Negotiating Responsible Futures:
Developing Technology and Innovation with the Horizon 2020 Framework Programme

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Abstract

This thesis is an investigation into the staging and negotiation of technologically responsible futures through Technology Assessment and Responsible Research and Innovation. Science, technology and Innovation are major co-producers of the ways we live our lives, our perception of what is possible and the way we reflect on our actions. This relation; between the responsibility of human sociotechnical ingenuity and the radical changes to the environmental dimensions of the planet, has been proposed

My research is occupied with investigating how different visions of responsible development of science, technology and innovation is being negotiated through practices of Technology Assessment and Responsible Research and Innovation.

Technology Assessment and Responsible Research and Innovation are inter- or transdisciplinary practices of analysis, which seek to provide guidance for decision-makers about science, technology and innovation. The application and content of these practices have changed from its reactive origin in the midst of the 20th century, to presently being used as design practices with science, technology and innovation in the co-production of pathways to responsible imaginary futures. Because they are being used to shape our sociotechnical future it is important to understand how these methods are being formed by our sociotechnical present.

With this objective, my research has been performed as an explorative process of following the negotiations of defining responsibility through multiple sites; the Danish Board of Technology, in the Council of Coaches project and in the funding program horizon 2020 developed by the European Commission. The multiple sites are entangled in their ambition to develop responsible sociotechnical futures, but just what this means differs between them.

Because of this, there is a continuous negotiation and aligning/re-aligning of stakeholders and stakes. These are stagings of ontological choreography, mobilising around particular issues and neither passive nor objective in themselves. Technology Assessment and Responsible Research and Innovation are to this extent situated and mediating particular ontological and ethical positions. The performative nature of this kind of knowledge-making is tightly linked if not inseparable to sociotechnical subjectivities of the participating parts. To this extent, the thesis explores how the practices of Technology Assessment and Responsible Research and Innovation act as mediators, and how the negotiation of dominating visions occur.

Keywords: Technology Assessment, Public engagement, Responsible Research and Innovation, Science and Technology Studies, Response-ability, Sociotechnical Imaginaries, Horizon 2020

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Structure of the report

This report is structured in a manner that is representative of the process of investigation. It represents - to a certain degree - my own experience of the relations between the actors and institutions, and the structure-agency they have with each other. The ambition is not exactly that of storytelling but related to a tradition of describing experiences as they unfold.

The first chapter acts as an introduction to the Anthropocene as a sociotechnical event, and a tool for conceptualising the large scale issues related to human exploits

The second chapter is a description of the theoretical foundational and methodological considerations. This takes into account my own participation in the field and the inherent ontological and epistemological context of this thesis. Furthermore, the chapter describes the theoretical framework, mesh and vocabulary set in place to analyse and discuss the field of investigation.

Figure 1: Structure of the report. Own illustration.

The third chapter introduces the particular case-study which act as the epicentre of the analysis and following discussion of Technology Assessment and Responsible Research and Innovation in the project of the Council of Coaches. There are three elements to this analysis:

- An introduction to the practices and context of the Danish Board of Technology Foundation
- Negotiations of responsibility in the Council of Coaches
- The governing structures of the Horizon 2020 funding program

The fourth chapter offers a discussion and reflection on the analytical points and descriptions from the different fields of practice and the Anthropocene setting, and reflections for acting with greater responsibility, sensitivity and care in an entangled world.

Finally, **the fifth chapter** presents the conclusion

Introduction

"Sciences role mediated and unmediated by technology is affecting our sense of possibility and our hopes and visions of good and attainable futures, what I have elsewhere called Sociotechnical Imaginaries" (Jasanoff, 2016, 22:59)

There are few things that are more constitutive to the way we think about the world we live in than the social and technological components we use to live in it (Jasanoff, 2004). It is with this notion that I have investigated the Council of Coaches project, the structures and processes that has let up to the development of the application, and how it is fitted into a particular perception of what responsible futures look like to the participating actors and institutions.

It starts with Horizon 2020, a financial distribution instrument for funding research and innovation in the European Union, stretching from 2014-2020, and the 8th Framework Programme for Research and Technological Development. To this date, it is the largest funding programme of its kind, with € 79 billion to be distributed between multi-annual work programmes (European Commission, n.d.). The work programmes are developed by the European Commission to match the framework inherent to the Horizon 2020 legislation and embedded in the European Union's policy-objectives and priority setting (CORDIS, n.d.)

This brings us to the Council of Coaches project which is a response to the 'open call' in the work programme: "Active ageing and self-management of health", under the topic of: "Personalised coaching for well-being and care of people as they age" (CORDIS, 2014). The focus of the Council of Coaches is on developing virtual agents for dialogical coaching of health and wellbeing, and through the application. Furthermore, the Consortium behind the project hopes to introduce a new paradigm of virtual coaching. The Consortium of the project is an interdisciplinary group of actors and institutions, all contributing differently but held together by the collective Grant Agreement of the Council of Coaches project. Each consortium member with the interest of developing a

successful project, and each with their particular agendas as researcher, institutions and funders.

This thesis investigates the practices of negotiating this development of technology and innovation, particularly through assessment of technology, alignment of responsibility in Research and Innovation, and alignment by sociotechnical imaginaries. In doing so I dive into three sites; the Danish Board of Technology Foundation, the Council of Coaches Consortium and the Horizon 2020 funding program of the European Commission, all of which are intertwined with the forming of the Council of Coaches project. My research is focused on the design process of the socio-technical futures which are intertwined in the practices of developing the technology and the innovation. This is specifically as viewed from the perspective of responsibility, or rather the negotiation of responsibility as the main analytical unit of analysis. Which responsibility, whose responsibility and what responsibility really means in this context will be clearer as the thesis unfolds.

Relevance

This study is focused on the design process of futures, specifically as viewed from the perspective of responsibility, or rather the negotiation of responsibility. The project is written into a literary and academic movement of designing for sustainability and Science and Technology Studies. I perceive design as a practice somewhat similar to how Victor Papanek describes it: “The planning and patterning of any act toward a desired, foreseeable end constitutes a design process” (Papanek, 1985, p. 3). In design, there are however often more than is desired and foreseeable, and this is one reason why the Anthropocene as a sociotechnical event is good to think with (note, that the Anthropocene is a conceptualisation of a new geological epoch, based in the material consequences of human sociotechnical agency on a planetary level). Because the ripples of the Anthropocene related crises are building immense pressure on the way humans are organising society, designing and developing. While there are plenty of potential solutions to the issues we are facing, it is certainly not all of them that are desirable from the perspective of sustainability in an Anthropocene setting. Neither the program of the Anthropocene or sustainability are by any means well-defined, and designs in either are relative to relation and association, temporality and spatiality. What seems like terrible images of the future from one perspective might seem preferable from another (Garud, Gehman, & Karnøe, 2010).

The research is relevant because it is questioning the frameworks used by the European Commission towards preferable designer futures. It is essential to investigate these conceptualizations of sustainability and responsibility as situated and embedded in a particular spatial and

temporal context, to understand what and who they sustain and are responsible for. This research is doing so by looking at the actor networks that are designing sociotechnical pathways to preferable futures through responsible innovation. Or, to be more precise, a performative responsibility which is a mobilisation of heterogeneous actors by the means of interestment, seduction and coercion.

By looking at the ecologies of actor-networks this thesis is engaged with discussing Technology Assessment and Responsible Research and Innovation as design-practices for sustainability. These practices are arguably designed for knowledge-making and world-making, to inform decision-makers in different positions of power. For this reason, the Danish Board of Technology Foundation can be considered ontological and epistemological choreographers, explicitly and implicitly pouring ethics into their practices. To this extent, designing responsible futures becomes a question of what techniques and devices/actors are being used to facilitate the process of co-creating responsibility by negotiation, and what effects they might have.

Problem analysis

It is highly contested how to transition towards a more sustainable society, and what this might look like - but there is little doubt about the magnitude of the issues we are facing locally and globally. Developing futures through the use of Technology Assessment and Responsible Research and Innovation is an ethical project of imagining futures. Planners and practitioners of practices such as these cannot simply rely on the notion that they are acting as intermediaries, assisting in the unveiling of realities by stakeholders because they are as much a contributor to the process of negotiation as any participant both human and non-/more-than-human (Metzger, 2013). Furthermore, the ecologies in which they are embedded provide particular sociotechnical imaginaries and in doing so enforce particular ethical, political and material mediation. Degrees of manipulation might be unavoidable, but understanding and expressing these biases calls for greater sensitivity on the techniques, practices and devices used to co-create particular sociotechnical futures.

Problem Statement

How is responsibility negotiated in relation to the Council of Coaches project, and what futures do the partners of the project imagine the technology to co-construct.

Motivation, Scope and Delimitation

I have been working at the Danish Board of Technology Foundation since August 2019, and while being there I have been both inspired as well as surprised by the practices set in place for producing and trans-

lating knowledge towards policy-making advise. As an institution, they stand for enhancing the use of public engagement and promoting democratic deliberation practices in domains which previously (and continuously) have been dominated by technocratic and/or political decision practices. Their vision is closely related to the democratically normative position of the organisation. Yet their actions are governed by negotiations with the socio-technical ecology in which they are mobilized. It is these negotiations which are the focus of my research.

In the entangled network ecology of the Council of Coaches, I focus on the actions and negotiations of the Danish Board of Technology Foundation, The Council of Coaches Consortium and the Horizon 2020 Framework Programme, in relation to each other and the Council of Couches negotiations of responsible technological development and innovation.

The Anthropocene Setting

"It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters [...] what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories." (Haraway, 2016, p. 12)

The reason for beginning with the Anthropocene, in this research about developing futures through technology, is that the Anthropocene is a descriptive proposition of the transformative agency which lies in the social and technological composition of human societies. In brief, the consequences of human activities by technology and innovation, as well as the systems that govern them, on a planetary level. It represents the interweaving relations of humans, science, technology and innovation, capitalism, society, the climate crisis and so on.

The agency derived from humanity's sociotechnical entanglement have manifested itself in the Anthropocene, and can be seen as a significant sociotechnical event, which calls for a greater degree of responsibility and care (Bellacasa, 2011; Blok & Jensen, 2019), to which it is possible to argue that we are presently not 'response-able' (Haraway, 2016).

Kauai ʻōʻō

(Smithsonian Library, 2020)

However, as the externalities of contemporary human activities show themselves, their severity fluctuating from the absurd expressiveness of a burning continent (Australia fires, 2019-2020) to the silence followed by the call of the male Kauai ʻōʻō Bird last of its kind, or the clean windshield phenomenon (Vogel, 2017). The climate crisis, mass extinction and mass destruction of ecologies are seemingly either indirectly associated with or directly related to the sociotechnical actions of humanity, unfolding disproportionally spatially and temporally on earth.

Following with this notion, the Anthropocene resonate in what Bruno Latour describes as a “new climatic regime” (Latour, 2018, p. 2) as the earth or perhaps more appropriately ‘Gaia’ (Latour, 2017) is reasserting its agency, settling hubristic ideas of humanity’s power and influence. To this point, the Anthropocene could be an expression of humanity’s illusions of grandeur and seen as a historical sociotechnical event from which we would have to change our ways.

Latour further suggest that one reaction to this disproportionately occuring crisis is anti-globalism, as seen in the governing principles of Trump and Brexit (Latour, 2018). A suggestion of turning inwards what is outwards impossible. Keeping afloat in the rising tide. Latour argue that they, (Trump and B. Johnson, and many more) “the obscurantist elites […] understood that, if they wanted to survive in comfort, they had to stop pretending, even in their dreams, to share the earth with the rest of the world.”(Latour, 2018, p. 19). The result is an political, economical and otherwise sociotechnical investment in neo-liberal nationalist movements.

There are others who would suggest that the Anthropocene as a testimony of humanity’s superiority and eventual domestication of the earth, such as in ‘An Ecomodernist Manifesto’ (John Asafu-Adjaye et al., 2015), who “writes with the conviction that knowledge and technology, applied with wisdom, might allow for a good, or even great, Anthropocene”(John Asafu-Adjaye et al., 2015, p. 6). As the earth is reacting panicky like a fish on land, we must tighten our socio-technological grip. There are plenty of examples for this position in classical engineering disciplines such as through geo-engineering and many other technological fantasies.

However, this latter perspective could be criticised of being based on a tradition of technological fixes, that is only solving the symptoms of the actual larger issues, thus not grasping the full extent of the systems from which the issues arise.

Either way, the Anthropocene is definitely an interesting sociotechnical event to think with, and I argue that it is not frivolous how one approaches this era, that is defined by its thoroughly entangling mesh that is drawing together in previously unseen ways so many elements of the world. In it we see the interweaving relations of humans, the climate crisis, science, technology and innovation, capitalism and so on. Leaning on anthropologist and feminist theorist Donna Haraway it is meaningful to carefully challenge the “comic faith in technofixes” (Haraway, 2016, p. 2) as we engage in the practices of speculation of imagined sociotechnical futures. In continuation of this point, it is not with the purpose of introducing a new earthly era that we talk about

the Anthropocene, but much rather about moderation of the attitude we have towards the earthly planet.

This thesis is part of an academic mobilisation that is not moving away from a human-centred design ethic but beyond it, in which speculating ways of giving voice to the voiceless is key (Ceschin & Gaziulusoy, 2016; Gaziulusoy, 2018; Latour, 2017; Tsing, 2015; Tsing, Bubandt, Gan, & Swanson, 2017). I take on the challenge of analysing some of the different positions of responsibility towards sustainability in practices of developing technology and innovation. What are we trying to sustain and who are the recipients of the initiatives?

To some extent, many of the most significant framings of sustainability have been designed to ensure that the needs of the present generation do not restrict or inhibit the needs of future generations (Arler, Mosgaard, & Riisgaard, 2015; IUCN, UNEP, & WWF, 1980; WCED, 1987). While human actors seem to be the obvious recipients of this formulation, the definition of 'needs' seems particularly vague, not least if one takes spatiality and temporality into account. Sustainable development is as little a linear path as the distribution of global goods are even. Swedish anthropologist and human ecologist Alf Hornborg expand on this perspective:

> *"By now it has become widely recognized that the disastrous ecological trajectory of global society is inextricably connected to its widening inequalities. [...] It is the very ontology of "technology" that is at stake. Rather than merely a category of magical ingenuity, technology is the link between our planetary overshoot and the increasing polarization of rich and poor." (Hornborg, 2017, p.71)*

With this in mind, that it is meaningful to think with science, technology and innovation as important visionary and transformative elements in constructing sociotechnical pathways towards imaginary futures. What I take with us from this point, is Hornborgs warning against disembedding technology, economy and the "ecological trajectory of global society" and a rethinking of what matters that need concern and care for in responsible future-making (Bellacasa, 2011; Jasanoff, 2004). It is in our sensitivities that better response-ability is developed.

Theoretical Foundation and Methodological Approach

[...] the experience of a piece of art is made up of matter and meaning. The material dimension creates and gives form to the discursive, and vice versa.

