seriously. It might, however, be difficult to get started with them and in their behaviour they are often unpredictable. Children and teenagers in general are often unconventional and react unexpectedly, which

could achieve unexpected results as well. Of course, language needs to be considered more than usual in this case. Groups of teachers and parents could contribute their perspectives as well.

One idea of the practitioners in the workshops was to look out for small groups already existing, or civil society groups or communities who are relevant stakeholders in the relevant case. However, it is often difficult to approach and select groups due to the heterogeneity and different structures in civil society, local specifics, the lack of authorized contact persons, or not (yet) institutionalised civil society organisations or similar. A recurrent suggestion in this regard at present is to work with so- called agents of change. Engagement processes could start with existing core groups or the nucleus of specific social systems. As, for instance, Corrigan observed there are signs of change when an »initiative is having people move in from the edges to the core team, coming closer to the core purpose of the initiative and taking more and more responsibility for seeing it through« (Corrigan, n/a).

However, individuals or groups who are considered as relevant and easily engaged have to be identified and appropriate formats and tasks have to be assigned for the collaboration.

11 Conclusions

Based on their experiences, the work of practitioners has confirmed many of the issues already discussed in the literature and enriched them with more details. At the same time, some considerations could be elaborated and reasoned further.

— Most importantly, it has been confirmed that Public Engagement in RRI is a very vague concept. It is not yet established and many questions remain unclear (as mentioned in chapter 8.3.1). It is still far from a commonly agreed understanding and the practitioners have indicated that many ambiguities prevail. Accordingly, they ask for much »tolerance of ambiguities« (Goffmann, 1956).

— Undeniably, Public Engagement in science and technological innovation is not a new idea (as discussed in chapter 8.1). However, Public Engagement in RRI can be regarded as an approach in its own right. It is an integral part of the RRI concept. As a consequence, only if issues on the practical implementation of Public Engagement are resolved is it likely that the RRI concept can be taken up and be made sustainable.

— The often described high aspirations of Public Engagement in research and innovation (as discussed in chapter 8.2) have been empirically demonstrated by the contrasting feelings of helplessness expressed by the practitioners. Through this contrast, overstrain and pressures on the processes became obvious. It is evident that the image of Public Engagement as a good-for-everything approach has to be revised and corrected. However,

indeed it was also shown that Public Engagement in Responsible Research and Innovation can have various beneficial effects. Practitioners believe in its positive outcomes and have already experienced many.

— However, there are also critical considerations. Against the prevailing attitude which implies that one cannot really say anything against Public Engagement, it became apparent that there are many good reasons when Public Engagement should not be applied or only under certain conditions which must first be guaranteed. If there is no readiness and willingness for engagement or no adequate resources can be allocated, engagement processes should not be considered. Also, it has to be made clear on which level of participation (see chapter 6.2) Public Engagement activities are located. This could help to avoid negative experiences that lead to further reluctance to participate (as described in chapter 8.3.3).

— In terms of timing, as discussed in the literature (see chapter 8.3.4), practitioners are able to observe all different stages of the value chain of research and innovation process in which Public Engagement is useful and possible. Evidently, personal concerns and interests can move a desired activity further upstream.

— The empirical study has shown that the concept and related roles as that of a practitioner are under construction. There are not yet commonly accepted norms on the RRI concept, which would enable the clear formulation of rules and role behaviours, neither are the different role-sets clear. Already many results have been experienced and applied, yet there are many uncertainties. Whether RRI will be implemented successfully and what will make Public Engagement in RRI a success still needs to be worked out. Apparently, an active role for the public participants has not yet been defined. There are roles foreseen for public participants in theory but still there is lack of agreement and clear outlines, which became empirically evident. Although many functions such as bringing in new voices are envisaged, clear descriptions of actual tasks for public participants are nonetheless needed.

— Who is the public is a question (as raised in chapter 8.3.2), which could not be answered. This is due to the fact that there is no public as such to be addressed (see chapter 10.4). Not everybody can or wants to get engaged must be accepted as a bitter truth. This truth could not only be of practical use in terms of operability but could also function as a counter argument for all those critics who fear that their work could be judged by a majority of ignorant people. Significantly, according to Wickson, Delgado & Kjølberg (2010), citizens not only have a »right« to have their interests represented in decision making process, they also have the »duty« to confirm that interests of others are deliberated.

— Noble motives (as mentioned in chapter 8.3.5) are a good driving force for Public Engagement; however, often the processes are unable to move beyond these. The concepts' requirements, as also actually shown within the EC Horizon 2020 calls, are situated on a theoretical level and lack practical guidance and a clear will for realization. Although they are invited to engage in the process, often public participants remain the audience, which is in part still an understanding of the deficit model. According to Phillipson et al. (2012), the still prevailing conceptions of knowledge transfer needs to be abandoned, as it is perceived to be distinct from knowledge production. Public Engagement in RRI could conversely be considered as an innovative and interactive modern model of co-production of knowledge, as already envisaged by proponents of Mode 2 research (e. g. Gibbons et al., 1994). These knowledge exchange exercises could be regarded as a »new enterprise« for knowledge sharing and knowledge production, as suggested by Yoshizawa (2012).

  Furthermore, these days processes are mainly characterised by consensus finding. Group pressure and mainstreaming of opinion often perceived in the process need to be counteracted by active listening and individualisation of different perspectives.

  As already formulated by Stirling (2008), the democratic openness of the Public Engagement processes which allow for new voices is contradicted by its technocratic barriers which creates a narrow framework. Practitioners have to deal with this and many other dilemmas within the discourse, which have not yet been adequately considered.

— As to the question ›What is it good for?‹ (as raised in chapter 8.3.6), practitioners have found many answers. They perceive many positive outcomes for individuals, the research process, its results and also the changing relation of science in society. Practitioners show much empathy (Goffmann, 1956) for their role and thus feel responsible for positive outcomes of the engagement processes.

— Still, engagement processes are difficult to assess (see chapter 8.3.7). More empirical evidence as to its effects is needed. Participatory evaluations of experiences — such as those undertaken here with the practitioners — might be helpful. Furthermore, as recently suggested, more attention should be put on self-reflection and awareness raising (Schrammel et al., 2016). A concept such as RRI in general and Public Engagement in particular cannot be understood prescriptively but rather reflexively. Practitioners are already prepared and willing for self-reflection.

— As shown in the literature (summarised in chapter 8.3.8), Public Engagement as such is being considered as a good idea but it is not yet established nor implemented regularly. It is not yet institutionalised. The work at hand could provide relevant results on how to implement Public Engagement processes and who should carry out the processes (see chapter 8.3.9). It describes the central role of the practitioners, their multifaceted tasks and the skills and attributes required to fulfil these tasks. This role is currently being developed. It is not only being shaped by the deployment of the RRI concept and its requirements, but also by a great number of expectations of related groups and persons, and last but not least by the empathic and highly motivated practitioners who make high demands of themselves. Indeed, practitioners spend much time figuring out how to put the new norms of RRI and its specific dimension of Public Engagement into practice while never losing sight of their vulnerable and insecure position.

In short, for practical implementation, firstly clearly defined roles of practitioners are needed as they are the ones who are designated to carry out the entire processes and who feel responsible for them. Secondly, common understandings need to be defined and agreed on to build standards, methods and quality criteria. Thirdly, these

standards have to be implemented and communicated to communities of practice. This must be done on a long term basis within a newly defined position of science in society and with the newly defined profession of practitioners as intermediaries. There are qualified critiques on uniformed engagement activities, which can be found in literature but at the same time there are clear calls for achieving more professionalization and standardisation. Recently, ideas such as a centre for expertise within the EC or the idea of creating a »European Public Engagement training academy« (plenary discussion, Engage 2020 conference, Brussels, 2015) proved this trend. Empircial results are already a solid basis for compiling suggestions and useful ideas for conducting the engagement processes, taking innovative techniques into account as well.

12 Consequences

Results have shown that Public Engagement in RRI is still quite limited. It is mainly carried out by practitioners although their role and those of others has not yet been defined and agreed upon. Thus, it cannot be said that RRI has been successfully implemented so far. The intended paradigm shift within the relation of science in society has not (yet) taken place.

Supplementary to these results, one can discuss and think about consequences and new strategies. Based on the empirical and theoretical work which revealed some issues and open questions concerning the discourse on Public Engagement in RRI which still need further considerations, new ideas and requirements need to be elaborated. After decades of practical experiences in public participation, many critiques but also recommendations and new ideas should be brought together. There is an ongoing lively discourse and it is also »recognised within the EC that Public Engagement matters« (Robert Madelin, innovation advisor, EC) but nonetheless many questions remain unsolved or create more open issues to be discussed:

— **Top down and Bottom up**
Public Engagement in RRI and the processes discussed previously are so called invited forms of participation. Contrary to many critiques, one could argue that invited forms of engagement could also offer other forms of encounter than the kind seminar style or laboratory activities usually offer. These forms could rather be understood as ***hosted forms of engagement***. Hosted Public Engagement means that the engagement processes are organised, funded and professionally accompanied but are less output oriented than

invited forms. They offer space for informal encounter, allow for unintended results and are closer oriented to the needs and experiences of the public participants. At the same time they are seen as located in »policy-contextual awareness« (Emery et al., 2015) which could also guarantee a better political uptake.

