The New Production of Politics – between the no longer and the not yet

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Blekinge Institute of Technology Doctoral Dissertation Series No 2019:13

The New Production of Politics – between the no longer and the not yet

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Doctoral Disseration in Technoscience Studies



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Graphic Design and Type Settning: Mixiprint, Olofstrom

Printed by Exakta Group, Sweden 2019

ISBN 978-91-7295-385-7 ISSN: 1653-2090 urn:nbn:se:bth-18746

## Abstract

Indications that the global environmental and inequality crises are intimately linked to our western ways of living, challenge the self-understanding of participants in the modern research-complex. As researchers we not only observe, unveil, analyse and solve problems "out there". Our knowledge-producing activities are (re)productive forces whose effects are not contained by the walls of any "ivory tower". As researchers we do not have a standpoint outside of a research-dependent culture. We are implicated in it. How do we convert this implication into resources for transformative movements in science and society?

The main objective motivating the texts presented has been to explore conditions for developing responsible technoscientific cultures – in and beyond – the academy. The linearity as well as the division of labour suggested by the "technology push" and "society pull" policy models are heavily criticized for ignoring the complexity and dynamics that emerge partly as a consequence of the success and pervasiveness of science and technology in late modernity. Science and society have both become transgressive invading each other's domains, and science policy questions are enhanced into political questions. A third, more interactive policy model is emerging figured in transdiscursive terms like 'strategic science', 'innovation system', 'post-normal science', 'technoscience', 'mode 2' and 'agora'.

The more specific objective has been to situate research processes as "triple loop" learning processes and to figure both 'research quality' and 'politics' in innovative ways that help responsible technoscientific cultures emerge. Resources from European traditions of "action learning" and "action research" as well as the recent U.S. trend of "technoscience as culture" are employed as frameworks for the analysis. Conditions for responsible innovation are explored through trying transformations or "participant provocations" at the University of Oslo (1986-1994) and at the Research Council of Norway (1998-2017). These experiments are documented in published articles and function as "original communications" to the thesis.

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## Acknowledgements

The Reality of our Fictions: Notes towards accountability in (techno)science is a reprint from my licentiate thesis with the same title, Luleå University of Technology, 1995:20L

Authority in Transformation is reprinted from European Journal of Women's Studies, 3 (2) 1996

The New Politics of Knowledge: Making (sustained) change happen was printed in GEN-DER & RESEARCH, Brussels, 8-9 November 2001, Maxwell L., et al. (eds.), European Commission

Integrering av kvinne- og kjønnsforskning i Norges forskningsråd is reprinted from the report Genusforskningens relevans (The Relevance of Gender Research. Final Report on Integration within Eight Swedish Research Councils) Trojer L., et al., FRN 2000

How can Universities become more active Partners in Innovation Systems? Lessons from the Nordic Countries? is reprinted from ICT, Innovation Systems and the Role of Universities in Societal Development – a (post)colonial Strain? Gulbrandsen E., Nsengiyumva A., Rydhagen B., Trojer L., National University of Rwanda Press, 2004

*From Science in Society to Society in Science* is published by The Research Ethics Library (2009-12), an online resource for research ethics education set up by the Norwegian National Research Ethics Committees

Co-inventing innovation: Comments on the convergence of knowledge and politics, in manuscript, August 2011

*Interlude: Explaining the approach*, text for editors explaining the manuscript acknow-ledged above.

*RRI as a wake-up call* is a slightly altered version of an opinion piece published online in EuroScientist Journal, December 14<sup>th</sup>, 2016

In addition, I hope the collated texts acknowledge the citizen scientists or analystactivists that sustain my ramblings between the no longer and the not yet. The vital question spurring me on in my struggles to become societally responsible still is: How can we collectively engage with and shape, the futures that (techno)science and innovation are implicated in making? These futures do not exist, but our expectations and dreams about them exist and should be taken seriously, especially as they are driving developments in science, technology and innovation. Thus, it is the quality of the imaginaries of the future - it is the quality of our figurations - that becomes important and decisive. This is also a reference to the title of my licentiate thesis from the middle nineties at Luleå University of Technology; *The Reality of our Fictions: Notes towards accountability in (techno)science.* In 2019 I would have chosen the term 'responsibility' over 'accountability'. But the point is the same: never before in history have our fictions - our imaginaries and our figurations - been more important and carried greater weight. Finally, I would also like to acknowledge a principal at a Norwegian university, whom in the light of increasing inequality and environmental crises, in his accession speech<sup>1</sup> (June 2019) asks:

How can one substantiate that the education system is a success when such big challenges are faced? How can one celebrate that research has been successful when the world is completely out of course? (my translation)

> The first text presents an update of the situation concerning *the challenge of addressing Grand Challenges* following Brexit and Trumpism. As such it serves to introduce the main themes of the thesis.

<sup>1</sup> In recent years, as the "challenge of addressing Grand Challenges" also hit the Norwegian universities, the response has often been to inquire how academics can fly less (as "evidenced" by discussions in e.g. Khrono - an independent national newspaper with news and debate from and about higher education and research). This context makes the questions posed by the new principal quite exceptional: [PDF] Tale - Universitetet i Stavanger

# Introduction: The New Production of Politics – between the "no longer" and the "not yet"

Indications that the global environmental and poverty crises are intimately linked to our western ways of living challenge the self-understanding of participants in the modern research-complex. As researchers we not only observe, unveil, analyse and solve problems "out there". Our knowledgeproducing activities are (re)productive forces whose effects are not contained by the walls of any "ivory tower". As researchers we do not have a standpoint outside of a research-dependent culture. We are implicated in it. How do we convert this implication into resources for transformative movements in science and society?