(Dolphijn & Tuin, 2012, p. 91)

In the interest of making this thesis as transparent as possible in terms of subjectivities, biases, theoretical and methodological positions, this chapter will illuminate the theoretical and practical mesh used in the representation of the field into this report. The following sections present the theory, the methods and the terms used as well as a description of how they are used.

The field of investigation is not simple and can not easily be restricted to certain boundaries. It is a project of unboxing black boxes and spots in the imaginary futures of Technology Assessment and Responsible Research and Innovation in the Danish Board of Technology Foundation. One could separate the field into three segments of; (1) imaging futures, (2) Technology Assessment and Responsible Research and Innovation, and (3) the context of the Danish Board of Technology Foundation. But, this is possible only in the thought of course, because they are as entangled as the stem, barch and leaves on a tree. To accommodate the complexity in the field, I am utilising a theoretical approach inspired by Science and Technology Studies (STS), variations of Actor Network-Theory and Design for Sustainability. Each position providing vocabulary and guidelines to interpret the experienced field, though sometimes overlapping and potentially act conversely to each other. The purpose of working with this theoretical mesh is to offer a clear perspective into the manufacturing of knowledge in the making of recommendations/sense and advice-making.

The stakes in the Anthropocene; presents into futures

As a point of departure, I believe it is meaningful to look into the rationale of managing the technological development of society. As described in the introduction, the sociotechnical ingenuity of humans which by so

many accounts have resulted in significant terraforming under the banner of progress and at times perhaps from mere curiosity.

First, we must think of where we are and where we are heading. The Anthropocene Epoch is an event which was proposed to emphasize just how radically humanity has changed the environmental parameters on the planet. While still being contested to this day, the term was popularised by Paul J. Crutzen in 2000 by suggesting it serve as a trope for analysing current environmental changes, such as the correlation between the earth's atmosphere and human activity (Fassbinder, 2017). Being a receiver of the Nobel Prize in Chemistry in 1995 in recognition of his work in protecting the ozone layer together with his colleagues Mario J. Molina and Frank Sherwood Rowland, provided significant agency in academic and mainstream media.

While the Anthropocene term is still contested its material counterpart - the human influence on climate change - is to a large degree accepted as a dominant narrative. If one is following this grand narrative, it will have repositioned humans far from being innocent bystanders or outside of the world, we must become conscious of our presence on terra and our transforming activities, take responsibility for the present and well into the future. This is, of course, not a new idea but the scale and scopes of the responsibility call for radical sustainable measures and represent a great call to arms for engineers, academics, politicians and everyone in between (Arler, Mosgaard, & Riisgaard, 2015). There are many who have taken up this challenge and in the diresome circumstances, present new modernist technoscientific solutions for transitions which they deem may save the planet (Stengers, 2015). One only has to look at the prominent field of geoengineering to see the reoccurring modern Prometheus (Shelley, 1818), exhibiting not only a hubristic perception of control but also pushing the ontological wedge of dualism between nature and culture. "The road to hell is paved with good intentions" (Bohn & Ray, 1855, p.514).

In the interest of transitioning from a history of science and governance which have conceptualized the planet as a resource and commodity to be tagged and bagged as fuel for an all-consuming capitalist economy, I argue for the necessity to rethink our response-abilities to the trouble of our time. I am making use of the term response-ability inspired by Donna Haraway (2016) referring to the ethical sensitivity of an actor as well as its ability to respond in accordance with it. Still, response-ability is not a position of vantage from nowhere one can take, but situated (Haraway, 1988) and to this point, we are advised to think in sympoisis which means making-with (Haraway, 2016, p. 58) the heterogeneous actors with whom we are entangled, and to being-with or becoming-with them as in opposition to the fallacy of the objective observer.

Technology Assessment and Responsible Research and Innovation present abilities of response to the problems which relate to present, emerging and innovation of technologies in society. They are meant to act as societal safety mechanisms, designed to prevent implementation of problematic technologies. So one of the questions related to taking precautionary and preventive measures lies in defining and representing the potential problems related to socio-technical development.

Planning for the future; the wicked Anthropocene

In 1973 Rittel and Webber published an article stating that the problems of planning and management are inherently different than the problems of science, they argued that the problems of planners were wicked as in relation to the problems of science which were tame (Rittel & Webber, 1973). The questions raised by science had linear strategies and were aspiring to produce definitive answers or solutions, while the strategies for planning emphasized an "argumentative process in the course of which an image of the problem and of the solution emerges gradually among the participants, as a process of incessant judgement" (Rittel & Webber, 1973, p. 162). The trope of planning problems as wicked is in many ways as descriptive for the way these problems are entangled on many dimensions of society when stakes are high and externalities uncertain.

Furthermore, participants of problem-solving are hardly the rational epistemic agents presented in this line of reasoning. In an effort to create conditions for dealing more appropriately with problems of science and technology which require a particular assessment of risks, Funtowicz and Ravetz proposed different practices of review with multiple reviewing communities. The division was determined by the reach and

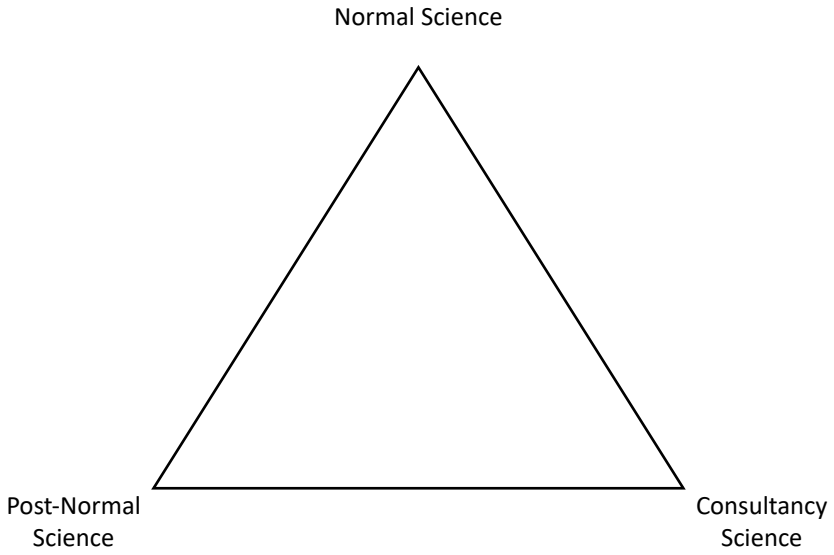


Figure 2: Based on Rittel and Webber's (1973) types of science. Own illustration.

estimated consequences of the technology (Funtowicz & Ravetz, 1992): In the case of Post-Normal Science, the extent of the community of peers would need to be much more than in cases of Normal- or Consultant Science. While the practice of set in place by the Danish Board of Technology Foundation already has a considerable width in terms of the community of peers, I argue that they are not necessarily sufficient. Further, I argue that all problems of imagining futures through in the practices of Technology Assessment and Responsible Research and Innovation are wicked because they are practices of planning, embedded in democratic discourses and it is impossible to formulate them in any definitive state. While it takes a lot of effort to mobilise the practices of Technology Assessment and Responsible Research and Innovation they can not be finalised, simply because the sociotechnical context will change, and for this reason, they have to be iterative.

Similar to the problematization of knowledge production and problems of planners, the field of Design for Sustainability has developed to deal with problems on a systemic perspective, thinking long term and with a focus beyond human exceptionalism (Gaziulusoy, 2018). Sustainability in this sense not defined as an environmental discipline, but as an approach to different type of issues. The approach argue for a shift in the manner one address issues as narrowly defined, by short term thinking at a primarily technologically or materially focussed, towards systemic and strategic approaches (Ceschin & Gaziulusoy, 2016). Furthermore, I am leaning on a conceptualisation of sustainability in the systemic sense rather than sustainability as attributed to parts of a system:

> *"[...] technologies individually cannot be defined as sustainable or unsustainable and they should be considered within the socio-technical system they are meant to be used in. Only if the socio-technical system of concern is sustainable, then the technologies therein can be regarded as sustainable." (Gaziulusoy, 2010, p. 1)*

It is with this line of reasoning that I look into the negotiation of responsibility in development of technological futures. I argue from a disposition where responsibility and sustainability are inherently similar to each other. Furthermore, when I argue for planning for the Anthropocene, it similarly means that at this point in time the it is essential to think radically about transitions, and be critical towards the systems we are used to.

Science and Technology Studies

> *"The world is not a solid continent of facts sprinkled by a few lakes of uncertainties, but a vast ocean of uncertainties speckled by a few islands of calibrated and stabilized forms." (Latour, 2005, p. 245).*

In this section, I will elaborate on the epistemological potential of using a wide variety of knowledge types. This is a question of what elements are introduced into the practice of representing the field. It is in this relation that the quote above by Latour is touching upon, and one of the central topics which Science and technology studies have concerned itself with since the first conceptualizations of scientific knowledge and technological development as being entangled in social practices (Bijker, Hughes, & Pinch, 1987; Bloor, 1976; Kuhn, 1962; Latour & Woolgar, 1986).

> *"Scientific knowledge [...] is not a transcendent mirror of reality. It both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions – in short, in all the building blocks of what we term the social. The same can be said even more forcefully of technology." (Jasanoff, 2004, p. 3)*

The matters represented in any practices of Technology Assessment or Responsible Research and Innovation must not be conceived as facts, but rather as a calibrated and stabilised form. It is, as I agree with Latour, not a matter of fact but a matter of concern (Bruno Latour, 2004). The de-objectification of facts and artefacts significantly alters our perception of the epistemic and the normative, entangling them in our response-ability of representation. It is easy to create privileged positions to scientists, experts and government officials based on their disciplinary expertise and build pedestals for them in deliberations. And it is not always unreasonable to do so, because their perspectives are valuable. However, reflexive representations of socio-technical futures should not only happen through ideas of objectivity, impersonal and apolitical. It is easy to fall into a technologically deterministic trap of one-sided causality. Instead, the world could be imagined by explicitly normative and cultural ideas of how the world ought to be (Jasanoff, 2010). Matters of fact, as well as concern, are not always the best tools for imagining futures; we need "not only the objectively claimed matters of fact but also subjectively appreciated facts that matter" (Jasanoff, 2010, p. 248).

Here I would take one moment to reflect on how we are representing the world in which there are matters of concern, but also concern that matters more than other. In this line of practice it is important to think

about the context and whoms concern matter. This is relevant when the Danish Board of Technology Foundation is practicing its co-creational Technology Assessment and Responsible Research and Innovation methods as abilities to respond to different issues, because they do not act alone but in relation with other actors, such as the underlying funding structures of the European Commission.

When we are thinking with Latour we are thinking without context, in this network it is the relations of humans and non-humans that exert their agency and not an idea of will (Latour, 2005). Each actor becomes mediators "that is, actors endowed with the capacity to translate what they transport, to redefine it, redeploy it, and also to betray it' (Latour, 1993, p. 81). In this sense, Latour offers a performative flat analysis without the performing dimension of context to frame the analysis and explain the phenomena of investigation (Tsing, 2008). What we are looking for in constructionist Actor Network-Theory is describing, analysing and representing situations through its forming of relations between various heterogeneous actors. In the Technology Assessment and Responsible Research and Innovation practices, it is, therefore, both human participants, the workshop structure, technical actors such as powerpoints and post-it notes, etc. Careful attention to the interaction and relations in a situation provides the map needed to analyse a situation.

But the positions of power, politics and morality or ethics are hard to demonstrate with the practices of actor network-theory (Gherardi & Nicolini, 2005; Jasanoff, 2004; Jensen, Lauritsen, & Olesen, 2007; Tsing, 2008). For this reason, I am leaning on ideas and traditions of symbolic-interactionists, being aware of what makes particular actors marginalised or powerful.

Thereby trying to not fall into the trap of following around the noisiest or strongest actors but what "rests on the intricacies of actors relationships and pay greater attention to powerless actors or 'dissidents' within the enrolled actors" (Gherardi & Nicolini, 2005, p. 290). This leads us to a slightly different perception of technological systems as being sociotechnical ecologies of actors (Gherardi & Nicolini, 2005) that is being, being with and becoming with (Haraway, 2016) through a co-production of the social, material, cognitive and normative (Jasanoff, 2004; Jasanoff, 2015). With Jasanoffs concept of co-production, we look at the construction of these epistemic and normative understandings through simultaneously occurring processes.

> *[...] the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it. Knowledge and its material embodiments are at once products of social work and constitutive of forms of social life; society cannot function without knowledge any more*

than knowledge can exist without appropriate social supports. (Jasanoff, 2004, p. 2-3)

If we believe Jasanoffs line of argumentation, then we need to be very aware of the relations between representations, identities, discourses and institutions and their conceptualisation of technological artefacts, scientific- and general ideas. These conceptualised associations co-create perception, and in turn, their practical application and effect (Jasanoff, 2004). To this extent we are always thinking with, being with and making with (Haraway, 2016).

Sociotechnical Imaginaries

To explore this entanglement of co-creation of technology and innovation with and within society I am using the concept of sociotechnical imaginaries (Jasanoff, 2004; Jasanoff & Kim, 2009; Jasanoff, 2015). This concept is interesting because it has anticipatory qualities which enables an investigation of what constitute desirable and undesirable futures projected through science, technology and innovation. The concept is useful in investigating the development of science, technology and innovation by actors and institutions that are political or otherwise non-scientific (Jasanoff & Kim, 2009).

Being inspired by the concept of sociotechnical imaginary we will look into the different participating actors and institutions of the Council of Coaches project. This is with the intention of investigating and discussing; "the role of political culture and practices in stabilizing particular imaginaries, as well as the resources that must be mobilized to represent technological trajectories as being in the ''national interest.'' (Jasanoff & Kim, 2009, p. 121). While the national interest is not the focus is in this research, it is the interest of the actors and institutions of the research field.

Furthermore, the Sociotechnical Imaginary concept is interesting because it presents a kind of emancipation of imagination, and a recognition of the importance of the stories we tell, about how technology, society or the world ought to be. "It matters what stories make worlds, what worlds make stories." (Haraway, 2016, p. 12).

With the sociotechnical imaginary, social and material practices become vantage points from which we see speculative trajectories of the future. Technology Assessment and Responsible Research and Innovation are the methods used to see and understand the implications of technology and innovation. What we need to be aware of is whose and what imaginaries are present in the practices and how they are relationally anchored.

When I am thinking with the sociotechnical imaginaries it is in relation to shared ideas; the collective, institutionalised, legislated and political assemblages that are (at least to some extent) accepted. When talking about states of imaginaries before they become shared we can refer to them as visions. The imaginary does not only express our thoughts on what might be realizable through science, technology and innovation, it also expresses what is considered to be 'the good' life, and how it ought to be lived (Jasanoff, 2015).

The Danish Board of Technology Foundation has en explicit goal of developing and implementing deliberative democratic practices because this resonates with the ideological and philosophical narrative of the organisation. The sociotechnical vision or imaginary is then a future in which these virtues and practices are integrated into society, and they affect the societal ability of possibilities for attainable futures (Jasanoff, 2015).

