**Deliverable D3.3**

# Synthesis report specifying similarities and differences in stakeholder/actor perspectives

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# Contents

# 1. Introduction

## 1.1 Background

The concept of responsible research and innovation (RRI) is a relatively new governance approach to research and innovation that is gaining traction across Europe. RRI is a call to "all stakeholders to work together for inclusive and sustainable solutions to our societal challenges" (Rome Declaration 2014[1]). The concept aims to align research and innovation with the values, needs, and expectations of society, calling for a "collective commitment of care for the future through responsive stewardship of science and innovation in the present" (Owen et al. 2013: 36[2]). This vision involves values that include openness, transparency, anticipation, reflexivity, responsiveness, and flexibility.

A key part of RRI is to engage with societal actors, both stakeholders and publics, early in the development of innovations: "science and innovation are envisaged as being directed at, and undertaken towards, socially desirable and socially acceptable ends, through an inclusive and deliberative process" (Owen et al. 2012: 753[3]). Societal engagement is thus seen as the way to make research and innovation both "inclusive and deliberative". Engagement ensures that science and innovation pathways are shared and this process also allows researchers to transparently engage with the purposes and motivations of involved actors. The legitimacy of this process is gained through the mutual respect, shared commitment, and communication it requires.

A core part of the RRI paradigm is the imperative to engage with Third Sector Organisations (TSOs)[4] because they represent organised societal perspectives. In the context of RRI, "societal engagement" means involving TSOs and other stakeholders in all stages of publicly funded research, from policy formation, to agenda-setting, carrying out research, and evaluating research outcomes. Engagement under the terms of RRI can happen in innumerable ways, as long as it begins early in the innovation process, is representative of diversity, and is focused on the idea of co-responsibility. It must also involve a genuine exchange between involved stakeholders, rather than simply being focused on the dissemination of information.

[1] Rome Declaration on Responsible Research and Innovation in Europe. (2014) Accessed 28/9/2017.
[2] Owen, R., Bessant, J., & Heintz, M., Eds. (2013) Responsible innovation: managing the responsible emergence of science and innovation in society. John Wiley & Sons.
[3] Owen, R., Macnaghten, P., and Stilgoe, J. (2012) "Responsible research and innovation: From science in society to science for society, with society", Science and Public Policy, 39, pp. 751-760.
[4] **Third Sector "actors" or organisations (TSOs)**, "is an umbrella term for various interest groups of citizens, such as civil society organizations (CSOs) and labour unions, as well as religious organisations and informal networks of citizens. …organisations of the third sector are often involved in science in society activities either due to moral, ethical and ideological concerns or in order to represent certain interests of groups of the society" (European Commission (2009), accessed 28/9/17).

### 1.2 About this deliverable

Through "Work Package 3: Mapping barriers and incentives for societal engagement under the terms of RRI" (WP3), our goals are to 1) identify key barriers and incentives for societal engagement under the terms of RRI across different R&I domains from the point of view of Third Sector actors and other stakeholders contributing to RRI, and 2) to explore the similarities and differences in the perspectives of the different stakeholders contributing to RRI. We seek to understand these specific barriers and incentives within particular case study contexts. There are nine case studies across three domains of research: Bioeconomy, Food & Health, and Nanotechnology.

WP3 is comprised of three deliverables. Deliverable 3.1 described our case study selection process, how we developed interview methodology, and the method for analysis we proposed to use. Deliverable 3.2 built on this work by providing the findings from the WP3 stakeholder interviews through three domain-based reports, with specific regard to the barriers and incentives to societal engagement in research and innovation. In this final deliverable (D3.3), we will provide a synthesis of the results of the three domain-related reports from D3.2 by setting out the similarities and differences across research domains, and from the perspectives of different stakeholders and actors. The results reported in this deliverable will inform the overall recommendations outlined in Deliverable 6.2, "Policy Guide on encouraging societal engagement under RRI", particularly in regard to the barriers and incentives to engaging with Third and Fourth Sector Organisations[5] (TSOs and FSOs).

## 2. Methodology

Our work involved selecting 9 case studies across 3 domains of research and innovation. Each of these case studies was chosen as a means by which we could explore the barriers and incentives to carrying out societal engagement with TSOs under the terms of RRI.

The case studies we selected for Food & Health are: A Healthy Future for the Potato (Netherlands); EPINET: In-Vitro Meat (International); and Well Now (United Kingdom).The nanotechnology cases include: BMU NanoDialog, including NanoKommission (Germany); NanOpinion (International); and Tracing Nano, including NanoCap for Downstream Users (Netherlands). Finally, our selected case studies for Bioeconomy (with a focus on synthetic biology) are: Ecover/Solazyme (International); SYNENERGENE (International); and UK Synthetic Biology Strategic Plan 2016 (United Kingdom).

[5] **Fourth Sector organisations (FSOs)** "integrate social and environmental aims with business approaches. Some fourth sector organizations go further by embodying features like inclusive governance, transparent reporting, fair compensation, environmental responsibility, community service, and contribution of profits to the common good". They are often described as "for-benefit" organisations (Fourth Sector (2017), accessed 28/5/2017). Including this stakeholder category allowed us to work with interviewees whose organisation did not meet the definition of a TSO and was also not part of the public or private sector. However, they nonetheless added value to projects through their engagement and it was important to capture their participation.

There was an extended, in-depth selection process for these case studies. We began from the assumption that each potential case study must, at least, satisfy the following criteria: *A societal engagement initiative associated with research and innovation in the three domains of nanotechnology, food & health, and bioeconomy. This initiative must have taken place between 2011 and the present. It can be entirely publicly funded, or be a recipient of public-private funding.* This criteria was established and agreed upon by all of the partners collaborating on this work package. As case studies were added to the list and then narrowed to create a short list, we also considered other factors as part of our search and recording criteria (please see Deliverable 3.1 for the full details of our case study selection process). Ultimately, our final decisions about case study selection were based on whether they reflected a variety of formats of societal engagement and the core tenets of RRI, whether there were conflicts of interest between PROSO team members and the proposed cases, if the case studies were fundamentally interesting, and where the case studies were located (so there was no Anglo-Germanic bias).

Stakeholders were recruited for interview through the networks of PROSO collaborators, through snowball sampling, and through "cold-emailing" (based on information we found online and in publications about the projects we chose). In-depth qualitative interviews began in September 2016 and were completed by February 2017, with most of the transcription work having been finished by the end of January. Please see Deliverable D3.2 (section 1.1.2) for a full summary of how many people were interviewed, from which stakeholder groups, within each case study.

In total, 60 stakeholders were interviewed from across all 9 projects. We were successful in interviewing a wide range of people with adequate representation from all stakeholder groups, although there was some difficulty accessing actors representing particular stakeholder groups in some case studies.

# 3. Analysis

## 3.1 Ontology and epistemology

The work reported in this deliverable takes a critical realist stance, which is a philosophical orientation that emerged from the writings of Bhaskar (1997[6]). Critical realism is an attempt to bridge positivism (oriented towards uncovering empirically observable regularities that can be extrapolated through statistical techniques in order to develop an explanation of the world) and constructionism (concerned with meanings people ascribe to events/the world). Critical realism as a philosophical orientation recognises the existence of reality independent of the mind, whilst accepting the constitutive role of communication and lay theories of the same reality. It therefore recognises the mutually constitutive role of agency and structure, language and social world. According to a critical realist stance, social structures exist beyond mind and communicative properties of interaction, however they are enacted through people's theories which are historically generated and conditioned. Critical realism suggests that shared experiences that

[6] Bhaskar, R., 1975 [1997], A Realist Theory of Science (2nd edition), London, Verso.

may impact individuals in a similar way can be treated as an aspect of reality. This means that tapping into stakeholders' and actors' worldviews and interpretations, and analysing the context, is essential in generating social scientific knowledge that is a valid reflection of reality.

Critical realist explanations of actual social events and phenomena are complex, non-linear and mutually constitutive, acknowledging that small changes in one aspect of the system will affect its other elements (Byrne 1998[7], Williams 2003[8]). The aim of a realist enquiry is therefore to identify these complex and interlacing pathways. In PROSO, this means identifying factors that, taken together, can encourage or prevent societal engagement as part of research and innovation, and which may relate to an individual (e.g. their unique properties) or the social structure. Within D3.2 we have used a thematic analysis to investigate the nature of the specific innovation trajectory through cases that we have selected within each of the three research domains, and we identify some co-occurring aspects of these that coalesced into themes. The task of D3.3 is to provide a deeper explanation of these themes.

In this deliverable we present the stakeholder analysis, which attempts to tap into the perspectives of specific societal actors within the system, thus building a rich picture of the way in which the unique role and position of different actors will be reflected in their perspectives about societal engagement with research and innovation. As the focus of the research is on understanding the barriers and incentives to the engagement of TSOs, guided by critical realist perspectives, we do not limit our investigation only to the perspectives of TSO actors. Instead, we explore the depth of the contingent context that encompasses the roles and perspectives of myriad other actors/stakeholders, including academics, industry, and policy makers. By exploring this multitude of perspectives, and by paying particular attention to the context through a focus on different cases – which are diverse in terms of the issue addressed, the funding involved, the geographical scope, and the number of actors involved – we hope to paint a rich picture of how engagement with TSOs actually unfolds. What emerges from this approach is a realisation that there is no single determinant or dominant causal factor that positively or negatively influences engagement. Rather, there exists a rich and complex web of factors – barriers and incentives - that continually interact with and influence each other to create a unique context for engagement.

## 3.2 Approach to the thematic analysis of case study data

From March 2017, PROSO WP3 partners began their analysis of the case study interviews by reviewing interview transcripts and developing codes and sub-codes related to the specific barriers and incentives to societal engagement. To use definitions from D3.2, "In research analysis, 'coding' is the process of

[7] Byrne, D. S. (1998) Complexity theory and the social sciences, London: Routledge.
[8] Williams, M. (2003) "The problem of representation: realism and operationalism in survey research" Sociological Research Online, 8(1), accessed 28/9/17.

categorising research data. These are the basic definitions for the terms we employ to describe the process of coding:

- A 'code' (also referred to as a 'top-level code') is a category that is applied to a basic segment of the raw data so it can then be assessed in a meaningful way.
- 'Sub-codes' are more specific categories within a particular top-level code.
- 'Themes' are used to describe and categorise how the sub-codes can be related to each other. Each theme should be clear and identifiably distinct from the other described themes."

For the purposes of this deliverable and for D3.2, the only codes we are concerned with are "barrier" and "incentive". The "sub-codes" are the specific barriers and incentives discussed by interviewees. We had to define the sub-codes specifically enough so that they were meaningful, but also generally enough that they could be used across very different case studies. Where possible, we used the words that had been used by interviewees, and defined the codes and sub-codes using the ways they had been discussed within the context of each case study. Please see Appendix 1 in D3.2 for a full list of these sub-codes and their definitions.

Once the sub-codes had been agreed between all WP3 partners, we worked together to group them into themes that emerged inductively from the data. There are nine themes all together.

Table 1: Summary table of barrier and incentive sub-codes grouped by theme

| **Themes** | **Barrier & Incentive Sub-Codes** |
|---|---|
| Anticipated Outcomes | Anticipated outcomes (barrier or incentive) |
| Perception of the issue/Worldview | Perception of the issue (barrier or incentive) |
| | Resistance to changing worldview about the issue or new ways of working (barrier) |
| | Resistance to changing worldview about engagement (barrier) |
| | Adaptability of worldview (incentive) |
| Perception of others | Perceived fixed categorizations of stakeholder groups (barrier) |
| | Imagined publics (barrier) |
| | Conflict between stakeholder groups (barrier) |
| Organisational Practices and Culture | Accessible communication (barrier or incentive) |
| | Institutional practices (barrier or incentive) |
| | Permitted discourse (barrier or incentive) |
| | Academic culture (barrier or incentive) |
| Momentum for change | Role of Key players/Change-makers (barrier or incentive) |
| | "Critical Mass" required for change (barrier or incentive) |
| Innovation processes | Processes of research prioritisation and funding (barrier or incentive) |
| | Resources for stakeholder/public engagement with research and innovation (barrier or incentive) |
| | Timelines (barrier or incentive) |
| | Engagement procedures for meaningful engagement (barrier |

| | |
|---|---|
| | or incentive) |
| Broader Social/ Cultural/ Political Influences | Broader Social/Cultural/Political/Economic Influences (barrier or incentive) |
| Values System | Flexibility (barrier or incentive) |
| | Transparency (barrier or incentive) |
| | Empathy & Altruism (barrier or incentive) |
| | Trust (barrier or incentive) |
| | Reflexivity (barrier or incentive) |
| | Other values (barrier or incentive) |
| Visibility | Reputation (barrier or incentive) |
| | Access to network (incentive) |

These themes are important because they reflect the key areas where stakeholders encounter barriers and incentives to societal engagement in research and innovation under the terms of RRI. The themes help us to consider the ways that specific barriers and incentives (sub-codes) work in combination with each other to either prevent or further engagement, particularly in regard to engaging with TSOs and FSOs.

The WP3 partners who carried out the interviews in a particular domain were responsible for the analysis of that domain through coding and sub-coding the data. This was carried out using data analysis software (either NVivo or MAXQDA). After the coding was complete, partners read through all of the coded data again, doing an inductive qualitative review of which sub-codes emerged most prominently in each case study. These barriers and incentives to societal engagement were discussed in detail within the context of each case study through the domain-based reports in D3.2. Please see D3.2 for those reports.

## 3.3 Analysis procedure across case studies

The across-case synthesis was carried out by Emily Porth and Lada Timotijević (SURREY) using the data presented in each of the domain-based reports in D3.2. In order to find the similarities and differences across case studies in this deliverable, we have taken the data from each of those reports and identified which themes were present in each case study as either a barrier or incentive. The resulting table (see Table 2 below) indicates the prevalence of these themes across case studies and research domains. These results are discussed in detail in section 4.1 of this deliverable.

## 3.4 Analysis procedure by stakeholder group

There are 3 reports in this deliverable which describe the analysis by stakeholder group for each domain. The purpose of these reports is to explore which barriers and incentives to societal engagement were of most concern to particular stakeholder groups; we were especially interested to learn about how to best promote engagement with TSOs from the perspectives of all stakeholder groups. These analyses were carried out and written by Matthew Peacock (Food & Health), Christian Hofmaier (Nanotechnology), and Daniela Fuchs (Bioeconomy).

The analysis by stakeholder group began with running a query through the data analysis software to create a table that details the number of times each sub-code appeared within a distinct stakeholder group, as a result of the data coding process. Taking into consideration the number of people interviewed within that stakeholder group, it was possible to determine which codes appeared most frequently in the group.

The next part of the analysis involved searching the coded transcripts, both across case studies and within stakeholder groups, for key phrases related to the most frequent sub-codes. This allowed us to understand the context in which the specific barriers and incentives to engagement (represented by sub-codes) emerged from the data within stakeholder groups, and to better understand the similarities and differences between case studies. These results are discussed in reports for each domain in section 4.2.

## Table 2: Prevalence and frequency of themes by case study (from D3.2) for the across-case synthesis

| Research Domains | Food & Health | | | Nanotechnology | | | Synthetic Biology | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Case Studies | Healthy Potato | EPINET In-Vitro Meat | Well Now | NanOpinion | Tracing Nano/NanoCap | BMU NanoDialog | Ecover/Solazyme | SBLC | SYNENERGENE | |
| **INCENTIVES** | | | | | | | | | | Total |
| Anticipated outcomes | x | x | x | x | x | x | | | x | 7 |
| Perception of the issue/ Worldview | x | | | x | x | x | x | x | | 6 |
| Values System | x | x | x | | x | x | x | | x | 7 |
| Momentum for change | | x | x | x | x | x | | | | 5 |
| Perception of others | | | | | | | | | | 0 |
| Innovation processes - Resources & Engagement | x | | | x | | x | | | x | 4 |
| Organisational Practices and Culture | | | | x | | | | | x | 2 |
| Broader Social/ Cultural/ Political Influences | | | | | | | | | | 0 |
| Visibility | | x | | | x | x | x | | x | 5 |
| Research Domains | Food & Health | | | Nanotechnology | | | Synthetic Biology | | | |
| Case Studies | Healthy Potato | EPINET In-Vitro Meat | Well Now | NanOpinion | Tracing Nano/NanoCap | BMU NanoDialog | Ecover/Solazyme | SBLC | SYNENERGENE | |
| **BARRIERS** | | | | | | | | | | Total |
| Anticipated outcomes | | | | x | | | | | | 1 |
| Perception of the issue/ Worldview | | x | x | x | x | x | x | x | x | 8 |
| Values System | | | | | x | | x | | | 2 |
| Momentum for change | | | | | | x | | x | | 2 |
| Perception of others | x | x | | | x | | | | | 3 |
| Innovation processes - Resources & Engagement | x | x | x | x | x | x | x | x | x | 9 |
| Organisational Practices and Culture | x | x | x | x | x | x | | | | 6 |
| Broader Social/ Cultural/ Political Influences | | | x | | | | | | | 1 |
| Visibility | | | | | | | | | | 0 |

# 4. Results Synthesis

## 4.1 Across-case synthesis

This synthesis across cases is based on an analysis of the results presented in Deliverable 3.2, as summarised in Table 2 (see section 3.2). Initial observations indicate that ***anticipated outcomes***, ***perception of the issue/worldview***, *and* ***values system*** *are the* ***three most important incentives*** to engaging with society across all research domains, although anticipated outcomes were less important to the stakeholders interviewed in synthetic biology. The ***three most important barriers*** *to societal engagement are* ***innovation processes*** *(an identified barrier in all 9 case studies),* ***perception of the issue/worldview*** *(a barrier in 8 case studies), and* ***organisational practices and culture***. Interestingly, organisational practices and culture was a barrier across all cases in both the food & health and nanotechnology domains, but was not identified as a barrier in any case study in synthetic biology.