These were the introductory lines when I presented my licentiate thesis at the Technical University of Luleå in 1995. Now, looking back, several "trying transformations" later, including having served on the Board of the *Transformative Innovation Policy Consortium*<sup>1</sup> from its inception in 2016, the question above still represents an overarching challenge. Over the years, comprising different situations and experiments, the challenge has become ever more insistent and encompassing - not least when considering what have emerged as Grand Challenges<sup>2</sup> the last decade. Grand Challenges grow out of our current systems for the provision of energy, mobility, food, healthcare and education. These large-scale sociotechnical systems are evidently not sustainable, and we are all implicated in creating and recreating them every day. This radicalization of

<sup>1</sup> The Transformative Innovation Policy Consortium (TIPC) was initiated for experimentation and learning regarding third generation research and innovation policy: http://www.tipconsortium.net/

<sup>2</sup> Grand Challenges as entered in the EU agenda through the Lund Declaration in 2009, revised 2015. Reference can also be made to the UN and the articulation of Agenda 2030 (2016).

the transformative challenge is succinctly explained in a paper by Stefan Kuhlmann and Arie Rip published in *Science and Public Policy*, February 2018; "Next-Generation Innovation Policy and Grand Challenges", in which they conclude that "coping with Grand Challenges is a challenge in its own right, for policy as well as for science, technology and innovation actors".

However, just as in 1995, we should not expect a consensus regarding this diagnostic. By far the largest part of the different actors mentioned by Kuhlmann and Rip continue to see science, technology and innovation (STI) as bringing only solutions to the Grand Challenges. Even while highlighting that research, technology and innovation play an increasingly larger part in everything surrounding us, there is little awareness, as evidenced in public debates, that this may also apply to what we perceive as Grand Challenges. STI is considered an unconditional public good, neither implicated in the global environmental and inequality crises, nor in the production of what Luc Soete<sup>3</sup> recently designated as "destructive creation". However, as indicated by the reference to renowned authors like Kuhlmann and Rip, we may be in for a change. It is likewise promising to see an international policy organisation such as the OECD<sup>4</sup> draw up a "post-trust" scenario, stressing that neither politicians in government nor public sector actors and institutions seem able to engage vital Grand Challenges in adequate ways. Under the heading "A crisis of confidence in government?" the OECD contends in its Outlook 2016 that this incapacity has implications for STI policy as "... much R&D continues to be performed in the public sector" (page 51).

Within the two years of the publication of the OECD's Outlook 2016, Brexit and "Trumpism" have enhanced the levels of discontent with the inability of presentday STI actors and their institutions to recognise the "challenge of addressing Grand Challenges"<sup>5</sup>. This also suggests a growing polarization and demarcation between those who argue that received STI ensure adequate responses to Grand Challenges, and those contending that we are in a situation where STI must be made an object of inquiry in its own right.<sup>6</sup>

Regarding Brexit (June 2016), there were different expressions related to the two positions. First, the contention from the absolute greater cohort that we must do more research to understand why it is that people rejected received expertise, including research, and ended up voting for Brexit. A few voices characterized the position of this majority as being "gloriously out of touch" in asking for more research<sup>7</sup>. The argument was that in so doing, researchers and their institutions demonstrated a critical incapacity to see themselves as implicated in a situation featuring rising inequality, environmental and other crises. Instead, they insisted, Brexit invited self-scrutiny and reflexivity:

The popular rebuke to reason that was Britain's vote to leave the European Union is a wake-up call. Our world requires an urgent rethinking of social progress. The sciences, social sciences and humanities should collaborate and open up their research agendas for public engagement and interdisciplinary dialogue to work towards a diversity of possible solutions to address the troubles of our time.<sup>8</sup>

Following the advent of Trumpism and the "science marches" in the spring of 2017, the critique of positioning science as an apolitical activity, as a "disconnected, objective enterprise" producing value-free truth free of bias, continued to grow. The wider ramifications of this positioning are poignantly described by Bart Penders in his "Marching for the myth of science: A self-destructive celebration of scientific exceptionalism" (EMBO-reports August 18, 2017). The post-trust situation described by the OECD in 2016 has recently become more manifest through the actions of youth movements like School Strike for Climate and Extinction Rebellion from 2018.

What new possibilities for transformative movements in science and society might such an emerging situation represent? Transformation is clearly moving up the agenda. At the same time, however, valuable resources for transformative movements between the "no longer" and the "not yet"<sup>9</sup> seem exposed to "kollektiv glömska" (collective forgetfulness)<sup>10</sup>. How to walk the transformation-talk? For me, 2017-18 has meant revisiting the overarching challenge that I struggled with in my licentiate thesis, as well as in the years that followed, observing that by now its remit is extended. It is no longer only researchers that "… *do not have a standpoint outside of a research-dependent* 

<sup>3</sup> In his paper "Is Innovation Always Good?" Luc Soete argues for complementing Schumpeter's "creative destruction" by new technologies: "Over the years, there has been a widespread tendency in the innovation literature to make the assumption that innovation is always good. Yet ..., innovation does not necessarily benefit society at large. It may also be of the "destructive creation" type, ..., i.e., benefitting the few at the expense of the many." Printed as chapter in *Innovation Studies: Evolution and Future Challenges*, Fagerberg, J., Martin, B.R., Sloth Andersen, E.S. eds., Oxford University Press (2013).