As John Law describes 'Democracy is about living together well in a common world' (Law, 2015, p. 13). But democracy is many different things and just how common can a world become without turning into a suppressive system for the marginalised. Looking at the methods of the Danish Board of Technology Foundation, democracy has to be deliberative and act through hybrid forums with many different participants, e.g. directly including citizens, experts and non-experts, etc. Their objective could be said, is to assemble different knowledge-types in hybrid forums, so what was once separated and fixated in siloes of technocracy become fluid (Barthe, Callon, & Lascoumes, 2009; Law, 2015). But as we will dive into later, the Danish Board of Technology Foundation are as embedded in structures of power and morality in which their visions of futures are negotiated among many others.

Ontological Choreography

By being- and making with sociotechnical imaginaries the subjectivities of social and material practices, as well as the planners of them, become more illuminated. As in the practices of Technology Assessment and Responsible Research and Innovation, there is the question of who gets to adjust the scope of concern that matters. To understand this negotiation it is important to look at the planners and participating actors and institutions in the assessment of responsibility of the Council of Coaches technology and innovation.

> *[...] planners inevitably do more than merely 'assist' stakeholders. They also contribute to fundamentally constituting the legitimately concerned parties of any planning processes, generating and fostering stakeholders by manipulating the interests and attachments of actors through the reality-crafting practices described as 'ontological choreography' "(Metzger, 2013, P.783)*

What Metzger is describing, is the practice of mobilising engagement in stakeholders as a quality that is co-created, rather than a pre given ontological default. This has implications for the way we see the stakeholder as much as the way we see the planner. The critique of Metzger relies on the stakeholder engagement practices of constructing a shared understanding of what is stake. It is the intentional/unintentional careful staging of the engagement process that is aligning planners and stakeholder through different kind of mediation, such as in presentations, written material and steered discussions. From this perspective, engagement planning can be conceptualised as a "practical craft of ontological choreography" (Metzger, 2013, p. 793), and the implications of the responsibility for the planner become more explicit.

The stakeholders are co-constructed in situ by the social and material relations and the series of procedures that are usually part of mobilization practice. The argument for a conceptualization of stakeholders as relationally entangled is very much in line with the perception of planners as mediators rather than intermediaries (Latour, 2005). Working with this perception suggest a greater sensitivity towards what kind of process that is being used to mobilise stakeholderness of the enacted actors. I am leaning on the approach by Metzger (2013) to examine how the Danish Board of Technology Foundation have choreographed their practices of imagining futures.

Mediation of ethics and morality by technology

In the practices of imagining futures through assessment of technology and responsibility in research and innovation, I lean on the perception, that technologies are entangled in moral communities and that they play a significant role in shaping morality (Verbeek, 2011). Not the least as by their conceptualised association which relates to the temporal and spatial relationality of people's perception towards certain technology. In the article "Categorization by Association: Nuclear Technology and Emission-free Electricity" (2010) Garud, Gehman, & Karnøe describe how the associated conceptualisation of qualities in technology does not remain static over time but are instead situated. For this reason, spatiality and temporality are important elements to think with when in assessing morality of technologies and the mediative capacity of technologies in itself, it relations with its users and environment it is set in (Verbeek, 2011).

Assessing technology and establishing what 'Responsible' Research and Innovation is difficult under these conditions, and further, it is very difficult to predict which relations they may establish with human and non-/more-than-humans and the impacts it may have. In Science, Technology and Innovation as well as the technoscience (the social and material practices) behind them, there is an inherent nudging towards particular normative and political actions (Verbeek, 2011). Following

this notion means that human actors and the non-/more-than-human are entangled and this inherently muddy the waters of what can describe as 'intention' is, and the translations of casualties which reside in the actions and decisions of people.

> *"Technological intentionalities are one component of the eventually resulting intentionality of the 'composite agent,' a hybrid of human and technological elements" (Verbeek 2011, p. 58).*

Thinking with tropes such as 'composite agents' emphasize the hybrid entanglement of humans and technology. Similarly, Donna Haraway proposes the term 'cyborgs' to describe human and machine assemblages instead of making categorical distinctions between them (Haraway, 2006). By perceiving the human, non-human or more-than-human, or nature and culture, organic and artificial as distinct and separate groups we risk limiting the scope of seeing how elements in the world are entangled (Haraway, 2016). With this point, I argue that this line of thinking can aid researchers in building thicker networks around the human and non- or more-than human relations, and enhance the transparency of these relations. Furthermore, working with actor networks as assemblages can be very helpful if you want to think about ethics because can help you in situating intentionality.

This also illuminate the importance of examining how knowledge, technology and society act as mediators for what we deem ethical or sustainable (Haraway, 1988). This perception of being entangled as in opposition to separated from non- or more-than-human, can contribute to the intellectual space where adding otherness into the scope of ethical and moral concern is more possible. In the enactment of technology the action becomes a state where we are thinking with technology. Perception and intentionality become affected by the situated conditions of any action and for this reason, it is important to understand how these entanglements might produce particular biases, as if by default. This is a question of ontology, thinking about the world, where I argue that it is not possible, or even meaningful, to try and place one's perception or ability to think outside of one's entangled body or situated knowledge (Haraway, 1988).

Let us for a moment think with Niel Harbisson, by some recognized as the first official cyborg because his headgear was permitted on his British passport photo, (Donahue, 2017; Jeffries, 2014; Stix, 2016). Harbison was born with achromatopsia, which is a rare condition of complete colour blindness. He had colour-sensoring antenna implanted into his head giving him the ability to turn colour into sound and thereby hearing the colourful world around him. In 2017 he was able to sense a greater spectrum than the human eye by including ultraviolet-

and infrared light, but he still was not able to see colour.

Taking this one step further by a degree of ‘systems thinking’ this perception becomes important when we assess the moral and ethical nature of technology because once entangled in the sociotechnical mesh of society technology becomes part of our cognition. The ability to perceive problems are partial, multiple and embodied and are consequently illusive to the poor planner engaged with collaborative mapping of problems. There is little linearity towards correct answers in the practices of Technology Assessment and Responsible Research and Innovation, what might seemly appear to be right and wrong are situated and flux temporally and spatially. Still, this does not mean it is impossible to say anything qualified about the problems of science, technology and innovation. It does, however, emphasize the necessity of being sensitive to who and how actors are enrolled.

Niel Harbisson

“Technology should not change the environment but the individual. And this would be the biggest benefit to Earth. [...] In the summer we put air conditioning so the Planet gets colder and in winter we warm up the Planet. And this is ridiculous. We should be vable to control our own temperature. If we can control our temperature there won’t be air conditioning and heaters.” (Boye, 2017)

Picture: Niel Harbisson. Sour
jpembedded, 20

Applied Methods

This section describes the methods of collecting empirical data from which I am representing the field of investigation and some considerations about them. This is relating with, but limited to, how I have been collecting data, what kinds of data I have collected and my own embeddedness in the data collected. Finally there are some considerations from the limitations and how particular data influence particular thinking.

While I will introduce my own participation in the Danish Boards of Technology Foundation in the next chapter, there are some significant reflections to make when one is as embedded in a field as I have been. For one, much of the data that I have been collecting has been delivered through emails, unpublished reports, internal memos, non-formal conversations between colleagues. The accumulative power of being part of non-generic knowledge sharing/building should not be neglected. Much to this point, I argue that it is valuable that I have participated in the day to day work assignments, both in the facility of the Danish Board of Technology Foundation and out of this space, participating in workshops, meetings and other work-related dimensions.

The first-hand experience with a field of action provides the opportunity to reflect on potential differences between how a task is planned and how a task is executed. Second-hand experiences leave a lot of space for silent knowledge, -actors and black boxes. Still both type of information are important in the weaving of representations.

Situational analysis

As much of this project is dealing with transdisciplinary perspectives and states of knowledge which sometimes act in incommensurable ways, and with a scope that invites a certain accumulative capacity, order and overview is essential. To accommodate this I have been running the acquired data through a situational analysis (Clarke, 2003; Clarke & Friese, 2007) primarily as a way of organising and revising the data and the actors in relation to each other. The method is similar with previous theoretical considerations dealing with a performative contextualization in which the network of actors we look at are actively introduced by the researcher. By any account the empirical composition must, therefore, be considered unique, temporally and spatially. This practice of organising and analysing data contribute to an empirically driven study and provide a particular ability of grounding the different type of knowledge.

For this research the method has been used primarily as a mapping and ordering, drawing on strategies in which the visual overview as an aid in sense-making of complex and entangled fields of research. This

is done through visual iterations of construction and deconstruction of the relation between actors. The actions of this tool kit enable new ways of seeing actors and ecologies while promoting interpretation, sometimes to a dialogical degree between researcher and kit. In relation to this particular project, the mapping and building of relations have also acted as the frame in which the project has been fertilised, overgrown and cut down to promote focus and clarity in the scope.

> *”The locus of analysis here is the situation” (Clarke & Friese, 2007, p. 237)*

Clarke and Friese present a variety of mapping exercises to visualise and organise. They ask the question: ”Who and what are in this situation? Who and what matters in this situation? What elements ‘make a difference’ in this situation?” (Clarke & Friese, 2007, p. 237). While these questions are good they are often difficult to answer before a thorough investigation. What they suggest and which I use is three states of organising data in maps; the (1) messy-map, (2) ordered map and (3) relational map. The names of the modes of mapping are highly suggestive, and just as one might think a messy mapping of the data collected across the type of knowledge in a nonsensical way, the ordering provides an overview of general themes, and the relational is for trying out relations. While analysing and investigating the field of research the maps have gone through several iterations, in which there is no chronological order but a steady flux of building and breaking relation, order but with a steady flow of mess. These practices are in many regards aiding my function as a builder of thought experiments and allow for these to be visual and mobile. This practice also provide the benefit of drawing things together that would otherwise not be easy to bring forward. The mappings act by as some of my translations from the fields of matter to form (Latour, 1999) and further in the thoughts of Latour, I hope the mappings of which I have gathered and displaced are presentable enough to convince you as they did me (Latour, 1986):

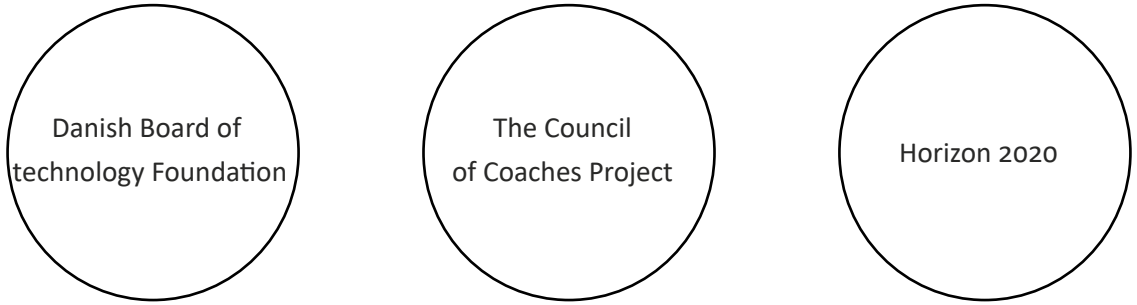
> *“the “things” you gathered and displaced have to be presentable all at once to those you want to convince and who did not go there. In sum, you have to invent objects which have the properties of being mobile but also immutable, presentable, readable and combinable with one another.” (Latour, 1986, p. 7)*

Appendix no. 1 represents an example of the processual mappings to illustrate parts of a otherwise sometimes elusive process of representation and analysis.

A final reflection before moving into the material which undergoes the scrutiny of this theoretical and methodical mesh. While contemplat-

ing methodical and theoretical manoeuvres, tropes, ways of organising and reasoning it must not come in the way of performing and producing good research. They are matters and thoughts to think with. As Anna Tsing describes it in her article Alien vs. Predator: “Researchers must love their material to produce good research [...] Immersion Produces Insight. Reifying theory as a higher life form gets in the way of love” (Tsing, 2008, p. 1). With this, we engage in the Technology Assessment and Responsible Research and Innovation practices of the Danish Board of Technology Foundation and the field of emerging speculative technological futures.

Into the Fields



I have been embedding myself into working life of the Danish Board of Technology Foundation for little less than a year. Being a part of the day to day practices in the organisation has situated me as an insider, providing me with materiel, normative and epistemic components and refining my perception to certain things but obscuring it to other. Being inspired by Haraway (2016) and Verbeek (2011) the site of the Danish Board of Technology Foundation makes an interesting composition of human-, non- and more-than-human actors entangled in practices of mediation, but also a composting - a material metaphor, for the way ecologies of human and non-human actors make and unmake possibilities for thought and action - wherein these actors are transformed in and with each other. The compost is the intertwined becomings and goings of projects, thoughts and other actors that are shaping the organisation. A compostition is, in other words, a being and becoming in technoscience entanglement of human-, non- and more-than-human actors.

In the following description of the field of research, I unfold my experience of the Danish Board of Technology Foundation and working with their approaches. Furthermore I look into dimensions of responsibility in the different field sites, in this the Council of Coaches project serve as the central turning point for my experience and analysis, and it is with this focus that the other major sites are investigated from.

Danish Board of Technology Foundation

"Creating society together"

The Danish Board of Technology Foundation is a Non-Profit and Non-Governmental Organisation, working "to ensure that society's development is shaped by informed and forward-looking cooperation between citizens, experts, stakeholders, decision- and policymakers" (tekno.dk, 2020). The organisation is independent, non-for-profit and strive to be as neutral in terms of particular interests to any parties in the projects, as can be.

In terms of sensitivities, the Danish Board of Technology Foundation are also explicitly normative about their ambitions; to enhance the general level of democracy in society through their different practices of (public) engagement. The democratically normative philosophy is not only part of their practices, but also part of the organisation maxim: "creating society together" (tekno.dk, 2020), which is represented in the Danish Board of Technology Foundation logo and self-understanding. This normative discourse is very apparent in the implicit and explicit actions of the organisation and can be traced back to a tradition that is stretching all the way to the origin of the establishment and the tradition that it is based on (see chapter: Technology Assessment..). This tradition is highly inspired by Habermas ideas of the deliberative democracy; by which deliberative practices become extended from the seats of the politically elected representatives in government, to allow more direct participation of the public in the deliberative practices of the decision- and policy-making (Habermas, 1994). This point is further emphasised in part of the introductory chapter of the book 'Policy-Oriented Technology Assessment' which encompassed a Technology Assessment Manifesto, written by Lars Klüver (Director), Marie Louise Jørgensen and Rasmus Øjvind Nielsen (senior project leaders) from the Danish Board of Technology Foundation:

> *"Citizens of Europe have a democratic right to be heard about the technological development since technology is strongly influencing their lives" (Klüver, Nielsen, & Jørgensen, 2016, p. 15)*

The statement was produced as part of a previous project; 'Parliaments and Civil Society in Technology Assessment' (PACITA), which was an investigation into wider use of Parliamentary Technology Assessment in Europe to counter the increasing influence of science and technology in society (Klüver, Nielsen, & Jørgensen, 2016). For the Danish Board of Technology, it is important to handle the construction of socio-technical futures with great care towards the citizens and involve relevant stakeholders. However, in the interest of clarifying the reach of the nor-

mative performativity; while the engagement of external stakeholders is essential, they do not have a direct say in what comes to be. They provide the basis on which others can make their decision (Personal Communication, 2020).