We applied a further system of categorisation developed by PROSO partners at OeAW and Dialogik, which is designed to categorise the barrier and incentives to engagement by *type of interaction*. Specifically, these "spaces of interaction" are places of change: they are the spaces within which we can interact with the barriers and incentives to engagement to promote change through policy or practice. The spaces of interaction are: "actor-specific", "procedure-specific", and "system-specific".

"Actor-specific" describes those spaces of interaction which are concerned with individuals and organisations. It encompasses the skills, capabilities, experiences, motivations, and interests of those involved. "Procedure-Specific" refers to the spaces where engagement events, activities, and research and funding processes are carried out. This can include, for example, event format, types of interaction, participant diversity, and the resources (time, money, skills, etc.) available. "System-specific" encompasses contextual spaces. Examples of this include a country, a culture, an institution, a business culture (including "academic culture"), politics, and engagement infrastructure.

These categorisations were applied to discuss the barriers and incentives to engaging with the public through research and innovation in Deliverable 4.3 ("Synthesis Report on citizens' views of engagement in research-related activities"), so we have also applied this system to the themes that emerged from our research about engaging with TSOs (see Table 3). This will enable the results from both of these deliverables to be linked in the Policy and Practice Guide which is the main project output.

Although D4.3 uses four perspective categories (actor-specific, issue-specific, procedure-specific, and system-specific), we have decided to omit the "issue-specific" category. As social scientists, we feel that "issues", which can be defined as the research area or technology, do not really exist outside of the actors, procedures, and systems which produce, change, and contemplate them. Even if someone were to suggest changing the technology in order to increase engagement with TSOs, this suggestion would be the result of the perceived risks and ethics of the technology, and would ultimately be about building a joint understanding of the purpose and the function of the innovation itself. But it is possible, for example, to equip individuals and organisations with more resources and skills (actors-specific), to change the ways participants are engaged with or the how projects are funded (procedure-specific), and to shift the ways that organisational or academic cultures communicate with stakeholders (system-specific).

Table 3: Spaces within which we can interact with the barriers and incentives to engagement and promote change through policy or practice.

| Spaces of interaction | Themes | Barrier & Incentive Sub-Codes |
|---|---|---|
| **Actor-specific** (concerning individuals and organisations; e.g., skills, capabilities, experiences, interests) | Perception of the issue/ Worldview | Perception of the issue (barrier or incentive) |
| | | Resistance to changing worldview about the issue or new ways of working (barrier) |
| | | Resistance to changing worldview about engagement (barrier) |
| | | Adaptability of worldview (incentive) |
| | Values System | Flexibility (barrier or incentive) |
| | | Transparency (barrier or incentive) |
| | | Empathy & Altruism (barrier or incentive) |
| | | Trust (barrier or incentive) |
| | | Reflexivity (barrier or incentive) |
| | Perception of others | Perceived fixed categorizations of stakeholder groups (barrier) |
| | | Imagined Publics (barrier) |
| | | Conflict between stakeholder groups (barrier) |
| | Visibility | Reputation (barrier or incentive) |
| | | Access to network (incentive) |
| | Anticipated Outcomes | Anticipated outcomes (barrier or incentive) |
| **Procedure-specific** (concerning engagement events/activities/ processes; e.g., format, interaction, diversity, outcome, resources) | Innovation processes | Processes of research prioritisation and funding (barrier or incentive) |
| | | Resources for engagement with research and innovation (barrier or incentive) |
| | | Timelines (barrier or incentive) |
| | | Engagement procedures (barrier or incentive) |
| **System-specific** (within the context of a specific country, culture, institution; e.g., engagement infrastructure, science culture, | Organisational Practices and Culture | Accessible communication (barrier or incentive) |
| | | Institutional Practices (barrier or incentive) |
| | | Permitted discourse (barrier or incentive) |
| | | Academic culture (barrier or incentive) |
| | Broader Social/ | Broader Social/Cultural/Political/Economic Influences |

| | | |
|---|---|---|
| political culture, civic culture) | Cultural/ Political Influences | (barrier or incentive) |
| | Momentum for change | Role of Key players/Change-makers (barrier or incentive) |
| | | 'Critical Mass' required for change (barrier or incentive) |

Returning to the prevalence of themes in Table 2, it is interesting to note **that *the top three incentives* to engagement (anticipated outcomes, perception of the issue/worldview, and values system) *are all actor-specific* spaces of interaction**. In contrast, ***the top three barriers*** *to engagement (innovation processes, perception of the issue/worldview, and organisational practices and culture)* ***capture all three spaces****: the first is procedure-specific, the second is actor-specific, and the third is system-specific*. Although this is a small sample and the prevalence of these themes across research domains is not necessarily representative of trends in research and innovation as a whole, it is interesting to ask what we can learn from this about how science governance can more effectively promote societal engagement under the terms of RRI.

The next three sub-sections are each dedicated to a space of interaction, and to a discussion of the themes encompassed by them. This will include a reflection on the prevalence of each theme within the data (in reference to Table 2) and speak to the ways themes emerged within and across the case studies. We also seek to frame the themes as challenges that policy makers can identify and then resolve with specific solutions.

### *4.1.1 Actor-specific Challenges*

The themes which interact with "actor-specific challenges" are: Anticipated Outcomes, Perception of the Issue/Worldview, Perception of Others, and Values System. As noted above, the top 3 most frequently occurring incentives for societal engagement across case studies are all actor-specific, although one of these themes (Perception of the Issue/Worldview) is also the second most prevalent barrier to engagement.

#### *Anticipated outcomes*

"Anticipated outcomes" refers to what stakeholders imagine could happen through new technologies and how these may impact society and the future of the technology in the broadest sense. The ability to imagine these outcomes can play a role in stakeholders' drive to engage in a dialogue about research and innovation. Interviewees conceptualised anticipated outcomes either in relation to the innovation (e.g. cultured meat) and its possible broader impacts (e.g. climate change), or in regard to outcomes of the process of engagement itself. This theme was ***one of the two most significant incentives*** *to carrying out societal engagement in research,* ***appearing in 7 of the 9 case***

***studies***; it was an incentive in all cases across the domains of Food & Health and Nanotechnology, but was absent in two case studies in synthetic biology.

In the case of A Healthy Future for the Potato, both participants in the engagement activities and those who agreed to become part of the project's valorisation panel became engaged in part because they were excited for, or in some measure concerned about, the impacts of the new hybrid potato seed. These impacts could include a range of possibilities, from transforming world food security, to segments of the potato industry being pushed out of business because they are unable to adapt to the wide-ranging changes in the potato supply chain. Being involved in the project was a way to voice and otherwise engage with those concerns about the future. However, some technologies/research domains that are typically described as "blue sky" do not easily translate into application and its future benefits may not be obvious. Engagement involving these topics may be less likely to attract stakeholder interests and, subsequently, willingness to engage.

Anticipated outcomes in relation to engagement can be about extrinsic or intrinsic impacts. Intrinsic impacts are discussed as stakeholders gaining something personal from the engagement, such as learning, reflexivity, and trust-building, through which their future practice and organisations benefit. Extrinsic impacts are stakeholders' ability to anticipate the influence/effect of any engagement with the issue. From the perspective of the synthetic biology case studies, TSOs were often less focused on the outcomes of engagement in regard to resolving conflict, and more interested in the mutual learning and building of relationships that happens through the engagement process. This may explain why "anticipated outcomes" (conventionally thought of as being extrinsic), did not emerge as a prominent incentive in two of the synthetic biology case studies.

Extrinsic impacts can also relate to the anticipation of conflict escalation as a result of the engagement, which may lead certain stakeholders (ostensibly researchers) not to engage with those groups whom they perceive as conflictual (e.g. some TSO or industry stakeholders). In this sense, it is about whether engagement process is seen to be aligned with the core values of trust and responsiveness. When there is lack of trust that engagement will have a stated outcome, that it will comply with values of mutual respect and responsiveness, or when there is a lack of communication by the organisers of the engagement about the outcomes and how they will be used, this can curtail willingness to participate in current or future engagement processes. For instance, in the early days of the Well Now programme, some participants had been referred to the programme by other healthcare professionals who told patients that they would be evaluated for gastric bypass surgery. Instead, the programme asked them to reconsider their relationship with their own body and with food through a 6 week course. When participants realised they were not going to be considered for

gastric bypass surgery as they had been led to believe by other healthcare professionals, some became angry and were completely unable to engage with the Well Now programme. They lost trust not only in the engagement process, but in the National Health Service as a whole. This speaks to the important ways that values systems are intertwined with anticipated outcomes, and why it is important to speak explicitly about how an engagement programme's design and communication strategy can contribute towards establishing trust with participants.

### *Perception of the Issue/Worldview*

The theme of "Perception of the Issue/Worldview" includes the perception of the issue, resistance to an actor changing worldview about the issue or about engagement, and the adaptability of an actor's worldview to take on new ways of thinking and working. This theme was ***both*** *the* ***second most important incentive*** *to societal engagement,* ***and the second most important barrier*** *to it*, which speaks to how important perception and worldview are in facilitating societal engagement under the terms of RRI.

The dominant representation of an issue or innovation is often a reflection of to what degree an actor/stakeholder promotes a particular framing of that issue. For instance, some stakeholders perceive synthetic biology in terms of sustainability, and they conceptualise it in light of benefits for the future of the planet, thus framing the discussions primarily in terms of health and environmental risks. However, there are also efforts to conceptualise synthetic biology as having safety concerns akin to those about genetic engineering, which is ultimately a critique of its marketization potential. Which narrative receives the most attention will affect stakeholders' understanding and knowledge about the topic, and ultimately influence whether they want to become engaged. Whilst opening up the framing of the issue is of primary concern under the terms of RRI, the way in which the issue is perceived or framed may de-incentivize engagement of exactly those groups that may help to broaden the terms of debate.

Worldview is closely tied to the theme of "values system", and particularly to the values flexibility, adaptability, and openness. It is also linked with the concept of critical mass, which is ultimately about a shift in worldview that spreads and can lead to widespread change. In TracingNano/ NanoCap, for instance, it was felt that the engagement process (consisting of discussion and information exchange) valuably influenced all participants' perspectives on nanotechnology. Being able to focus attention on specific issues raised by the TSOs provided academics with the opportunity to see the deep level of understanding that TSOs had about the topic, and a gave them a better understanding of the rationale behind their concerns. Being able to enter into this dialogue in the first place and, most importantly, to internalise others' perspectives, speaks to academics'

adaptability of worldview in this case study. If academics attempting to carry out societal engagement are ultimately resistant to changing their worldview, the engagement effort will be reduced to a box-ticking exercise. This speaks to the need to invest in training academics about the principles of RRI, and to consider building incentives into the academic promotion system for added impetus for them to take this work seriously.

Resistance to changing worldview about an issue or about engagement *within* an organisation/ stakeholder group is also a key barrier to societal engagement. This was discussed at length in regard to the Well Now case study in D3.2 (please see that report), and it was also a prominent issue in the Tracing Nano/NanoCap case study mentioned above. Although academics adapted their worldview through the engagement process, TSOs felt that their perspectives were not actually being taken into account to shape policy; decisions were made in line with the economic goals of industry and government stakeholders, rather than being in line with the societal values and needs represented by the TSOs. In this case, it seems to be the policy makers who commissioned the research, received the recommendations from academics, and subsequently made the policy decisions who were the actors ultimately resistant to changing their worldview and perception of the issue. This should be of concern to those who are advocating for a science governance agenda across Europe that is grounded in the principles of RRI.

### *Perception of Others*

This theme describes how actors within the innovation process perceive each other and how they perceive the wider publics, and this in turn affects whether and in what ways engagement will be sought. This was ***not an incentive for societal engagement in any case study****, and was an identified* ***barrier in only 3 case studies****, two of which were in Food & Health*.

Despite the value of engaging with different stakeholders in the spirit of mutual responsiveness and learning, there is evidence in the data that some actors will not engage with others because of assumed knowledge. Their perception of others is based on stereotypes and fixed categorisations, as well as the anticipation of conflict. If, for instance, a scientist believes that they have knowledge of a TSO's position on an issue, and if that position is seen to be controversial or leading to animosity, there will be less willingness to engage with the TSO. TSOs may also perceive engagement in innovation processes that include the private sector as antithetical to their values and damaging to their core mission and constituent roles as granted to them by their charter and their own stakeholders/trustees. Both of these situations occurred in the Healthy Potato case study, where a prominent environmental charity had been involved in the project's valorisation panel, and then left the project once an industry partner became involved. There was also some anticipation from

particular actors that environmental TSOs "lived from opposition… when there's no controversy, they lose their reason for existence".

It was in nanotechnology, where societal engagement has been done consistently for a long time, that there was recognition from those involved about importance of continuous engagement processes. They are crucial for building trust and establishing relationships between diverse stakeholders. In this sense, the best way to encourage societal engagement in R&I and break down these perceived categorisations is to gain experience doing it and working with others. However, there are other activities and more formal exchanges, secondments, and internments that could also lead to more positive attitudes towards the value of engaging with other stakeholders and publics.

### *Values System*

The theme "Values system" was ***one of the two most significant incentives*** *to carrying out societal engagement in research,* ***appearing in 7 of the 9 case studies***; it was an incentive in all cases across the domains of Food & Health, and was present in two case studies in both nanotechnology and synthetic biology. It was ***only identified as a barrier to engagement in two case studies***, which were TracingNano/NanoCap and Ecover/Solazyme.

Transparency emerged as a core value that was essential for societal engagement across all 3 research domains. It was defined in the sense of researchers being open and honest about the research process, about the aims and format of the engagement procedures, and about how outputs were envisioned to impact policy or the development of the technology. Transparency was strongly linked to the idea of trust, and was primarily expressed in terms of the importance of creating trust during both innovation and engagement processes. For example, in the case study "A Healthy Future for the Potato", Solynta's commitment to transparency through their development of the hybrid potato seed was a way to seek acceptance of their new innovation from other stakeholders in the potato supply chain. In the NanoCap case study, several TSOs mentioned the important role transparency played as part of the process of building trust between participants during engagement. However, other stakeholders in NanoCap reported that they came into the project unable to trust project participants because of their preconceived ideas about different stakeholder groups, and it was difficult to let go of these stereotypes in order to cultivate trust.

Reflexivity was also discussed at length, and stakeholder engagement was perceived to be a means by which reflexivity could be achieved as a core social value. Responsiveness and openness appear to be prerequisites for engagement, and whilst this may be conceived of as a matter of individual value orientation, these values could be nurtured at all levels, from the individual, through organisations,

to larger institutions of practices (e.g. science, government). The challenge is how to instil the values that may be the core enabler of engagement with R&I in the future (e.g. through education, narrative, and concrete institutional practices such as funding).

### *Visibility*

"Visibility" emerged as an important ***incentive to societal engagement in 5 out of 9 case studies****, and was* ***not indicated as a barrier*** *to engagement in any case study*. There are two sub-codes related to the theme of visibility, and these include "reputation" and "access to network" (see Table 1). Of these two, "access to network" was the sub-code that appeared most prominently across case studies, and it was an incentive that enticed stakeholders to want to become engaged in R&I projects.

In cases like In-Vitro Meat, the engagement event was seen by researchers as a way to reconnect with each other, and an opportunity to brainstorm how to create new sources of funding. For other case studies, such as in nanotechnology, engaging in a project was an opportunity for TSOs to connect with other TSOs, as well as connect with researchers whose work could potentially benefit the mission of the TSO. In SYNENERGENE, gaining access to networks meant an opportunity for stakeholders to participate in national and European-wide debates on new technologies.

The case study research tells us that networks need to be recognisable to invited stakeholders, and perceived to be permeable through the process of engagement. Engagement in this sense cannot just be a token exercise in "box-ticking" that leads to networks which are actually closed, but must be a genuine process of mutual exchange. The visibility provided through the engagement process could also have the potential to lead to new opportunities and partnerships with other stakeholders.

### *4.1.2 Procedure-specific Challenges*

Innovation Processes is the theme which interacts with "procedure-specific challenges". This theme includes processes of research prioritisation and funding; resources (time, money, knowledge, etc.) available for societal engagement; timelines; and engagement processes. Through our analysis of the data presented in the domain-based reports in D3.2 (see Table 2), *procedure-specific challenges were the third most prevalent barrier to societal engagement, and the sixth most prevalent incentive to societal engagement*. This indicates that ***the current constellation of processes around research and innovation play a more significant role in preventing societal engagement than in promoting it***. Across all research domains, the most challenging procedure-specific barriers were lack of resources to carry out societal engagement, and processes of research prioritisation and funding, which are not often hospitable to multidisciplinary projects.

### *Innovation Processes*

Innovation processes refer to the processes through which decisions are made about how to prioritise certain research and innovation trajectories, and the decisions about the resources that will be allocated to them (e.g., funding of research and innovation, capacity building, dissemination of research results). How engagement is conceived of throughout this process provides the context/cultural and material backdrop for engagement that acts as a barrier or incentive to engaging with TSOs and other stakeholders in research, and mutual exchange between different actors within the system. *Only 4 case studies found that innovation processes were an incentive to societal engagement in R&I, and* ***all nine case studies found that innovation processes were a barrier to engagement: it was the number one identified barrier****.* In particular, of the four sub-codes encompassed by the "innovation processes" theme (which includes processes of research prioritisation and funding, resources for engagement, timelines, and engagement procedures), **a lack of resources to carry out or participate in engagement emerged as the primary barrier**.