<sup>4</sup> In the policy literature, the OECD is recognized as the first major global policy developer concerning STI.

<sup>5</sup> Reference to the title of a report for ERIAB by Rip and Kuhlmann (2014): https://ec.europa.eu/ research/innovation-union/pdf/expert-groups/The\_challenge\_of\_addressing\_Grand\_Challenges. pdf

<sup>6</sup> As developed in "RRI as a wake-up call" for EuroScientist Journal, December 2016, reprinted in part II of the thesis.

<sup>7</sup> As exemplified by Richard Owen's presentation for RRI Tools, published July 28 2016: https://www.youtube.com/watch?v=FlBU-t4yfi4

<sup>8</sup> Excerpt from Johan Schot "Lessons from Brexit", Nature, vol 535, issue 7613, 2016. See also James Wilsdon "The Brexit experience - evidence, expertise, and post-truth politics", Journal & Proceedings of the Royal Society of New South Wales, vol 151, part 1, 2018 (pp 45-49), Colin Macilwain "The Elephant in the Room We Can't Ignore" *Nature*, vol 531, issue 7594, Dan Sarewitz (2016) "Saving Science" in The *New Atlantis*. The book series *The Rightful Place of Science* from The Consortium for Science, Policy & Outcomes exploring "the complex interactions among science, technology, politics, and the human condition" invites further self-scrutiny on the part of researchers and their institutions.

<sup>9</sup> Between "the no longer and the not yet" as developed by Patti Lather (1991) in *Getting Smart; Feminist Research and Pedagogy within/in the Postmodern*, Routledge.

<sup>10</sup> A reference to Helena Streijffert's intervention "Forum för kvinnliga forskare och kvinnoforskning - en ny kvinnorörelse" in *Kvinnorna är hälften*, UHÄ FoU, Sth 1984:1. Kollektiv glömska/ collective forgetfulness is discussed in my paper "Från kollektiv glömska till kollektiv kompetens? (Kvinno)forskning och förändring" in *Naistutkimus/Kvinnoforskning* 2/90. Reprinted in my licentiate thesis *The Reality of our Fictions: Notes towards accontability in (techno)science*, Luleå University of Technology 1995:20L.

*culture. We are implicated in it. How do we convert this implication into resources for transformative movements in science and society?*" This is a question that does not qualify as a "forskningsfråga" (research question) in a received or traditional sense. But then again, the situation may no longer qualify as "normal" (reference to Thomas Kuhn), and post-normal<sup>11</sup> responses may be required.

## Revisiting the licentiate

While the essays compiled for my licentiate in 1995 were written for different occasions and from different perspectives, they could all be read as introducing, discussing, developing and concretizing "the challenge of addressing Grand Challenges". The texts I have collected for my doctoral thesis are produced with the same ethos in mind. Inspiration for my struggles at the time came mainly from a tradition of feminist science studies that had radicalized into a transformative project, as signalled by the title of Sandra Harding's seminal book from 1986: The Science Question in Feminism. Arguing for a shift from the "woman or gender question in science" to "the science question in feminism", Harding clearly indicated that the scientific foundations needed to be questioned and destabilized, including the received distinctions between science and politics. While considering science<sup>12</sup> as a question, we (as researchers) are challenged to explore the validity of our own institutional taken-for-granted assumptions and routines. How to make sense of this turn? What could it mean for science as a practice? This was, and remains, the most provocative kernel of my work in, with and sometimes against Nordic women's and gender research, as evidenced by the texts included in part I of the thesis.

Most of the essays assembled for the licentiate originated in talks I had given, while spinning out and reflecting on my own "trying transformations" in the modern research complex<sup>13</sup>. The aim of my oral efforts was – and still is – to mobilize for transformative engagements in science and society adequate to our Nordic contexts – while taking into account the Grand (global) Challenges. This also means that the texts should not be read for answers, or as a presentation of completed, neatly wrapped research. The "trying transformations" I engage in are more aptly described as situated

between the "no longer" and the "not yet", in reference to Patti Lather. When assembling texts for the licentiate, I was motivated by Aino Saarinen's warning from 1989<sup>14</sup>: "The greatest danger for feminist research at this stage is the impatience for a concrete product". The quality of the questions we could come up with thus mattered more than the quality of the results, given that questioning is the prime mover towards the "not yet". Saarinen's warning stands up to a repetition now as well, some 30 years after it was put on the agenda of Nordic women's and gender research. Only now the scope is being radically expanded to include other fields.

## Between the "no longer" and the "not yet"

Towards the turn of the century, I added Saarinen's warning to Jane Flax's demonstration of how such a consistent "lack of closure" could be a hard position to keep up<sup>15</sup> when trying to pass as a serious researcher with ambitions to climb the academic career ladder. This apprehension correlated with a question I had received from both colleagues and supervisors over the years regarding my essays and texts: "But is this *research*?" As Sandra Harding's "science question" gradually became harder to refute, I could easily relate to Jane Flax's narrative of how she sensed aggression from academic colleagues while discussing what she designated, in an essay<sup>16</sup> with the same title, as "the end of innocence".