While the Danish Board of Technology Foundation is independently owned, they are still subject to governing conditions of a competitive market. Based on experiences in the organisation, this is, however, not self-evident in the organisation self-conceptualisation. The Danish Board of Technology dates back to 1986 when it was established as a statutory body under the name of the Technology Board. In 1995, the organisation became an independent body established by the Danish Parliament and written into the budget of the Ministry of Finance as civil servants and changed the name to The Danish Board of Technology. Their role was focussed on providing advice for the Danish Parliament as well as other governmental bodies, in the assessment and discussions of technology. Then in 2011, the Danish Board of Technology had its funding cut and abolished by law (Jørgensen, 2012). In 2012 the organisation was (re-)established as the Danish Board of Technology Foundation, re-emerging as a non-profit foundation

This transition also meant a transformation of what independence means; from steady funding of governmental finance to funding from a competitive market. With stable funding, the negotiation of projects scope and scale, methods and approaches are not under as much pressure as in a competitive funding structure. Most competitive funding programmes have specified frameworks which applicants have to match in order to be considered for funding. Ultimately this disposition as applicants puts the autonomy of the Danish Board of Technology Foundation under pressure.

Social and material methods

Having existed since 1986, the Danish Board of Technology Foundation have a catalogue of methods for close to every occasion. Yet, to themselves and their peers, the Danish Board of Technology Foundation is known for their capability in developing new methods for in response to the conditions and context. This is my experience from participating in the pre-workshop deliberations about methods and approaches. To this extent, the organisation representative takes on the role both as researchers, practitioners and designers of methods for engaging with- and developing society. While there is a list of core services and activities, these are not generic and often seems to be overlapping in different dimensions.

An example is the practices of Technology Assessment and Responsible Research and Innovation, which are the methodological focus point of

this research. While we have already gone through the details of the practices in general in previous chapters, it is important to note that in each project there will be a generation of context-dependent development of practice to engage with the particular kind of project they are dealing with. In some cases, there are particular requests to the practices used in the projects, some times these are negotiable and sometimes they are not. These conditions are set forward by the "buyers" of the services, e.g. public institutions, collaborators or funding programs. In this manner, the methods of interacting and affecting the sociotechnical mesh of the world are through negotiations from the world. Some aspects of change are obvious and explicit and other aspects are more subtle.

A review of Technology Assessment & Responsible Research and Innovation

In the Council of Coaches project, the Danish Board of Technology Foundation is using two central practices to develop structures for the responsible development, namely; Technology Assessment and Responsible Research and innovation. While it is valuable to use the practices as complementary and/or intertwined, they offer different approaches to caring for a responsible and sustainable present and future. The following sections explore the different layers of Technology Assessment and Responsible Research and Innovation with the offset in the Danish Board of Technology Foundation and in peer-reviewed articles.

Technology Assessment as a response to sociotechnical challenges

I begin with an introduction of Technology Assessment because of its historical precedents to Responsible Research and Innovation. Technology Assessment is not as such any fixed practice of generic steps towards solutions but rather a situated problem-based discipline of response-ability that engage stakeholders in problems where society is (more or less) explicitly intertwined with technology.

Technology Assessment was established within the particular socio-technical conditions in the USA during the 1960s and 1970s, in the noticeable backlash of rapid transformation following the industrialization in which various unintended, and undesired consequences of science, technology and innovation manifest (Grunwald, A., 2009; Klüver, Nielsen, & Jørgensen, 2016). This was following the post-second world war period that for more than a decade was categorised with rising consumption, economic- and industrial growth, but also the problems related to the methods of production. The issues associated with the growing industrialization drew stronger relations to that of limited land area and resource scarcity as well as pollution and the side effects of lacking regulations of chemicals such as DDT and pesticides. While there were many concerned actors criticizing the inadequate manage-

ment of the emerging technologies, one of the major contributors to shape a 'cool mobilization' (Hayagreeva, 2008) of the environmental turn was Rachel Carson with the publication of "Silent Spring" (1964) which gave rise to significant public debate, and academic reports (Arler, Mosgaard, & Riisgaard, 2015; Gaziulusoy, 2018; Grunwald, 2009; Grunwald, Armin, 2019). Furthermore, previously optimistic 'categorization by association' (Garud, Gehman, & Karnøe, 2010) which conceptualized 'progress' as carried by scientific and technological development became the subject of significant pressure. This was not at least apparent in contemporary social science where the ambivalence relating to technological development was a central theme in directions such as that of Critical Theory from the Frankfurter School (Grunwald, 2009).

In the midst of these mesh entangled socio-technical developments, the establishment of the Office of Technology Assessment became in 1972 at the Congress in the USA. This was set in motion to bridge the access between "technically and politically relevant information between the USA's legislative and executive bodies" (Grunwald, 2009, p. 1104; Grunwald, 2019). In other words, Parliamentary Technology Assessment was partially developed from the demand of independent and unbiased knowledge production by independent institutions, as a reply to the continuously more

Technology Assessments are inherently normative, defined by the particular context and not necessarily bound to any generic procedure. Still, there are elements that characterize the orientation of the practice (Grunwald, 2009, p. 1111-1113):

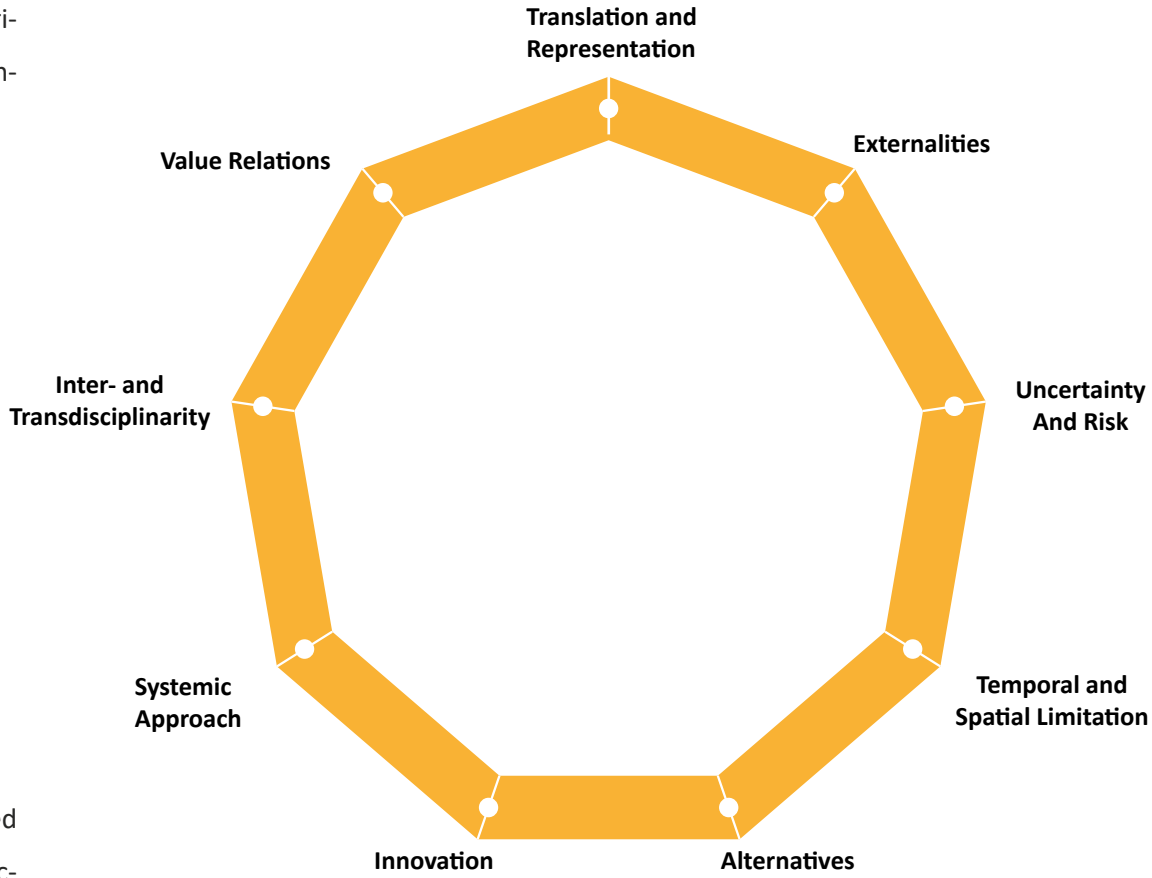


Figure 3: Based on Grunwald characterizations of Technology Assessment (2009, p. 1111-1113). Own illustration.

complicated science, technology and innovation in society. Technology Assessment was however not the only 'new' interdisciplinary (Klein, 1990) practice of analysis for staying with the trouble of the times in this period:

"Environmental impact assessment, risk assessment, foresight studies, technology ethics and the cross-disciplinary field of science-and-technology-studies (STS) all have their historical roots and institutional raison d'être in the apparent complexity of governing modern technology and the loss of popular trust suffered by experts and industrial stakeholders" (Klüver, Nielsen, & Jørgensen, 2016, p. 3).

The mobilization of Technology Assessment was a practice of response-ability, becoming-with situated in technical and societal challenges that previous means of response-ability did not manage to deal with. Understanding that it was necessary to broaden the scope of elements necessary to think with, meant opening a deliberative practice where other actors with stakes in emerging technology were heard. Well worth noticing is, according to Grunwald (2019), that the Office of Technology Assessment besides providing Congress with unbiased assessments, was concerned with strengthening the democratic integrity of the USA. This practice of Technology Assessment also became known as Parliamentary Technology Assessment and spread to Europe where it became widely developed by multiple institutions.

Among the institutions that originated in the wake of the institutionalization of Technology Assessment was the Danish Board of Technology Foundation, which at the time was called "Teknologinævnet" and serving as an independent governmental organisation. By many accounts, the Danish Board of Technology was developed under similar sociotechnical circumstances as the OTA. While the implementation of Technology Assessment has a great effect on emerging and present technology, it does by some accounts not deal with setting a direction for the development of technologies to come. This is where Responsible Research and Innovation intercept the process of sustainable development by giving greater focus on aspects such as thinking forward and long term planning practices, more emphasis on participation in different and earlier stages and building further policy action (D'Anna-Huber, 2017; Fisher, 2017; Klüver, Nielsen, & Jørgensen, 2016).

Responsible Research and Innovation

While Technology Assessment engages in the evaluation of science and technology, it is the objective of Responsible Research and Innovation to develop ethical imperatives acting as guidelines for what is considered responsible in a sociotechnical setting (Fisher, 2017). Furthermore, Responsible Research and Innovation focus on the relationship between a researcher and the innovator, making their collaborative re-

sponsibilities more explicit.

> *"Responsible Research and Innovation (RRI) is the ongoing process of aligning research and innovation to the values, needs and expectations of society (…). Decisions in research and innovation must consider (...) the respect of human dignity, freedom, democracy, equality, the rule of law and the respect of human rights, including the rights of persons belonging to minorities. RRI requires that all stakeholders are responsive to each other and take shared responsibility for the processes and outcomes of research and innovation" (European Council, 2014, p. 1)*

I draw on the definition of Responsible research and Innovation from the section above because this is the definition set forward from the European Commission and used in the COUCH project delivery no. D2.1: "The COUCH Vision" (Øjvind, Rasmus Nielsen & Bedsted, 2018, p. 10). The way I use the term innovation is to cover the implementation of science and technology into society, it is not defined by its material composition but it's sociotechnical relations.

It is often the case within the disciplines of classic design and engineering and related development of science and technology that they are particularly focused on the technological dimensions of innovation (Valderrama, Jørgensen, Stissing, Un-published). This mode of thinking is aligned with a rationalistic ontology, in which problems are often easy to reduce and restrict. However, in science and technology studies the world is a messy, heterogeneous, temporally and spatially scattered place full of entanglements and contradictions, an inherently complex system like the metaphor of the rhizome without a centre, beginning or end, but full of competing present- and future norms, needs, companions, known and unknowns (Deleuze, Guattari, & Massumi, 1984; Haraway, 2003). This does not mean that it is impossible to act with well-reflected rationale, it means that the rational is a relational understanding of the world, arguing for the situatedness of actors, science, technology and society.

The Rome Declaration on Responsible Research and Innovation in Europe (European Council, 2014) describes Responsible Research and Innovation, as an ongoing process of alignment, not definite or in any way static, but relying on the attention of the contemporary values, needs and expectations of society. This is a vision where science and technology have to become-with society, and not something which exists outside society, but as a complementary moralizing composite-agent. This ontological position suggests that science and technology are not free from value but value-laden and consciously or unconsciously conceptualized in its development by its particular socio-technical setting.

Furthermore, the role of innovation in this perspective is translated into a 'social good' (Delvenne, 2017) and become very outspokenly normative. In the Danish Board of Technology Foundation, Responsible Research and Innovation have some interpretive flexibility relating to its contextualisation.

> *"Responsible Research and Innovation has been our main focus for the Horizon 2020 research program its a kind of umbrella term in dealing with ethics, gender equality, open access to science, science education, governance and public engagement in European research and innovation" (Bjørn Bedsted, Deputy Director at the Danish Board of Technology Foundation, 2020)*

Responsible Research and Innovation is, in this sense, a mediator that becomes inscribed with particular values. Besides being a mediator, it also serves as a commodity which is sold by the Danish Board of Technology Foundation, in this case to the European Commission and its funding program Horizon 2020. It is with some significance that Responsible Research and Innovation has developed the abilities of actors and institutions to perform collective responses to matters of concern.

Being with the Danish Board of Technology

My affiliation with the Danish Board of Technology Foundation began on August 15th, 2019 as an intern - the position was part of my third semester of the master program Sustainable Design. The internship was 30 hour weekly and lasted five months; from August till December. During this period I participated in a number of different projects, particularly the "Human Brain Project" (also) a Horizon 2020 funded project, which consisted of multiple related subprojects and working-groups. I was particularly engaged in two projects; (1) EBRAINS, a co-creation project of developing a research infrastructure for knowledge sharing multimodal neuroscience data and computational models between different stakeholders, in e.g. researchers, pharmaceutical companies, tech-companies and patient organisations, and (2) 'EuropeSay, in which EU citizens deliberation on Artificial Intelligence'. EuropeSay was designed to create an overview for policy-makers on the opinions of the European public on innovation and implementation of emerging artificial intelligence technology in society at large. This project was following up on a stakeholder and experts workshop who had been assessing artificial intelligence in the Human Brain Project. Within both projects, there was significant emphasis on the relationship between responsibility and innovation. Through this work, I became familiar with some of the methods and approaches of the Danish Board of Technology Foundation. This is important because many of the methodical, theoretical and philosophical approaches from the organisation seem recurring and my insight into the practices definitely benefited from the

repetition.