Grass rooted initiatives still could be encouraged. A new profession of trained practitioners could possibly offer useful assistance to guide bottom up processes as well.

— **Policies and Governance**

The relationships between science and technological innovation and society are not only under constant negotiation but they are also of a political nature. The political contexts of Public Engagement activities, however, have not yet been explored sufficiently. The challenge is how to integrate engagement processes into wider patterns of political decision-making. The question does not only concern regulations and standards which need to be applied but mainly an acknowledgement and establishment of public participation. Its regular implementation could be regarded as an imperative and more recognition could be attributed to added value. Still, Public Engagement goes hand in hand with resistance. Persuasive efforts are only undertaken if resistance is expected. The prevailing image of public counterarguments, which could hamper or threaten research processes, must be corrected. Furthermore, the question is how a culture for experimentation can be established and ***alternative models of scientific governance*** can be carried out.

— **Roles and Stories**

To understand and apply a normative concept such as RRI, practical examples are needed. Especially for the key dimension of Public Engagement, ***stories and experiences are required***, which could show more of the challenges and opportunties. In this way, more pluralistic practices could be offered and new ways of thinking could be encouraged.

As a consequence of the missing protagonists within the discourse, their stories are also missing. Narratives are necessary to understand environments and contexts, their backgrounds and correlations. The SwafS (Science with and for Society) call of the EC is at present explicitly asking for such »storylines« and »narratives« to better enable the practical implementation of RRI and Public Engagement (SwafS-09-2016). Future projects will show if these will be incorporated satisfactorily.

Accordingly, positions and roles must also be described. Only established structures allow for orientation within a social system. By establishing certain rules of play, only ones own rooms of development and action are secured (Goffman 1956). Socialisation processes to enable learning of different roles are vital. First of all, the role of the public participants needs to be reconsidered and active tasks have to be allocated. Secondly, the role of policy makers or clients has to be questioned as to how they could become part of the process too. Which role they could take within the deliberations must be identified. Finally, the central role of the practitioners needs recognition and an adequate and clear job description. Their in-between positions need to be acknowledged and strengthened. Empirical work has shown that those in charge of the engagement processes are filling existing gaps and have already developed strategies. Within their insecure role definition they already have developed their individualised practices. These have to be commonly accepted and further developed. In the discourse, additional roles need to be identified and formulated, for example the one of industry and business, which is not yet considered adequately (Iatridis & Schroeder, 2016).

— **Power and Interest**

Often it is uncertain in whose interest the Public Engagement processes are being carried out. In terms of empowerment, indications can be found that the science and research realm gains more in terms of robustness and acceptance than public participants could in decision-making. It is unclear if Public Engagement is meant to support and strengthen science or to empower and absorb inherent insecurities. With regard to Responsible Research and Innovation and its acquired shared responsibility, accurate and pointed questions on ***how to deal with decision and power*** of co-responsibility have to be raised.

Also, when defining and developing the different roles it must be considered who it is shaping them. In the current discourse of Public Engagement in RRI, the roles identified so far can only be regarded as preliminary and not equal.

It needs to be clarified for whom finally and in whose interest Public Engagement activities are conducted. Is it in the interest of the matter in question or in the interest of one or more involved parties? Whose needs are being satisfied? Accordingly, the question has to be raised in whose interest the homogenisation processes, often observed in group deliberations, are taking place. Rank

and group dynamics have also been insufficiently considered. This necessitates a reassessment of the predominant idea of group engagement activities in favour of working with individuals.

In short, power relations and systems inequalities have not yet been appropriately addressed. How to integrate weakly organised interests is a question that is hardly ever raised. In science and technology industry the question is, essentially, if Public Engagement activities with mini publics can be a counterweight to leaders in the techno-scientific field. An important question is also how these activities can possibly work in the industry sector, as there are so many obstacles, such as profit motives, patents or intellectual property rights. The question needs to be addressed as to how realistic it is to expect short-term or timely events — as engagement activities are carried out these days — so they could have real impact on decisions in research and innovation.

— **Persons and Functions**

Within the Public Engagement processes, the how is more decisive than the what or the why. More attention is paid on the ways processes could be carried out rather than what the topics are and which results could be achieved so as to develop on them. The techniques of participation are more in the foreground than the participants themselves. The process is the main focus, not the actors, which are hardly identified. The participating persons with their stories and needs are inadequately considered. This reduction to functionality means a loss of human attributes, which turns public participants into interchangeable externs. Within the engagement processes they are reduced to objects of utility, for one specific use, but without allowing comprehensive interaction.

Although there are some more holistic concepts and approaches that have already been tested and are available, which put the persons in the centre (von Unger, 2014), Public Engagement processes in research and technology undertaken these days, are mostly artificial temporary processes which can only provide limited perspectives. Public participants are mostly addressed in a very specific function only, but less as individuals integrated into the process. Such a view conflicts with the actual idea of engagement, which would like to work with persons, but in the effect deals only with a very specific, isolated and controllable part. This paints a functional picture of society in which only those things are in focus which are considered as being useful. According to Rosa's sociological diagnosis of »optimisation« of society (2016),

processes and resources are applied most efficiently. But to strive for the most and best out of a process often misses its proper meaning. On the other hand, to frame the public as »citizens« as suggested by Wickson, Delgado & Kjølberg (2010) would ***allow the persons themselves to express their own concerns*** which would fall beyond externally imposed ones.

Above all, the question must be raised as to what Public Engagement in Responsible Research and Innovation can really fulfil. Obviously hosted engagement processes cannot be considered optimal for effective personal encounters as they are sometimes held in certain sociotopes such as a village in which people have known each other for years. At the same time, however, temporarily opened venues or those opened specifically for this purpose, could offer opportunities where considerable exchanges could occur as examples of established approaches (such as Participatory Action Research) have shown earlier. Practitioners emphasised the importance of improving working relations recurrently, but this is not yet in great demand within engagement processes.

— **Responsibility and Reflexivity**

Practitioners in the workshops critically reflected engagement processes as a fig leaf without real meaning or influence. They counteract this assessment with high demands, their attitude of appreciation, adequate and selected formats, and high quality processes including art of hosting principles. But one could critically ask, if they may be overestimating their task based on their own high demands of themselves. It must be reconsidered if it is really the practitioners who should carry the responsibility of the processes. Currently, although they are only meant to cover a certain part of an engagement activity, mostly they are also held accountable for the results and their relevance for policy contexts. But in the interest of shared responsibility, it would require more parties' responsibility for the co-production of new knowledge and also its relevance for further societal and technological developments.

The transparency of processes, which is demanded without fail, including unveiled interests and framings, could make Public Engagement processes a further means of second order reflexivity. Consequently, RRI practitioners must reflect on their own role of intermediaries and constantly question their own opinions and attitudes. To aquire the qualifications expected to play a role, a certain role-distance, the ability to look at and to reflect on ones own role, also needs to be achieved (Linton, 1945).

Paradigms and especially shifts in paradigms ask for critical self reflection. In this sense, we should not consider practice and critical reflection as separate activities but take ›reflective practice‹ and ›practical reflection‹ equally seriously as suggested by Irwin (2014). ***Public Engagement*** would not be just another key of RRI, but mainly ***contribute to reflexivity*** of the current research and development system.

— **Boundaries and Rooms**

As described in the previous sections, a long lasting relationship is in the process of being reformulated. Some speak about a new contract of science and society, some about an expected paradigm shift, which will be further reinforced by the establishment of RRI (as described earlier in chapter 4.3). However, as already mentioned this social change has not yet been put into effect.

But the overriding question is, if a new understanding of a science and research system is what is really wanted and intended by the implementation of Public Engagement. There seem to be some clues, which hint at a certain kind of pseudo-openness. Questions are being formulated which ask if the ***scientific system could allow for a real opening and participation of parts of the public*** in terms of collaboration and co-decision and if there are »truly opportunities to incorporate societal concerns into the practice of science?« (Schuurbiers & Fisher, 2009, p. 424). Or would a real participation threaten the existing scientific system, and thus can only ever happen within clear contoured and segregated frames as we encounter these days?