Having completed my licentiate, I left the academy to take up a position at the Research Council of Norway (RCN) – an organisation set up to care for society's investments in STI via doing "policy for science" as well as "science for policy".<sup>17</sup> It seemed sensible at the time to move closer to the political and societal side of the received dichotomy between science and society, both to take a more thorough look at how the conditions for a thriving and healthy research system could be designed and implemented, and to get to know one of the more powerful organisations in the Norwegian research and innovation landscape.<sup>18</sup> This move also opened up interactions with influential international policymakers such as the OECD<sup>19</sup>, the European Science

<sup>11 &</sup>quot;Post-normal science" (PNS) was developed in the 1990s by Jerry Ravetz and Silvio Funtowicz. PNS has moved from a focus on the use and mis-use of science to include its production. In 2006, for instance, Ravetz described PNS as adequate to "the stage where we are today, where all the comfortable assumptions about science, its production and its use, are in question", *The No-Nonsense Guide to Science*, published by The New Internationalist. It is worth mentioning that the Centre for the Study of the Sciences and the Humanities at the University of Bergen, Norway, has become a stronghold of PNS in Europe.

<sup>12</sup> By "science" I denote what is referred to in Norwegian as "vitenskap", in Swedish as "vetenskap" and in German as "Wissenschaft", all of which include not only the natural sciences, but the social sciences as well as the arts and humanities.

<sup>13</sup> A reference to the paper 'Trying Transformations' by Aiken et al. 1987 published in *Signs*. This was the first attempt to make sense of transformative work from inside established institutions that I came across.

<sup>14 &</sup>quot;Kvinnoforskningens interventionsprojekt - problem och utmaningar" (Women's research as a project of intervention - problems and challenges) in *Kvinnovetenskaplig tidskrift* 3/4 1989.

<sup>15</sup> In Thinking Fragments: Psychoanalysis, Feminism, and Postmodernism in the Contemporary West, University of California Press (1990), Jane Flax explores a cultural incapacity to adapt to uncertainty and unpredictability.

<sup>16 &</sup>quot;The End of Innocence" in *Feminists Theorize the Political*, Butler, J. & Scott, J. W. eds., Routledge (1992).

<sup>17</sup> The two received approaches to "science policy" as recognised by the OECD.

<sup>18</sup> Please note that RCN is an atypical research council in many respects. Most importantly it is charged with being the main policy advisor to the government when it comes to STI. RCN also has extensive activities related to innovation.

<sup>19</sup> I participated in a project to prepare the OECD's first innovation strategy, published in 2010. Link to our ensuing report: https://www.oecd.org/sti/inno/47861327.pdf

Foundation<sup>20</sup> and the EU Commission<sup>21</sup>, as well as an engaging Nordic collaboration on research policy through NordForsk<sup>22</sup>. The shift of organisation in the research and innovation system provided inspiration for the texts assembled as part II of the thesis, examining in more detail how society and politics are always already integrated into science, and vice versa.

The main objective for the second part of the thesis was to explore conditions for developing responsible technoscientific cultures, both inside and beyond the academy. The linearity as well as the division of labour suggested by the "science and technology push" and "society pull" policy models have long been heavily criticized for ignoring the complexity and dynamics that emerge, partly because of the success and pervasiveness of science, technology and innovation in late modernity. Science and society have become transgressive, invading each other's domains. As a consequence, policy questions are enhanced into political questions. A third, more interactive policy model is emerging figured in transdiscursive<sup>23</sup> terms like "strategic science", "innovation system", "post-normal science", "technoscience", "mode 2" and "agora".

A more specific objective for the texts presented has been to investigate how to situate research as "triple loop" learning processes. One preliminary finding is that a prerequisite relates to creating innovative figurations of both "research quality" and "politics" that can help responsible technoscientific cultures emerge, both inside and beyond the academy. This finding connects to a question that will linger on through future engagements: *Working from the premise of integrated models of science and society, what further development of competences, skills and knowledges are needed to enhance our transformative struggles as citizen scientists*<sup>24</sup> *and citizen policymakers, or even better; as analyst-activists*<sup>25</sup>?

- 20 The European Science Foundation initiated a Member Organisation Forum (2010) and organized a series of events (2010-2012) to foster science and society relationships. I represented the RCN: http://archives.esf.org/hosting-experts/scientific-review-groups/social-sciences-soc/activities/strategic-activities/the-future-of-science-in-society.html
- 21 As documented in e.g. "The new production of Knowledge: Making (sustained) change happen", reprinted in part I of the thesis.
- 22 One example of a challenging and fruitful policy collaboration that I took part in: https://www. nordforsk.org/no/programmer-og-prosjekter/prosjekter/nirpa-the-nordic-network-for-international-research-policy-analysis
- 23 Reference to Reijo Miettinen's discussion in *National Innovation System: Scientific Concept or Political Rhetoric*, Edita/Helsinki (2002) as well as extensive use of the term 'transdiscursive' in the texts compiled for the thesis.
- 24 For an inspiring exploration of the "citizen scientist" figuration, see the Demos publication from 2009: *citizen scientist* by Jack Stilgoe. A citizen scientist is unable to draw a line between her professional activities as a scientist and her responsibilities towards society as a citizen not to be confounded with "citizen science".
- 25 Reference to seminal texts from the Nordics that explicitly discuss and demonstrate a positioning as analyst-activist: Linda Paxling's doctoral thesis *Transforming Technocultures: Feminist Technoscience, Critical Design Practices and Caring Imaginaries* (2019); Lena Trojer's *Sharing Fragile Future* (2018), Aino Saarinen's doctoral thesis *Feminist Research, an Intellectual Adventure: A Research Autobiography and Reflections on the Development, State and Strategies of Change of Feminist Research* (1992).