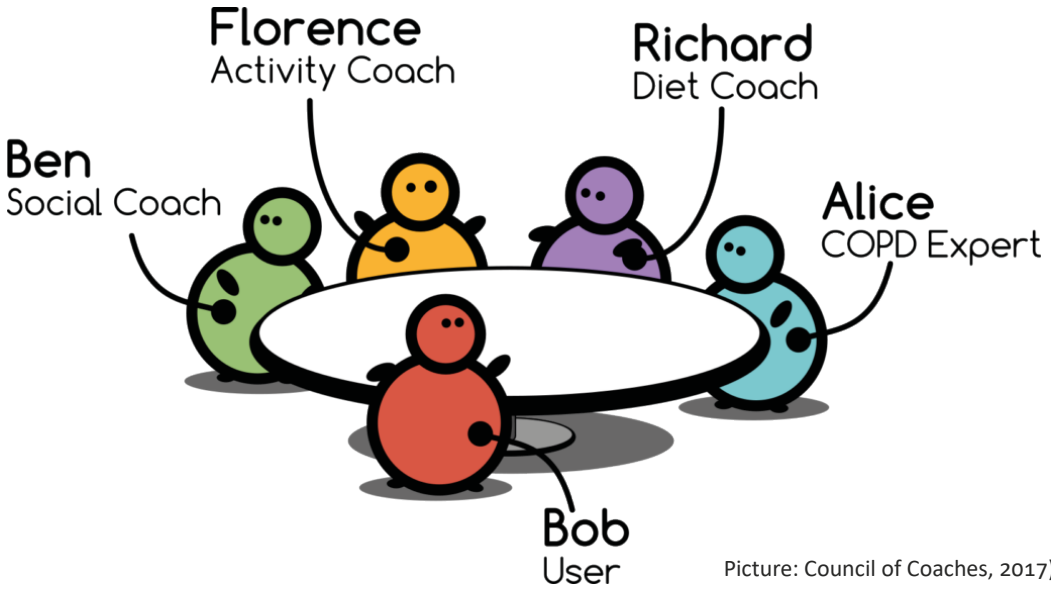
At the end of my internship, I received the opportunity to continue as a student worker in a project position, and I agreed. In this position, I have been working 15 hours a week on the project Council of Coaches which is an EU funded Horizon 2020 project focussing on the development of virtual agents for dialogical information and advice construction. My participation is part of the finalization of the project, and for this reason, I have the benefit of the overview and hindsight, but also the lack of direct experience from many of the workshops and negotiations. To this extend much of my empirical material is acquired from internal reports, publications and conversation. The Council of Coaches has been active from September 2017 and concludes in August 2020.

The Council of Coaches

"A modern way of life needs a modern way of coaching" (Akker et al., 2018, p. 219)

The quote above is the first passage of the abstract of the article "Council of Coaches: A Novel Holistic Behavior Change Coaching Approach" published by the Council of Coaches (COUCH) consortium (Akker et al., 2018). The passage strikes a chord which resonates through the article and the project in general. The Council of Coaches developing Information and Communications Technology with an interdisciplinary approach in the field of health and wellbeing.

The Council of Coaches project is a reply to one of the work programmes proposed by in the Horizon 2020: "Health, demographic change and well-being" specific call: "Personalised coaching for well-being and care of people as they age" (Grant Agreement, 2017; "Funding & tenders", 2020). In the Grant Agreement made between the Consortium and Horizon 2020, the consortium argues that societal advancements in living standards, care and treatment options have added significantly to the average length of human life expectancy. This is however not intrinsically good because these added years are not always lived with a high quality of life or in good health, but often subdued to the effects of



Picture: Council of Coaches, 2017)

chronic diseases and ailments. While many of these conditions might not be downright curable, they argue that a healthy lifestyle with multiple related activities has the potential to prevent or minimise many of these age and lifestyle-related conditions. Further, there is currently a wide variety of coaching applications available (and emerging) which assists its users in tackling these issues individually but does not engage in any holistic manner with the user (Akker et al., 2018).

Unlike other advice manufacturing coaching application, the Council of Coaches revolves around the development of multiple virtual coaches, interacting in a dialogical style as an interdisciplinary approach. The autonomous agents are designed to inform, educate and motivate

the user groups to healthier lives. Each virtual coach represents a particular discipline or type of knowledge, and present it in a multi-party dialogue. The coaches interact with the users of the application by; sensing and profiling, dialogue management, and by providing user interaction advice. This means the application if demonstrating the capacity of listening, replying with information or inquiries, discussing advice between themselves, set collective goals for the user and tries to inspire/motivate. The application is fed with - and provide advice based on - multiple types of information (see figure x)

The inputs are collected through; (1) sensor data, that is either on-body and home-environment sensors, (2) through the coaching sessions where the coaches act as a sensor and (3) epistemic knowledge from the different coaching disciplines which are continuously updated (see more at the link: Council of Coaches D4.1).

Needless to say, the shared knowledge base (the COUCH cloud) is balancing a very wide variety of knowledge types and likely challenged by epistemological differences. The application is acting as and providing advice from all the coaches: Olivia Simons (Physical Activity Coach), François Dubois (Nutrition Coach), Emma Li (Social Coach), Helen Jones (Cognitive Coach), Carlos Silva (Peer & Support), Rasmus Johansen (Chronic Pain Coach), Katarzyna Kowalska (Diabetes Coach) and Coda

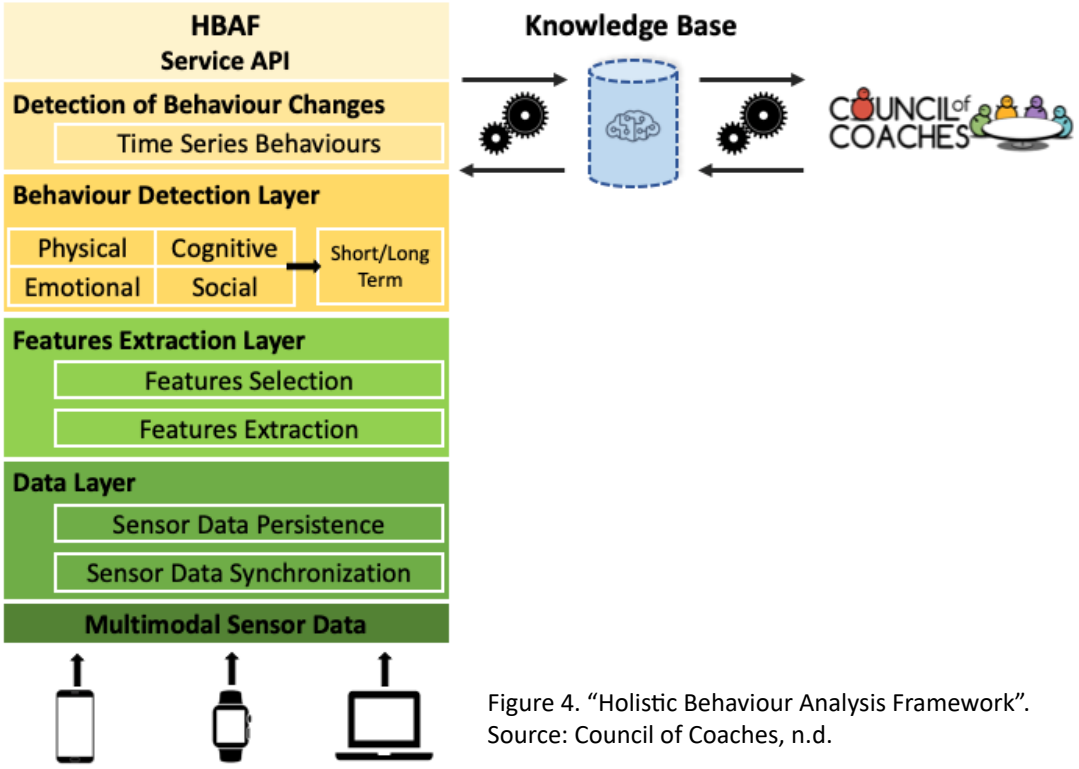


Figure 4. “Holistic Behaviour Analysis Framework”. Source: Council of Coaches, n.d.

(Council of Coaches Assistant). While health and lifestyle coaching is not a new phenomenon, nor in information and communication technology, it is not yet common to have as many virtual agents participate as in the manner aspired in the Council of Coaches. It is in this particular dimension of interdisciplinarity that the consortium argues that the Council of Coaches is superior to other available and emerging e-health applications. Still, while the particular project of the Council of Coaches is engaged in e-health its efforts do not seem to limit itself to this field. They proclaim that the success of the project will be measured by seven objectives. Objective no. 2 states that:

> *"The project will introduce the new coaching paradigm of the Council of Coaches. In this paradigm, the virtual coach is manifested in a group of virtual characters that each represents a different knowledge domain of the coach. [...] This paradigm's success criteria are to significantly increase the engagement of the user with the system, and his willingness to actively participate in the coaching sessions." (Grant Agreement, 2017, p. 133)*

The developing science and technology in the Council of Coaches project have a lot of potentials to reach far beyond that of personal health. The vision is, as described in the quote above, to build a new paradigm of coaching. The Council of Coaches presents a future of technological companions serving as moralising components in our hybrid lives. The sociotechnical significance and potential for good and bad of this project are however not lost in its technological ambition. The role of the Danish Board of Technology Foundation in the project is in linking the technological development with societal expectations and sensitivities. This is done firstly by building a Responsible Research and Innovation Vision (Grant Agreement, 2017), this is a sociotechnical framework of responsibility compliance, a shared vision to which the researchers are supposed to follow. Seeing how this is done we look into two practices of the Danish Board of technology; Technology Assessment and Responsible Research and Innovation, and some of the governing points of reference in them.

The final workshop which I helped design and perform was postponed barely within of the reach of this report, because of the COVID-19 pandemic, and has taken a somewhat novel format being held online. This was decided after much deliberation between the managing Consortium coordinators of COACH and representatives from the Danish Board of Technology. It was decided to do the workshop over three separate sessions primarily using the software Zoom. What originally was planned to be a one and a half-day (12 hours) workshop in Brussels, now became three sessions of one and a half hours (4½ hours). While the composition of the workshops changed its objective remained: A

collaborative drafting of recommendations by external stakeholder towards a practical approach of responsible prototyping. This is responsible practices on a practical level for the innovation of virtual coaches and similar information and communication technologies.

The drafting session was performed much like a stakeholder-session of Technology Assessment, in which the participating stakeholders were presented with particular issues previously constructed by the COUCH Consortium member at the initial responsibility workshop.

This is the angle which is under investigation. What is important to notice here, is that there are many positions at play in this ecology of negotiating actors, and perceptions of what sociotechnical imaginaries are desirable and what sensitivities are included in them. How does the framework from which we intend to design sustainable societies work and for whom are they sensitive?

The Infrastructure of the Council of Coaches

The Council of Coaches project is developed by a consortium of seven partners, each contributing and maintaining different roles in the project. Furthermore the project is divided into nine work packages, with each partner responsible for certain aspects. The project is funded by the European research and innovation fund Horizon 2020, in exchange

European Commision

Horizon 2020

The COUCH Project

Work Packedges:	Consortium:
WP1 Management	University of Twente: Center for Monitoring and Coaching (CMC)
WP2 Responsible Research and Participatory Design	Danish Board of Technology Foundation (DBT)
WP3 Coaching Strategies and Knowledge Base	Roessingh Research and Development (RRD)
WP4 User Behaviour Sensing, Modelling and Analysis	University of Twente: Center for Monitoring and Coaching (CMC)
WP5 Dialogue and Argumentation Framework	University of Dundee (UDun)
WP6 Human-Computer Interfaces	Sorbonne University (SU)
WP7 Overall Integration and Demonstration	Polytechnic University of Valencia (UPV)
WP8 Dissemination & Exploitation	Innovation Sprint Sprl (iSPRINT)
WP9 Ethics requirements	University of Twente: Center for Monitoring and Coaching (CMC)

Figure 5: Based in the organisational structures of Council of Coaches project. Own Illustration

for abiding with their rules and norms, along with further specificities that we look into in later chapters (Horizon 2020: Negotiating funding and visions). The collaboration was officialised in a grant agreement, in which the Consortium Members account for the different work packages and who is responsible for maintaining them (Grant Agreement, 2017).

The Danish Board of Technology Foundation is in charge of work package no. 2; Responsible Research and Participatory Design. It is within this branch of the project that I have been embedded. The work package no. 2 is dealing with the operationalisation of responsible research and innovation, in this relation, it means that the Council of Coaches is to be aligned with the societal values and ethical considerations of the present as well as future user and society. To this point, most researchers and innovators agree, at least on a principle level, that research and innovation should be responsible and designed for the improvement of society at large (Ramchandra, n.d.). Subsequently, it is one of the explicit objectives of work package no. 2 and the responsibility of the Danish Board of Technology Foundation to develop a:

> *"shared understanding and vision of what RRI means for the COUCH consortium and how this vision should be achieved" (Grant agreement, 2017, p. 13)*

It is an integral part of the Council of Coaches project to develop a methodology that can make responsibility - in practice - less abstract for the participating members of the project activities (Ramchandra, n.d.). As the consortium members are experts from various disciplines and because each are inclined to focus on their own work practices, it was the role of the Danish Board of Technology Foundation to implement an approach of participatory design across these disciplines, with the inputs of external stakeholders and integrate the findings into the working routines of the consortium researchers.

This is unlike the explicit moralizing structures set in place by the European Commission and Horizon 2020, who are more coercive in the methods of what could be considered imperative responsibility. In Horizon 2020, responsibility is encouraged top-down into all projects; through legal and ethical frameworks. In this sense, the co-creational model of by the Danish Board of Technology suggest and rely on a much more bottom-up methodology.

> *"In COUCH we have tried to integrate it [read, responsibility] into the research and innovation process in a way that makes sense for the people involved. Early in the project, the consortium partners had an internal workshop in which they identified a set of what we call RRI [read, Responsible Research and Innovation]*

issues that we wanted to address throughout the project period" Bjørn Bedsted

The vision of the Responsible Research and Innovation agenda can therefore very well be thought of as an assemblage becoming through a series of negotiations with the consortium, the RRI issues and external stakeholders, which related to the next objectives of the grant agreement:

> *"Stakeholder and user engagement processes: a series of deliberative, co-constructive multi-stakeholder workshops" (Grant agreement, 2017, p. 13)*

And the integration of the responsibility reflections into practice:

> *"Socio-technical integration: social scientists engage scientists and engineers in semi-structured interactions designed to enhance reflection upon research decisions in light of broader considerations - including the stakeholder views - and societal implications." (Grant agreement, p. 13)*

In this regard, the task of the Danish Board of Technology Foundation has been to create a performative assemblage of responsibility to act as a shared sociotechnical vision/imaginary for both the researchers and the stakeholders, e.g. users and society at large. In the Council of Coaches, project responsibility has been infused into each work package as cornerstones both relevant during the scientific and technological development and beyond the final stages of exploitation.