The implementation of the concept of Responsible Research and Innovation — Public Engagement being only a part of it — puts pressure on the field of science and research as it demands substantial change. The practitioners introduced and investigated here, cannot solve the conflict and resistance caused by this enforcement on their own. On the contrary, as was demonstrated, the practitioners' role can be regarded as being difficult precisely because of this. Additionally, these perceived difficulties could also have been partly caused by their own frustration at not being able to permeate existing boundaries. Obviously, »the public« cannot be a part of or make a partial contribution to science and research. The question then is, if a truly public participation is possible from a systemic point of view. Accordingly, the question is whether non-scientists change their role as soon as they enter the scientific system. And as the European Group on Ethics asked

critically in discussing recent trends of citizen science: »Can ›science‹ even be conducted by ›non-scientists‹?« (EGE The European Group on Ethics in Science and New Technologies, 2015, p. 24). This necessitates a complete new understanding of roles and positions. However, these developments are still in progress and as Irwin put it, Public Engagement is still a »profoundly flawed and problematic construction which in many ways promises more than it can ever deliver, but understand that (at least for now and in some settings) it can be a valuable tool for the unpacking of larger questions« (Irwin, 2014, p. 74). These need to be tackled further. RRI as a normative concept cannot be just defined, but normative changes can only be implemented by an overall societal negotiation process. Regardless as to whether one follows a rather sceptical or optimistic position on this issue, this development is part of an ongoing long-term transition as recently diagnosed by a group of RRI experts (Bauer et al., 2016).

Despite all this uncertainty, there is much that has been achieved already. For the moment, we can continue to ***work at the intersection of science and society***. As there are no structures in place which allow for meaningful exchange at present, a new room for Public Engagement needs to be created. According to Stahl (2013), RRI could offer such a new space for interaction, reflection and innovation. Coming back to an understanding of an ongoing social change, a wider spectrum of societal actors must be involved throughout the process. All members of the social system need to be invited to collaboratively work on a shared vision and shared responsibility so as to translate it into practical change. In order to make sure that public interests do not finally remain the residuals of this transformation process, it must be ensured that public participants are already integrated into the setup of this new understanding of science in society.

Appendix

13 Bibliography

A AA1000SES. (2015). Stakeholder Engagement Standard. Retrieved from http://www.accountability.org/standards/aa1000ses.html on May 12, 2016.

AG Soziologie (Ed.). (1996). *Denkweisen und Grundbegriffe der Soziologie*. Campus Verlag.

Anton Svane Olesen. (2015, March 10). Mainstreaming of Public Engagement in Horizon 2020 | Engage 2020. Retrieved from http://engage2020.eu/news/mainstreaming-of-public-engagement-in-horizon2020/ on April 4, 2016.

Arnstein, S. R. (1969). A Ladder of Citizen Participation. Retrieved from http://lithgow-schmidt.dk/sherry-arnstein/ladder-of-citizen-participation.html on February 2, 2016.

Asante, K., Owen, R. & Williamson, G. (2014). Governance of new product development and perceptions of responsible innovation in the financial sector: insights from an ethnographic case study. *Journal of Responsible Innovation*, 1(1), 9–30.

Asveld, L., Ganzevles, J. & Osseweijer, P. (2015). Trustworthiness and Responsible Research and Innovation: The Case of the Bio-Economy. *Journal of Agricultural and Environmental Ethics*, 28(3), 571–588.

B Banthien, H. (2003). *Governance of the European Research Area: The Role of Civil Society* (Final report). Bensheim/Berlin/Brussels: IFOK. Retrieved from http://www.eu.nl/research/science-society/document_library/pdf_06/final_report_study-20-october-2003_en.pdf on April 11, 2016.

Bauer, A., Bogner, A. & Fuchs, D. (2016). *Report on the expert workshop ›Contemporary experiences with societal engagement under the terms of RRI‹* (Deliverable No. D 2.1.). Institut für Technikfolgen-Abschätzung der Österreichischen Akademie der Wissenschaften.

Baur, V. E., Abma, T. A. & Widdershoven, G. A. M. (2010). Participation of marginalized groups in evaluation: Mission impossible? *Evaluation and Program Planning, 33*(3), 238–245.

Baur, V. E., Van Elteren, A. H. G., Nierse, C. J. & Abma, T. A. (2010). Dealing with Distrust and Power Dynamics: Asymmetric Relations among Stakeholders in Responsive Evaluation. *Evaluation, 16*(3), 233–248.

Beck, U., Bonss, W. & Lau, C. (2003). The Theory of Reflexive Modernization: Problematic, Hypotheses and Research Programme. *Theory, Culture & Society*, *20*(2), 1–33.

Bensaude Vincent, B. (2014). The politics of buzzwords at the interface of technoscience, market and society: The case of ›public engagement in science‹. *Public Understanding of Science*, *23*(3), 238–253.

Biggins, D. (1978). Social Responsibility in Science. *Social Alternatives*, *1*(3), 54–60.

Boal, A. (1999). *Der Regenbogen der Wünsche.: Methoden aus Theater und Therapie*. Kallmeyer.

Bogner, A. (2012). The Paradox of Participation Experiments. *Science, Technology & Human Values*, *37*(5), 506–527.

Bora, A. & Hausendorf, H. (2006). Participatory science governance revisited: Normative expectations versus empirical evidence. *Science and Public Policy*, *33*(7), 478–488.

Bradbury, H. & Reason, P. (Eds.). (2006). *Handbook of Action Research*. London: Sage Publications.

Breuer, F. (2010). Der Forschungsstil der Grounded Theory. In F. Breuer (Ed.), *Reflexive Grounded Theory: Eine Einführung für die Forschungspraxis* (pp. 39–114). Wiesbaden: VS Verlag für Sozialwissenschaften.

Bucchi, M. (2008). Of deficits, deviations and dialogues — Theories of public communication of science. In *Handbook of Public Communication of Science and Technology* (pp. 57–76). Taylor & Francis.

Bucchi, M. & Neresini, F. (2008). Science and Public Participation. In *The handbook of science and technology studies* (pp. 449–472). MIT-press.

Burgess, J. & Chilvers, J. (2006). Upping the ante: a conceptual framework for designing and evaluating participatory technology assessments. *Science and Public Policy*, *33*(10), 713–728.

Burgess, M. M. (2014). From ›trust us‹ to participatory governance: Deliberative publics and science policy. *Public Understanding of Science*, *23*(1), 48–52.

Burke, B. (1998). Evaluating for a change: Reflections on participatory methodology. *New Directions for Evaluation*, *1998*(80), 43–56.

Bush, V. (1944). *Science the Endless Frontier*. US. Retrieved from https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm on March 11, 2016.

C Callon, M. & Lacoste, A. (2012). Defending Responsible Innovation. *Debating Innovation*, *1*(1), 19–24.

Cavallaro, F., Obach, M., Schroeder, D., Chennells, R., Snyders, L., Steenkamp, A., … Kumar, A. (2014). *RRI and End_Users* (Deliverable No. D 4.2.). UK. Retrieved from http://www.progressproject.eu/wp-content/uploads/2013/05/ProGReSS-D4_2-RRI_and_End_Users-20141031_1200_final.pdf on May 8, 2016.

Chorherr, O. (1994). Die Gruppendiskussion als Erhebungsverfahren. In *Verführung zum qualitativen Forschen. Eine Methodenauswahl* (pp. 69–76). WUV-Universitätsverlag.

Cobb, M. D. & Gano, G. (2012). Evaluating Structured Deliberations about Emerging Technologies: Post-Process Participant Evaluation — ProQuest. *International Journal of Emerging Technologies and Society*, *10*, 96–110.

Coghlan, D. & Brannick, T. (2005). *Doing Action Research in your Own Organization*. London: SAGE Publications.

COM. (2004). *Towards a European strategy for nanotechnology* (Communication from the Commission). Brussels: EC.

COM. (2010). Europe 2020: A strategy for smart, sustainable and inclusive growth. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF on November 12, 2015.

Connors, S. C. & Magilvy, J. K. (2011). Assessing vital signs: Applying two participatory evaluation frameworks to the evaluation of a college of nursing. *Evaluation and Program Planning*, *34*(2), 79–86.

Cooke, B. & Kothari, U. (2001). *Participation: the New Tyranny?* Zed Books.

Cooperrider, D. L. & Srivastva, S. (1987). Appreciative inquiry in organizational life. In *Research in Organizational Change and Development* (pp. 129–169). JAI Press inc.

Corbin, J. & Strauss, A. (1996). *Grounded Theory: Grundlagen Qualitativer Sozialforschung* (1st ed.). Weinheim: Beltz.

Corrigan, C. (n/a). From consultation to participatory engagement: a concept paper and design plan for creating ownership and activating leaders in community engagement initiatives. Retrieved from http://www.chriscorrigan.com/Participatory%20engagement.pdf on March 8, 2016.