## Commuting between policy and research

In the years following the licentiate, I alternated between the policy arena (RCN) and the academy (BTH), spurred on by the growing attention given to the global environmental and inequality crises as these moved up governmental agendas. Visiting academic contexts, this time engaging more with feminist technoscience than feminist science studies, I learnt a lot about how these two arenas - the academy and policymaking - were intimately coupled by performing what can be termed "de facto politics" – or "politics by proxy". The feminist technoscientists I met through my sporadic engagements at BTH were "citizen scientists" with a profound sense of the responsibility that comes with acknowledging the societal power of the research organisations they inhabited. They were both analysts and activists engaged in politicoscientific<sup>26</sup> projects. Looking back, I find that they explored and developed "in practice and as culture"<sup>27</sup> the diagnostic proposed by Bart Penders some 30 years later<sup>28</sup>: "Science is inseparable from politics to the point that science itself becomes a form of power".

Over years, feminist technoscience has produced numerous narratives, perspectives, concepts, figurations and valuable discussions of "trying transformations" that are not referred in the so-called "transitions literature"<sup>29</sup> or other fields of research seeking to provide an evidence-base for the contemporary development of research and innovation policy. What is now emerging as 3rd generation research and innovation policy<sup>30</sup> clearly needs to take a closer look at the rich resources present in feminist technoscience literature. There is neither time nor tolerance for another round of "kollektiv glömska" – as I will argue in the following.

The growing accumulation of political power in the research and innovation system proved to be a conducive context for my commute between policy and research. The research institutions, as well as a funding bodies and policy advisers such as the RCN, were emerging as vital societal actors in their own right<sup>31</sup>. At the same time, the de-

<sup>26</sup> Reference to Michael Flower's figure of "politicoscientific communities" as presented in Donna Haraway's *Modest\_Witness@Second\_Millennium.FemaleMan\_Meets\_OncoMouse*, Routledge (1997), p 114 ff.

<sup>27</sup> Reference to Pickering, A., *Science as Practice and Culture*, University of Chicago Press (1992).28 Penders, B. "Marching for the myth of science: A self-destructive celebration of scientific exceptionalism" EMBO-reports, published online, August 18, 2017.

<sup>29</sup> Reference to, e.g., three researcher-networks on sustainability transitions: Sustainability Transitions Research Network (STRN), The Global Research Network (Globelics) and the European Forum for Studies of Policies for Research and Innovation (Eu-SPRI Forum).

<sup>30</sup> The 3rd generation research and innovation policy is motivated by a failure to engage the Grand Societal Challenges in constructive ways. Following on from generations motivated by "market failure" and "systems failure", the diagnostic motivating the 3rd generation relates to "transformation failure". For references and relevant activities see the website of the Transformative Innovation Policy Consortium (TIPC): http://www.tipconsortium.net/ or a recent report commissioned by the RCN: Raising the Ambition Level in Norwegian Innovation Policy (pdf).

<sup>31</sup> Reference to the two evaluations of RCN; *A Singular Council* (2001) and *A Good Council*? (2011). See especially Ch. 2 in *A Singular Council* where the question "Are research councils necessary?" forms the basis for the evaluation pointing out that RCN would be assessed as a societal actor.

velopment of institutional "societal responsibility" lagged behind in Norway, as it could easily be outsourced from institutions in the research and innovation complex and delegated to the well-developed Norwegian landscape of National Research Ethics Committees (est. 1990), the Norwegian Biotechnology Advisory Board (1991), and the Norwegian Board of Technology (1999). However, a nationwide discussion concerning the universities' contracts with oil companies put this "regime" under pressure as well as accompanied RCN's negotiations with Norwegian academic institutions regarding a new overall strategy for the Council (2013-2015). This new overall strategy<sup>32</sup> issued a firm challenge to RCN to evolve as a responsible societal actor. The strategy provided the impetus for RCN's large-scale technology programmes and the SAMANSVAR (co-responsibility) programme to initiate a learning arena for Responsible Research and Innovation (RRI) presenting expectations for development work both to themselves as well as to the (techno)science projects they fund.<sup>33</sup>

#### Nordic studies of power and democracy

Another important backdrop that proved conducive to my commute relates to the renewed interest in integrated models of science and society following in the wake of the latest Norwegian study on power and democracy (NOU 2003:19)<sup>34</sup>. The context was the Nordic tradition of large-scale research programs on power and democracy. This last edition (2003) contended that political power had left the traditional political institutions, only to recur in business, media and law. As the research-community's own powers were not addressed in the main report, public debates were sparkled, papers and books published arguing that it was time to move from segregated to integrated models regarding science and society. <sup>35</sup> This resonated, of course, with more international turn-of-the-century debates concerning mode 2 and co-production of science and society.<sup>36</sup> It also drew on the relatively strong critique of positivism that flourished in Norway in the 60s and 70s, often with reference to Hans Skjervheim's influential 1957-essay on participant-observer problematics<sup>37</sup>.