Negotiating issues through a shared RRI Vision

Constructing the RRI Issue cornerstones, started by the practice of creating a preliminary listing of responsibility issue priorities through a shared vision of what Responsible Research and Innovation is, or might be. The RRI Vision was to act as an catalyst for the responsibility in the project, and based on:

> *"an agreement between the project partners about what responsibilities arise from the ambitions of the project, who needs to bear these responsibilities, and how the project is going to ensure that they do" (Øjvind & Bedsted, 2018, p. 44)*

The RRI Vision present a frame of reference and structure for the engagement of responsibility. It serves as a net to hold the responsible practices together as all three are essential to reach any kind of responsible mobilisation. Furthermore, it was the ambition to address three aspects in the initial workshop, which in turn was divided into three

correlating sessions and was executed over one and a half-day. The first session was a brainstorming session, based on the background information provided previously and presentations by the Danish Board of Technology Foundation on: What is an RRI Issue, and how do we work with it? The brainstorm of the issues was a contextualisation of what Responsible Research and Innovation could and should mean for the Council of Coaches. During the second session, the participants developed more precise descriptions of the issues and suggestions of how to handle them. The third session was then a discussion of distribution, who should maintain and follow up on the issues of responsibility which had been illuminated during the workshop.

This next section is an analysis of the initial RRI workshop. Which was designed to aid the Council of Coaches Consortium in fulfilling the RRI Vision, by negotiating the responsibilities; within and arising from the project, who would be responsible for them and how to do it. The assessment of the emerging technology was based on a network of aspects, presented to the participants in a Background Brief (Øjvind, Rasmus, Bedsted, & Haukeland, n.d.). The aspects of the brief provided thoughts for thinking with responsibility and being in a responsible innovation project.

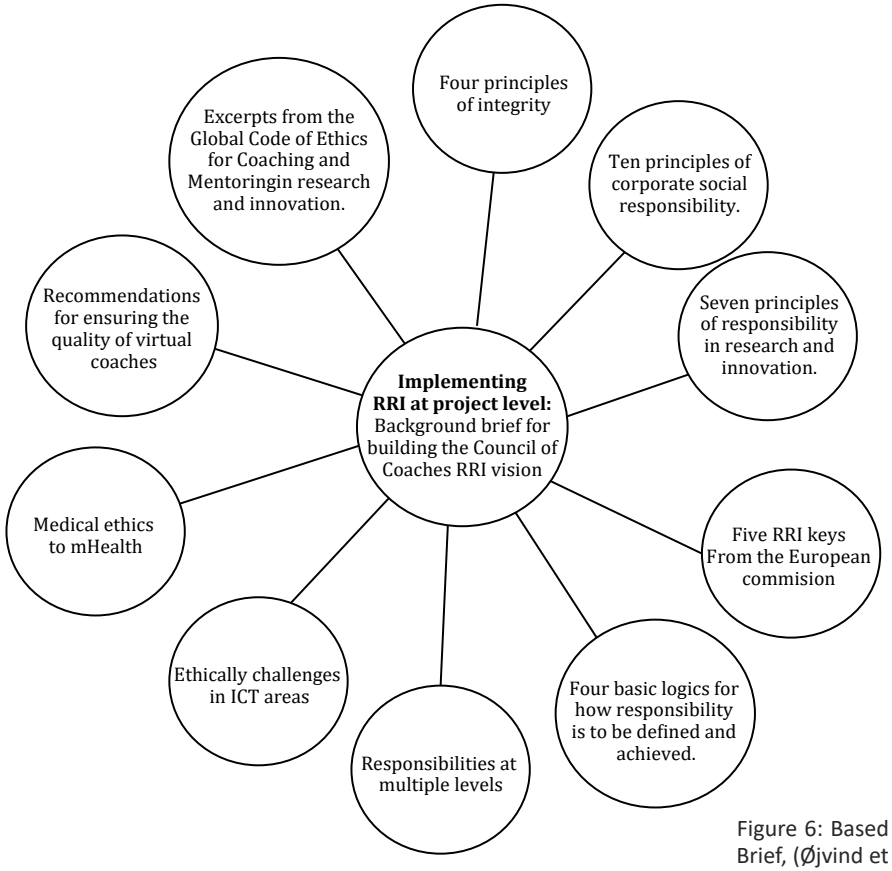


Figure 6: Based on RRI Background Brief, (Øjvind et al., n.d.). Own Illustration

The Background Brief as choreography

Two weeks prior to the workshop the participants received the 32-page Background Brief for the workshop: "Implementing RRI at project level: Background Brief for building the Council of Coaches RRI vision" (Øjvind et al., n.d.). The material included a wide series of perspective to think and act with responsibility from various sociotechnical levels. The Background Brief was primarily written by three members of the Danish Board of Technology Øjvind, Bedsted & Haukeland. It contains a variety of positions, recommended by the authors, and thought relevant in the

translation from RRI Vision to the issues of the COUCH Consortium.

The Background Brief provided guidelines for talking about the kind of issues and positioning of their role in defining responsibility for themselves, their work and the collective project. Further, it contained a series of schemas, figures, thoughts and points related to responsible research and innovation and norms from within health and information & communication technologies. With this analysis, it is important to state that each participant who read the Background Brief will have interpreted the positions differently, relating them to their position in the consortium and the disciplinary background. The Background Brief is interesting because it does more than assist the participants in projecting issues relevant to the Council of Coaches. It legitimises particular translations of issues and constructs a reality with the participants, as in ontological choreography (Metzger, 2013). The subjectivities of the workshop participants are therefore not only their 'own' but a co-produced result of the process. While I have separated the ten aspects into three categories they are in many regards overlapping, intertwined and multiple.

Positions for responsibilities of researchers and innovators

Initially, we look at responsibilities related to the individual researcher and innovator, relating to perspectives of internal assessment but also principles for viewing the surrounding sociotechnical structures. There are two traditional and dualistic positions to the researcher and innovator: researchers do research for the sake of the research and innovators are moved by the prospects of doing business. The readers are introduced to the what the Background Brief describes as the traditional positions and positioning of responsibility, which conceptualise a strong division between the different interests a human actor might have, in being both researcher but also citizen engaged in democratic society (Øjvind et al., n.d.; Øjvind, Rasmus Nielsen & Bedsted, 2018).

Four principles of integrity

Integrity is divided into four principles for the researcher; Reliability, Honesty, Respect and Accountability. These are set out by the European Code of Conduct for Research Integrity (European Science Foundation & All European Academies, 2011) and are reflecting the principles of good research. Ideally, this is to produce independent knowledge not tied to the agency of funding, ideology, economic or political interest. The sensitivities are focused on the responsibility of the researcher and related awareness to the ability to which they can respond with integrity.

Seven principles of responsibility in research and innovation

The principles are adopted from Gwizdała & Śledzik (2017) who con-

ceptualised seven principles of the transition from research to innovation in university settings in an attempt to define Responsible Research and Innovation. They engage with the issues related to sociotechnical consequences of research which can not be restricted to the internal consequences but has to consider futures of emerging technology as an effect of it. With inclusion, anticipation, responsiveness, reflexivity, sustainability, care and economy, these principles relate to the issues of the planner of wicked problems. While wicked problems are not directly mentioned, each principle expands the aspects of the COUCH project an places it in a societal context.

There is one element which stand out in the principles, and this is a competitive dimension of; firstly academic survival, relating to the adaptive ability of the innovation in society; and the economic position which is in fact represented in the position of sustainability. The foundational argument here is that science and technology do not necessarily add any inherent value to society, and therefore is expected to express its competitiveness in a marked-framework.

Ten principles of corporate social responsibility

These are the ten principles of the United Nations Global Compact, which is a guide to corporate sustainability operationalised through four fundamental responsibilities towards human rights, labour, environment and anti-corruption (United Nations, n.d.). Many of these are inscribed into law and non-negotiable while others rely on normative principles of precautionary. They present general and very wide definitions but are inscribed with the reflections of sociotechnical awareness. These principles are based on the conceptualisation of sustainability in relation to the triple bottom line, the dimensions of which are social, environmental and economical (Elkington, 1998). While the primary focus of the triple bottom line is to have produce profit, it frames an ethical incentive of doing this through as little harm as possible (in relation to the social and environmental) thus remains just over the bottom line of responsible acceptability.

Five RRI keys and compliance in the Council of Coaches

The introduction to the multiple levels of policy making about the responsibility the Background Brief present the readers with a further contextualisation of the COUCH project and its embedding in the European Commission's 8th Framework Programme for Research and Development and as a recipient of the Horizon 2020 funding programme. The five keys are categories seeking to make Responsible Research and Innovation more tangible both in terms of the policymaking aspects but also in the operationalisation of Responsible Research and Innovation.

"The European Commission itself has been a driving force in the development of the RRI concept and has invested significant resources in making the concept tangible and operable at both a policy and a practice level. During this process of operationalization, the Commission has settled on an understanding of RRI as an umbrella concept for five RRI 'keys', namely: public engagement, science education, gender equality, ethics, and open access". (Øjvind et al., n.d., p. 13)

In this regard, Responsible Research and Innovation could be defined by its normative nature, drawing together the relationship between the science, technology & innovation and society at large. The thematic elements of Responsible Research and Innovation, while being interpretive, have an important mediating agency to the European Union. Still, normativity is by no means equal to relativity, and the COACH project has defined several ways of compliance to meet the key point of Responsible Research and Innovation.

Frameworks for positioning responsibility

As introduced in the previous section, there are particular objectives for the different actors roles in science and innovation and a certain freedom to pursue their particular objectives. There are however limitations which are related to a common conceptualisation of producing societal value. The question left for the readers of the Background Brief

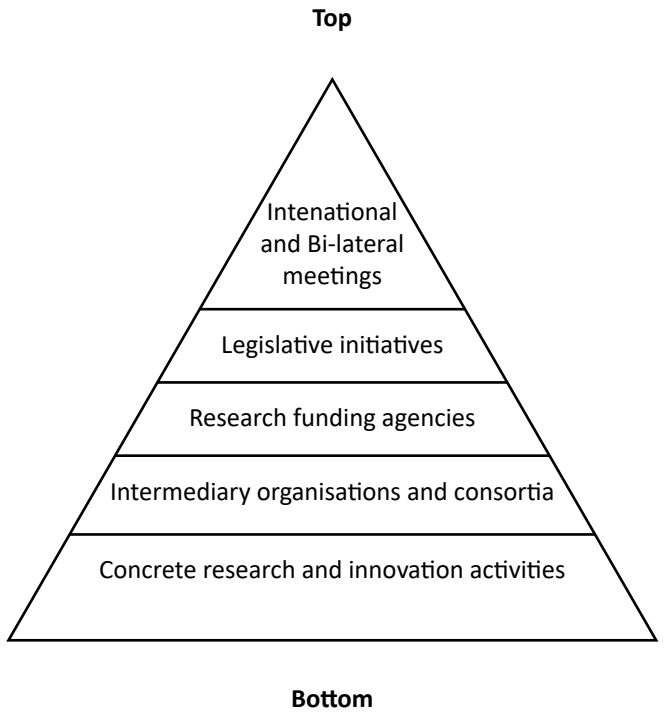


Figure 7: Based on Fischer and Rip (2013) discourses and activities at different levels of governance. Own illustration.

is thus how responsibility then should be negotiated collectively and by whom.

Responsibilities at multiple levels

With the development of greater emphasis on responsibility in research and innovation, there are more actors who become co-responsible in thinking about societal embedding and the potential socio-technical impact of science and technology. Fisher & Rip (2013) describe some ways of making sense of the new relations responsibility assign on multiple levels (See figure, xxx). This place the effort and space for developing responsibility in perspective to one relative position.

Four basic logics for how responsibility is to be defined and achieved

The figure represents an overview of rationalities. The question is focusing on making sense of how to relate to responsibility and developed by Glerup and Horst (2014). This relates to the positioning of responsibilities, to which extend is the researcher able to respond to particular positions of responsible action. The positions are arranged in a matrix of 2 x 2 dimensions; the first is a reflection on whether responsibility should be considered related to the outcome of a project

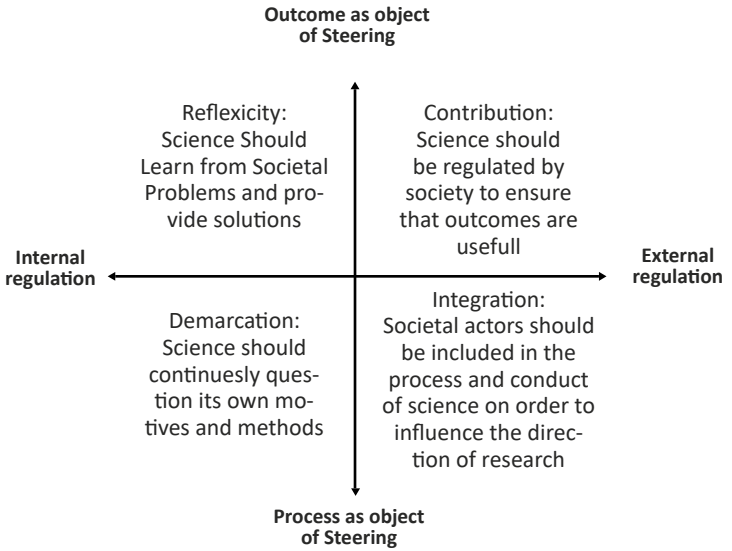


Figure 8: Based in the four basic logics for how responsibility is to be defined and achieved by Ierup and Horst (2014). Own illustration.

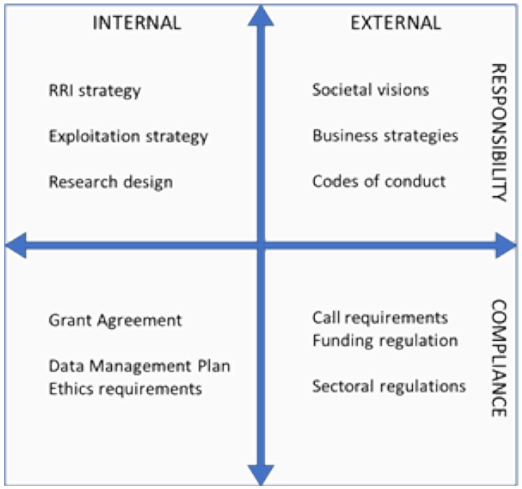


Figure 9: RRI issues within a project. Source: Øjvind, Bedsted, & Haukeland, p. 11 (n.d).

or the process; the second relates to the regulation of the project and whether it should be relying on internal or external regulation.

What is an 'RRI Vision' for a research and innovation project

Further, as it is the agreement within the consortium that the RRI vision is co-constructed by themselves in the issues that arise through the ambitions of the project. To enhance the understanding of who needs to be response-able for the issues and how to ensure that it is done, the brief present another 2 x 2 matrix in which responsibility and compliance act as an axis, and internal and external act as another. Identifying issues with this matrix (as well as the previous) illuminate the diversity of knowledge types which needs to go into forming the project but also frame the responsibilities of the consortium. Their own RRI strategy or vision has to contain all these elements, some of which are predefined from their grant agreement, some of which can only be introduced through stakeholders. To identify RRI issues, the consortium must draw on a wealth of different sources of information. Compliance issues may be identified partly through the requirements set out by the funding agency, and partly by taking a broader view of sectoral regulations (e.g. medical regulations). The task of identifying RRI issues is shared between different elements of a Horizon 2020 project. Some RRI issues will be handled by achieving compliance with legal and contractual demands on the consortium. These issues have a home in the risk management, ethics, and data management plan.