Cousins, J. B. & Whitmore, E. (1998). Framing participatory evaluation. *New Directions for Evaluation*, *1998*(80), 5–23.

Creek, M., Marschalek, i., Handler, K., Smallman, M., Steinhaus, N., Alix, J.-P., … Giannokopoulou, A. (2014). *D 2.1 — Guidelines for the implementation of the stakeholder consultation in relation to RRI* (Deliverable No. D 2.1). Ecsite, ZSI, University College London, CIPAST, Euroscience, European Business Network, European Schoolnet.

Cuhls, K. (2003). Cuhls, K.: Form forecasting to foresight processes — new participative foresight activities in Germany. *Journal of Forecasting*, *22*(2–3), 93–111.

Cullen, A. (2009). *The Politics and Consequences of Stakeholder Participation in International Development Evaluation* (Unpublished Dissertation). Western Michigan University.

D Dautzenberg, K. (2014, December). Handlungsempfehlungen Strategischer Dialog ›Partizipation in Forschung und Innovation‹. Dokumentation. Ramboli Management Consulting GmbH.

Davies, S. R. (2013). The rules of engagement: Power and interaction in dialogue events. *Public Understanding of Science*, *22*(1), 65–79.

Delgado, A., Kjølberg, K. L. & Wickson, F. (2011a). Public engagement coming of age: From theory to practice in STS encounters with nanotechnology. *Public Understanding of Science*, *20*(6), 826–845.

DG Research workshop on Responsible Research & Innovation in Europe. (2011). (Documentation). Brussels.

Diamond, D. (2013). *Theater zum Leben. Über die Kunst und die Wissenschaft des Dialogs in Gemeinwesen*. Stuttgart: ibidem.

Durant, J. (1999). Participatory technology assessment and the democratic model of the public understanding of science. *Science and Public Policy*, *26*(5), 313–319.

Durant, J., Evans, G. A. & Thomas, G. P. (1989). The public understanding of science. *Nature*, *340*(6228), 11–14.

E EC. (2007). *Public Engagement in Science* (Conference proceedings). Lisbon.

EC. (2013). *Special Eurobarometer 401Responsible Research and Innovation (RRI), Science and Technology* (Special Eurobarometer 401). Retrieved from http://ec.europa.eu/public_opinion/archives/ebs/ebs_401_en.pdf on April 11, 2016.

Eden, G. (2014). Special Eurobarometer 401: survey summary on responsible research and innovation, science and technology. *Journal of Responsible Innovation*, *1*(1), 129–132.

Eden, G., Jirotka, M. & Stahl, B. (2013). Responsible research and innovation: Critical reflection into the potential social consequences of ICT (pp. 1–12). IEEE.

EGE The European Group on Ethics in Science and New Technologies. (2015). *Ethics of New Health Technologies and Citizen Participation* (Opinion No. 29). Retrieved from http://ec.europa.eu/research/ege/pdf/opinion-29_ege.pdf#view=fit&pagemode=none on October 13, 2015.

Einsiedel, E. F. (2008). Public participation and dialogue. In *Handbook of Public Communication of Science and Technology* (pp. 173–184). Routledge.

Emery, S. B., Mulder, H. A. J. & Frewer, L. J. (2015). Maximizing the Policy Impacts of Public Engagement: A European Study. *Science, Technology & Human Values*, *40*(3), 421–444.

Engage 2020. (2014a). *Current Praxis of Policies and Activities Supportuing Engagement in R&I — Trends, Needs and Barriers* (Policy Brief No. 3).

Engage 2020. (2014b). *Public Engagement in R&I processes — Promises and Demands* (Policy Brief No. 2).

Engage 2020. (2015). *Societal Engagement — Policy and Practice in the Future* (Policy Brief No. 5).

EPSRC. (n. d.). Framework for Responsible Innovation. Retrieved from https://www.epsrc.ac.uk/index.cfm/research/framework/ on December 1, 2015.

European Commission. (2013). *Options for strengthening responsible research and innovation*. Luxembourg: Publications Office of the European Union.

European Union (Ed.). (2012). Responsible Research and Innovation — Europe's ability to respond to societal challenges. Retrieved from http://ec.europa.eu/research/science-society/document_library/pdf_06/responsible-research-and-innovation-leaflet_en.pdf on October 11, 2015.

European Union, European Commission & Directorate-General for Research and Innovation. (2013). *Options for strengthening responsible research and innovation*. Luxembourg: Publications Office of the European Union.

F Felt, U. (2003). Scientific Citizenship. Schlaglichter einer Diskussion. *Gegenworte. Hefte Für Den Disput Über Wissen*, *11*, 16–19.

Felt, U. & Fochler, M. (2008). The bottom-up meanings of the concept of public participation in science and technology. *Science and Public Policy*, *35*(7), 489–499.

Fischer, F. (1999). Technological deliberation in a democratic society: The case for participatory inquiry. *Science and Public Policy*, *26*(5), 294–302.

Fisher, E., Mahajan, R. L. & Mitcham, C. (2006). Midstream Modulation of Technology: Governance From Within. *Bulletin of Science, Technology & Society*, *26*(6), 485–496.

Föger, N., Garber, K., Grießler, E., Gschmeidler, B., Hafellner, S. & Polt, W. (2015). RRI in Österreich. Positionspapier ›Verantwortungsbewusste Forschung und Innovation‹. Begriffsbestimmung, Herausforderungen, Handlungsempfehlungen. Platfform RRI Österreich.

Fook, J. & Askelang, G. (2006). The ›critical‹ in critical reflection. In *Critical reflection in health and social care*. Maidenhead: Open University Press.

FraunhoferISI & TechnopolisGroup. (2012). *Interim evaluation & assessment of future options for Science in Society Actions Assessment of future options*. Retrieved from https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CC0QFjABahUKEwjch-vzv_bIAhXFHw8KHU19DOA&url=https%3A%2F%2Fec.europa.eu%2Fresearch%2Fswafs%2Fpdf%2Fpub_archive%2Fphase01-122012_en.pdf&usg=AFQjCNGWzMKcJS4LdgKkuMwekRnGH_noMA, on March 13, 2016.

Friedman, S. M. & Egolf, B. P. (2005). Nanotechnology: risks and the media. *IEEE Technology and Society Magazine*, *24*(4), 5–11.

Frodemann, R. & Holbrook, B. (2007). Science's Social Effects | Issues in Science and Technology. *Issues in Science and Technology*, *23*(3).

Funtowicz, S. O. & Ravetz, J. R. (1993). Science for the post-normal age. *Futures*, *25*(7), 739–755.

G Garcia, D., Zuazua, E., Perat, B. & Lopez, I. (Eds.). (2016). *A practical guide to responsible research and innovation. Key lessons from RRI Tools*. Spain.

Geist, M. R. (2010). Using the Delphi method to engage stakeholders: A comparison of two studies. *Evaluation and Program Planning*, *33*(2), 147–154.

Genus, A. & Coles, A. (2005). On Constructive Technology Assessment and Limitations on Public Participation in Technology Assessment. *Technology Analysis & Strategic Management*, *17*(4), 433–443.

Gibbons, M. (1999). Science's new social contract with society. *Nature*, *402*, C81–C84.

Gibbons, M., Nowotny, H. & Limoges, C. (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. Sage Publications.

Giddens, A. (1999, January 1). Democracy. *BBC lectures*. Retrieved from http://news.bbc.co.uk/hi/english/static/events/reith_99/ on March 11, 2015.

Gieryn, T. (1996). Policing STS: A Boundary-Work Souvenir from the Smithsonian Exhibition on ›Science in American Life‹. *Science, Technology & Human Values*, *21*(1), 100–115.

Glaser, B. G. & Strauss, A. (1998). *The Discovery of Grounded Theory. Strategies for Qualitative Research*. Aldine de Gruyter.

Glerup, C. & Horst, M. (2014). Mapping ›social responsibility‹ in science. *Journal of Responsible Innovation*, *1*(1), 31–50.

Goffman, E. (1956). *The Presentation of Self in Everyday Life*. Edingurgh: University of Edinburgh, Social Science Research Centre.

Goode, W., J. (1960). A Theory of Role Strain. *American Sociological Review*, *25*(August), 483–496.

Grand, A., Davies, G., Holliman, R. & Adams, A. (2015). Mapping Public Engagement with Research in a UK University. PLOS ONE, *10*(4)

Gregory, R., Fischhoff, B., Thorne, S. & Butte, G. (2003). A multi-channel stakeholder consultation process for transmission deregulation. *Energy Policy*, *31*(12), 1291–1299.

Grieger, K., Wickson, F., Andersen, H. B. & Renn, O. (2012). Improving Risk Governance of Emerging Technologies through Public Engagement: The Neglected Case of Nano-Remediation? *International Journal of Emerging Technologies and Society*, *10*, 61–78.