The way in which innovation processes are governed can send signals to stakeholders such as TSOs about the value of their input. For instance, if innovation is primarily linked to economic valorisation and the "knowledge economy", this can act as a barrier to engagement for many actors/stakeholders who may not share such an understanding. The perception that innovation processes prioritise technological innovations that can demonstrate clear economic benefits, rather than those that have less quantifiable benefits, is a barrier to engaging certain groups of stakeholders, such as TSOs and FSOs. In the SBLC case study, for instance, a main criticism of the leadership panel was around its membership, which was more or less comprised of academics, scientists, and industry that were interested in funding availability and opportunities for economic profit. The only place for TSOs to have their voices heard was through dedicated public dialogue events, and there were no other opportunities to encourage the leadership panel to focus on societal needs and values.

Innovation processes create parameters around engagement, such as project timelines and the resources available for different aspects of a project. In relation to the latter, for instance, the innovation processes as they are currently practiced may prioritise and actively seek the input of a specific type of stakeholder, for instance industrial partners, over other type of stakeholder, such as TSOs. FSOs like artists may be difficult to form partnerships with because they do not know what the creative output of a project will be prior to beginning the work, but the output may need to be defined in advance in a funding application. This can make collaboration difficult, and also limit funding opportunities.

Other factors, such as timelines, can also make engagement difficult: TSOs and FSOs, for example, are often used to working to much shorter timelines than academics, and this can cause tension if not deliberately planned for. Timelines can also impact academics; academics in the Healthy Potato case study were passionate about working interdisciplinarily, but they felt that the timelines of most projects did not allow academics from science and social science disciplines to learn from each other, and certainly did not allow academics enough time and opportunity to mentor PhD students and post-doctoral researchers to work across disciplines. Although this was not the situation in that case study (the 5 year project length was seen as "exceptional"), it was an issue they had encountered in previous projects and worried about for the future, particularly in relation to training PhD students to work across disciplines, where there is widespread pressure to make doctoral programmes as short as possible. These issues speak to the need for innovation processes to be more flexible so as to engage with as many societal stakeholders as possible, and for research funders and policy makers to acknowledge that interdisciplinary work – particularly when it involves societal actors – requires long-term commitments, as well as opportunities to build relationships founded on trust and mutual respect over a prolonged period of time.

### *4.1.3 System-specific Challenges*

The themes which interact with "system-specific challenges" are: Momentum for Change, Broader Social/Cultural/Political Influences, and Organisational Practices and Culture. *Themes related to system-specific challenges were* ***not particularly prevalent incentives*** *for societal engagement (momentum for change appeared as an important theme in just over half of case studies), but* ***organisational practices & culture was the third most prevalent barrier***.

#### *Organisational Practices and Culture*

"Organisational Practices and Culture" was perceived to be an ***incentive to engagement in only two case studies*** *(NanOpinion and SYNENERGENE), but it was seen as a* ***barrier in every case study across the Food & Health and Nanotechnology domains****.* This theme encompasses a variety of different aspects, from institutional practices, to what discourse is permitted within institutions, and whether communication from researchers was accessible to non-academics. It also includes the nebulous, yet widely acknowledged, entity that is "academic culture".

In the SYNENERGENE case study, some TSOs felt that participating in engagement events was in line with their mission statements, and this acted as an incentive for them to get involved. Interviewees in Nanodialog also thought societal engagement had been mainstreamed within their institutions, which was incentive to carry out further engagement on specific topics within nanotechnology (which had been a successful strategy to get particular stakeholders involved). However, in

TracingNano/NanoCap, academic culture was perceived to be a barrier to societal engagement, in the sense that researchers' efforts to carry out engagement were treated as unimportant within their institutions. There were no reward mechanisms in place within universities to acknowledge, appreciate, or encourage that work. As a result, TSOs who had engaged in projects with academics did not feel as though their perspectives were taken seriously, and this was a barrier to future engagement. The negative impact of academic culture on the desire of researchers to carry out societal engagement speaks to the need for institutions to develop new ways to value this type of work, including processes for promotion, so that it becomes a valued, important, and standardised part of academic research.

### *Momentum for Change*

The "momentum for change" theme encompasses two incentive and barrier sub-codes: role of key players/change-makers, and critical mass. *This theme was an **incentive** for societal **engagement in 5 case studies**, and it was seen as a **barrier to engagement in only 2** case studies (NanoDialog and SBLC).*

Critical mass is defined as when there are a sufficient number of adopters of an innovation for it to become self-sustaining and create further growth. We can use this loosely defined concept to think about critical mass as an incentive for engagement. When a critical mass of people adopts a particular perspective, there is often a greater willingness within an institution or culture to engage with that innovation. Similarly, once a critical number of actors have the perception that an issue (e.g. a solution to a problem) is relevant, this can act as a catalyst for those actors to seek engagement from broader group of stakeholders on this issue. This can happen directly, such as when an increasing number of people engage with the issue, or indirectly, such as when more funds are directed to foster engagement due to the perceived growing relevance of the issue. The latter explains why momentum for change was an incentive for societal engagement for all 3 of the nanotechnology case studies, as there was a huge push from policy makers and research funders to carry out research with a wide range of stakeholders on the possible impacts of this technology when it began to emerge, around the year 2000.

To achieve critical mass, an issue needs opinion leaders: the individuals who are willing to be the spokespeople for the topic of concern and who are effective in transmitting the message. These "key players" or "change-makers" can thus influence the wider adoption of innovation. The role of key players is to achieve momentum, and as part of this an increasing mass of people (including organised stakeholders) are recruited and engaged. This is often mentioned in the data, especially in relation to the topics that are new or innovations that challenge received wisdom. The Well Now

case study is a particularly good example of momentum for change, especially because it is a social innovation that is slowly resulting in an organisational culture change around the treatment of people categorised as "obese". In this case, there were a few key players in the NHS Highland public health team who found that traditional weight loss programmes had very low success rates. These programmes also failed to account for the mental and emotional health of patients, the social and environmental factors which affect whether people are able to follow the advice they are given, and how such programmes can ultimately vilify larger people who then internalise shame and stigma about their body size. Well Now is linked to wider shifts in Western culture that have been instigated by an international fat activism and body-positive social movement.

The Well Now programme was brought into NHS Highland by a few key players who introduced the training to other staff in public health; although most people trained in this approach have been incredibly enthusiastic about the programme and are passionate about promoting it (i.e., it has reached critical mass within the public health team and is still spreading throughout the institution), some staff members (particularly dieticians) have struggled to embrace a programme that does not focus on weight loss as the major outcome of the programme. This demonstrates how an actor-specific theme we previously discussed, worldview, is closely intertwined with the system-specific theme of momentum for change: if someone has a fundamentally different understanding of what constitutes appropriate treatment, and for what reasons a programme participant may or may not be successful in weight loss, it is very difficult for them to accept radically different ways of engaging with participants and, thus, for change to be successful at a systemic level. This is an important lesson for policy makers, as well as those trying to promote institutional culture change. In response to this challenge, those managing the Well Now programme within public health at the institutional level decided to encourage staff complete the Well Now programme as participants, before training them to deliver the programme and implement its philosophy as part of their daily jobs. Engaging with the ideas on a personal level, before engaging with them professionally, seems to have resulted in a greater acceptance of the programme and its ideas. Programme managers are also committed to engaging with other health care staff in one-on-one conversations about the programme and more broadly through seminars and lectures.

### *Broader Social/Cultural/Political Influences*

Broader influences ***only*** *emerged as a noteworthy theme in the* ***Well Now*** *case study, in the form of a* ***barrier*** *to societal engagement*. This is likely for two different reasons: First, Well Now is the only case study we selected which is an example of a "social innovation". As such, it is perhaps inevitable that it may be more directly (or, at least, more obviously) affected by broader social, cultural, and political influences. Second, the programme was designed and practised from a social justice

perspective, which means it actively sought to recognise and reduce inequalities and exclusion. Subsequently, this has meant those involved in developing the programme also recognised the myriad ways these broader forces impacted participants' abilities to implement what they had learned, or to even attend the course in the first place. For instance, a low income precluded some participants from being able to buy healthy food, or to afford appropriate shoes for sport. Other participants lived in more rural areas and did not have access to a car, but using public transportation to reach the programme venue would have taken an excessive amount of time, which made attendance untenable for those who were caregivers or who had a disability. Programme facilitators were also mindful that the spaces in which they held the course needed to be accessible to those with limited mobility, and they also needed to pay attention to minor details, such as having chairs without arms so that larger people would be comfortable and feel welcome. Being trained to have an awareness of these factors means it is to be expected that interviewees would discuss this topic explicitly, and that it would emerge from the data as being an important theme.

Even though this theme only appeared to be significant in this one case study, the fact that social, cultural, and political forces are undercurrents in all research and innovation processes means that this theme had an influence in every case study. As such, it is important to note how social, cultural, and political shifts impact the research and policy landscape, ultimately making stakeholders more open or closed to engagement processes.

## 4.2 Stakeholder Analysis

This section contains the three domain-based reports which explore which barriers and incentives to societal engagement were especially prevalent within particular stakeholder groups across the case studies within a single domain. The quotes presented in these reports have been edited for readability, and any identifying features have been removed if we did not have an opportunity to check these quotes with interviewees prior to publishing the deliverable, in order to maintain their anonymity.

### *4.2.1 Food & health stakeholder analysis*

This section provides an analysis of the food and health case studies described in Deliverable 3.2. Whereas the earlier report compared the barriers and incentives described by those involved in different case studies, this section explores how the described barriers and incentives varied amongst stakeholder groups.

The case studies themselves and the projects they represent are described elsewhere in the report and discussed in detail in deliverable 3.2. However, to recap, the three illustrative case studies in the domain of food and health are:

(a) A Healthy Future for the Potato

(b) EPINET: In-vitro meat

(c) Well Now

This deliverable will analyse incentives and barriers for societal engagement – particularly those affecting the engagement of Third Sector Organisations – in the area of food and health. These will be discussed in relation to stakeholder groups because different types of stakeholders have different interests and capabilities and their reasons for engaging in research and innovation in different domains will vary accordingly.

In total 32 interviews were carried out and, due to time constraints, 15 of these were analysed. This included 4 interviews with members of Third and Fourth Sector Organisations (TSOs and FSOs), 5 interviews with academic stakeholders, 1 interview with an industry stakeholder, and 5 interviews with policy makers. No research funders were available to be interviewed. This distribution is described in Table 4 below.

Table 4: Interviews per stakeholder group in each case study

| Case Study / Actor group | A Healthy Future for the Potato | EPINET – In-Vitro Meat | Well Now |
|---|---|---|---|
| TSOs/FSOs | 1 | 2 | 1 |
| Academia | 2 | 3 | 0 |
| Industry | 1 | 0 | 0 |
| Policy Makers | 1 | 0 | 4 |
| Research Funding | 0 | 0 | 0 |

As the interviews were unevenly distributed across stakeholder groups, this report will not seek to generalize findings to speak for entire stakeholder groups or for the research domain. Moreover, as a qualitative analysis, generalisation is not the objective. Instead, it aims to explore the different patterns of incentives and barriers to engagement cited as important by these particular examples of stakeholders within different groups. Again due to the small number of interviewees, the analysis will avoid identifying the quotes and examples by case studies whenever possible to maintain the confidentiality of interviewees.

Table 5 below shows the most prevalent barriers and incentives, as identified by the coding incidence of sub-themes within the interview transcripts, ranked within each stakeholder group.

Table 5: Most prevalent barriers and incentives ranked by stakeholder group.

| | TSO/FSO | Academia | Industry | Policy Makers |
|---|---|---|---|---|
| 1 | Engagement Procedures | Engagement Procedures | Broader social, cultural or political influences | Engagement Procedures |
| 2 | Perception of issue | Perception of issue | Innovation Processes | Resistance to changing worldview about topic |
| 3 | Resources for engagement | Academic culture | Resistance to changing worldview | Organisational Practices |
| 4 | Innovation Processes | Anticipated outcomes | Anticipated outcomes | Role of key players/ change makers |
| 5 | Academic culture | Organisational practices | Perceived fixed categorisations of stakeholder groups | Empathy and altruism |
| 6. | Perceived fixed categorisations of stakeholder groups | Perceived fixed categorisations of stakeholder groups | Resources for engagement | Perception of issue |

It should be noted that as there was only one stakeholder in the Industry category, the ranking within this group is likely to be less representative than in other groups.

The sections that follow will discuss the most important incentives and barriers to societal engagement by each stakeholder group. The ranking in figure 2 above reflects how many times the different thematic sub-codes were used in the coded interview transcripts.

### *Perspectives of Third and Fourth Sector Organisations (TSOs)*

The sections that follow will discuss in more detail the incentives and barriers for TSO engagement in research and innovation for Food and Health. For brevity, the acronym TSO will therefore sometimes be used to encompass both third and fourth sector stakeholders.

The decision was made to discuss third and fourth sector organisations together in this report. Though distinct in some ways, there were significant similarities between the likelihood of third and fourth sector stakeholders engaging in R&I. Crucially, these groups are alike in that they represented avenues for organised citizens to engage in RRI processes.

Whilst academic, funding, industrial and policy-making stakeholders all engage with R&I on the basis of providing funds, knowledge or in some other way enabling the process of research, the involvement of the third and fourth sector organisations is science engaging with society in its purest form because engagement can be driven by a belief in the innovation or care for the broader issues it

seeks to address. Although other stakeholders were implicated in some way in the infrastructure that enables and sustains research, third and fourth sector organisations represent the embeddedness of RRI in wider society; engaging with them therefore has the potential advantage of holding it true to the goals and values of the people its innovations must ultimately benefit. Furthermore, whilst researchers have no choice but to engage with or be influenced by funders, policy makers and industry to different extents, they are not necessarily obligated to involve third and fourth sector organisations at all and when they to choose to do so, as the analysis that follows describes, it tends to be for specific reasons and in service of specific goals.

### *Incentives*

Engagement procedures/Anticipated outcomes

Whilst policy makers, industry and academia all to some extent were already a part of the research and innovation process, third and fourth sector organisations represent the interests of outsiders, or at least of those not intrinsic to the system. Therefore, in order to be able to engage with RRI, TSOs first needed to be invited in.

It is no surprise then that engagement procedures emerged as so important in determining whether TSOs successfully and meaningfully engaged in the process or indeed whether they were involved at all. Crucially, the research and innovation process needed to be made transparent and accessible to them in some way that spoke to their goals, values and anticipated outcomes.

The one notable exception was the Well Now programme, which tended to manage engagement process differently from the other case studies in several respects because it is an innovative weight management programme rather than a scientific research project taking place within academia. A key aspect of this distinctness is that it was conceived and driven by a fourth sector stakeholder who therefore took on the role normally played by academia of designing and putting into action the engagement process. In the early stages of building the Well Now programme, engagement was crucial in gaining support and building a network that could help make her vision a reality: “the conferences and stuff, I’ve done because I want to meet people and I want to get the message out there”.

Though it was less common for other third and fourth sector stakeholders to initiate engagement processes themselves, they were nonetheless driven to engage by the same need to find new mediums for their message. When they did engage it was likely to be because this gave them a forum in which they could exert influence or a means to make their voices heard.

FSOs and TSOs are also distinct from other groups in their diversity. Different case studies attracted interest groups with different goals and objectives who were motivated to engage in the process (or not) for a variety of reasons. These reasons reflected both those goals and the remit they represented. In all of these cases, meaningful and sustained engagement required researchers to immediately establish the anticipated outcomes of the process and clearly align their goals with those of the TSOs:

> "I feel like there wasn't a strong sense of what the purpose of the meeting was [laughing]. I mean, I don't mean to bash it, but it's more like, if I were to have done it, I think I would have made it very, very clear what we were trying to accomplish. The thing that it felt like, in the end, was, okay, we all agree that there's not enough funding in this area and so we need to figure out how to get more funding, and that's kind of been a theme for meetings about [x]. So, that would have been very helpful."

The outcomes that third and fourth sector organisations desired, which justified spending time and resources on engagement, could sometimes appear mismatched with those of the researchers they were engaging with. Whereas researchers were primarily motivated by achieving specific goals – making a technology viable or more efficient – to fulfil the demands of their funders, third and fourth sector groups answered to members of the public who were often motivated by less tangible or longer-term goals and beliefs. Third sector stakeholders were particularly aware that change is as often driven more by the momentum of technological progress than the ideals that motivated their members and funders.

> "A lot of our supporters are also [x], who see this as a natural next-step, a technology that essentially helps people do the right thing. There have been lots of instances in the past of major changes happening because of a technology and not necessarily because of people having different opinions or a change of heart or a behavioural change."

Though sometimes driven by abstract ideals and a concern for the wellbeing of hypothetical future populations, third sector stakeholders were also astute enough to know that research and innovation was going to happen with or without them. Those operating on a not-for-profit basis recognized that the influence they could exert – at least in the short term - was likely to be less than that of an organization that makes money. They nonetheless saw their current operating model as both more commensurate with long term efficacy and more reflective of the goals and values of their members:

> "I also got involved with this because I felt like it was going to happen anyway and I wanted it to happen my way [laughing]. I do think that we've chosen a much more difficult path in doing things [this] way… we're constantly confronted with the idea maybe we could do this faster if we were private, but ultimately, we've chosen the much harder path of keeping things as open as possible, but I think it's more sustainable and will have a bigger impact in the long run."

Ultimately, engagement in RRI came at a significant cost to the necessarily limited resources afforded by their supporters – a relatively large expenditure in exchange for a relatively small degree of

influence – but for many of these groups it was less a question of whether they can afford to be part of the process and more one of whether they can afford not to be.

A key to successfully engaging in the RRI process whilst continuing to serve the interests of members and financial supporters was to adhere to the core values which drove the organization in the first place; these will be the subject of the next section.