Sectoral Principles and Ethics

The four remaining points and schematics are related to the sectoral aspects of the Council of Coaches project. In this function they represent the thoughts of the disciplines that the Council of Coaches are leaning up against .

Excerpts from the Global Code of Ethics for Coaching and Mentoring

By design, the Council of Coaches technology makes coaching more accessible and to introduce advice which needs to comply with the sectorial code of ethics for Coaching and Mentoring. For this reason, the brief introduces the global code of ethics for Coaching and Mentoring developed by the Association for Coaching and the European Mentoring and Coaching Council. Each element present important aspects legally and normatively in the client and coach/mentor relation.

However as it is the Council of Coaches is made from the agency of non-human virtual agents, the classical code of ethics fall somewhat short.

Recommendations for ensuring the quality of virtual coaches

The continued responsibility of the technology relies on building relations to established institutions of regulation and the institutionalisa-

tion of new normative and legislative aspects of virtual coaching. The idea was developed at the Rathenau Institute (Kool, Timmer, & van Est, 2015) using variations of (technology) assessment practices to examine the potential impacts of virtual coaching. In the brief, it is presented that the central argument is the need for quality control that the virtual coaches are designed to actually help the user.

Adapting medical ethics to mHealth

Similar to the transition from coach to virtual coach, the question here lies in the transition from human to human interaction, to a human to a virtual agent in medical ethics. What changes? In the Brief, the four principles known in bioethics is presented as; respect for autonomy, beneficence, nonmaleficence and justice. While each of the principles become adapted to fit the setting of mHealth a fifth principle is introduced by Albrecht and Fangerau (2015) “good scientific practice”.

Ethically challenges in ICT areas

Information and Communication Technology have great potential in the field of health providing and managing health and care. But they similarly raise the ethical concern and the questions of responsibility to meet a societal need. In the Background Brief, there are then selected ethical challenges for the readers to take into account. Each of them, when inspected, is based on instrumental factors of the agency.

The Consortium RRI Issues

Upon the finalization of the first Consortium workshop, they had defined and described in some detail twelve different RRI Issues, divided into four Primary RRI issues and eight Secondary (“Sleeper”) Issues. What is interesting about these RRI Issues is that they for the most part seem to be relying in an instrumental mediation. This kind of mediation is related to a understanding of technology of being the instrument of human intent or intention, placing the mediative power and responsibility in the hands of the human user. The Council of Coaches technology is in this interpretation passive or morally neutral and relying on the inputs to become a desirable or undesirable addition to sociotechnical fabric of society.

To some extent the issues imply that the technology itself does not require further scrutiny because it is how it is used which matters. It is, in so many words, out of the hands of the researchers. There is ofcourse many good reasons to why the consortium would reflect in such a way about the issues, particularly, as every participant of this workshop had great personal gain from developing the technology. But also because of a long tradition of dividing responsibility between disciplines and not by transdisciplinary approaches.

External Stakeholders

As part of the grant agreement work package no. 2, objective 2., and to a high degree sociotechnical practices of the Danish Board of Technology Foundation the inclusion of stakeholders and their perspectives was a essential part of responsible design of the project. In the D2.2 Report on user and stakeholder needs and expectations, they argue that:

"In order to align COUCH with the societal demands and values, the consortium inquired advices and attitudes toward the technology from different stakeholders. The consortium works with the stakeholder understanding, of it being all the persons or organizations that have a task or role in relation with, or are affected by, the eHealth intervention"(Broekhuis, van Velsen, Akker, Øjvind, & Andersson, 2018, p. 9)

It seems curious that the first workshop was designed to align the Consortium around their visions and RRI Issues, providing an imaginative space for contemplating these, and then not do the same in the primarily external stakeholder workshop. This would leave the external stakeholders with a somewhat limited operational space for defining RRI Issues related to themselves, while aligning with already established Issues. In many engagement practices such as Technology Assessment such as this, there are always practical restriction of time and space. In this case It seems that the output of the workshop was more focussed on practical input on predefined topics.

In the D2.2 report on users and stakeholder needs and expectations, they argue that "When a responsible design is to be conducted, it is of great importance to include a wide spectrum of people and organisations that have specific knowledge and experiences within the field of the new technology" (Broekhuis, van Velsen, Akker, Øjvind, & Andersson, 2018, p. 9). However, the mobilisation of stakeholders in the workshops did not necessarily provide the creative thinking space for these actors to utilize their knowledge and experiences. Instead the planned process of engagement seemed choreographed towards the already defined RRI Issues. This is not saying that the planning process of stakeholder engagement had any malevolent intend of favorable partiality particular to any certain aspects represented.

The participating stakeholders contributed to a slight expanding the listing of issues, while not changing the primary RRI Issues, to any mention worthy degree. Their contribution became noted and then translated into reports which held their opinions and problematizations. The RRI Issues were refined and further developed by the external stakeholders to the project.

Sociotechnical Integration

There was however the obstacle of having the consortium researcher integrate the issues and visions from the workshops into their actual work. This was part third objective in the grant agreement work package no. 2, objective 3. To this extend the Danish board of technology Foundation implemented soft interventions (Fisher & Rip, 2013) performed by an agent (not in disguise) placed in many of the meetings regarding the development of technical dimensions of COUCH by the Danish Board of Technology Foundation. The role of the agent was then to (re)assert the focus on Responsible Research and Innovation by asking questions and raising attention from this position of responsibility into their deliberations. The practice is inspired by soft interventions (Øjvind & Bedsted, 2018) the subtle but persistent presence of a reflexive responsibility advocate the technically focussed researchers which could weave responsibility into the fabric of the project. The final result would be a co-created format of responsibility integrated socially and technically.

> *"If you are among the people involved in the different aspects of the technical development, you can expect to receive ongoing support for the implementation of the RRI vision. The RRI Vision will also inform the non-technical parts of the project including risk management, data management, and innovation management, exploitation, and ethical approval." (Øjvind & Bedsted, 2018, p. 9).*

Even if the individual researcher decided to push the agenda of responsible development of their research and innovation it only makes sense to do so as a collective and on multi-levels. And here the agent functioned also as a feedback loop. At the end of the project, it is all being finalized by looking forward and addressing the issues relevant for further development of COUCH and similar technologies. The RRI Vision of the COUCH Consortium then becomes a mediator in the translations of what is considered responsible sociotechnical futures by the participating actors, as they are described in the continues consortium debate, the day to day sociotechnical integration and the stakeholder engagements. These matters of concern and what is assessed to be the concern that matters are then translated into manageable issues, immutable mobiles acting as moralizing components in the final design, the options of exploit and implementation.

Choreographing a translation to RRI Issues

The aim of the initial consortium workshop was to form a shared vision on the relation between the possibility of adding social value through the development of the Council of Coaches technology and assessing

the risks which might follow. The workshop was in this sense a practice of Technology Assessment to plan the further course for Responsible Research and Innovation. It was also explicit that the goal of the workshop was to align the consortium participants behind a limited set of issues. The Background Brief and the three activity sessions were explicitly supposed to align the consortium members in a process of understanding the opportunities for adding societal value through the Council of Coaches Technology, but also understanding the risks to society which might also entail it.

Horizon 2020:

Negotiating funding and visions

"The general objective of Horizon 2020 is to build a society and a world-leading economy based on knowledge and innovation across the whole Union, while contributing to sustainable development." (CORDIS, 2014)

This chapter is looking into the role of the Horizon 2020 funding program in the negotiation of shaping the Council of Coaches technology, particularly in relation to its dimensions of being socio-technically responsible. The funding programme presents a is using a variety of conditions, objectives and rules, which, given the limited space in this analysis we will not address, but rather focus on particular points and more general statements.

European Framework Programme

Horizon 2020 is the 8th European Framework Programme, which, since its establishment in 1984 has been supporting the development of science, technology and innovation in Europe. From its initiation, the budget has steadily risen from 3750 million Euro in 1984 with the first Framework Programme to 77028,30 million Euro in Horizon 2020 (CORDIS, 2014; European Council, 1983). The gradual increase in the budget is to some degree mirrored or represent in the parallel development of the influence of the Framework Programmes in the European setting (Enger & Castellacci, 2016).

Interestingly, Horizon 2020 explicitly represent a normative change from previous framework programmes because it is the first to have a name, that is not its number in the line of frameworks. In this regard, Horizon 2020 presents a significant symbolic disposition of looking into the future. In opposition to other Framework Programmes the Horizon 2020 was developed in the wake of the Anthropocene, becoming with acute climate emergency and in the backlash of the economic crisis of 2007 to 2010 (Young, 2015).

"There is a critical need to reinforce, widen and extend the excellence of the Union's science base and to ensure a supply of world-

class research and talent to secure Europe's long term competitiveness and well-being." (Council of the European Union, 2013, p. 966)

While there are many aspects one can read into this, there is a division of three which are interesting to this research. The sentence presents an argument in which the goal is competitiveness and well-being. To reach this abstract notion of well-being we need to be competitive, through a reinforcing, widening and extending the supply of high-quality science produced in Europe. The argument seems to rests on a capitalist economic logic, in which knowledge is treated as a commodity and traded in return for well-being, or growth. This position is further enforced in the Horizon 2020 in Brief pamphlet, where they argue that:

"The goal is to ensure Europe produces world-class science and technology that drives economic growth". (Horizon 2020 in brief, 2014, p.9)

With the opening quote, that is three statements which describe the general objectives of the Horizon 2020 framework, indicating a strong focus in research as being valuable by its innovation and commodification. While this statement exerts are fairly generic, they are nevertheless descriptive of an approach to management which is very much in line with the practical style of New Public Management, in which the practices of public administration imitate the practices of business administration.

Objectives and Evaluation

The programme consists of three parts: Part one is pursued through three priorities: (1) excellent science, (2) industrial leadership (3) societal challenges. These are related to the initial argument. Part 2, is pursued through specific objectives: (4) spreading excellence and widening participation, (5) Science with and for society. Part three, through the (6) non-nuclear direct actions of the Joint Research Centre. Each element is complementary with each other and serves to construct a sociotechnical framework which acts in favour of the European union's interest (Appendix no. 2, for mapping of General Objectives).

Going a bit further into the actual selection and award criteria set out by the European Commission there are three criteria of evaluation. The criteria are related to different dimensions of the projects: (1) the excellence, (2) the impact and (3) the Quality and efficiency of implementation (European Commission, 2013; Council of the European Union, 2013). Each category is evaluated and rated by experts/peers from the related fields of research, on a scale on 1-5. The different aspects of assessment are considered in relevance related to the project and are in

many instances based on normative ideas and speculations (Appendix no. 3, for mapping of evaluation criteria). A sufficient score in comparison with the competing projects presents one of the final rites of passage for the funding (European Commission, 2013).

A variety of structural passage points provide a particular playing field of negotiations. The ability align the material and normative elements in a project, with those of the network of Horizon 2020, is a particular art form and a skill of seeing through the structure and understand the underlying conceptual associations of the elements in the framework, is essential in getting the funding (Personal communication in the Danish Board of Technology Foundation, 2020).

In the initial steps of the forming of a project funded by the Horizon 2020 program, multiple series of negotiations and translations take place. Each step negotiates the different dimensions of the applying projects nudging particular philosophical, normative, political and material aspects to align with those idealised by the European Union. The material structure of the application practices and the ability to align with the normative and regulatory positions within them are essential is any project is to receive any funding through the Horizon 2020. During a meeting in the offices of the Danish Board of Technology Foundation, we were celebrating another project was approved for funding from a funding program of the European Commission. During which the necessity of meticulous alignment of project dimensions as presented above, or as said plainly by the vice deputy of the Danish Board of Technology Foundation Bjørn Bedsted:

> *"De skal følges til punkt og prikke / They must be followed to the point" (Personal Communication, 2020)*

To this extent, Young (2015) criticize the Horizon 2020 framework for allowing the preliminary financial crisis of 2007-2010 to pave the way for a ranking system in the which the projects which would receive the funding would be the best at following the evaluation dimensions. Young argues that the evaluation is based on a "zero-sum" excellence systems, which follow the assumption that "excellence is a limited resource decided by relative and competitive means. There can only be so much excellence, and as researchers improve, the excellence target moves with them" (Young, 2015, p. 25). The competitive advantage thereby comes by not only aligning as close to the dimensions of the funding program as possible but also in assembling in teams with as wide a span as possible.

Funding is a powerful interestment device in the practice of aligning in actors to "collectively held and performed visions of desirable futures

(or of resistance against the undesirable)" (Jasanoff, 2015, p. 28) and in other words a sociotechnical imaginary. Important to note here is that the result of a long and complex negotiation and rather an assemblage under a common banner than directly collective. The implications are not really surprising but nonetheless substantial, because of the consequences on knowledge production and the degrees of autonomy the consortium and particularly the institution of Technology Assessment and Responsible Research and innovation represented and enacted by the Danish Board of Technology.

Responsibility in Work Package no. 2

Let us for a brief moment return to the work package no. 2, which was the responsibility of the Danish Board of Technology Foundation, and represented the Council of Coaches effort of: Responsible Research and Participatory Design. The effort was divided into three steps: a shared consortium RII vision and insight in RII issues, Stakeholder & user engagement and Socio-technical integration. The practices were well thought out and designed, particularly the Design Brief was detailed beyond what might be expected from Technology Assessment Practices.

"The objective of this work package is to ensure that the research and innovation process in the project follows the principles of Responsible Research and Innovation, implementing the framework laid out in the European Responsible Industry project (EU-FP7-609817)." (Grant Agreement, 2017, p. 13)

The framework is designed to aid industries in different areas of responsibility by moving beyond economic parameters of successful business, to a business in which their: "process and outcomes of their research and innovation are societally acceptable, desirable and sustainable" (CORDIS, 2020). The Danish Board of Technology are more than capable of designing practices which live up to any standard of industry responsibility. But the interestment of work already within the disposition of the European Commision discourse and the recognition provide a plausible benefit in reaching grants.

Discussion

The following chapter offers discussion and reflections on the different observations and analytical points made in the different sites of investigation. In this research, we have been following the engagement of the Danish Board of Technology Foundation on sites that makes the Council of Coaches Project. The project is a proposition towards the future of healthcare, that intends to change the way we live our lives, and how we think of virtual coaching. To this extent, the technology relates to much more than the elderly and ill in an acute need for health advice. The technology mediates our perception of what is possible, how we live and our visions for what constitutes the good in life. But there are many elements in the design process and dissemination of the technology and innovation which seem governed by pre-established structure-agencies, such as the European Commission.

Mediative qualities/responsibilities in the Council of Coaches

The intention of the Council of Coaches Consortium is to develop an application that will influence the behaviour of users with different ailments towards a higher quality of life. Implicit to this solution there is a problematization of the societal capacity for social and technical support from the healthcare system to aid the individuals with particular conditions. In this sense, the intentions of the technology act as a supportive pillar to a health system under pressure and a greater sense of autonomy for the users. Behind these explicit intentions and vision of the project, and inside the consortium, there are further interests, in particular, the research is also the livelihood and claim to fame of the participating researchers. And going a bit further, there seem to be an interest in Eurocentric market based growth and leadership, inscribed into the funding structure. Each level is contributing to the shaping of

technology, and the shaping of the spaces where technology is developed and innovated.