These perspectives all imply that research not only provides solutions to societal problems and the Grand Challenges, but also may be implicated in creating them. The possibility of being embroiled in "destructive creation"<sup>38</sup> was suggested in later debates about the oil contracts by voices pointing out that we were all funded by an oil extracting state. It can also be noted that one of the few fields in which Norwegian researchers excel, is geology. In these quite recent discussions, Norwegian researchers and their institutions are positioned as societal actors, as co-creators of society – including the Grand Challenges. And as STI thus become more societally important, asking bigger questions concerning policy and politics, STI actors must find ways to connect more explicitly with civil society. As I considered myself involved in building what some have called a "new social contract for science", it became pressing for me to further explore how scientists and their institutions could be empowered to take responsibility for their "de facto" performance as citizen scientists<sup>39</sup>.

#### How to become responsible for what we learn how to see?

These policy developments during the first 10-15 years of the new millennium correlated with developments in feminist technoscience, which in turn helped my questions mature. To enable us to see how we might be implicated in co-creating both challenges and solutions, reflexivity moved up the agenda and emerged as: How to become responsible for what we learn how to see? As will be evident from the assembled texts, the main inspiration for this question came from Donna Haraway and others' technoscientific activism, the motivation for which Haraway explains as follows:

The relations of democracy and knowledge are up for materialized refiguring at every level of the onion of doing technoscience, not just after all the serious epistemological action is over. I believe that last statement is fact; I know it is my hope and commitment. This position is not relativism; it is a principled refusal of the stacked deck that forces choice between loaded dualities such as realism and relativism. (Haraway 1997, p 68)

The breakdown of the linear model leaves little or no intermediary time or place to develop science's relations with society *after* the epistemological action is over. Our (techno)scientific struggles are deeply embedded in world-making processes. To develop the knowledges, competences and skills adequate for such diffractive<sup>40</sup> endeavours we need to make as explicit as possible received conceptions of science, of policy and

<sup>32</sup> Research for Innovation and Sustainability (2015-2020) https://www.kooperation-international. de/uploads/media/Strategie\_Norwegischer\_Forschungsrat\_2015-20.pdf

<sup>33</sup> For an introduction to this initiative, see "RRI as a wake-up call" (*EuroScientist Journal*, 2016) reprinted in the thesis, an early evaluation: Evaluation of the RCN's BIOTEK2021 programme and an assessment of RCN's RRI-engagements by the EU-consortium RRI-Practice: RRI-Practice National Case Study Report NORWAY. The RRI-framework is included in the appendix as it relates the diagnostic that motivate activities at the learning arena, as well as my own struggles. It took two years to negotiate the framework text, with the undersigned as main mobilizer and "corresponding author".

<sup>34</sup> https://www.regjeringen.no/no/dokumenter/nou-2003-019/id118893/

<sup>35</sup> Siri Meyer, an art historian well versed in discussing symbolic power and one of the five members of the research group tasked with compiling the report, was instrumental in raising the debate. She declined to sign the main report and co-edited instead the book *Kunnskapsmakt* (The Power of Knowledge), Oslo 2002.

<sup>36</sup> Relevant texts include Gibbons, M., et al. 1994 *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, Sage, Nowotny, H., et al., 2001 *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty* Jasanoff, S., ed., 2004, *States of Knowledge: The Co-production of Science and Social Order*, Routledge 2004.

<sup>37</sup> Professor Hans Skjervheim's (1926-1999) 1957 essay "Deltakar og tilskodar" (Participant and Observer) became an important reference text for much of the societal debate in Norway from the late 50s onwards, both as part of academic and more explicitly political discussions.

<sup>38</sup> Reference back to footnote 3 and "creative destruction" (Schumpeter) and "destructive creation" as discussed by Luc Soete.

<sup>39</sup> As already noted: It is important to observe the distinction between citizen scientist and citizen science. Reference again to the DEMOS publication from 2009: https://www.demos.co.uk/files/Citizen\_Scientists\_-\_web.pdf

<sup>40</sup> See footnote 68 for reference.

politics – in order to question them. Likewise, it is equally important to discuss and develop new figurations of these rather vital concepts and their relations.