Core Values – Transparency and Perception of the issue

More than most other groups, third and fourth sector organisations were driven by the need to directly represent the views and underlying core values of their members in everything they do, including engagement activities. While we have seen that establishing a sense of shared, or at least mutually compatible, anticipated outcomes early on is crucial to fruitful engagement between researchers and TSOs, the same appears to be true on the more abstract level of core values. This may be especially the case if third sector organisations are driven as much by the values they serve as the anticipated outcomes of the engagement process, values which may be different to those driving other stakeholder groups they engage with.

> "it depends on the values that you want to achieve, and that actually is an interesting bridge towards the concept of responsible innovation because it depends whose values you are working on. Are they commercial values, are they societal values, and if so, who is it to determine it?"

This tendency to talk about reasons for engaging in terms of values is not surprising. Believing in core values, be they abstract principles regarding animal welfare or a vision of how to feed a growing population in the decades to come, is not only what drives third sector organisations to engage in the RRI process: it is the reason they exist in the first place. As one listens to stakeholders discussing this process it becomes increasingly clear that this makes these organisations fundamentally different from other stakeholders.

> "Whereas, when you're a donor organisation, it's very much you're receiving funding from people […] It only seems fair that, if you're using money from the public, you should make whatever research you develop with it public as well."

Part of this responsibility lay in ensuring that the knowledge and innovations developed by research ultimately benefitted society by being appropriately and efficiently applied. Whilst commercial and society values are sometimes seen as being in opposition, one third sector stakeholder in particular made a compelling case that the commercialization of new techniques had a key role to play in putting innovation into action.

> "My position now, here at [X], is to make sure that research, especially fundamental research somewhere in universities, end up with people who translate it to application. […] The first step in valorisation is to move towards the commercial use of scientific knowledge."

There was more to TSO's roles beyond simply ensuring their engagement ultimately benefits society; just as important in many cases was ensuring transparency at every stage of the research process. Transparency in general emerged as a key value for third and fourth sector organisations and especially those funded by individuals on the basis of belief in or commitment to a cause who needed to be shown that the organization is doing the job they entrusted it with. This was all the more difficult – and all the more important – when the researchers they engaged with worked in scientific fields with their own academic culture and language that then had to be made understandable to their supporters. These supporters included members of the public who may have a strong interest in the mission of the TSO, such as animal welfare or finding ethical sources of food for the future, but might lack specific scientific training to be able to access the information.

> "I think transparency is such a key element of any [innovation] and I think should be more of a key element of science in general, especially in an age where there's a lot of science denial and confusion and misinformation about scientific research."

In these instances the unique role of a third or fourth sector organisations included not just engaging with researchers to represent the needs of their members, but engaging with members to represent the research, acting as a kind of intermediary between scientific institutions and the public they serve.

The role of third and fourth organisations in engaging with RRI was depicted as even more crucial in that while researchers are responsible for advancing technology to the next level on behalf of their institutions and funders, it is these smaller organisations which represent the voices of the public in innovations such as in-vitro meat and hybrid potato seed, and who benefit from the engagement. It therefore falls to TSOs, utilising opportunities to engage with the scientific infrastructure, to think of the longer time and larger scale, weigh up the practical and ethical implications, and give a voice to society.

### *Barriers*

Academic Culture/Perception of the issue

Successful interdisciplinary collaboration is important for fruitful engagement, but is difficult to achieve; many interviewees said this difficulty was closely tied to academic culture. Disparities in language that hampered communication between stakeholder groups was especially evident between the representatives of the various highly specialized scientific fields involved and the third sector organisations which represent the interests of concerned members of the public. The extent of this difficulty also hinged on the backgrounds of the third sector stakeholders themselves, some of whom may have worked in academic research before joining third sector groups.

Another reported obstacle to the engagement of third and fourth sector stakeholders stemmed not from the process of engagement itself, but the highly compartmentalised disciplines in which scientific researchers are used to working in. Interviewees depicted scientists working in fields of research that, however similar they may appear to the layperson, are culturally and academically distinct from each other. These fields of research rarely communicate, let alone regularly engage with others outside of the scientific community. When third and fourth sector stakeholders manage to successfully engage with academia, it may not be based on their ideas or what they had to offer, but because they have some experience and value in the academic world that could be capitalized on.

> "[name] got in touch with me and said that they were doing a conference, like a local conference, and would I come and speak to them… So, I'd spoken in Edinburgh at [x] conference, so all this time, I've got a PhD but I've never been in academia. I've been on the fringes and I have been read as if I'm in academia, which is social capital which can be great."

Being perceived as an insider or having connections with insiders can open many doors for third and fourth sector stakeholders to take part in engagement processes. The absence of such skills and connections is especially problematic when the innovation being developed inherently requires expertise from several such fields.

Furthermore, this is rarely evident to the public who engage in and support third sector organisations. The public might perceive a particular field as a hot-topic in research and which no doubt receives much funding and attention from top-scientists in labs all over the world. Again, it falls to third sector organisations to translate this to their supporters, moderate their anticipated outcomes, and thereby prevent disappointment when what is learned from transparent engagement with researchers is disappointing rather than inspiring.

> "part of the challenge is that, for such a big idea, people make the assumption that there is a lot of support for it because, obviously, there should be a lot of support for it, but it turns out to not be the case. So, a lot of people find themselves quite surprised to find that there's not a huge scientific community working on this."

> "I mean, yes, theoretically, it sounds awesome and obvious and great, but when it comes down to, okay, how is that actually going to happen and, you know, there's not a lot – that's when it becomes challenging."

The difficult role of third sector organisations as translators between the understanding and expectations of the public and the views of researchers is exacerbated because scientists themselves are rarely trained to engage and communicate their research to those outside their disciplines. The lack of funding for research on in-vitro meat in particular also translates into a lack of funding and resources when it comes to initiative and supporting the engagement process itself, especially with stakeholders located outside the scientific infrastructure such as third and fourth sector

organisations. These organisations typically provide neither funding nor extra expertise so reaching out to them can often seem like a lesser priority when it comes to deciding how to spend the limited amount of an already small budget earmarked for engagement processes.

When there is no such invitation forthcoming and TSOs need to somehow motivate engagement from the outside, often the only way around entrenched perceptions of the issues and the resistance of large organisations to change is the persistence, persuasiveness and sheer conviction of key individuals. This was particularly true in the case of the Well Now programme. Such "change makers" can have a crucial role to play in achieving a critical mass within the health service to generate a change in the way people think about and promote weight management. Faced with changing entrenched organisational practices, it quickly became apparent to such key-players that simply being a passionate evangelist for the approach in the hope of bringing others around to their way of thinking wasn't enough. Instead, they needed to be engaged and empowered. Empowerment was a key feature of the Well Now groups themselves, so it seems appropriate that a similar approach would be appropriate for promoting the initiative within the health service:

> "I would say it's got easier, certainly, I would say it's got easier, and that's because I'm less invested in the outcome. I'm not less passionate about it, but I'm not trying to make somebody think like I think. I'm no longer trying to impose – well, aspiration, I'm not saying I never go there [laughing], but that's what I hope for. These are my truths, this is how I see it….Do you want to talk about it? Or they don't. And I'm not investing in trying to change the other person."

By taking this approach to engagement, others active in influencing and enacting policy on weight management began to come around.

<u>Perceptions of other stakeholder groups</u>

A key motivation for engagement that could also be a barrier was a distrust of other stakeholder groups, such as industry, whose remit is seen as largely profit based, possibly at the expense of wider public interests.

> "And I think that that makes for such an interesting story when you're talking about the development of [x] because, I think, at the root of a lot of people's issues with [this innovation] is that some big corporation is profiting off of this and that and whatever, and it's about interests and who's getting what and that kind of thing."

At the heart of this perception is distrust, a belief that the public is being exploited rather than served, in order to generate larger profits for "big corporations". The third and fourth sector organisations are therefore both driven to engage in order to give the common person, and wider public interest, a voice. However, they are also hampered in doing so by a distrust of other stakeholders they might be engaging with, suspicious of their motives and even of their reasons for engaging. Are industry and research-based stakeholders really interested in what third sector

organisations have to say, or do they simply wish to be seen to be engaging with such groups in order to enhance their own ethical standing? The flip side of this is that third and fourth sector organisations may feel that if they do engage they will face an uphill battle in overcoming preconceptions private stakeholder's hold about them:

> "you know, big [x] companies and lots of science companies want nothing to do with [x] advocates because of the research, because of their opposition to research and all this kind of stuff, and they just want nothing to do with it."

Third sector stakeholders tended to have quite a nuanced view of how to negotiate this minefield of assumptions preconceptions to achieve a fruitful engagement. This includes understanding that whilst some companies are more ethical and open-minded than others, they are fundamentally driven by the imperative to make money. Furthermore, whilst individual actors might be enlightened and well-intentioned, the organisations themselves may not share these values or collectively fail to act on them.

> "I think there are private companies who can have amazing intentions and want to do all the right things, but just because it's private is reason enough to distrust. Even if you know the individuals, even if you know everything you do, it's just not the same. So, that's literally my opinion only because there are lots of people who don't seem to worry about it."

This last extract suggests that third sector stakeholders can see being cautious and even distrustful of other stakeholders as part of their responsibility to their members, to ensure this perspective is represented whether they themselves feel that way or not. In some cases the engagement of third sector organisations might even be encouraged by researchers who are wary of allying themselves too closely with industry and private funding by providing a form of balancing stakeholder engagement processes.

A final way in which perceptions of other stakeholder groups acted as a barrier for third and fourth sector organisation engagement was when these groups were not invited to engage or were made to feel unwelcome because the stakeholders who initiated the engagement didn't want to hear what they had to say:

> "nobody has ever said, 'Well, I think you've got this wrong, [own name].' It's not that. It's just 'We don't like it – you're a threat', you know?"

In this instance, the barrier is not that those gatekeeping the engagement process thought the fourth sector stakeholder in question was wrong, but rather that the disruption and conflict their input represented was not an outcome they desired from the engagement process. Again, it was significant that whilst other stakeholders were sought out as engagement partners because they offered financial support, access to new networks, enhanced credibility or new knowledge, the benefits of involving third and fourth sector organisations were often less tangible and potentially less predictable. Whilst being seen to engage with a respected TSO can indeed enhance a research

project's standing, third and fourth sector organisations also bring with them their own values, opinions, and vested interests which may be seen as potentially coming into conflict with the goals and values of the researchers themselves.

In the case of the Well Now case study, support was withdrawn precisely because the stakeholder driving the process would not tow the party line of those providing funding.

> "I over-delivered on everything, and the funding was stopped because they wrote to me and they said that I had to say that I would unequivocally communicate the fact that obesity kills, and I realised that is the line I wouldn't cross. So, it wasn't that [the programme] didn't work. The reason I got the funding is I said I would deliver a cardio-protective intervention. I said these are the changes I'll expect, changes in dietary quality, fruit and veg, Omega 3, frequency, shifts in self-esteem, self-efficacy, increased time spent exercising. I overdelivered on everything, but I would not say obesity kills. And I was hauled up in front of the Chief Executive, and what was really interesting was seeing power operate and how she tried to ridicule me."

This account is a timely reminder of that fact that although engagement can have a levelling effect, ensuring that everyone who has a concern also has a voice, equality is not always guaranteed and not every voice is listened to. If values are not aligned and core messages are not shared, those who manage or fund the engagement process can very easily sideline anyone who does not agree with them. When such disparities arise it is often the third or fourth sector organisations, the perpetual outsiders, who end up on the wrong side of the balance of power.

### *Perspectives of Academic Stakeholders*

Understanding the motivations of academic stakeholders is key to understanding stakeholder engagement as a whole because it is the researchers who are working in, or with, academia who are at the heart of the process. Effective stakeholder engagement with RRI often begins and ends with academic researchers; it is their research and innovations which create opportunities for engagement, and it is their work that will ultimately be affected by the outcomes of societal engagement.

#### *Incentives*

<u>Engagement Procedures/fixed categorisations of other stakeholders</u>

Engagement procedures were especially significant for academic stakeholders because it was often up to them whether to initiate a process of engagement with other stakeholders, and to decide which specific groups to reach out to. The latter decision in particular appeared to be guided by their expectations of what these groups would be like and what they would add to the R&I process in which the researchers were already engaged.

In some cases, researchers seemed most interested in inviting engagement not from stakeholders who would bring something unexpected or challenging to the process, but stakeholders they thought would increase their professional networks of supporters and allies. This could mean attracting more funding, adding knowledge, or improving their reputation. Sometimes inviting engagement from groups, such as some third sector organisations, who might create conflict or disrupt their research, appeared to be actively avoided.

> "the point is that if you start out with this stakeholder conception, sort of starting on the value side, then your point of departure often will be that of a conflict or a conflict of interest or conflict of values. In a way, you are starting with antagonism."

By the same token, as academics they were also generally aware that adversarial debate within the context of professionalism and respect can also be a valuable way of honing knowledge and refining ideas. Inviting dissenting voices to engage with the research could also be seen as a way of addressing or at least acknowledging potential issues early enough that they did not become genuine problems or sources of serious conflict:

> "conflict up-front is important, but it's more to avoid that you have conflicts later on, and then it's business as usual."

Given the costs of engaging with stakeholders in time, resources and potential for disruption, it is hardly surprising that researchers initiating engagement processes tended to do so for specific reasons, with specific outcomes in mind. They therefore choose to reach out to specific stakeholders in order to do so. Anticipated outcomes played a key role in shaping and driving engagement procedures.

Anticipated Outcomes

The choice to engage with a particular stakeholder or sector can sometimes be driven by a perceived sharing of values and goals, but most often it takes place with a specific need and outcome in mind, even if engagement only serves this goal indirectly. For example, while academic stakeholders saw making their research transparent to those outside the scientific community as an inherently worthwhile activity, being seen to engage with the public was sometimes just as important to their strategic goals as the engagement itself.

> "I give presentations mostly in [x country], also for schools, education, etc., but also in Europe, basically in all the continents, and that's now part of strategy. It's valuable for us because we still have to attract new investors, so you have to show exposure otherwise they are not interested. Besides, we like to increase our impact, we have to cooperate. We are much too small for a worldwide impact alone, so we need also partners all over the world."

Researchers in general felt under pressure to be engaging with other stakeholders and doing so in visible and demonstrable ways. When it came to choosing who to engage with, how and when, one

researcher drew an interesting distinction between the need to conduct research that is accessible to those groups in society it will ultimately benefit, and actually collaborating in ways that effect how the research is done.

Some stakeholders argue that the social responsibility component of RRI can sometimes be served by collaborating with social scientists, rather than reaching out to stakeholders beyond the shores of academia. Though collaborating outside ones' discipline, even with other academic researchers, can involve negotiating disparities in disciplinary language and practices, at least such collaboration can take place within the context of academic ethics and models of professionalism shared by the university sector. It is also potentially cheaper and easier to organise collaborations within shared professional networks, and perhaps even in shared institutions.

> "RRI research does not necessarily have to fit in a kind of straightjacket of participation, not necessarily. I think it is almost always interdisciplinary, though, because you want to include different social sciences in your natural science research, in order to properly think about societal impact. It does not necessarily have to involve societal partners – NGOs or farmer groups or whatever."

Echoing the accounts of third and fourth sector stakeholders, this suggests there is a tendency to perceive less effortful engagement as being more likely to succeed with engagement partners who share the same professional goals, values, and cultural practices. These perceptions, and the extent to which they reflect reality, will vary from one stakeholder group to the next and are likely to affect choices of with whom to engage.

Larger research organisations were more likely to have dedicated teams working on communicating their work to the outside world, though often the lines could be blurred between actual engagement activities and mere public relations.

> "we have about [x] researchers and about [x] people who are supporting staff working in the Communication Department. There are five or six people working in this Department. So, yeah, you don't really have to think about that even. There's a whole social media infrastructure already in place."

By employing people specifically to communicate their work to outside organisations, they thereby avoid the difficulties of entrusting engagement to researchers who may not be trained in how to make their work transparent to laypeople. Such departments might not simply be involved in dissemination, but could also play a role in engaging with the public directly in order to ensure time and money are not "wasted" on engagement that will turn out to be irrelevant.

> "you include them from the beginning of the project, so that you think of a strategy together because, if you think of it afterwards, it doesn't really align with what the public would be interested in, for example."

Although researchers clearly thought socially responsible research was a valid goal in itself, some nonetheless found this quite an intangible and problematic concept.

> "So, it's a socially responsible innovation project, we're thinking about scenarios that are socially responsible, but we're also thinking about ways to engage [x] sector with these scenarios. So, "socially responsible" …what does that mean? Everyone will have a very different opinion about that."

The nebulous nature of what is and is not considered "socially responsible" research (and from whose perspective) in the absence of clear definitions and frameworks creates a risk of this ideal taking a back seat to more pressing and clearly defined anticipated outcomes, when it comes to driving engagement activity.

Equally, researchers may choose to engage with industry, TSOs, or policy makers in order to prepare the way for their innovations and discoveries to be utilized, increasing the chances that potentially risky new technologies will be accepted by the industry. Industry stakeholders therefore needed to be persuaded that the money they would have to invest in an untried new technology would eventually pay off in profits. Change was not seen as something that would simply happen once the technology became available; instead, paving the way for putting their upcoming innovations to use required engagement with multiple types of stakeholder:

> "[Engagement] should be done by academia. That should be done by NGOs, whoever is capable, has the capacity to think about the entire system and what it would change in the entire system. Economists, psychologists, landscape people, geologists, whatever, and [who] think really in a very systematic way [about] what are going to be all the implications. […] The industries are going to change."