Looking at the issues conceptualised by the COUCH Consortium and the Background Brief, and the analytical structure behind it, there are several things that are interesting. The Background Brief together with the initial Responsible Research and Innovation workshop performed an alignment of anticipated issues from within the consortium. It was the explicit intention to form a shared RRI vision for further action. The workshop had the effect of making the researcher sensitive to the particular elements which they drew forward from the Background Brief and incentivised thinking of particular issues. The interpretation of responsibility aligned around an instrumental perception of how technology is mediated by users and in society. The major issues with the technology were constituted in the intentions of humans and the technology primarily as the instrument of their goals which might be good or bad. The Council of Coaches might, in fact, prove to do much more than act in this instrumental fashion of extending advice to people in need, as it might change the structural foundation of the health system. This is almost ironic since the managing consortium members are located at Twente University, the residing university of Peter-Paul Verbeek, renowned for his work about ethics in technology. The technology implicitly mediates that more responsibility could be placed on the individual patient or users relieving the system of the pressure but potentially also changing the health sector landscape. As a major part of the Council of Coaches, the project relies on the possibility for future exploitation of the technology, this also relates to the distribution of economic resources for future health systems.

The opportunities for exploitation is a fundamental element in the Council of Coaches vision and work package no. 8. But the actual means of exploitation have not been defined. There are, however, the guidelines presented in the Horizon 2020 funding programme, encouraging the concept of competition to promote European leadership and wellbeing. In a capitalist economy, the Council of Coaches technology could present a competitive actor in the healthcare market. How would this affect publicly funded care? While this is highly speculative there are two positions which represent the duality of the conditions. Perhaps the Council of Coaches technology relive the strain on the healthcare system, giving the people in dire need of treatment better care and attention. Another thought experiment could redistribute the budget from the healthcare system to a virtual one which might prove to be more cost-effective. Note here that what is cost-effective, is by no means necessarily the same as better. To this end, the Council of Coaches technology could influence the relationship between coercion and freedom of choice for people with ailment, between the usage of

information and communication technologies and human helpers.

From this perspective, the Council of Coaches might not deal with its technological potentials in a systemic fashion but address the problems too well-defined and isolated and with a predisposition (at least from the consortium perspective) which is technologically optimistic. It is not possible to reduce the Council of Coaches technology to the intentions and vision of the consortium, even if it is done with great skill and craftsmanship by the Danish Board of Technology Foundation. And while there have been continues iterations of the issues with external stakeholders to the project, the RRI issues have not been changed or modified to any degree in a significant way. The defined RRI Issues have however been integrated into the technological composition of the application, within aspects such as GDPR, etc.

Imaginary Capacity of the European Commission

It might not be any grand discovery that the European Commission favour and fund projects which support and comply with their funding framework for science technology and innovation. It is key to investigate the role of discourse, knowledge and politics, in the production of science, technology and innovation, mediated and unmediated from its materialities, in structures and practices in society. The innovations of the present affect our imaginary capacities, the building of visions and sustainable futures, the co-production of what we have been calling sociotechnical imaginaries. And the other way around.

The European Commission has constructed the Horizon 2020 funding program so that it is inscribed with their sociotechnical imaginary from a perspective that could be argued to be post the financial crisis (2007-2010). To this extent, the funding framework does not only inform the projects of what is important and should be taken into account to move well into the future, but directly act as a co-creator in the shaping of the project so that it fits into the imaginary. In this domain of mediation, the influence if the Horizon 2020 framework then happens through a kind of seduction or coercion of the fund-applicants. This is further emphasized if the governing structures of the redistribution of funds from the European Union is based on rhetorics and governing principles of New Public Management, and neoliberal economic practices of the best applicants (winners) takes it all, as proposed by Young (2015).

This is related to the process of gaining access to the Horizon 2020 funding program. Any given project or applicant has to align with the values and discourses set out by the European Commission. To this extent, there are several elements which need to be aligned. The consequences of this would become a uniformity of sociotechnical imaginaries projected by the funded projects, all driving the innovative change

of Europe, and all in turn representing the sociotechnical imaginary of the European Commision.

How much diversity is compromised, how many radically transformative sustainable projects and institutions dilute or give up their visions to access the deep pockets of the European Commission? I would argue that the Danish Board of Technology Foundation is one institution which has had to come to terms with the level of independence and autonomy in order to keep the business going. With the loss of its financial independence, the Danish Board of Technology also lost its autonomy to act outside the interest of the European Commission. It seems fairly clear that the European Commission is acting through the Horizon 2020 to seduce or coerce science, technology and innovation in a direction which is reflective of the sociotechnical imaginary of the Commission. This being a neo-libertarian focus on privatisation of public research programs to promote the ideas of orthodox capitalist economics.

Neutrality in a Competitive Frame

The Danish Board of Technology Foundation play an interesting role in the negotiation of responsibility in the Council of Coaches. The RRI Vision of the project focussed to a large extend on the finding issues and figuring out how to deal with them. But the discussion did not seem to reach a level of societal responsibility. This is likely due the the initial workshop, which framed the primary RRI Issues and did it in a way that emphasized responsible mediation of technology as an problem that can be handled instrumentally. This made the practical dimensions of the responsibility approach easier for the consortium to work with, but restricted the observable field of issues for following workshops.

The three step responsibility rocket; shared consortium vision and issues, Stakeholder and user engagement and Socio-technical integration, is a well thought out and planned model for Technology Assessment and Responsible Research and Innovation. But the perception of both problems and solutions seem to be founded within the sociotechnical imaginary of the Horizon 2020. In itself this is not a problem, but it does raise the questions of how independent the Danish Board of Technology Foundation actually is. Being part of a competitive market the directions of the Horizon 2020 framework is followed to the point, and this entails a very well elaborated ambition/goal that any project effort should lead to new businesses.

This falls back on the sociotechnical, and particular political and economic situation in Denmark, which seem to prioritize the privatisation or of develop greater dependence on private institutions for knowledge production, instead of funding it directly. To this extent it is curious that the Danish Board of technology Foundation lost their public funding

just after a shift from centrum-right wing government to a centrum-left wing government in 2011-2012 (Jørgensen, 2012). Though rather speculative, it seems that ideals of New Public Management, rather than a an exact neo-liberal agenda are significant factors in these developments. It would be fair to argue that one is borderline indistinguishable from the other in certain aspects.

The methods of the Danish Board of technology are based on traditions embedded in a different social and technical period. The individual Technology Assessment Practices feed into the general formation of Responsible practices and outcomes of Innovation. To this extend the Danish Board of Technology Foundation live up to the standards of the field it represents. But perhaps unbiased and independent advice is impossible or close to impossible when your assessment goes against the system that feeds you.

It is clear that the survival of such businesses as the Danish Board of Technology Foundation rely on funding programs, such as Horizon 2020. Understanding how to apply and how to align with the requirements is key to this survival. As the Horizon 2020 funding program is lacking towards its end it is now the new "Horizon Europe" that the Danish Board of Technology are looking towards. For the past months there have been a lot of "talking in the corners" and pulling on contacts within the European Commision to get hints on what the coming priorities are going to be. This is with the explicit goal of writing applications in a way that match these new directions. Up until the directions are released it is all about anticipating what they might say, because fund-applications are not easy to do.

Relationally Responsible Futures

Responsible Innovation is not rational, it is speculative and context dependent. During the investigative process of my research there several different translations of responsibilities which has been observed. Furthermore, they are all indicators of different imagined futures. The relation between these modes of thinking are interesting because they speak of the ways we see the world differently, the ontological perception and how we examine this to verify our ideas.

To this extent we see the ways in which the Danish Board of technology works with responsibility as a practice of engagement deliberation towards the forming of well-informed interdisciplinary foundation focussing on different types of knowledge. In the practices it is not only the technical aspects which are valued, but both normative and imaginative. I argue that this relates to the their use of technology assessment and practices of Responsible research and innovation. But, and it is a big but. The creative space of thought is too restrictive, and it reduce

the explorative capacities of the stakeholders to the framing responsibility within the scopes defined by the Council of Coaches Consortium. This aligning in shared ideas are arguable counter-productive on a societal scale, but practical if one is working towards a tangible goal.

The consortium demonstrate an instrumental perception of responsibility from the mediation of the technology as a tool and encourage particular regulated use for it. This is a traditional perspective of the engineer, in which we can fix society with technology. This discourse is and have been challenged in particular by the field of design for sustainability, and science and technology studies. In this manner I argue that societal alternatives to the technology have not been presented in the project, though I believe it should have. But this is for reasons that are both obvious and problematic. It is possible to have a good reputation within the European Commission Framework Program (Horizon 2020), but it seems explicit that the Horizon 2020 framework expect market ready technology coming out of the other end of where they are feeding in funding.

In this regard the Horizon 2020 is interesting, because it is not only an representation of the European Union, it is also the ecology from within the other actors are unfolding their practices. Historically the socio-technical conditions of the funding framework have been very strict, a tendency which Horizon 2020 has tried to loosen. Still, the framework govern the response abilities of its applicant receivers. The conditions accepted in the Grant Agreement needs to be followed as minutiously as the funding application process. But it does seem to be goal oriented, in tha sustainable development needs to happen through technological innovation and competition.

It could be interesting to see what a funding structure would look like if based on the ideas of the Anthropocene, rather than competitive ideals of market based societal development, developed in the post financial crisis in Europe. The perception of desirable or undesirable design of technology and innovation and responsibility at large, are arguable founded in an ontological stance of to whom we design and are responsible for. In this it is curious how values and intent inscribe actors with different mediative messages, explicitly and implicitly.

Imagining with the Anthropocene

Part of imagining futures could be described and perhaps even defined as extrapolative. The same can be said about the work of design towards desired outcomes. Of course it is possible to design for certain kinds of action and desired outcomes, particularly if mediation is well thought into the design, and thereby decrease the likelihood of it turning horribly wrong. To the extent of what we know is unknown and

what we don't yet know is unknown, it makes sense to act with caution in the development of technology and innovation. This is one reason why the Anthropocene as a sociotechnical event is good to think with.

At the beginning of this thesis I argue that this research is part of a mobilisation moving beyond a human centered design-ethic and that it would entail a transition on the sociotechnical system level to do so. Just as the field of design for sustainability has developed its critique of addressing design issues of technology too isolated, with technologically optimistic predispositions and focus on incremental changes (Gaziulusoy, 2018), my research suggests a similar critique.

In the Council of Coaches, the framework which is steering the development of technology and innovation is to a large extend the sociotechnical imaginary inscribed into the Horizon 2020 funding programme. The relational agency of the Horizon 2020 is significant, both in relation to the Danish Board of Technology Foundation, the rest of the Council of Coaches Consortium and the project at large.

In turn the sociotechnical Imaginary of the Horizon 2020 co-constructs the innovative boundaries in the Council of Coaches to fit into a system that is arguably political. To this extent it would be interesting to analyse the sociotechnical imaginary of the funding framework to a larger degree. The funding is based in the interest of the European Union, and there are some indications that it enforce a competitive eurocentric market idealisation, which is to a certain degree inscribed in the the Horizon 2020. The "Europe First" discourse is well integrated into a history of accumulation and capitalism, defined by a long history of capitalism (Røpke, 2020) and unequal exchange (Hornborg, 2015). And if the 9th Framework Programme "Horizon Europe" lives up to its name, then it might seem unlikely that the grip on global leadership by economic competition should losen. With this I am tempted to quote Tsing, from her book "The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins":

> *"there might not be a collective happy ending" (Tsing, 2015, p. 21)*

Tsing is concerned with the past and future consequences of capitalism, and of having technologically optimistic classical engineers, and nature-culture dualists, attempt to save the planet (with the same sociotechnical systems that is ruining it). Let's hope it does not come to that.

But in the optimistic opportunities of becoming cyborgs like Neil Harbisson, perhaps we have not found the right social and/or technical

component to see the problems of the world with. If it is responsible development of society through technology and innovation, it makes sense to understand the system around the development, and the dynamics they enforce. Inge Røpke describes this point with Dewey's thoughts on means-to-end rationality:

"[...] it does not make sense to distinguish between means and ends because ends are always means to something else. Since there is no final end, it is necessary to consider different combinations of means and ends and to realize that an end may have to be revised in the light of the means" (Røpke, 2020, p. 10)

Conclusion

In this research I have investigated the negotiation of development in technology and innovation through the assessment of technology and alignment of responsibility in Research and Innovation. In doing so I have illuminated parts of the sociotechnical imaginaries conceptualised by the Danish Board of Technology Foundation, the Council of Coaches Consortium and the Horizon 2020 funding program of the European Commission. This entails what they are trying to sustain and who the recipients of their responsibility activities are.

Stepping into the Danish Board of Technology Foundation, we find an organisation holding its democratic values in high regard, both in its explicit outspokenness about them and also in its practices. In the relation with the Council of Coaches the Danish Board of Technology Foundation seem to adapt the practices of Technology Assessment and Responsible Research and Innovation, so that it does not collide with the collective end-goal, which is developing a market ready product. In this the approach has become opaque about whether the ambition is to create society together or to deliver technology as gently to society as possible. The pressure from the funding framework to deliver innovation could arguably have a impact on the practices of assessment. The dependency on a good reputation within the arenas of funding can to this extent drive even more subordination to the expectations of funding scheme. Unbiased reflections and advice based on the interest of society are perhaps somewhat compromised in this constellation of Technology Assessment and Responsible Research and Innovation practices.

The Council of Coaches Consortium is consisting primarily of academic institutions which - like the Danish Board of Technology Foundation - are relying heavily on the funding from funding schemes such as the Horizon 2020. While there are already incentives from the technical researchers perspective to produce working technology they are fur-

ther encouraged by the agreement inherent in the Grant Agreement. Either way the perception of the consortium seem to be founded in an instrumental understanding of its mediative abilities. In other words, it is the intentions of the users which need to be designed and mediated with responsibility.

The Horizon 2020 funding framework provides the opportunities for large scale interdisciplinary collaborations from research to innovation. There are of course many good elements embedded in this mechanism of redistribution in the European Union, but, there are aspects of the framework that are unsustainable. The matter that the foundational rationale for the fund is based on capitalistic market based logic and well-being is defined to a eurocentric position, is a concern that matters. The futures imagined from the perspective of the Horizon 2020 is one of business as usual, where incremental changes are welcome.

Technology and Innovation should be understood from within the socio-technical system in which they are embedded. Responsibility is situated, speculative and not rational. In this research I have demonstrated that there are several different translations of responsibility and that they all indicate differently imagined sociotechnical futures. The relations between them are negotiated through several processes but the sociotechnical imaginary inscribed in the Horizon 2020 funding framework have significant negotiative agency over the other participating parties. In this sense the Horizon 2020 funding framework is 'well' choreographed and the collaborators align nicely within the sociotechnical imaginary.

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"Even if it's true that we really are screwed, let's not spend the rest of our lives on this planet telling ourselves how screwed we are."

What should we do instead?

"Shake hands with a hedgehog and disco."

Interview with Timothy Morton
by Alex Blasdel (2017)