#### Shared space: slow science and slow policymaking

Both researchers and policymakers need more opportunities to discuss and deliberate upon the choices they make in the "context of production"<sup>41</sup>, the assumptions their work reproduces, and the purposes to which it might be directed. The experiments that RCN have invited under the umbrella term<sup>42</sup> of Responsible Research and Innovation (RRI) since 2015, are in the format of engaging learning arenas or networks - not only of individuals but also institutions.<sup>43</sup> At the same time, it is important to stress that these experiments represent attempts at doing policy or de facto politics - not only by design but also through dynamics orchestrating governance not of but in complexity. The experiments are conducted with allusion to this distinction as offered by Arie Rip and the mode he describes in "A co-evolutionary approach to reflexive governance and its ironies" in Voss, J-P., et al. (eds.) Reflexive Governance for Sustainable Development (2006). While missing an explicit reference, Jack Stilgoe links nicely to this approach with his figuration of operating in "a shared space" in his 2016-paper, "Shared Space - Slow Science", now to be (re)published as a chapter in von Schomberg and Hankins (eds.), International Handbook of Responsible Innovation: A Global Resource<sup>44</sup>. Stilgoe also indicates which new competences and skills that need to be developed to perform in this "shared space". These skills and competences relate to improvisation, and as such highlight shortcomings of understanding (traditional) academic and scientific approaches as mapping exercises, as "reading nature" not being implicated in "cowriting" it as well. Academic pathologies<sup>45</sup> aside, reading nature-culture and drawing up (road)maps will always be in danger of coming too late and being obsolete given the complexities and dynamics in which present day STI-activities are implicated.

## The Campus Karlshamn brand of technoscience studies

It is the so-called technosciences – information and communication technology, biotechnology, together with nanotechnology – that most clearly call into question and

- 44 https://www.e-elgar.com/shop/international-handbook-on-responsible-innovation
- 45 For an approach that opens up a discussion of how "academic pathologies" may hinder transformative movements in science and policy, see "The Walkshop Approach to Science and Technology Ethics" in Science and Engineering Ethics, Wickson, F., Strand, R., Kjølberg, K. (2014).

erode the boundaries between science and society. These hyphenated technologies are characterised by a reverse logic, in that the knowledge has to be used in order to be tested (Beck 1996). In other words, the time and space between the production of knowledge and its application vanish. The technosciences can have relatively direct reality-shaping effects. They are implicated in changing the terrain, or what Arie Rip<sup>46</sup> suggests we think of as "producing new furniture of the world". It is not only new understandings and maps that are being produced; the terrain itself is changing: "Areas such as information technology, biotechnology and materials technology, demonstrate quite clearly that we are moving at full speed towards a society in which production technology builds directly on scientific research: a research-dependent society".<sup>47</sup> From this perspective, technoscience provides a template for a change in our understanding of the relationship between science and society, with the invasive aspects of the sciences brought into focus (Tranøy 1986/1991.48 Reproduction technology, from in-vitro fertilisation to cloning, is an evident (and by now, classic) example of an integrated model. Synthetic biology, meanwhile, is a more recent illustration. Thus, technoscience helps us move from a conceptualization of science and society as activities in separate spheres to more integrated models of the same<sup>49</sup>.

While developing feminist technoscience at BTH, we have followed Donna Haraway's suggestion and consider technoscience paradigmatic for our predicament: a production of knowledge that empowers society to intervene more directly and on a massive scale into the "nature of nature", both on a micro level (biotech and nanotech) and on a macro level (global climate and biodiversity). The transformational potency of what is being created is unprecedented in history. "The only possible analogue we have to today's emerging technologies is nuclear weapons", Daniel Sarewitz contends, reminding us that we were "… a hair's breadth of cataclysmic nuclear war during the Cuban missile crises. We were lucky, not smart."<sup>50</sup>

At the international level, discussions, experiments and development work regarding the relationship between science and society gained momentum around the turn of the millennium. The temperature of the discussions indicates that fundamental investments – institutional as well as individual – are being shaken up. We are not merely go-

<sup>41</sup> As underlined and discussed in the papers compiled for my licentiate, both the "context of discovery" as well as the "context of justification" are focussed in received philosophy of science, while attention to the "context of production" is mostly missing.

<sup>42</sup> See discussions of umbrella terms, figurations, transdiscursive terms or boundary objects in the texts assembled for the thesis. The RRI-framework co-produced by RCN's large-scale technology programmes and the SAMANSVAR initiative (co-responsibility) gives an introduction to the diagnostic (reprinted in the appendix).

<sup>43</sup> For a recent assessment of RCN's approach to RRI, see the report published by the EU-consortium RRI-Practice on RRI-activities in Norway: https://www.rri-practice.eu/

<sup>46</sup> A. Rip Futures of Science and Technology in Society, Springer (2018).

<sup>47</sup> F. Sejersted "Forskningspolitikk i et forskningsavhengig samfunn" (Research policy in a researchdependent society) in *Universitet och samhälle. Om forskningspolitik och vetenskapens samhälleliga roll* (University and society. Science policy and the sciences' societal role) Nybom, T., ed., Stockholm 1989.

<sup>48</sup> K.E. Tranøy Vitenskapen - samfunnsmakt og livsform (Science - societal power and way of life) Oslo 1986/1991.

<sup>49</sup> See e.g. "The bottom-up meanings of the concept of public participation in science and technology" by Ulrike Felt & Maximilian Fochler, in *Science and Public Policy* 35(7), August 2008, pages 489-499. For a discussion of an interactive model of science and society relating to the activities of a research council as Vetenskapsrådet (The Swedish Research Council), see Hanne Foss Hansen: Mellem barn og voksen: En opfølgningsanalyse vedrørende Vetenskapsrådet (2003/04:URD2) (Between child and grown-up: A follow-up analysis of the Swedish Research Council).