### *Barriers and Inhibiting Factors for Engagement*

<u>Academic Culture</u>

Within academia, a lot of lip service is paid to the value of engagement with stakeholders in industry, policy, and wider society. Along with most other forms of interdisciplinary collaboration and outreach activity, engagement is seen as a good thing to be involved with. Nonetheless, it appeared to be difficult for academic researchers, and in particular early career researchers, to find time and money to take part in activities that do not directly result in tangible outcomes in the form of research outputs, or other forms of short-term quantifiable "impact".

There is an overall lack of training in interdisicplinarity and engagement, as well as no funding available for early career academics to take part in engagement activities when under pressure to produce tangible evidence of career progression, such as publications. One stakeholder also noted the reluctance of natural scientists in particular to engage with the sorts of wider societal concerns

associated with third and fourth sector organisation involvement, as their training and inclinations favour a "purer" and more "rational" form of enquiry, as well as a desire to rigorously test and understand the innovation they are working on before involving outsiders.

> "they like to figure out things before they go into the open….a typical natural scientist has an idea, let's see whether it works, and it's not my job to think about implications in society, about what may work or what not. That's later. They don't know how to handle not 100% rational comments, ideas. They don't know how to deal with it: 'Oh, that's emotion!' And when they say that, they disqualify it from the start, and that's one of the big weaknesses of natural scientists."

Professionalism to such scientists, the stakeholder seems to suggest, involves isolating the object of their enquiry from emotional and societal concerns – indeed, from all extraneous variables – and addressing it in purely objective terms. This makes engagement with stakeholders who do not share this perspective a potentially disruptive distraction.

The willingness to engage with the ideas of outsiders, the same stakeholder goes on to argue, is a tendency found in a minority of scientists who enjoy being challenged and see interdisciplinarity as a chance to learn.

> "I've never considered myself a real naturalist scientist. I say, when working with sociologists, economists, lawyers, it's so much more exciting than only working with fellow [scientists]… I would say the brains of a lawyer are wired differently than mine. So, a lawyer will challenge me in a totally unexpected way and that's fun. Now, if you want to be a super-scientist in [x], you don't want to be distracted by that kind of challenges."

If this predilection to enjoy being challenged by new ideas is indeed the exception rather than the rule in the natural science community, then it is problematic to expect all researchers to engage with other stakeholders, or at least to do so willingly and well. It is an argument in favour of the previously mentioned model of research organisations where there is a particular value on academic freedom and the role of science in advancing knowledge to the benefit of all, and they could be wary of engaging too closely with private industry and thereby compromising their integrity. This created a tension as at the same time they needed to cultivate new sources of funding and couldn't afford to alienate the private sector.

> "the conflict may arise, and that's of course an age-old problem, is that universities are supposed to have their academic freedom, etc. and of course we all are looking for public/private partnerships and whatever, but too much private funding and private involvement in university funding especially, may reduce academic freedom. And there I see quite a big difference between universities as they are and public research institutes.… public research institutions run a lesser risk, in my view, of running after private funds too much. But universities, definitely, in my view, they need to remain a free haven of knowledge."

Similarly, researchers might also be wary of engaging with industry and other academics if they feel they have a patent, privileged knowledge or sensitive findings to protect. The professional

frameworks of academic culture could also be a barrier in reaching out to stakeholders where this was seen to be courting an unfair, or at least ethically questionable, advantage.

### *Perspective of Industry Stakeholders*

Only one stakeholder interviewed represented the perspective of industry, so the analysis that follows is therefore somewhat limited in scope.

#### *Incentives*

Broader social, cultural, and political influences

More than most other types of stakeholder, the industrial interviewee appeared to be subject to the vagaries of changing national and global cultural trends. Whereas researchers and funders were insulated to some extent by working within dense and highly structured professional cultures with their own entrenched values, industrial stakeholders existed in the marketplace and were likely to be more cautious about expending the time and resources engaging with other stakeholders in politically and economically uncertain times. Even in areas to which they have a strong personal commitment, it seems industry stakeholders feel obligated to be risk averse because they are protecting the need of their own company to remain solvent. This is a different set of core values than those found in most other types of stakeholder. The industrial stakeholder was also very aware of the need to attract engagement partners and have something tangible to offer to achieve this. In this particular case, this involved having a patent for the technology they developed, which served as a way of protecting their existing investments of time, money and resources.

#### *Barriers*

Perceived fixed categorisations of stakeholder groups/ Resistance to changing worldview about topic

The same measures the industry stakeholder used to make the company attractive to engagement partners could also be an impediment to other potential collaborators. Holding a patent turned out to be a double-edged sword, bringing them into conflict with the core values of other stakeholders. Other stakeholders' perceptions of and assumptions about industry could therefore create obstacles to fruitful engagement. Interestingly, the industry stakeholder frames this as a matter of emotion rather than an assessment based on evidence, although it is difficult to say for sure whether he is caricaturing a potential opponent or speaking from direct evidence.

Resources to participate in Engagement

As with other stakeholder groups, the industry stakeholder found that engagement could be a difficult process because limited funding resulted in a limited capacity to take risks. This was particularly true in sector dominated by the giants of the biotech industry.

## *The Perspective of Policy Makers*

With only one exception, the participants interviewed in their capacity as policy makers were actors associated with the Well Now programme. These were government employees advocating for and implementing a new, social justice-focused approach to weight management. Though not all policy-makers in the traditional sense, they were clearly active in driving and changing NHS policy above and beyond the remit of implementing the programme itself and were of interest to the case study research in this capacity. Given the difficulty of recruiting other policy makers as interviewees, the analysis that follows will necessary concern it itself largely with the Well Now programme, drawing on the account of a policy maker involved in the Healthy Potato study wherever appropriate. With this in mind, one might expect the themes discussed in this section to be different from those raised in discussions of policy stakeholders in other domains. It is interesting, then, that the most frequently cited incentive to engage was the type of engagement procedure.

### *Incentives*

Engagement procedures and the Role of key players

The primary incentives for policy makers to engage centred on engagement procedures. In retrospect, the predominance of this theme is not surprising as it is broad and encompasses anything to do with how the engagement itself was designed and conducted. It is also the theme that most directly addresses the activity of stakeholder engagement itself, rather than simply the factors that influence it. In short, many interview extracts inevitably fell into this category as it is both flexible and general and speaks to the heart of the PROSO project. In keeping with this flexibility, engagement procedures were discussed by policy makers in this field quite differently than by other stakeholder groups. This is appropriate given the Well Now programme's status as a weight management initiative, rather than as an innovation in scientific research.

First and foremost, the talk around engagement procedures involved finding the right language and engagement techniques to draw in two key types of stakeholder: the members of the public who would engage with the programme, and other members of the health infrastructure who must be persuaded to accept not just the pragmatic value of the Well Now programme, but the core values and ideas that underpin it.

Similarly, when it came to getting communities to engage with the Well Now programme to the extent that people were regularly attending the meetings, critical mass needed to be generated by finding the right inclusive approach and using the right language. In some cases this had to be language that wouldn't offend potential group members who were still embedded in traditional "weight normative" approaches to healthcare. This included ditching the slogan "health at every size", which originates in fat activist circles in America, but evoked a negative response from some health care staff in NHS Highland.

Achieving critical mass within communities entailed utilizing both the community and its health services as a medium for the message, and adapting the Well Now programme to the needs of the local culture and infrastructure.

> "We had three [Community Food & Health Practitioner] posts in Highland that were situated in areas of deprivation, and the remit of their work was to do community development health improvement, kind of using food as a vehicle for that because it's great for getting people engaged and all the rest of it, and part of their role was also to deliver Well Now groups."

Again, it was crucial that rather than being a process of imposing ideas on others, successful engagement was a two-way process that respected the core values of the Well Now programme and those who attended it.

In addition to establishing shared values, this required negotiating anticipated outcomes that were consistent with a weight management programme that goes beyond measuring weight and size, and yet proved to be rewarding for participants who initially arrived wanting to be slimmer rather than to improve their health. The need for shared, or at least compatible, anticipated outcomes amongst group members extended up to organisers, policy makers, and managers at every level, all driven by shared core values which made it easier to bring objectives into line and ensure that engagement was sustained and the Well Now message propagated.

A problem with traditional weight management programmes is the danger of regaining lost weight after the programme ended, so considerable effort was invested in sustaining the momentum of the engagement process in a way that could be continued after the actual classes ended. It was hoped this would be sustained by the shared core values of participants. The focus of Well Now was always therefore on changing lifestyles and changing lives, rather than simply changing behaviour over the short-term, although supporting members after leaving the programme was rendered more difficult by limited time and resources.

The commitment to flexible engagement procedures extended to continually trialling different engagement formats to reach new communities and speak to different groups of people, such as teenagers and children, and new initiatives such as Well Now cafes and performance poetry. In each case, the engagement strategy embodied core values such as community and social justice. For example, delivering programmes to groups was a way of bringing people together and creating sustainable networks of mutual support that could outlive the programme itself. At every point inclusiveness was key, and no effort was spared in adapting the approach to be relevant to every community and every participant who might benefit.

> "we bend over backwards because we know that our patients are difficult to reach and have often had poor experiences of healthcare, and feel stigmatised and feel judged. So we try different methods of trying to contact them and, you know, letters might not be delivered – we try text, we try email, we try mobile phones. We ask them how they prefer to be contacted and we try very hard to make them feel that we are accessible."

The adaptability of the Well Now approach is here again attributed to sharing strong core values across the programme which ensured that whatever form delivery took, it always felt like being part of the same movement. This also demonstrates the central importance of getting the engagement processes right in reaching out to a group that is disenfranchised and powerless; in these instances it is not enough to invite participation and make the process accessible, one must actively reach out to those most in need. In order to engage such people Well Now needed to demonstrate empathy and altruism.

<u>Empathy and Altruism/Transparency and Trust</u>

The core values of Well Now reflect an empathetic, yet pragmatic, approach to both the psychological and practical challenges of weight management, addressing their cultural embeddedness and different manifestations in different communities. When it came to engaging with programme participants, these values were directly expressed in every aspect of the interaction, with empathy and empowerment being key features:

> "if you want to change, you have to think that the change you're making is important and you have to think that you're important enough to make that change. Well, if you're feeling ashamed about yourself, you're not feeling very important, are you? [No.] You're not liking yourself enough to make that change."

From these beginnings, Well Now practitioners would work to sustain engagement by levelling the power relationship through an inclusive approach, rather than creating an expert/patient power disparity. Key to establishing and building this relationship was trust, achieved by making the process as transparent as possible, in a way echoing the way third sector organisations discussed their relationships with their members.

> "If you're honest with them and say I obviously enjoy Well Now and I facilitate Well Now because I think it's right. You'll maybe not agree with me, and that's totally your choice. But

> then, at least if you give them the awareness of that, then I think that builds the trust then, they know you're not preaching to them."

It appears to be crucial that not only was the process followed by the Well Now programme transparent to those who joined it, but so were the values that drove that process. Understanding that these were values they too shared, or at least had some sympathy with, enabled participants to trust the Well Now programme and its practitioners because they knew that everything they would be subjected to in the potentially difficult and emotionally fraught process of weight management would be in keeping with values they embraced.

### *Barriers*

Resistance to changing worldview about the topic

Another important element of changing worldviews is the considerable resistance to adopting this new approach and what it stands for within NHS Highland as an institution. Well Now's approach proved quite challenging to the accepted discourses of weight management taught to and perpetuated by professionals working in many areas of the health service, for example dieticians. Finding ways to constructively engage such people was therefore a challenge:

> "that's what I mean by 'old-school'. It goes against everything that they've learnt and everything that they've been practising …. I don't know if some of them take it that way, 'Oh, you've been doing this wrong for ages'. And it's not that they're doing anything wrong at all, but I think that's sometimes the stigma with it, that they just don't want to accept it because, you know, they're being told they've been doing something wrong."

The interviewees expressed difficulty working with professional colleagues and integrating the core values into other aspects of institutional practice. Some dieticians in particular struggled with the philosophical change in approach to treatment because changes contradicted the core of their training as dieticians.

Another crucial barrier to engaging with the programme and with the needs of its participants and proponents is resistance to changing the worldview emanating from government policy, which funds healthcare interventions for obesity. Most weight management programme outcomes, after all, are still based on criteria such as BMI reduction. These metrics pervade the health system to the extent that they are even used to determine who has access to potentially life-changing health care: "You've been refused surgery because it's your problem, and you're fat – go and do something about it!"
To be an advocate for changing policy was depicted by champions of the Well Now programme as an uphill struggle, working in a system that has values in many ways contrary to one's own in the hope of changing those values from within: "it feels isolating, I have to be honest. To be a Well Now facilitator feels as if you're doing something that's quite isolating from the organization".

On the whole, the NHS was depicted as a large and cumbersome infrastructure, resistant to change, and while progress could be made on a local level and many individual practitioners proved amenable to new ideas, others did not. Moreover, promoting a consistent message within the Well Now programme was seen to be insufficient as attendees leaving the programme would then find themselves confronted by other organs of the health system that still espoused what one stakeholder described as "old school" values.

Another problem with running such a controversial programme was that those who graduate from the programme can then find themselves frustrated by a health system that does not share their newfound values. This was especially true in one case in which a group member who had been taught that weight wasn't the only thing that mattered in terms of healthiness was then told he wasn't eligible for knee surgery because he was still too heavy, despite being healthier overall after taking part in the programme:

> "the surgeon is still saying the same things and the situation is still the same, but having gone through Well Now, I think the patient realises that he's up against a surgeon who's not going to change his mind. So, the course has helped him – although he's still in the same situation as he was, the course has helped him, and he's delighted with that, although he's not happy that he still hasn't had the operation [laughing]!"

Established worldviews could also prove a barrier when it comes to managing the expectations of those who were referred to Well Now groups via NHS consultations and came expecting to attend a clinic and be weighed. Facilitators had to be aware of the need to convince attendees that though they weren't getting what they expected they were nonetheless getting what something of value.

> "Well, one of the dilemmas I guess we have is that this is a little bit different and it's not a clinical intervention. So, we have people who are referred into it, and I've had people on my courses come and say 'I've come for your clinic', which is not a language I would use around Well Now at all. It's not a clinic, not a clinical setting. And fully expecting that they would be weighed, they'd be measured, you know, a health intervention, so that's an interesting one about their perception is, because it's NHS and because they've been referred into it, it must therefore be clinical."

<u>Resources to participate in engagement</u>

Another problem of initiating policy change that went against the accepted way of doing and seeing things was that it was difficult to obtain funding and resources when the bodies charged with allocating them share the value system you are trying to change. Even when the Well Now programme was able influence policy enough to gain some support, this did not always translate into more money:

> "I'm not saying that NHS is not supportive because, clearly, this is the mechanism that they've decided to go down for delivery of healthy weight, but actually, when it comes to it, it's not the priority for funding."

Though the programme didn't inherently require a great deal of equipment or resources, the fact that it was delivered in disparate, and occasionally remote, locations meant that a lot of time needed to be allocated for travel and cultivating local networks. In these cases, again the flexibility of the programme proved an asset, allowing the intervention format to be adapted to areas where there would be fewer attendees.

> "geographically, in the Highlands, it's quite difficult to deliver [the programme] to places where people would go …but, if we're aware of that, we might know patients on the West Coast – it's very unusual that they're going to get [a programme offered there] – so we would maybe say, 'Look, Well Now might not be for you, if you're not going to be in an area where they'd normally take place – we'll get a dietician to see you one-on-one with the philosophy of it'."

This again demonstrates the Well Now approach's determination to "bend over backwards" when necessary to leave no patient behind, however remote. Nonetheless, the fact that volunteer programme facilitators often worked a day job and then had to travel to the group meeting and deliver the programme in the evening did limit both the range of locations and the energy they could bring to the group.

One obvious approach to the problem of funding the groups that was charging for attendance. This was something the Well Now team felt uncomfortable with, first and foremost as a matter of principle.

> "NHS services are free at the point of delivery, so we wouldn't charge for them, but it is interesting that we do frequently have people who simultaneously will say "But I'm also doing…" I mean, at the course yesterday, there were people talking about SlimFast and things like that, paying quite a large amount of money…. And so, there is a question about, if we started to charge, would that make a difference? I guess, fundamentally, I feel that I would be uncomfortable with that because this should be an opportunity available for anyone!"

This objection again goes back to the strong core principles of the Well Now approach. These values do not sit well with the idea of potentially discouraging those who might find it difficult to pay from attending as those who are the most deprived are also statistically those in the poorest health and with the greatest need. Moreover, addressing the role of social injustice in poor health is one of the key concerns of the Well Now ethos:

> "That comes from a personal passion or belief. That said, repeatedly, in Scotland in particular, there is a huge emphasis on looking at health inequalities, so, you know, and I've seen changes.… actually the root causes of many of that is social injustice, and that's a sea-change that says, actually, that we're treating the end result of these things, and we actually need to be addressing the fact that life is unfair. So, I think the NHS is starting to move into an arena where it also has that as a vision."

The Well Now programme, therefore, was depicted by policy stakeholders as an example of engaging with society, not as a consultation exercise, but to directly address the root causes of poor health in

the communities where it exacts the highest toll. This is another respect in which it was fundamentally different from the other forms of stakeholder engagement discussed in this report.

### *4.2.2 Nanotechnology stakeholder analysis*

In work package three, the project's task was mapping barriers and incentives for societal engagement in the three research domains food and health, bio-economy and nanotechnology. Whereas in deliverable 3.2 PROSO analysed barriers and incentives on a general level across stakeholder groups, the following analysis focuses on the differences and similarities in the perspectives of the different stakeholder groups.