Grießler, E. & Wolfslehner, D. (2015). *Ethics Assessment in Different Countries. Austria* (Deliverable No. 1.1.). Retrieved from http://satoriproject.eu/media/4.a-Country-report-Austria.pdf on March 15, 2016.

Grunwald, A. (2011). Responsible innovation: bringing together technology assessment, applied ethics, and STS research. *Enterprise and Work Innovation Studies*, *7*, 9–31.

Guijt, I. (2014). *Participatory Approaches* (Methodological Briefs No. 5 Impact Evaluation). Florence, Italy: UNICEF.

Guston, D. H., Fisher, E., Grunwald, A., Owen, R., Swierstra, T. & van der Burg, S. (2014). Responsible innovation: motivations for a new journal. *Journal of Responsible Innovation*, *1*(1), 1–8.

Guston, D. H. & Sarewitz, D. (2002). Real-time technology assessment. *Technology in Society*, *24*(1–2), 93–109.

H Habermas, J. (1996). *Between facts and norms: Contributions to a discourse theory of law and democracy*. Cambridge, MA: MIT Press.

Handler, M. & Trattnig, R. (Eds.). (2011). *Partizipation: Zukunft der Öffentlichkeitsbeteiligung - Chancen, Grenzen und Herausforderungen*. ÖGUT, Lebensministerium.

Hennen, L. (2015). ›Public Engagement‹ in Forschungs- und Innovationsprozessen. In *Responsible Innovation. Neue Impulse für die Technikfolgenabschätzung?* (pp. 91–100). Nomos.

Hochgerner, J. (2012). New Combinations of Social Practices in the Knowledge Society. In H.-W. Franz, J. Hochgerner & J. Howaldt (Eds.), *Challenge Social Innovation* (pp. 87–104). Springer Berlin Heidelberg.

Holliman, R., Adams, A., Blackman, T., Collins, T., Davies, G., Dibb, S., … Wissenburg, A. (2015). *An Open Research University*. Milton Keynes: The Open University.

Horlick-Jones, T., Rowe, G. & Walls, J. (2007). Citizen engagement

processes as information systems: the role of knowledge and the concept of translation quality. *Public Understanding of Science*, *16*(3), 259–278.

Horton, R. (2010). Science will never be the same again. *The Lancet*, *376*(9736), 143–144.

House of Lords – Science and Technology – Third Report. (2000). Retrieved from http://www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3807.htm, on October 14, 2015.

Hugman, R., Pittaway, E. & Bartolomei, L. (2011). When ›Do No Harm‹ Is Not Enough: The Ethics of Research with Refugees and Other Vulnerable Groups. *British Journal of Social Work*, *41*(7), 1271–1287.

Human, B. A. & Davies, A. (2010). Stakeholder consultation during the planning phase of scientific programs. *Marine Policy*, *34*(3), 645–654.

I Iatridis, K. & Schroeder, D. (2016). Responsible Research and Innovation in Industry. Cham: Springer International Publishing.

IAP2 International Association for Public Participation. (n. d.). Retrieved from http://www.iap2.org/?page=A4 on March 8, 2016.

Irwin, A. (2006). The Politics of Talk: Coming to Terms with the ›New‹ Scientific Governance. *Social Studies of Science*, *36*(2), 299–320.

Irwin, A. (2014). From deficit to democracy (re-visited). *Public Understanding of Science*, *23*(1), 71–76.

Irwin, A., Jensen, T. E. & Jones, K. E. (2013). The good, the bad and the perfect: Criticizing engagement practice. *Social Studies of Science*, *43*(1), 118–135.

J Jahn, T., Bergmann, M. & Keil, F. (2012). Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics*, *79*, 1–10.

Jasanoff, S. (2003). Technologies of humility: citizen participation in governing science. *Minerva*, *41*(3), 223–244.

Johnstone, K., Schreyer, C. & Schreyer, P. (2014). *Theaterspiele: Spontaneität, Improvisation und Theatersport* (9. Aufl). Berlin: Alexander-Verl.

Jones, R. (2008). When it pays to ask the public. *Nature Nanotechnology*, *3*(10), 578–579.

K Kessl, F. (2009). Critical reflexivity, social work, and the emerging European post-welfare states. *European Journal of Social Work*, *12*(3), 305–17.

King, M. & Sutcliffe, H. (n.d.). *What does the public expect from companies using innovative technologies?* Matter. Retrieved from http://www.matterforall.org/what-does-the-public-expect-from-companies-using-innovative-technologies/, on October 12, 2015.

Klaassen, P., Kupper, F. & Broerse, J. (2014). *Polcy brief on the state of the art on RRI and a working definition of RRI* (Deliverable No. D 1.1.). Amsterdam: Athena Institute, VU University Amsterdam. Retrieved from http://www.rri-tools.eu/workplan-deliverables, on March 6, 2016.

Klein, J. T. (2001). *Transdisciplinarity: joint problem solving among science, technology, and society: an effective way for managing complexity*. Birkhäuser.

Kleinman, D. L., Delborne, J. A. & Anderson, A. A. (2011). Engaging citizens: The high cost of citizen participation in high technology. *Public Understanding of Science*, *20*(2), 221–240.

Kolb, B. (2008). Involving, Sharing, Analysing — Potential of the Participatory Photo Interview. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research; Vol 9, No 3: Visual Methods*.

Krabbenborg, L. & Mulder, H. A. J. (2015). Upstream Public Engagement in Nanotechnology Constraints and Opportunities. *Science Communication*, *37*(4), 452–484.

Kupper, F., Klaassen, P., Rijnen, M., Vermeulen, S. & Broerse, J. (2015). *Report on the quality criteria of Good Practice Standards in RRI.* (Deliverable no. D 1.3.) Retrieved from https://www.rri-tools.eu/documents/10184/107098/D1.3_QualityCriteriaGoodPracticeStandards.pdf/ca4efe26-6fb2-4990-8dde-fe3b4aed1676, on August 3, 2016.

Kupper, F., Klaassen, P., Rijnen, M., Vermeulen, S., Woertman, R. & Broerse, J. (2015). *A catalogue of good RRI practices* (Deliverable No. D 1.4.). Athena Institute, VU University Amsterdam. Retrieved from http://www.rri-tools.eu/documents/10182/18424/D+1.4+A+catalogue+of+good+practice+standards+in+RRI/16f80230-03e4-46e4-b655-b445e66aaae3, on December 4, 2015.

L Latour, B. (2003). Is Re-modernization Occurring — And If So, How to Prove It?: A Commentary on Ulrich Beck. *Theory, Culture & Society*, *20*(2), 35–48.

Latour, B. (2004). Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern. *Critical Inquiry*, *30*(2), 225–248.

Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, *2*(4), 34–46.

Lindner, R., Goos, K. & Kuhlmann, S. (2015). Entwicklung eines europäischen Governance-Rahmens für ›Responsible Research and Innovation‹. Herausfordrungen und erste Konturen. In *Responsible Innovation. Neue Impulse für die Technikfolgenabschätzung?* (pp. 81–90). Nomos.

Linton, R. (1945). *The Cultural Background of Personality*. New York: Appleton-Century Crofts.

Longen, J., Hoffmann, S. & Weyer, J. (2015). ›Governance of Discontinuation‹ als neue Perspektive der sozialwissenschaftlichen TA. In *Responsible Innovation. Neue Impulse für die Technikfolgenabschätzung?* (pp. 121–128). Nomos.

Lövbrand, E., Pielke, R. & Beck, S. (2011). A Democracy Paradox in Studies of Science and Technology. *Science, Technology & Human Values, 36*(4), 474–496.

Luhmann, N. (1995). *Social Systems*. Stanford, California: Stanford U. P.

M Maiukait-Žvinien, S., Tauginien, L., Rask, M., Mejlgaard, N., Ravn, T. & d'Andrea, L. (2014). *A Refined Typology of PE Tools and Instruments D 2.1* (Deliverable No. D 2.1.). Retrieved from http://www.PE2020.eu on November 12, 2015.

Malagrida, R. (2015). *Perspective on Public Engagement* (Rationale).

Marschalek, i. (2008). *Transdisziplinäre Forschung im Nachhaltigkeitsdiskurs — eine zeitgemäße Herangehensweise an komplexe Problemlagen. Forschungserfahrungen aus dem ländlichen China.* Universität Wien.

Marschalek, i. (2015). Assessing Stakeholders' Needs and Constraints Related to RRI. Experiences and First Results of a Pan-European Stakeholder Consultation. In *The next horizon of technology assessment* (pp. 93–100). Prague: Technology Centre ASCR.

Marschalek, i. (2016). *Beteiligung von Öffentlichkeit in Forschungsfragen* (Flipchart Protokoll).