In contrast to the domain bio-economy, nanotechnology has a longer history of public debate and public engagement activities beginning around the turn of the 21st century, before there were many real products on the market or even significant commercial activities. Partly in response to the GM debate in Europe, and partly because of the unknowns in nanosafety, government agencies across the globe sought to have constructive, upstream dialogue with stakeholders including TSOs, industry and academia, in addition to wider society. The purpose of this engagement was to support the responsible development of nanotechnology, while not significantly delaying innovation or preventing its expected economic benefits. As a result of these and other activities, more societal viewpoints were incorporated in the development of the technology, for example a number of codes of conduct were developed to guide responsible innovation in nanotechnology in the first decade of this century. These set out strategic issues that organisations should consider when engaging in research and development using nanotechnology, and encouraged an open dialogue with other stakeholders.

As in the other two research domains, three case studies were chosen to illustrate different ways of stakeholder engagement:

i) NanOpinion, an EU funded project which aim was to foster public communication and dialogue about nanotechnologies in the European Union. Going beyond one-way communication in order to raise awareness and enable citizens to make educated choices, the project gathered and monitored the opinions of thousands of European citizens via a large variety of engagement methods, including both face-to-face and online activities. Using these methods the project aimed to inform policy decisions on nanotechnology through a greater understanding of citizens' concerns regarding specific issues.

ii) NanoCap, another EU funded project that aimed to deepen the understanding of environmental, occupational health and safety risks and ethical aspects of nanotechnology, by organising a structured discussion between different stakeholder groups. A follow-up project was TracingNano, funded by the Dutch Ministry of Infrastructure and Environment, which focused on improving the traceability of manufactured nanomaterials (MNMs) in products and articles for downstream use. It focused primarily on the input of TSOs and explored the position of Dutch TSOs regarding the problem of openness and the practical use of MNMs in products.

iii) NanoKommission/NanoDialog, a national dialogue process in Germany under the lead of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. Its aim is to support an exchange of ideas between civil groups and stakeholders on the opportunities and risks of nanotechnologies and thus help promote responsible and sustainable use of nanomaterials. The dialogue is still ongoing and entered its fifth phase in 2016.

Across these case studies, 13 interviews were conducted. Most of the interviewees were third and fourth sector actors. The analysis reflects that by focusing on the barriers and incentives for societal engagement of this stakeholder group and refers to other interviewed groups where feasible.

Table 6: Interviews per stakeholder group in each case study

| | Nan-Opinion | TracingNano/NanoCap | BMU NanoDialog |
|---|---|---|---|
| Third Sector Organisation (TSO) | 1 | 4 | 1 |
| Fourth Sector Organisation (FSO) | 3 | | |
| Policy | | | 1 |
| Research Funder | | | |
| Academic | 1 | 1 | |
| Industry | | | 1 |

### *Perspectives from Third and Fourth Sector Organisations*

In these three projects, the actors had different roles to play. Whereas in NanOpinion the actors were part of a consortium comprised of different stakeholder groups, which interacted with citizens, they were on the other hand participants in structured discussions and working groups in NanoCap and NanoDialog. Some barriers and incentives are more prominent for one role than for the other.

*Incentives*

Perception of topic

For TSOs like trade unions or consumer organisations, the issue of the perception of the topic includes two aspects: First, the perception of the topic closely relates to the perception of the topic of the people they represent. When, for example, consumers are aware of issues concerning a specific technology, it is for the consumer organizations to inform them about the technology and to raise awareness of their concerns among other stakeholders. Second, it is their responsibility to inform them about the risks and benefits of emerging technologies, which might affect the consumers, but which they are not aware of, yet.

At the beginning of NanoCap and NanoKommission (2006), nanotechnology was at an early stage of the innovation process with few products on the open market and the TSOs deemed it important to engage in stakeholder dialogues to foster a more public debate and help shape the way nanotechnology develops and embraced the opportunity to do so. One actor participating in the NanoKommission and the NanoDialog phrased it this way:

> "And this was the primary goal and, thank God, the first time that a dialogue of that scale and depth and with this intensity was conducted for such a topic. That's what I remember. Of course, we had discussions about technologies before. But these came too late, think of the GM discussion. And we wanted to learn from those and try to include many groups at a very early stage in order to find solutions, figure out requirements, define reasonable frameworks and identify research fields worth pursuing."

The interviewees pointed out that they wished that in other emerging technologies were similar kinds of engagement.

In recent years, other technologies emerged and became more prominent in public debates and the focus moved away from nanotechnology, making it difficult for smaller organisations with limited resources to engage in nano related processes.

Anticipated outcomes

Anticipated outcomes, be they policy recommendations, agenda setting in funding programmes, capacity building or simply getting access to a network, are an incentive prominent across all stakeholder groups. The clearer the output of a project is formulated at the beginning, the more willing the actors are to engage, if it aligns with their agenda. Again, this is a very important factor for organisations with limited resources such as smaller NGOs. One actor pointed out, that

> "… the real impacts of the project when it comes to society after the end of the project, was visualised from the very beginning. We knew that this project […] has a potential to really influence the policy agenda, or the policy debate at European level."

However, different stakeholders may anticipate different outcomes. Where TSOs might pursue a strict regulation early on in the stage of an innovation cycle, other stakeholders prefer a more flexible framework. The differences do not only occur between different stakeholder groups, but also between different actors of the same group with different priorities and agendas.

Access to network

The opportunity to gain access to networks was an incentive for many TSO actors. Especially two points were raised repeatedly. First, the possibility to engage with relevant actors e.g. in policy, academia or industry and raise awareness for their own views and concerns. Second, the knowledge transfer back to the TSOs enabled them to build up their capacity in the domain of nanotechnology, for example by being informed of new research or best practices in the field. In the case of the NanoDialog, the effect the network had on the actors went a bit further: new co-operations between different stakeholders emerged of it and actions were taken beyond the framework of the engagement process itself, as one interview described:

> "The first phase had huge impact. First, a nationwide network developed which today still exists. Of this stakeholder network originated follow-up projects, some between companies and researchers, some between companies and civil society organisations. The essential factor for creating these projects was this network. The positive thing about the process was meeting and working on an issue over a long period of time. If you have one time events, everyone gives a presentation and nothing happens. […] This would probably not have happened without the NanoDialog."

Transparency and trust

For all actors, transparency and trust were key for a successful engagement process. Especially for TSOs, things like knowledge transfer, mutual learning as well as open and fruitful discussions about conflicted issues would not be possible without it.

> "But I think the issue of exposure to different sectors of society, different people representing those different sectors, in a genuine way, is that trust that needs to develop is an important element of the success or not of a research project."

Transparent design of processes, tasks and aims within the engagement and being transparent with the own agenda to other actors is the basis on which trust is built in societal engagement with stakeholders. The first is to a large degree a matter of communication and organisation.

> "The more the organisational aspects are fleshed out and the clearer they are, […] the easier it is. These are things that influence my feelings and my inclination to engage with the issue at hand. And this, yes, I would say that this is a factor of success, if you are able to provide this. […] If you are able to design the process in such a way, it definitely helps to run an event successfully."

In the case of the NanoDialog, another factor was pointed out in all interviews. The long duration of the process and the continuity helped a lot to build up trust. Without being forced to start from scratch at every meeting, it enabled to form a positive environment for fruitful and in depth discussions.

> "You have a certain core of people who are present every time. In this way, you build a certain continuity and it is extraordinary how easy it is to talk to each other and one's opinions are respected and it gets less harsh. You can create such a climate when you have this core of people who bring this culture in the discussion every time, I would say. And then you can go more in depth and that makes the difference."

### *Barriers*

In the conducted interviews there were many barriers mentioned which make TSOs hesitant to take part in engagement processes. Some of them tie into the absence of the incentives described above. Among the others the following three barriers were most prominent. A complete account of the barriers mentioned can be found in the deliverable 3.2.

#### Key players

A huge problem for TSOs is, and this is more important for small organisations than for bigger ones, that in order to participate in societal engagement processes, there needs to be someone who is competent enough in the research domain at hand. Without competent staff, it is immensely difficult for those organisations to fill the role they have to play in the engagement process successfully or even to participate. Interviewees stated, that the decision to participate or not depends crucially on available personnel. One actor illustrates the problem for TSOs:

> "And that is particularly the case with civil society organisations. There is often only one person. And when this one person leaves the organisation for whatever reasons, then the issue is no longer existent. So some organisations could not participate anymore, because they simply had nobody who could work on this."

However, the differences between smaller and bigger organisations regarding this issue are not unique to the third sector. Smaller enterprises in the industry face similar problems.

> "The large companies have the position in the market and the right people to deliver. Whereas SMEs often don't have the capacity needed to create transparency."

For them sometimes the only option to engage is via small company associations, which feed their views and concerns into the engagement process and the results back to their members.

#### Limited resources

Besides the dependence on competent personnel, limited resources in general are a main barrier for TSOs to engage.

> "For us, as a small association, the workload is a great challenge. This should not be underestimated. Of course the design and the preparatory work of the organisers make it easier, but nevertheless you have to deal with issues which are not part of your everyday work. For a two day discussion you have to invest a whole amount of time more. […] There are no funds dedicated to support civil society organisations and make it easier for them to participate."

Often funded by members or donations only, especially smaller TSOs have to spend their available resources according to which issues are most urgent for their supporters. In the case of nanotechnology, the public debate has moved on in recent years to other research areas and thus nanotechnology for many is not a top priority anymore, as one actor describes:

> "This is the problem of priorities and the limited number of people they have employed, and those with the knowledge necessary to be able to discuss nano. In their organisations is also one or two persons, and they are involved with other environmental problems. So practical problems lead to priorities they have to set themselves, and not to choose for nano."

Often the only way for TSOs to take part in engagement processes, is being funded by a third body like the EU or other funding agencies. Educational TSOs in NanOpinion for example would not have been able to participate in such a project without EU funding.

For academics, even on tenure tracks, time is a crucial resource when it comes to engagement processes.

> "I had always had an interest in that, but I've always understood it to be no pay back. You know, hobby things, because clearly in the environment I have been it harms your scientific career if you spend time doing these things. […] In the UK it is part of the job, but here and in Sweden where I was, it was framed as being an additional task."

<u>Lack of impact</u>

The third huge barrier for TSOs is a perceived lack of action on the outcomes of earlier projects they participated in. Some actors in reported, that from the NGO and trade union perspective, few if any of the recommendations to come out of the projects have been taken up by the EC or Member State governments. This aligns with the feeling of other partners who stated, that some recommendations reported to the EC have not lead to any action addressing the issues. This leads to the impression, that, while being heard, their input is not taken into account.

> "We are heard but sometimes or very often that's not taken on board. I feel that we are just given the floor and that's it. That's not really engagement. Like: They were there. And because they were there: wow, social dialogue and engagement and outreach and Europe is involving."

Such experiences lower the willingness of TSOs to allocate resources to participate in future engagement processes.

### *4.2.3 Bioeconomy stakeholder analysis*

This deliverable provides a further analysis of the case studies described in Deliverable 3.2. The project PROSO did interviews in three different R&I domains (food & health, nanotechnology, and bioeconomy/synthetic biology) as part of three illustrative case studies in each domain. The case studies in the field of synthetic biology are:

(a) a case of protest against the company Ecover which trialled ingredients produced from a process involving synthetic biology in one of their products. Protesting TSOs triggered a series of invited engagement events, namely the "Enabling the Conversation on Novel Biotech" (2014/2015) and the Solazyme Roundtables (2014). In the first project, a tool on how to deliberate on questions of emerging technologies was developed (Deliberation Aid) which outlines (i) different questions that should be asked before introducing products to the market, (ii) examples of synthetic biology applications and (iii) a summary of the various perspectives on the issue. TSOs participated in the first event as organizers and were also invited to take part in the process; in the second, they were invited as participants.

(b) the Synthetic Biology Leadership Council and their Governance Subgroup. TSOs and actors in favor of public engagement are involved in both groups, debating long-term development of synthetic biology in the UK.

(c) the EU project SYNENERGENE (2013-2017), a deliberation project on synthetic biology, which aimed at strengthening mutual learning between different actors in a variety of events. TSOs were involved in the project consortium and participated in several events organized by the project.

For more detailed information on the case studies, please see Deliverable 3.2.

This report will discuss the incentives and barriers for societal engagement – in particular the engagement of Third Sector Organizations – in the area of synthetic biology from an actor specific point of view. The focus will be on similarities and differences *between actor groups and the research domains*. However, as the selected case studies in synthetic biology present highly specific settings of engagement, case studies and formats of engagement will be mentioned where necessary.

In total, 15 interviews were conducted, seven interviews with TSOs, four interviews with academia, two interviews with industry and one interview with policy makers and research funding respectively (see Table 7). Due to the restricted number of interviews per case and the uneven distribution of interviews across cases and actor groups, this report does not aim at generalising statements for whole actor groups or the whole domain. Rather, it aims at exploring different patterns of engagement and non-engagement the reasons behind those patterns.

Table 7: Interviews per actor group in each case study (*interview concerned both case studies)

| Actor group / Case Study | Ecover | SBLC/SBLC Subgroup Governance | SYNENERGENE |
|---|---|---|---|
| TSOs | 3,5* | 1 | 2,5* |
| Academia | | 1 | 3 |
| Industry | 1 | 1 | |
| Policy Makers | | 1 | |
| Research Funding | 1 | | |

Table 8 shows an overview on identified barriers and incentives per actor group which will be discussed in more detail below. As shown in Table 8 two identified barriers (Perceived fixed categorizations of stakeholder groups, Resistance to Change Worldview on Topic/ New Ways of Working) were prevalent in (almost) all stakeholder groups, whereas three (transparency and trust, Imagined Publics and Reputation and Critical Mass) were only mentioned once – in the context of TSOs. As TSO engagement was the main focus of this analysis it is not surprising that almost all identified incentives and barriers were mentioned in this context, whereas policy-makers and research funding do show least variety of incentives and barriers mentioned. However, this may also be due to the unequal spread of interview partners among different actor groups (see Table 8).

Table 8: Incentives and Barriers identified per actor group

| Incentive or Barrier / Actor group | TSOs | Academia | Industry | Policy Makers | Research Funding |
|---|---|---|---|---|---|
| **Incentives** | | | | | |
| Anticipated Outcome | x | | x | | x |
| Transparency and Trust | x | | | | |
| Access to Network | x | x | x | | |
| **Barriers** | | | | | |
| Epistemological Focus: Resistance to Change Worldview on Topic/ New Ways of Working | x | x | x | x | |
| Perception of others: Imagined Publics and Reputation | x | | | | |
| Perception of others: Perceived fixed categorizations of stakeholder groups | x | x | x | x | x |
| Broader Social/Political/Cultural Influences | x | x | | x | |

| | | | | | |
|---|---|---|---|---|---|
| Research Infrastructure: Lack of Resources to Participate in Engagement | **x** | | **x** | | **x** |
| Organizational Culture: Timelines | **x** | **x** | **x** | | |
| Momentum for change: Critical Mass | **x** | | | | |
| Momentum for change: Role of Individuals | **x** | | | **x** | |
| Research Infrastructure: Engagement Procedures | | **x** | | | |
| Organizational Culture: Academic Culture | | x | | | |

In the following, the identified incentives and barriers to societal engagement will be discussed in detail per actor group. The incentives and barriers for each actor group – grouped in themes and listed according to their relevance for the respective actor group (or respective case study as discussed in Del. 3.2) - will be discussed separately. Subsequently, a synthesis of incentives and barriers for engagement in the domain of synthetic biology will be provided for the selected case studies, building on findings of Deliverable 3.2 and 3.3.

### *Perspectives of Third Sector Organisations (TSOs)*

Being the main focus of this analysis, TSOs engaged with all three case studies, taking on different roles within each: (i) TSOs have been “organizers” of engagement processes such as the "Enabling the Conversation on Novel Biotech" project and (ii) TSOs appeared as “campaigners”, i.e. they pushed a certain perspective (e.g. focusing on possible ecological side-effects of synthetic biology). Both of these roles appear to be part of TSO work in general. However, the interviews suggested that each TSOs’ approach to a specific engagement setting also depended on their self-conception, highlighting either the “organizing” or “campaigning” aspect of their organization. Which roles TSOs tend to take on may not only be dependent on the current opportunity of engagement, but also on how different TSOs are organised and run, as well as their stance toward technologies in general. Accordingly, how TSOs perceive themselves and the roles they take in specific engagement settings highlight different incentives and barriers for engagement in the field of synthetic biology. TSOs acting in the former role tended to focus on the incentives and barriers for engagement from the point of organizing an engagement process, those in the latter role tending to talk more about their own incentives and barriers for participating in a specific engagement process.

In the following, incentives and barriers for TSOs regarding their engagement in different processes are discussed in more detail.

### *Incentives*

Transparency and trust were necessary preconditions for any decision to engage in RRI on the part of TSOs. More concrete incentives for engaging in specific processes typically centred on access to different networks and anticipated outcomes of the respective process.

#### Transparency and Trust

Being trusted by their clientele and members is crucial for any TSOs to function. Organizing TSOs are concerned about the trust put in a particular process. Transparency was considered to be a crucial precondition to enable a trustful relationship between actors. In interviews, the relation between transparency and trust was crucial, even more so as the success of a particular process (here: "Enabling the Conversation on Novel Biotech" project) was considered to be directly related to the confidence stakeholders had in the organizers themselves. Hence, regarding funding, transparency and independence - of the institution as well as the process - was precondition for building a trusted relationship.

> "[W]e pride ourselves on being a little bit more independent […] than just being able to be paid. I mean that's, it's continually a challenge […] and it's a total valid challenge, and we have to continuously […] question ourselves, keep an eye on what we are doing to make sure that […] we are not going to be influenced by that." (I01)

Campaigning TSOs seem to be primarily concerned about how to satisfy the demands of "a broader public" which they understand themselves as advocates of (see "imagined publics" below). Hence, values such as transparency, inclusion and authenticity were considered to be preconditions for trust and being interested in dialogue at all. A lack of these preconditions was said to negatively impact TSOs' interest in participating altogether as they rejected to participate in any activity suspected to be tick-boxing rather than genuine dialogue.