Marschalek, i., Handler, K., Hofer, M., Schrammel, M., Schuch, K., Hochgerner, J., … Holocher, T. (2014a). *Report on comparative data* (Deliverable No. D 6.4.). ZSI — Centre for Social Innovation. Retrieved from http://results.nanopinion.eu/download/nanopinion_D6_Report_on_comparative_data.pdf on September 11, 2015.

Mercer, S. L., MacDonald, G. & Green, L. W. (2004). Participatory Research and Evaluation: From Best Practices for All States to Achievable Practices within Each State in the Context of the Master Settlement Agreement. *Health Promotion Practice, 5*(3 suppl), 167S–178S.

Merton, R. K. & Sztompka, P. (1996). *On Social Structure and Science*. University of Chicago Press.

Miah, A. (2005). Genetics, cyberspace and bioethics: why not a public engagement with ethics? *Public Understanding of Science, 14*(4), 409–421.

Mitcham, C. & Frodemann, R. (2000). Beyond the Social Contract Myth: Science should move beyond a contractual relationship with society and join in the quest for the common good. *Issue in Science and Technology Online, summer 2000*.

N Neubauer, C. (2013). Media in Responsible Research and Innovation. *Living Knowledge. International Journal of Community Based Research. Future Options for Responsible Research and Innovation*, *11*, 12–15.
Nisbet, M. C. (2010). Framing Science: A New Paradigm in Public Engagement. In *Understanding Science: New Agendas in Science Communication* (pp. 40–67). NY: Taylor & Francis.
Nitsch, M., Waldherr, K., Denk, E., Griebler, U., Marent, B. & Forster, R. (2013). Participation by different stakeholders in participatory evaluation of health promotion: A literature review. *Evaluation and Program Planning*, *40*, 42–54.
Nordmann, A. (2014). Responsible innovation, the art and craft of anticipation. *Journal of Responsible Innovation*, *1*(1), 87–98.
O Olson, B. & Jason, L. (2015). Participatory Mixed Methods Research. In *The Oxford Handbook of Multimethod and Mixed Methods Research Inquiry* (pp. 393–405). Open University Press.
Owen, R. (2014a). *Responsible Research and Innovation: Options for Research and Innovation Policy in the EU*. Retrieved from https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjp9dnD3e3LAhUFXA8KHat7AVsQFgggMAA&url=https%3A%2F%2Fec.europa.eu%2Fresearch%2Finnovation-union%2Fpdf%2Fexpert-groups%2FResponsible_Research_and_Innovation.pdf&usg=AFQjCNEottvafuSRV7NWrI8a-rTisi8PUg&cad=rja on November 21, 2015.
Owen, R. (2014b). The UK Engineering and Physical Sciences Research Council's commitment to a framework for responsible innovation. *Journal of Responsible Innovation*, *1*(1), 113–117.
Owen, R. & Goldberg, N. (2010). Responsible Innovation: A Pilot Study with the U. K. Engineering and Physical Sciences Research Council. *Risk Analysis*, *30*(11), 1699–1707.
Owen, R., Macnaghten, P. & Stilgoe, J. (2012). Responsible research and innovation: From science in society to science for society, with society. *Science and Public Policy*, *39*(6), 751–760.
P Pain, R. & Francis, P. (2003). Reflections on participatory research. *Area*, *35*(1), 46–54.
Parsons, T. (1951). *The social system*. New York: Glencoe, Ill.: Free Press.
Pfersdorf, S. (2012). Governing Nanotechnology through Stakeholder Dialogues: The Example of the German NanoKommission. *International Journal of Emerging Technologies and Society*, *10*, 45–60.
Phillipson, J., Lowe, P., Proctor, A. & Ruto, E. (2012). Stakeholder engagement and knowledge exchange in environmental research. *Journal of Environmental Management*, *95*(1), 56–65.

Pilotprojekt des Vereins ScienceCenter-Netzwerk in drei Wiener Bezirken April bis November 2013. (2014). Retrieved from http://www.science-center-net.at/fileadmin/SCN_new/Projekte/Wissensraum/SCN_Wissens__raum_2013__Projektbericht_20140F.pdf on October 12, 2015.

Powell, M. C. & Colin, M. (2008). Meaningful Citizen Engagement in Science and Technology. What Would it Really Take? *Science Communication*, *30*, 126–136.

Powell, M. C. & Colin, M. (2009). Participatory Paradoxes: Facilitating Citizen Engagement in Science and Technology From the Top-Down? *Bulletin of Science, Technology & Society*, *29*(4), 325–342.

Principles of Public Participation. (n.d.). Retrieved from http://www.co-intelligence.org/CIPol_publicparticipation.html on January 11, 2016.

Prisching, M. (1995). *Soziologie*. Böhlau.

Public Participation — UNECE Home. (n. d.). Retrieved from http://www.unece.org/env/pp/welcome.html on January 11, 2016.

Putnam, R. D. (2001). *Bowling alone: the collapse and revival of American community* (1. touchstone ed). New York, NY: Simon & Schuster.

R Randles, S., Youtie, J., Guston, D., Harthorn, B., Newfield, C., Wickson, F., Rip, A., von Schomberg, R. & Pidgeon, N. (2012). A Transatlantic Conversation on Responsible Innovation and Responsible Governance. In H. van Lente, C. Coenen, T. Fleischer, K. Konrad, L. Krabbenborg, C. Milburn, F. Siefert & F. Thoreau (Eds.), Little by Little: Expansions of Nanoscience and Emerging Technologies (pp. 169-179). Dordrecht: AKA-Verlag/IOS Press.

Reed, M. S., Fraser, E. D. G. & Dougill, A. J. (2006). An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*, *59*(4), 406–418.

Reiter, A. (2008). Kunsttherapie und Menschenbildforschung. *Musik-, Tanz und Kunsttherapie*, *19*(4), 160–166.

Richmond, L. S., Peterson, D. J. & Betts, S. C. (2008). The Evolution of an Evaluation: A Case Study Using the Tribal Participatory Research Model. *Health Promotion Practice*, *9*(4), 368–377.

Rietbergen-McCracken, J. & Narayan, D. (Eds.). (1998). *Participation and Social Assessment: Tools and Techniques*. World Bank. Retrieved from http://www.rmportal.net/library/content/tools/biodiversity-conservation-tools/putting-conservation-in-context-cd/participatory-approaches-resources/1-c.pdf/at_download/file on March 12, 2012.

Rip, A. (2009). Futures of ELSA. Science & Society Series on Convergence Research. *EMBO Reports*, *10*(7), 666–670.

Rip, A. (2014). The past and future of RRI. *Life Sciences, Society and Policy*, *10*(1).

Ritva Höykinpuro & Arja Ropo. (2014). Visual narratives on organizational space. *Journal of Organizational Change Management*, *27*(5), 780–792.

Rosa, H. (2016). *Resonanz: eine Soziologie der Weltbeziehung* (Erste Auflage). Berlin: Suhrkamp.

Rowe, G. (2004). Evaluating Public-Participation Exercises: A Research Agenda. *Science, Technology & Human Values*, *29*(4), 512–556.

Rowe, G. & Frewer, L. J. (2000). Public Participation Methods: A Framework for Evaluation. *Science, Technology & Human Values*, *25*(1), 3–29.

S Scarinci, I. C., Johnson, R. E., Hardy, C., Marron, J. & Partridge, E. E. (2009). Planning and implementation of a participatory evaluation strategy: A viable approach in the evaluation of community-based participatory programs addressing cancer disparities. *Evaluation and Program Planning*, *32*(3), 221–228.

Schatzmann, L. (1991). Dimensional analysis: Notes on an alternative approach to the grounding of theory in qualitative research. In *Social Organization and Social Process* (pp. 303–314). New York: Aldine de Gruyter.

Scholl, G., Petschow, U. & Ferdinand, J.-P. (2012). Deliberating Converging Technologies — An International Comparative Perspective on Public Engagement with Emerging Technologies. *International Journal of Emerging Technologies and Society*, 1–5.

Schrammel, M., Marschalek, i., Unterfrauner, E. & Hofer, M. (Eds.). (2016). Self-Reflection Tool. Fostering Responsible Research and Innovation. Vienna: Rema print.

Schuurbiers, D. (2011). What happens in the Lab: Applying Midstream Modulation to Enhance Critical Reflection in the Laboratory. *Science and Engineering Ethics*, *17*(4), 769–788.

Schuurbiers, D. & Fisher, E. (2009). Lab-scale intervention. *EMBO Reports*, *10*(5), 424–427.

Scott, J. F. (1971). Internalization of norms : a sociological theory of moral commitment. — Version details. Englewood Cliffs.