#### Access to networks

Access to expert networks concerned with similar issues to the TSO constitutes a form of social capital providing a valuable resource in knowledge and expertise. Access to networks, be they expert or practitioners' networks, or simply the opportunity to engage with different stakeholder groups, were considered crucial in all three case studies. Incentives drawn from these networks are information and enhanced mutual understanding of relevant stakeholders, as well as an opportunity to gain confidence about participating in the key debates around synthetic biology. When talking about networks interviewees often focused on personal and informal networking as a key incentive.

> "It keeps me abreast as well. You have to read the papers, and you are involved, and partly, for me, I am learning all the time and I consider it to be a learning experience. Learning about people, learning about SynBio, learning, learning, learning." (I05)

As it was pointed out in the context of the SYNENERGENE deliberation project, access to (peer) networks may support fostering the debate in the respective national context by some TSOs.

> "[SYNENERGENE] was a good occasion for us to have the support in the European area. In [my country] it is really so difficult … […] so, the example of what is done outside could be encouragement for our own country." (I10)

Anticipated outcomes

TSOs need to justify their work to their clientele so anticipated outcomes were a strong influence on their willingness to engage. The more concrete such outcomes are the easier it is to evaluate a specific process. One example here is the Deliberation Aid as result of the „Enabling the Conversation on Novel Biotech" project. The Deliberation Aid is a tool designed to facilitate processes on novel technologies by providing a list of questions which should be answered before using new technologies in production processes. In order to make conversations easier, (synthetic biology) applications are listed as examples and individuals should make appreciating perceptions of other stakeholder groups easier in order to enable an open multi-perspective debate on pros and cons of the respective technology (which is here, of course, synthetic biology).
However, in some cases, the more important outcomes remain somewhat abstract: for campaigning TSOs, the resolution of conflicts is not necessarily the most important outcome of discussion processes. Rather, provoking a conversation, further analysis and mutual learning were mentioned as important anticipated outcomes of engagement processes even if such impacts cannot be concretely measured.

### *Barriers*

Regarding Barriers and Inhibiting Factors of Engagement, interviews with TSOs revealed a variety of different factors impacting their willingness to engage. For example, not being willing or able to change fundamental assumptions on synthetic biology's potential and on how collaboration between different actors should work was considered a fundamental barrier to engagement by different actor groups. The issues of how organizations assume to be perceived by others (e.g. their clientele) and how they perceive other actor groups involved in the dialogue were considered important factors for or against engagement. Further on, issues such as the influence of broader social/political and cultural influences, research infrastructure (esp. lack of resources), organizational culture (esp. timelines) and momentum for change were mentioned. However, while these barriers will be discussed individually, it is important to keep in mind that a certain linkage between different barriers exists.

Resistance to Change Worldview on Topic/ New Ways of Working

The question of whether TSOs are able or willing to engage in certain processes is highly dependent on the framing of the process in question. TSOs in all case studies pointed out that the questions that are asked during such processes are crucial for their willingness to engage and pre-framed processes make it more difficult for them to engage as the scope of deliberation is restricted and alternative framings are difficult to establish. In the Ecover case study the engagement processes were criticized by campaigning TSOs as top-down approaches to gain acceptance and, thus, asking the wrong questions. This resulted in the impression that no genuine interest in deliberation existed; rather, that organizations with particular interests were looking for affirmation.

> "The question they were asking us is; in what way can we use synthetic biology that you will be comfortable with or it would be okay to use these biotech techniques that you would be comfortable with. That wasn't the discussion we wanted to have." (I02)

While sustainability has been mentioned as overall frame within which synthetic biology is debated, the ways of how to reach a sustainable development differed widely. While for some TSOs sustainability and synthetic biology applications are mutually exclusive (e.g. for questions of risk), others were in favour of using technological solutions in order to achieve more sustainable products. Framing, however, does not only affect the general willingness to participate in engagement processes, but also influences ways of how to engage with one another. Hence, TSOs organizing engagement processes pointed out that confrontational discussions and emotional language were difficult to manage. In relation to this, taking fundamental positions toward synthetic biology - framing the technology as either good or bad per se - was considered a barrier for open dialogue. Such fundamental positions were said to usually aim at dismissing the technological approach altogether. This opinion, however, might not be shared by all actor groups around the table. With regard to the dialogue process itself, organizing TSOs stressed the need for mutual empathy between discussion partners. Frustration was said to be caused by a lack of empathy and interest in listening to other stakeholders' views. For handling the deliberation, discussions on concrete applications were in favour; thus a narrowing-down of the frame of debate was considered useful. In accordance to this, for some organizing TSOs, it was unlikely that the technological progress could be stopped; however, the contexts of applications would still remain open for debate. This prompted campaigning TSOs to perceive certain processes as rather pro-technological. Hence, the deliberation within such projects was suspected to have a certain framing from the beginning. In accordance with this, a more comprehensive approach to issues was considered desirable. Such an approach would allow for alternative framing of the debate on synthetic biology and societal engagement in relation to it.

When regarding deliberation of synthetic biology as a whole in certain countries, TSOs argued that protests against synthetic biology prompted ministries to refrain from openly discussing this particular technology. Hence, the openness of national settings for TSO engagement was deemed questionable.

Imagined Publics/Reputation and Perceived fixed categorizations of stakeholder groups

In order to enable mutual understanding and learning, participants of dialogues have to remain open to listening to others – at least to a certain extent. However, this openness is highly interconnected with different ways that stakeholders perceive each other. The first aspect of perception concerns the tasks of TSOs as they perceive themselves as advocates of a certain clientele and orient their activities accordingly. The second aspect is rather restricted to engagement activities themselves: here, images about how other stakeholder groups behave (or are thought to behave) highly influence, and mostly impact negatively, the willingness of TSOs to engage at all. Hence, it is a balancing act for TSOs to satisfy their (perceived) clientele's demands while, at the same time, remain as open as possible to discussion without 'selling out their mission'. Especially campaigning TSOs did have a clear picture about the publics interested in their activities and tailored the discussions accordingly. Thus, they had a clear orientation on how to perceive synthetic biology and deriving products: synthetic algae oil was clearly perceived as not being natural and sustainable. As a result, the scope of discussion was restricted: as some framings of the debate was dismissed as non-sustainable and unnatural from the beginning, TSO's openness for dialogue was inhibited from the outset. However, engagement of TSOs was important to industry nevertheless as their reputation (at least partly) also relies on their public image. Especially when aiming for "green" products, being perceived as "not sustainable" was feared to have a negative impact on industry.

With regard to the perception of stakeholders, TSOs' perception of others' perceptions of their own role appeared to be crucial for their decision about engagement. In the setting of an expert committee, critical voices considered themselves to be mainly perceived as conflicting groups. While they considered their early warning function important, they thought that they were being perceived as outsiders and as an interfering element within the process. This is closely interlinked with questions of framing and the openness of the process in general. Industry, on the other hand, was suspected to follow a rather instrumental approach to RI, not engaging in deliberation of this and other alternative approaches to innovation. These perceptions, be they true or not, hence impact the perceived opportunities of TSOs to become involved and feel heard in such processes.

Lack of Resources to Participate in Engagement

The way of how TSOs are organized and funded (mostly by donations of their supporters) does limit and influence their willingness and opportunity to engage. Hence, issues do have to fulfil certain criteria to be put on TSO's agendas, e.g. accordance with their inherent mission, urgency of the issue and/or the opportunity to raise public awareness about it, opportunities to be heard within the process.

Thus, as pointed out by TSOs, lack of resources is related to the respective priority of the issue. As participation in any process is resource and time consuming, time constraints do matter, especially when the issues at stake are not considered top priority. Thus, an opportunity for additional funding for TSO engagement in debates around synthetic biology was considered to be crucial whenever the issue was not considered a current top priority.

From an organizing role, questions of resources were addressed in terms of the immediate outcomes of the process. Thus, for the "Enabling the Conversation on Novel Biotech" project, funding restrictions limited the ability to involve more interested parties than just the 'key actors'. With regard to increased budget, concrete ideas of improving the project's quality and outreach were mentioned, such as designing the Deliberation Aid to be more user-friendly or disseminating the Deliberation Aid (e.g. online) and holding more face-to-face workshops using the Deliberation Aid.

Timelines

When engaging in dialogue with different stakeholders, the different time frames of organizations have to be taken into account. If there is no or little understanding for different demands of organizations (timewise as well as to other regards), it is likely to create challenges to the whole process. With regard to campaigning TSOs, incompatibility of timelines between different sectors (here: TSOs and industry, respectively policy) were said to fuel conflicts. A lack of understanding for the respective timelines of different actors caused frustration about the process.

A too narrow time frame for TSOs contributing to a discussion (or report) automatically restricts opportunities to do so. If the write up of the results was perceived to be rushed, TSOs believed that this would either result in exclusion of certain perspectives from the beginning (in order to speed up the process) or, in the forcing of consensus in order to keep to tight time frames. Thus, adequate planning of time for all actors to contribute is crucial for TSOs in order to feel respected.

Critical Mass and Role of Individuals

In any situation of change, the question of who should initiate it is crucial. With regard to ways of including a variety of stakeholder perspectives, especially the ones of TSOs, two factors do have to be

taken into account: first, the importance of key individuals who are able to push issues and force a re-arrangement of priorities, and second, the impact of a (real or anticipated) critical mass who take up ideas of change and, therefore, indirectly foster change. In accordance with these two features, our interviews showed an enhanced reception of critical voices and perspectives to integrate different agendas (e.g. societal engagement) in incidents of crises (real or anticipated) regarding public acceptance of technologies. Hence, when protests or negative reactions from the public side or TSOs are likely to have adverse effects on the acceptance of technology development, it is more likely that agendas, such as societal engagement are implemented beforehand. However, in order to actually do so, these issues need to be prioritized by certain groups or people: quite a lot of time they depend on individuals taking action.

### *Perspectives of Academic Stakeholders*

Academia was mainly involved in the SBLC and the SYNENERGENE case study, although individual researchers closely observed the Ecover process as well. Interestingly, most of the academics interviewed argued from a perspective outside the project itself, although they had engaged in the aforementioned processes in different ways: as organizers of projects and events, researchers, practitioners (see DIY biology below), or, quite often, external observers.

How interviewees spoke about the engagement itself and the other stakeholders involved in it varied considerably depending on their own role. Nevertheless, it has to be pointed out that academic stakeholders in all three case studies in the synthetic biology domain were generally in favour of societal and public engagement. However, this may be due to the fact that they were all social scientists or active in related fields such as technology assessment and hence either worked in the field themselves (e.g. organizing events and engaging with different kinds of actors), or considered engagement to be an interesting research object in the context of STI (Science and Technology Industry) governance. Thus, there are no general resentments against engagement found among the interviews of all three case studies. Rather, they provide some kind of meta-observation on either general societal process where societal engagement plays a role in or on particular engagement processes. However, some members of academia did also engage themselves, sometimes as part of, sometimes as organizers of concrete procedures.

The particular case of DIY biology[9], a social movement in which actors in society beyond academia study biology using the same techniques as traditional research institutions, has been included in the actor group of academia for two reasons. The first reason is the DIY's critique on blind spots of what is considered traditional academic life, underlining openness of science and the very societal context

[9] The term Do-it-Yourself (DIY) biology covers a variety of research practices related to (synthetic) biology that take place outside academic institutions.

of innovation. Second, while the societal setting of science has changed, they do share a frame of relevance: DIY may criticize academia for their relation to society in general as they perceive science as rather closed box, somehow detached from the rest of society. However, they do not question more fundamental issues such as how knowledge in academia is produced; hence, a scientific paradigm is kept alive within the DIY movement and hardly changed.

### *Incentives*

The only concrete incentive for engagement pointed out by actors of academia has been the access to peer-networks, mainly for community building and to acquire funding (in case of DIY).

Access to networks

Access to networks was described as great incentive for different actors: for DIY, it provides opportunities with regard to potential funding opportunities, community building, and people moving from academia to DIY.

### *Barriers*

Regarding barriers and inhibiting factors for engagement, academia's perspective gives insights in two ways: first, academia described barriers and incentives of engagement of other stakeholder groups with regard to specific engagement formats or occasions. This was in fact a big part of their narratives. Hence, this will be discussed as perception of other stakeholders, revealing also thoughts on broader societal conditions and engagement per se.

Second, when focusing on their own engagement in processes, they often did understand themselves as (remote, benevolent) advocates of public engagement per se, thus often taking a critical stance towards differently oriented engagement procedures.

Here, academic culture in general was highly criticized from DIY's point of view with regard to opportunities of engagement both with DIY people themselves as well as the public in general. Further, engagement procedures, timelines and resistance to worldview have been discussed by academics with regard to their involvement.

Perceived fixed categorizations of stakeholder groups

As mentioned above, academia does take on a variety of roles within engagement projects or processes; thus, academia quite often offers rather external observations. Hence, academia did offer some valuable insights on engagement of other stakeholder groups with regard to certain processes.

With regard to reputation of certain stakeholder groups involved in SYNENERGENE, academia observed that the use of project funding from SYNENERGENE for TSO campaigns may have caused (further) precaution among other stakeholders (especially industry) to further engage with the issue of synthetic biology. This seemed to be the case especially for companies who consider themselves as "green" and "sustainable", hence to a certain extent depend on the approval of TSOs. Thus, keeping the discursive upper hand of one party seems to negatively impact the willingness of other actor groups to engage.

Within deliberation projects on synthetic biology, it was argued that concrete incentives for industry to engage in such projects are lacking as their concrete impact is not always obvious to industry.

> "In general it can be said that those organizations whose main interests are stakeholder and public dialogue, do have advantages [pushing their own mission] with regard to the given structure of SYNENERGENE – and EU deliberation projects in general. […] A big company […] does not necessarily have strong interest to invest resources in citizen dialogues. This has to be said: there is no incentive structure for them." (I09; translated by author)

Academic culture

With regard to societal and public engagement, most of institutionalized (natural) scientific research culture was fundamentally criticized by DIY biologists as being little interested in opening up and engaging in general. While there are parts of academia interested in DIY in particular (see above), (natural) scientific research was said to rather marginalize DIY biology as a phenomenon and being not particularly interested in knowledge exchange. Hence, engagement opportunities were perceived to be dependent on individual scientists. Here, young scientists were described to be more open, albeit usually subdued by lack of resources and career pressure. Academic culture as described from a DIY biologist's perspective was considered absolutistic and non-democratic while, at the same time, being unable to cope with an increasing complexity of real-world problems.

Engagement Procedures

The way engagement procedures are organized and held sets the scene for how engagement with different actor groups is going to happen. Hence, details of engagement procedures make a difference in how academia perceived these procedures. In some instances, organizational details of engagement procedures were said to serve as signals of genuine interest.

With regard to engagement procedures, it was pointed out that aligning the mission and the engagement format increases the engagement of any organization. However, how deliberation projects such as SYNENERGENE are organized poses a structural obstacle to the way some actors are able to engage. Here, finding an engagement format fitting for all included stakeholders was

considered key: while the proposed Open Fora format of SYNENERGENE only proved valuable for certain groups (e.g. science journalists and TSOs), other stakeholder groups preferred other ways of interaction (e.g. industry). Hence, it was concluded that the specific structure of deliberation projects benefits organizations whose mission covers societal engagement in the first place, while other stakeholders tend to keep a more reactive approach as public engagement (deliberation) is not considered their core mission.

”I think in general that advantages of the given structure of SYNENERGENE - and probably of EU funded [deliberation] projects in general - lie with organizations which see their very purpose in this kind of stakeholder and public dialogue. They will achieve success way easier than other [stakeholders].” (I09) (Translated by author)

In accordance with this, a lack of resources was observed to impede engagement of all actor groups (regardless the engagement format), especially when engagement itself was not considered to be core activity of the respective organization. Thus, funding for TSO engagement could enhance the willingness of TSOs to engage as they usually only have resources to cover most urgent issues of their core activities.

When considering ways of doing engagement, the specific context of Technology Assessment (TA) was mentioned: here, DIY biologists argued that interdisciplinary knowledge exchange was limited due to the understanding of how to engage. TA was said to rather focus on deliberation not being willing (or able) to include hands-on practices as preferred by DIY approaches.

Timelines

When being engaged in societal engagement processes itself, academia pointed to the issue of time pressure especially regarding rather time-consuming activities and activities in need of preparatory effort such as writing contributions. Receiving short-term invitations for contributing to reports or for participating in events, for example, impedes academia’s willingness to engage with the process as a whole. It was pointed out that time pressure tends to lead to a rather centralistic writing process which limits engagement of critical stakeholder groups, thus being prone to pre-framing of issues and exclusion of alternative perspectives.

Resistance to Change Worldview on Topic/ New Ways of Working

From an academic meta-perspective rooted in the case study of the SBLC, it was argued that alternative ideas of innovation are difficult to integrate as linear thinking of innovation processes was said to prevail. With regard to governance, a re-framing of RRI as public acceptance was criticized as

well. Academia pointed out that engaging in an up-stream dialogue could be considered to be more difficult than to tick measurable things; hence, certain (narrow) interpretations of how to conduct engagement prevail, e.g. in terms of risk and safety in regulation.