Shirk, J. L., Ballard, H. L., Wilderman, C. C., Phillips, T., Wiggins, A., Jordan, R., … Bonney, R. (2012). Public Participation in Scientific Research: a Framework for Deliberate Design. *Ecology and Society*, *17*(2).

Shove, E. & Rip, A. (2000). Users and unicorns: a discussion of mythical beasts in interactive science. *Science and Public Policy*, *27*(3), 175–182.

SiS-RRI Conference. (2014, November 21). Rome Declaration on Responsible Research and Innovation in Europe. Retrieved from https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjtk7Wb2bjJAhUHJw4KHXpoAOAQFggdMAA&url=https%3A%2F%2Fec.europa.eu%2Fresearch%2Fswafs%2Fpdf%2

Frome_declaration_RRI_final_21_November.pdf&usg=AFQjCNEYr6tzFHssqWMZKMBM9rzH36INNg&cad=rja on Februar 5, 2015.
Siune, K., Eszter, M., Calloni, M., Felt, U., Gorski, A., Grunwald, A., … Wyatt, S. (2009). *Challenging Futures of Science in Society - Emerging trends and cutting-edge-issues. Report of the MASIS Expert Group setup by the European Commission*. EC Directorate-General for Research. Science in Society. Retrieved from https://ec.europa.eu/research/science-society/document_library/pdf_06/the-masis-report_en.pdf on September 11, 2014.
Slocum, N. (2003). *Participatory Methods Toolkit - A practitioner's manual*. King Baudouin Foundation. Retrieved from http://unu.edu/hq/library/Collection/PDF_files/CRIS/PMT.pdf on April 8, 2005.
Smallman, M., Lomme, K. & Faullimmel, N. (2015). Report on the analysis of opportunities, obstacles and needs of the stakeholder groups in RRI practices in Europe. (Deliverable 2.2.) Retrieved from http://www.rri-tools.eu/documents/10182/18424/RRITools_D2.2-AnalysisNeeds+ConstraintsStakeholderGroupsRRI.pdf/d5aadef5-12c4-4045-a813-15a55fc534ff on May 18, 2015.
Socientize Consortium. (2014). *White Paper on Citizen Science: Citizen Science for Europe, Towards a better society of empowered citizens and enhanced research*. (Deliverable). Socientize project. Retrieved from http://www.socientize.eu/sites/default/files/white-paper_0.pdf on September 11, 2015.
Stahl, B. (2012). *Optimising Civil Society Participation in Research. Consider Policy Brief No. 1. Civil Society Organisations in Designing Research Governance* (Policy Brief No. 1). Retrieved from http://www.consider-project.eu/wp-content/uploads/2012/04/CON-PB1-1.5.pdf on April 17, 2014.
Stahl, B. C. (2013). Responsible research and innovation: The role of privacy in an emerging framework. *Science and Public Policy*, *40*(6), 708–716.
Stahl, B., Eden, G., Jirotka, M. & Coeckelbergh, M. (2014a). From Computer Ethics to Responsible Research and Innovation in ICT: The transition of reference discourses informing ethics-related research in information systems. *Information Und Management*.
Steinhaus, N. (Ed.). (2013). *Future Options for Responsible Research and Innovation* (Vol. 11). Bonn.
Steinhaus, N. (Ed.). (2014). *Impact through Co-creation and Participation* (Vol. 12). Bonn.
Steinhaus, N. & McKenna, E. (2014). Making a Difference to Research Strategies. *Living Knowledge. International Journal of Community Based Research. Impact through Co-Creation and Participation*, *12*, 12–14.

Stilgoe, J., Lock, S.J. & Wilsdon, J. (2014). Why should we promote public engagement with science? *Public Understanding of Science*, *23*(1), 4–15.

Stilgoe, J., Owen, R. & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, *42*(9), 1568–1580.

Stirling, A. (2008). ›Open Up‹ and ›Closing Down‹. *Science, Technology, & Human Values*, *33*(2), 262–294.

Strand, R. & Spaapen, J. (2015, January 25). Indicators for Promoting and Monitoring Responsible Research and Innovation. Report from the Expert Group on Policy Indicators for Responsible Research and Innovation.

Strübing, J. (2008). *Grounded Theory. Zur sozialtheoretischen und epistemologischen Fundierung des Verfahrens der empirisch begründeten Theoriebildung* (2nd ed.). VS Verlag für Sozialwissenschaften.

Sutcliffe, H. (2011). *A Report on Responsible Research and Innovation by Hilary Sutcliffe*. Retrieved from https://ec.europa.eu/research/science-society/document_library/pdf_06/rri-report-hilary-sutcliffe_en.pdf on March 12, 2014.

Sutcliffe, H. (n.d.). Why I said no to participating in Peer Review for RRI | Matter. Retrieved from http://www.matterforall.org/why-i-said-no-to-participating-in-peer-review-for-rri/ on April 18, 2015.

T Taebi, B., Correljé, A., Cuppen, E., Dignum, M. & Pesch, U. (2014). Responsible innovation as an endorsement of public values: the need for interdisciplinary research, *1*(1), 118–124.

Taylor, P.L. (2007). Rules of engagement. *Nature*, *450*(7167), 163–164.

The Lund Declaration. (2009). Retrieved from https://era.gv.at/object/document/130

Thompson, L., Lucas, B. & Hall, E. (2012). Upstream and Downstream Negotiation Research. Oxford handbooks.

Timmermans, J. & Stahl, B.C. (2014). *D6.4 Annual Report on the main trends of SIS, in particular the trends related to RRI* (GREAT Project).

U UNECE (1998). Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). Retrieved from http://www.unece.org/env/pp/contentpp.html on September 7, 2015.

V van Asselt, M., Mellors, J., Rijkens-Klomp, N., Greeuw, S., Molendijk, K., Beers, P. & vanNotten, P. (2001). Building Blocks for Participation in Integrated Assessment: A review of participatory methods. The Hague: International Centre for Integrative Studies.

van den Hoven, M. (2013). Value Sensitive Design and Responsible Innovation. In *Responsible Innovation*. Wiley.

van Est, R. (2011). The Broad Challenge of Public Engagement in Science: Commentary on: ›Constitutional Moments in Governing Science and Technology‹. *Science and Engineering Ethics*, *17*(4), 639–648.
van Est, R., Walhout, B., Rerimassie, V., Stemerding, D. & Hanssen, L. (2012). Governance of Nanotechnology in the Netherlands — Informing and Engaging in Different Social Spheres. *International Journal of Emerging Technologies and Society*, *10*, 6–26.
von Schomberg, R. (2011). Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields. *SSRN Electronic Journal*.
von Schomberg, R. (2012). Prospects for Technology Assessment in a Framework of Responsible Research and Innovation.
von Schomberg, R. (2013). A vision of responsible innovation. In R. Owen, J. Bessant & M. Heintz, *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*. London: John Wiley & Sons. Retrieved from https://app.box.com/s/orzg7b4ci7nau9ha18zj on March 3, 2015.
von Unger, H. (2014). *Partizipative Forschung. Einführung in die Forschungspraxis*. Wiesbaden: Springer VS.
w Waelbers, K. (2009). Technological Delegation: Responsibility for the Unintended. *Science and Engineering Ethics*, *15*(1), 51–68.
Wallerstein, N. B. (2006). Using Community-Based Participatory Research to Address Health Disparities. *Health Promotion Practice*, *7*(3), 312–323.
Walls, J., Rowe, G. & Frewer, L. (2011). Stakeholder engagement in food risk management Evaluation of an iterated workshop approach. *Public Understanding of Science*, *20*(2), 241–260.
Warburton, D., Colbourne, L., Gavelin, K., Wilson, R. & Noun, A. (2008). *Involve — Deliberative Public Engagement — Nine Principles*. UK: National Consumer Council. Retrieved from http://www.involve.org.uk/blog/2011/06/28/deliberative-public-engagement-nine-principles/ on March 17, 2015.
Weingart, P. (2005). *Die Wissenschaft der Öffentlichkeit: Essay zum Verhältnis von Wissenschaft, Medien und Öffentlichkeit* (1. Aufl.). Velbrück.
Westhues, A., Ochocka, J., Jacobson, N., Simich, L., Maiter, S., Janzen, R. & Fleras, A. (2008). Developing Theory From Complexity: Reflections on a Collaborative Mixed Method Participatory Action Research Study. *Qualitative Health Research*, *18*(5), 701–717.
Wickson, F., Delgado, A. & Kjølberg, K. L. (2010). Who or what is ›the public‹? *Nature Nanotechnology*, 5(11), 757–758.
Wickson, F. & Carew, A. L. (2014). Quality criteria and indicators for responsible research and innovation: learning from

transdisciplinarity. *Journal of Responsible Innovation*, *1*(3), 254–273.
Wilsdon, J., Stilgoe, J. & Wynne, B. (2005). *The public value of science: or how to ensure that science really matters*. London: Demos.
Workshopdokumentation: Welche Werte zählen in der europäischen Forschungspolitik? Responsible Research and Innovation — Verantwortungsvolle Forschung und Innovation in der nationalen Förderpolitik am 23. Juni 2015 im NABU Bundesverband Berlin. (2015, June 23). Retrieved from http://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCUQFjAAahUKEwj-tJXwyuTHAhXHvBoKHQwiA2A&url=http%3A%2F%2Fwww.forschungswende.de%2Ffileadmin%2Fuploads%2Fuser_upload%2F20150623_FW_RRI_Doku_final.pdf&usg=AFQjCNGB_rZNjlnLoFXOOhSiGUOLAPtSIA on October 12, 2016
Wynne, B. (1993). Public uptake of science: a case for institutional reflexivity. *Public Understanding of Science*, *2*(4), 321–337.
Wynne, B. (2005). Risk as globalizing ›democratic‹ discourse? Framing subjects and citizens. In *Science, Citizenship and Globalization*. London: Zed Books.
Wynne, B. (2014). Further disorientation in the hall of mirrors. *Public Understanding of Science*, *23*(1), 60–70.
YZ Yoshizawa, G. (2012). Functions and Management of Intermediaries Linking Knowledge and Social and Public Values. Transactions of the Academic Association for Organizational Science, 1(1), 78–85.
Zukoski, A. & Luluquisen, M. (2002). Participatory Evaluation. What is it? Why do it? What are the challenges? *Policy Practice*, *No 5* (April 2002).

EC funded RRI related projects (mentioned in the text)

CONSIDER: http://www.consider-project.eu/
Engage 2020: http://engage2020.eu/
GREAT: http://www.great-project.eu/
INVOLVE: http://www.involve.org.uk
MASIS: www.masis.eu
NanOpinion: www.nanopinion.eu
PE 2020: https://pe2020.eu/
ProGReSS: http://www.progressproject.eu/
PROSO: http://www.oeaw.ac.at/ita/en/projects/proso/overview/
ResAGora: http://res-agora.eu/news/
RRI Tools: www.rri-tools.eu
RRI-ICT Forum: http://rri-ict.eu/
Socientize: http://socientize.eu/
TAMI: https://www.itas.kit.edu/english/projects_grun02_tami.php

14 Tables and Indexes

Tables

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Images

(All images were made within the participatory workshops; the photos have been blurred to anonymize.)

List of Abbreviations

CSO	Civil Society Organisation
CTA	Constructive Technology Assessment
DG	Directorate General (Of the European Commission)
EC	European Commission
EPSRC	Engineering and Physical Sciences Research Council, UK
ERA	European Research Area
FP7	7th Research Framework Programme of the EC
IP	Intellectual Properties
IS	Information Systems
MASIS	Monitoring Policy And Research Activities On Science In Society In Europe (EC Project)
n/a	Not avaialbe (no date, no pages)
n. d.	No date (year)
oE	Original Emphasis
PE	Public Engagement
PP	Public Participation
PTA	Participatory Technology Assessment
R&D	Research And Development
R&I	Research And Innovation
RTTA	Realtime Technology Assessment
SiS	Science In Society
STS	Science And Technology Studies
SWAFS	Science With And For Society (EC Work Programme)
TA	Technology Assessment
Transl. i. M.	Translation by ilse Marschalek (the Author)

Abstract
Deutsche Übersetzung
Die vorliegende Arbeit behandelt das sich aktuell stark verbreitende Konzept der »Verantwortungsvollen Forschung« (Responsible Research and Innovation — RRI), das in den letzten Jahren seitens der Europäischen Kommission als Handlungsprinzip und politisches Konzept ausgerufen und beworben wurde. Das RRI Konzept basiert auf der sich verändernden Rolle von Wissenschaft in der Gesellschaft. Die Bedeutung von Wissenschaft und Forschung für gesellschaftliche Fragestellungen als auch die Beteiligung von Öffentlichkeit in Forschungsprozessen werden zunehmend wichtiger. Dieses neue Wissenschaftsverständnis geht mit einem gesellschaftlichen Wertewandel einher, der sich durch die gezielte Implementierung von RRI beschleunigen und verstärken wird. Welche Effekte auf Wissenschaft und Gesellschaft dies haben wird und welche Auswirkungen auf die verschiedenen sozialen Akteure, ist allerdings noch nicht klar.

Unklar ist außerdem, wie die Einbeziehung und Zusammenarbeit tatsächlich organisiert und sinnvoll umgesetzt werden kann. Nach Jahrzehnten der Erfahrung mit Öffentlichkeitsbeteiligungsprozessen in verschiedenen Kontexten werden nach wie vor Zweifel und Kritik hinsichtlich ihrer fruchtbaren Umsetzung geäußert. Es scheint daher notwendig, einige der Ansätze und Ansprüche, die hinter Partizipationsprozessen stehen, zu hinterfragen. Weil Öffentlichkeitsbeteiligung ein integraler Bestandteil des RRI Konzeptes ist, müssen für eine erfolgreiche Umsetzung des Konzepts diese Bedenken behandelt werden. Die vorliegende Arbeit

umfasst eine Zusammenstellung von Kritiken, die in der Literatur aus unterschiedlichen Perspektiven geäußert wurden, als auch Empfehlungen, die diesbezüglich abgegeben wurden. Diese werden mit Hilfe partizipativer Forschungsmethoden in der empirischen Arbeit überprüft und ergänzt.

Sozialer Wandel, der mit dem RRI Konzept initiiert wird, bedeutet auch, dass Aufgaben und Rollen neu definiert und beschrieben werden müssen. Eine dieser Rollen, die bislang weitgehend unberücksichtigt war, betrifft jene, die mit der Durchführung der Beteiligungsprozesse im Auftrag der Forschungsfördergebung betraut werden. Mangels einer vorhandenen einheitlichen Bezeichnung, werden sie hier »Practitioner« genannt. Demzufolge greift diese Arbeit die Notwendigkeit einer genauen Betrachtung der Rolle der Practitioner auf, als auch den Bedarf einer genauen Forschung über deren Arbeit als Intermediäre zwischen Wissenschaft und Gesellschaft.

Obwohl es für die Rolle der Practitioner noch keine klare Definition gibt, führen diese bereits Beteiligungsprozesse durch. Sie müssen sich dabei auf vorhandene Konzepte und Strukturen stützen. Basierend auf empirischer Arbeit mit den Practitionern selbst werden diese Konzepte und Strategien untersucht. Die Ergebnisse zeigen ihre Perspektiven und Erfahrungen, welche Möglichkeiten und Grenzen sie in ihrer Arbeit wahrnehmen und wie sie damit umgehen.

In den Ergebnissen wird deutlich, dass noch keine allgemein akzeptierten Normen bestehen, die eine Ausformulierung von Rollen und Verhalten ermöglichen würden. Beteiligungsprozesse werden oftmals in Unklarheit und Überforderung ausgetragen. Weiters fehlen im Diskurs eindeutig benannte Akteurinnen und Akteure. Obwohl die Stellung »der Öffentlichkeit« eigentlich von besonderer Bedeutung sein sollte, ist ihre Aufgabe diffus, ihr Handlungsspielraum gering, ihre Rolle in den Beteiligungsverfahren oftmals bescheiden. Practitioner hingegen haben eine multifunktionale und vielfältige Rolle. Sie moderieren nicht nur, sondern sind darüber hinaus auch verantwortlich für den gesamten Prozess. Sie müssen dabei vielschichtige Aufgaben und Pflichten und unterschiedliche Erwartungen erfüllen. Die Rolle der Practitioner kann daher im Diskurs als zentral betrachtet werden. Sie ist zwar einerseits von Unsicherheiten und Rollenkonflikten geprägt, andererseits

nehmen sie Practitioner aber bereits motiviert und empathisch wahr. Sie haben Erfahrungen und Ideen und schlagen Bedingungen, Haltungen und bestimmte Anforderungen für fruchtbringende Öffentlichkeitsbeteiligungsprozesse vor. Sie raten allerdings auch, genau zu hinterfragen, ob und wann Prozesse sinnvoll sind und es eine tatsächliche Bereitschaft für Beteiligung gibt. Diese scheint oftmals nicht gegeben zu sein.

Die Ergebnisse zeigen dadurch auch, dass Öffentlichkeitsbeteiligung im Rahmen von RRI zur Zeit begrenzt ist, Rollenverständnisse noch nicht etabliert und viele der notwendigen Veränderungen noch nicht vollzogen sind. Die vorliegende Arbeit soll zu einer kritischen Reflexion dieses Diskurses beitragen und Empfehlungen und Überlegungen für eine mögliche zukünftige Implementierung geben.

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