> "I think it's much harder to engage in an up-stream open dialogue than it is to do more […] constrained and […] measurable things, so I think the way that [RRI has] been interpreted […] has been much more in terms of risk and safety in regulation. But I think it's partially because of the difficulties of actually operationalizing RRI." (I07)

### *Perspectives of Industry Stakeholders*

Industry engaged in two processes in different ways: In the first one - the debate around synthetic algae oil- they actively participated in the discussion after their decision to use this ingredient in some of their products. In the second case, industry was invited to take the role as chair of the Synthetic Biology Leadership Council. Hence, the barriers to engagement may vary considerably, dependent on the role they are taking on. This did not always involve industry stakeholders directly interacting with TSOs but nonetheless helped shape the landscape and agenda that made TSO engagement more or less likely.

#### *Incentives*

Access to (expert) networks that enabled them to stay informed about issues and processes was a key determinant of industry engagement in the RRI process. For example, in the "Enabling the Conversation on Novel Biotech" project specifically, learning more about current technological debates was a key incentive.

Access to network

Industry in both roles claimed to benefit from the access to issue-specific networks and hence from new knowledge input in order to gain a deeper understanding of the issue at stake from different perspectives. In the case of product-relevant communication, observing engagement activities from other actors in the field (namely, the Solazyme roundtables) was considered helpful in order to develop a more comprehensive and transparent communication strategy. In all other cases, the access to state-of-the-art information on perspectives from different actors, the respective technology or governance processes were highly appreciated for individual learning effects and broadening one's horizons. This was a respect in which industry stakeholders rarely chose to involve TSO stakeholders, perhaps because they were not perceived as having anything sufficiently unique and valuable to offer that warranted extending the invitation to engage beyond the already existing networks of experience and expertise linking the infrastructure of industry and academia.

Anticipated outcomes

Process descriptions and guidelines developed in multi-stakeholder settings such as the Deliberation Aid from the "Enabling the Conversation on Novel Biotech" project were considered useful in working out which questions need to be answered in order to proceed with the broad approval of different stakeholder groups when implementing new technologies. Thus, taking on the debate was considered to help managing future stakeholder relationships with all groups, including TSOs. Synthetic biology here serves as an example of contested technologies; processes and argumentations developed in the run of the debate on products here were considered to be more universal by industry.

However, as can be easily recognized here, a certain pre-framing of the issues often exists and may become even more resistant to change when protocols become standardized. This is another respect in which earlier engagement in the RRI process involving industry, researchers and particularly TSOs, who may have a new and valuable perspective to offer, can help shape the goals and values of the research before anticipated outcomes become set and stakeholders initiating engagement fall prey to pre-framing, only seeking input from stakeholders they perceive as already aligned with their objectives.

### *Barriers*

Not being willing or able to change fundamental assumptions on synthetic biology's potential and on how collaboration between different actors should work were considered to be important barrier and inhibiting factor for engagement. This was especially true when it came to the decision to involve, or in this case not involve, Third Sector stakeholders. Closely linked to this, perception of other stakeholders was considered crucial for industry in order to engage in processes. On a more practical note, lack of resources as part of research infrastructure and timelines as part of organizational culture were pointed out.

<u>Resistance to Change Worldview on topic/New Ways of Working and Perceived fixed categorizations of stakeholder groups</u>

Industry stakeholders claimed to be very open to inviting different perspectives and to bringing in new ideas when discussing synthetic biology products (e.g. considering the livelihood of farmers, or questions of alternative products etc.). However, more fundamental differences of worldviews were unlikely to be resolved in this way because industry tended to be interested in debating concrete applications rather than synthetic biology in general. Industry stakeholders therefore called for a more argument-based, constructive debated on technology in general that made a real effort to take into account these different worldviews. The debate on products, however, was considered to be

difficult due to the fact that there was hardly middle ground between industry and campaigning TSOs.

> "If you talk to [TSO1], they were quite well informed, they have a very specific opinion and a very extreme one but they tried to relate as much as possible on science and about real effects. I did like them as a discussion partner, they pushed us by asking the right questions, even if I don't agree with their point of view, but they are the right discussion partner. I had problems with the way [TSO2] were discussing, because they weren't using any arguments they were just having a mantra almost. That really is a lot more difficult." (I04)

Hence, industry considered public dialogue as a testbed for the defensibility of their position and as an opportunity of getting new input on the issue of new technologies. While being in favour of resolving conflicts by open discussion and while establishing long-term thinking and sustainable solutions to challenges were considered crucial, the progress of the technology was perceived to be inevitable. Also, the how such issues should best be debated was considered crucial. While being interested in multiple perspectives, industry did consider it difficult to meet all aspects put forward by TSOs (e.g. dismissing synthetic biology altogether). The variety of TSOs involved in the debate on synthetic biology and the lack of alignment with TSO positions was considered to be difficult to handle especially.

Lack of Resources to Participate in Engagement

Both engagement situations in the synthetic biology case studies discussed here demonstrated that engagement of industry is dependent on availability of resources; this in turn is linked to the priority assigned to the issue under discussion and its immediate relevance for their daily business activities. In the case of Ecover, taking on the debate on algae oil and engaging with other actor groups in the field was clearly relevant for the company as a whole because their reputation was at stake. This was especially important given that Ecover have built their "brand" on offering products that were 'sustainable' and 'green'.

In the case of SBLC, the issue of scarce resources for such deliberation activities has been pointed out: as only the secretariat support is provided by the Government, the activity of the group and subgroup is dependent on the members to be self-financed, in some ways echoing the funding model of many TSOs. Thus, the likelihood of industry's engagement in such committees and deliberation projects depends on the issue's perceived relevance to their core business tasks.

### *Perspectives of Policy Stakeholders*

Stakeholders representing the policy making perspective were not significantly involved in the case studies and were only active in the setting of the SBLC and the Subgroup Governance of the SBLC.

Actors from the policy realm nonetheless provided some interesting observations on the interaction between different stakeholder groups and the overall setting of such committees. It must be pointed out, that the interviewed person was not a policy-maker per se but someone who provided advice on public and societal engagement with relation to STI governance.

### *Incentives*

No specific incentives regarding societal engagement were mentioned.

### *Barriers*

Barriers and inhibiting factors outlined pointed to the challenge of perceived fixed categorizations of other stakeholder groups and, closely related, a resistance to change worldview/new ways of working were considered most important. Furthermore, broader social/political/cultural influences were mentioned, as well as the importance of individuals to initiate change.

Perceived fixed categorizations of stakeholder groups

Policy in the context of the SBLC referred to the pre-set agenda of such committees in terms of commercialization, economic and societal benefits, and maximizing UK's economic position. It was argued that this particular setting of STI committees (mostly academia and industry), as well as a focus on market acceptance to justify technology paths, tends to exclude a broader societal voice per se, leading to critique from parties in favours of broader approaches to STI governance.

> "If you take the leadership council as one example, or you take even a research council, […] the membership of those bodies are primarily either academics, scientists that have an interest in getting the funds through, or they are private sector business people who obviously have an interest in sort of applying the science and exploiting that science for economic and other ends, and the wider societal voice is not heard around the decision making table. It is only accessed through managed activities like public dialogues." (I06)

Resistance to Change Worldview on topic/New ways of Working

With regard to societal engagement and public engagement, it was suspected that committees were likely to focus their energy on other issues, while broadly recognizing the importance of societal engagement per se. Alternative agendas were argued to be incompatible with the technology fix-worldview favoured by this commercialization agenda. TSOs in particular were seen as likely to have goals and values that were incompatible with those of policy-makers.

> "Well I am talking about the different NGOs, I'm talking about people have different views of the relationship between business and society, I'm talking about different models of agriculture, essentially different priorities for looking at the world. [...] And those views, those views are quite difficult to integrate into our, a business led, technology led you know economically directed strategy." (I06)

Broader Social/Political/Cultural Influences

When talking about broader political influences hindering societal engagement, interviewees depicted a tendency to exclude broader issues about STI governance from the discussion in the beginning of the innovation path. Ignored in the early stages of the development of new technologies when organisations such as TSOs might help actively shape the future direction and goals of research, even its underlying values, these discussions were often delayed to a later point in the process when there was less chance of them making a meaningful difference. Thus, the burden of dealing with them later-on falls onto the regulatory system, a framework which is not prepared to meaningfully engage with such broad issues. This was linked the stagnation of a lot of STI regulation overstraining of the system, because priorities about technological development had not been discussed at an earlier stage. With regard to barriers, this results in a tendency to exclude critical stakeholder groups (e.g. critical TSOs) later-on in STI governance processes.

Role of Individuals

In the context of prioritizing societal engagement and public engagement within the SBLC, the importance of key actors should not be underestimated. Hence, it was argued that in order to put these issues on the agenda, the 'right positions' with the power and ability have to be interested in prioritizing them. However, if these key actors do not exist, respectively do not occupy positions which can initiate change, this turns into a barrier for pushing the issue of engagement.

> "But there's nobody from within the community [particularly interested in societal engagement] standing up and saying I really think we should do this [Public Engagement] now. [T]here doesn't seem to be a real desire or intention to do it in any sort of a systematic way at the moment. [However,] [t]hat could change." (I06) (emphasis added)

### *Perspectives of Research Funding Stakeholders*

Research Funders only had a dominant role within one of the outlined case studies (Ecover) as they only engaged in the "Enabling the Conversation on Novel Biotech" project. However, with regard to societal engagement, research funding can draw from similar experiences in different settings (pointed out below), which makes their contribution even more valuable.

#### *Incentives*

With regard to incentives, research funders paid particularly attention to anticipated outcomes of the processes they funded.

Engagement Procedures

Engagement procedures that were seen as likely to deliver the anticipated outcomes research funders' desired was a key determinant of their willingness to engage TSOs. Thus, in the case of the "Enabling the Conversation on Novel Biotech" project, the cooperation process of the team was

perceived as successful as it allowed for honest, open and frank discussions, and for a non-restrictive way to develop the project. As a result, funders were satisfied with the Deliberation Aid, though room for improvement still exists (e.g. face-to-face rather than online consultation). With a rise in resources, additional ideas, such as a revision of the tool to make it more user-friendly or to apply it within new contexts could be advanced further.

### *Barriers*

With regard to barriers and inhibiting factors for engagement, research funding predominantly referred to the perception of their own organizations by stakeholders, as well as organizational issues (lack of resources).

Perceived fixed categorizations of stakeholder groups

Some preconditions were considered especially important as funding organizations suspect that being perceived as part of establishment could discourage engagement from certain groups, especially TSOs. However, anticipating a reluctance to engage, they needed to put emphasis on this aspect to overcome this barrier. As a successful example, the long-term cooperation with TSOs in the steering group of the Synthetic Biology Dialogue (2010) was mentioned. To be perceived as being interested in engaging in research at stake and doing it socially responsibly, hence being open to different perspectives, was considered core as research funders did not care for being suspected as biased and interested in acclamation policy: “And being open and transparent and honest about our motivations enabled that to be a productive relationship.” (I08)

Lack of Resources to Participate in Engagement

As pointed out above, priority setting of TSOs implicates a lack of available resources for certain activities and was hence mentioned by research funders in different contexts: first, it was argued that priority setting for campaigning TSOs would inhibit engagement with research funders directly. Research Funders’ activities in this case focus on rather distant (form every-day life) research where TSOs hardly have the resources to work on. In rather direct programs (e.g. on issues such as food or health), where a more direct incentive for TSOs’ engagement was suspected, closer interactions with TSOs exist. However, priority setting and respective resources impact interaction with other stakeholder groups as well, e.g. policy makers.

### *Synthesis on the domain of synthetic biology*

In the context of synthetic biology, perspectives of five different actor groups have been analysed: TSOs, academia and industry as well as policy and research funding. Members of most actor groups

(except for research funding and policy) in this analysis took on different roles within different settings; thus, roles seem to be flexible in terms of the actor groups who take them on. For example, TSOs can take part in debates as campaigners as well as organizers of processes; industry may not only participate, but also take on mediation and academia seems to be most flexible when it comes to roles: be it organizer, researcher, facilitator, external observer or practitioner (DIY biologists). Depending on the respective role, the perspectives and activities regarding engagement in the domain of synthetic biology vary considerably. The way of how actors are willing to engage is highly dependent on their stance on engagement per se, but also on the issue at stake and the underlying assumptions on innovation-society relations. The way how process set-ups are pre-framed from the outset highly influences the willingness to engage of actors with divergent agendas. Thus, the (political) will behind the process should to be made clear beforehand in order to avoid frustration with the process.

Another aspect of debates around synthetic biology seems to be that they are considered by some people to be blueprints for how to deal with emerging technologies (although there is a strong case to suggest that nanotechnology projects are the blueprint for synthetic biology engagement projects). Here, the way of *how to engage* on issues of emerging technologies rather than ultimately solving the specific issues at stake seems to be most important. However, this approach of standardization may hold the risk of transferring pre-framings and premature decision-making from one technology field to the other.

It can be further concluded that formats of engagement do influence the willingness of different actor groups to engage. Thus, formats and processes appropriate for the respective participants have to be established. Accordingly, some of the barriers outlined may be more linked to specific engagement formats and personal settings rather than to the domain itself. This may be due to a rather universal set-up of processes (e.g. deliberation projects, STI councils, protest arenas) while the specificity of debates tend to change according to (technology and actor) settings.

## 5. Key insights from the PROSO case study research

Within the PROSO project, work package 3 has sought to explore and improve our understanding of the barriers and incentives that different stakeholders – particularly Third Sector Organisations – encounter in becoming engaged, or engaging with others, as part of research and innovation. The qualitative research that PROSO partners carried out across 9 case studies was instrumental in understanding these barriers and incentives from the perspectives of those who had been, or were currently being, engaged in projects/programmes developed either explicitly or implicitly under RRI

frameworks. It is our hope that exploring the barriers and incentives within the context of each case study has provided a deeper understanding of the lived realities of societal engagement, and that these insights will help to shape future engagement under the terms of RRI in these research domains, and beyond.

We conclude this deliverable with a reflection on the key insights from the WP3 case study research. These insights focus on the significant themes that emerged from the across-stakeholder analysis (section 4.1 of this deliverable), and reflect on the barriers and incentives that the domain-based reports show to be most important in engaging TSOs.

Anticipated outcomes and values system were the two most important incentives for societal engagement across case studies. These two themes are linked in that transparency and trust are the core values that interviewees associated with anticipated outcomes: those engaging want to know up-front how the information they provide will be used, and what the main impacts of the engagement will be. Open, accessible communication is essential to making this happen.

“Anticipated outcomes” is another way of talking about “impact”, which has emerged as an important concept in both science governance and higher education across Europe. In the context of RRI, though, this refers to the impacts of engagement, rather than the impacts of the research itself. Crucially, because RRI focuses on engagement before research begins, and at all stages of the research and innovation process thereafter, these impacts can include changes to the R&I process, or shape the development of a research field more broadly. But how does one capture or measure these often intangible outcomes? This is an extraordinarily important consideration, particularly if societal engagement becomes more closely tied to research funding processes and access to resources (which were the main barriers to engagement across all case studies). As such, there also needs to be transparency about how researchers and other stakeholders assess the impacts of engagement: being explicit about engagement impacts legitimises the R&I process, and it acts as an incentive to the future engagement activities. Transparency about anticipated outcomes can be seen as a core principle of RRI.

Transparency and trust were also crucial in persuading stakeholders to become engaged in the first place: transparency leads to trust. Stakeholders did not want to get involved in a project with people they did not trust. It appears that providing opportunities for mutual exchange and contact between the stakeholders whose relationship may be characterised by inherent lack of trust could pave the way towards building a stronger basis for future efforts for engagement. To this end, a way to incentivise engagement between researchers and other stakeholders is to create opportunities for

them to build trust, such as through secondments, exchanges, or internships. Structures must be put in place to facilitate these exchanges, and more resources made available to encourage cross-disciplinary collaboration between social scientists and natural scientists. Engagement is also a route to breaking down stereotypes about other stakeholders, so engagement itself is a path to encouraging future engagement. It may also be helpful to encourage stakeholders within an engagement process to "agree to disagree", rather than forcing consensus, which may exacerbate conflict.

Right now, societal engagement does not generally happen until research is already well underway. This means its goals and values are already well-established, and key opportunities for fruitful engagement have potentially already been missed. How do we move engagement "upstream" in the research process and ensure it becomes a standard part of how research and innovation are conducted? First, there must be an acknowledgement that researchers do not generally know how to successfully engage with stakeholders in wider society, or even how to work with researchers in other disciplines; they need support and resources in order to do these things, which include training, money, and time. Second, the means by which they can access these resources must also be made transparent, and it is the responsibility of academic institutions, research funders, and policy makers to ensure that is the case.

Perception of the issue and worldview are also important factors that act as both incentives and barriers for societal engagement. This means that, beyond changing the innovation processes (funding structures and resources) to encourage researchers to invite societal engagement in the earliest phases of research design, it is crucial to consider how open researchers are to doing things differently. If someone perceives societal engagement to be a waste of time, then training them to do engagement will probably not result in them doing engagement. And if they do undertake it, they will not do it well. What we learned about momentum for change in our case studies is useful in finding ways to encourage a shift in academic culture, and within the culture of TSOs, about societal engagement. First, who are the key individuals and change-makers within an institution who can promote societal engagement in R&I? If there are none, societal engagement will remain on the fringes of research practice, so ensuring there are people who can act as "societal engagement champions" is crucial to moving the RRI agenda forward and shifting organisational and academic culture. It is also important to note that in order to reach a critical mass for change within an institution, there have to be several key players – one or two people cannot make this shift happen on their own. Second, in order to shift a person's worldview, they need to interact with ideas about societal engagement on a personal level. This is where incentivising researchers and TSOs to participate in engagement processes (such as those already being run by key players) and other

knowledge exchange opportunities (e.g., internships, secondments, etc.) can get them in the door, help them to learn to trust other stakeholders, and provide them with an opportunity to see what good engagement look likes and why it is valuable.