<sup>50</sup> D. Sarewitz "Science Policy Present: Where is the Frontier" paper presented at New Frontiers in Science and Technology Policy, Plymouth, NH, August 20-25, 2000.

ing to have to learn something new that can be added to our background knowledge. Rather, this concerns a paradigm shift in our basic understanding of the relationship between science and society. Inspired by Sandra Harding's commitment to such a paradigm shift in *The Science Question in Feminism* (1986), Campus Karlshamn at BTH invites engagement with the "technoscience question in feminism".

The challenge of addressing Grand Challenges entails situating research *processes* as "triple loop" learning processes. This involves figuring both "politics" and "research quality" in innovative ways that can help responsible technoscientific cultures emerge, in and beyond the academy.<sup>51</sup> The conditions for responsible innovation (in a broad sense) can only be explored through "trying transformations" or "participant provocations" at relevant sites<sup>52</sup>. An enhanced understanding both of resistance against and possibilities for transformation is emerging as a much sought-after competence. What does it take to collectively develop prospectives and figurations to provide directionality for new "trying transformations"? How can we further mutual learning and the development of innovative approaches by researchers, research councils and innovation agencies? My hope is that the texts assembled for the thesis can provide inspiration, resources and references for others traversing the spaces between the "no longer" and the "not yet". As such crossover activities also depend on recognising and thriving on failures, I will end my mobilizing efforts by relating recent developments not taken up in the texts assembled.

## Trusting the State too much?

The recent decade has seen a plethora of umbrella terms motived by the complex matter of addressing societal challenges by innovation: Open Innovation, Challenge-driven or Challenge-led Innovation, Responsible Research and Innovation (RRI), Agenda 2030 (Sustainable Development Goals), Transformative Innovation Policy, and, lastly, Mission-Oriented Innovation or Mission-Driven Science and Innovation. These umbrella terms all designate a key role to governance. At the same time, the understanding of governance changes as a result of the distribution of responsibility for governance across dynamic and heterogeneous networks. One of the more challenging tasks for actors promoting such initiatives concerns how to foster collective experimentation<sup>53</sup> that asks for new forms of open interactions between what is seen as the different worlds of government/public sector, industry/business, academia/knowledge institutions and civil society. As mentioned previously, governance *in* complexity has been suggested as a wiser strategy than (ever more) attempts at governance of complexity.<sup>54</sup> But what are the necessary competencies, capacities and skills for developing such "governance through dynamics" and not (only) "governance by design"? The rapid shifts of umbrella terms may indicate that we still are at a miss concerning what it takes to walk the talk.

Developing a repertoire of "technologies of humility", as suggested by Sheila Jasanoff<sup>55</sup> has been designated as important in relation to the growing insistence on coevolutionary, interactive or integrated images in models relating to science and society. Corresponding to the figuration of "shared space - slow science" as recently suggested by Jack Stilgoe, co-evolution of science and society entails increased complexity, unpredictability and irregularity in both spheres - so the argument goes. Jasanoff contends that we need to develop a set of "technologies of humility" for assessing the unknown, unspecified, uncontrollable, ambiguous and intermediate aspects of scientific and technological development. These technologies of humility call for capabilities and forms of engagement between scientists, experts, decision-makers and the public that are different from the regulatory and predictive "technologies of hubris", that are prevailing today, according to Jasanoff. To admit failure and recognise the limits of one's own knowledge and competence, and to be skilled in asking for help, may sound simple - but it is certainly not easy. A deep cultural shift regarding modality is required. At the London conference on Genomics and Society in April 2005, Jasanoff talked about technologies of humility as "narratives [that are] not predictive and often personal in tone". These are skills for collective experimentation in "shared spaces", for improvising and for co-creating figurations<sup>56</sup>.

Jasanoff's discussion in the 2003-article can also be read as enhancing policy questions into political questions. As previously discussed, policy questions are often represented as questions concerning merely strategy or tactics; that is, as tools, instruments or mere means. However, Jasanoff insists that we see policy as constitutional:

There is growing awareness that even technical policy-making needs to get more political - or, more accurately, to be seen more explicitly in terms of its political foundations. Across a widening range of policy choices, technological cultures must learn to supplement the experts' preoccupation with measuring the costs and benefits of innovation with greater attentiveness to the politics of science and technology.

In 2019, I still find Jasanoff's explication of the challenges for policymaking valuable and her concept of "technologies of humility" suggestive, especially in our Scandinavian cultures where we tend to trust the state too much<sup>57</sup>. That is, we trust the state to

<sup>51</sup> As explicated in the two following sections; "Trusting the State too much?" and "The challenge of addressing Grand Challenges intensifies".

<sup>52</sup> Please see the discussion under "Vital research questions and methodological approaches".

<sup>53</sup> References ranging from Bruno Latour's "From the World of Science to the World of Research?" in *Science* Vol 280, No 5361, 10 Apr 1998, pp. 208-209, to *Taking European Knowledge Society Seriously*, EU Commission (2007), and relate to experimentalism taking hold at governmental level in Finland as well as being explored and promoted by NESTA/UK the last 5-10 years.

<sup>54</sup> See Arie Rip "A co-evolutionary approach to reflexive governance - and its ironies" in Voss, J-P., Bauknecht, D., Kemp, R., (eds.), *Reflexive Governance for Sustainable Development*, Elgar 2006.
55 "Technologies of Humility: Citizen Participation in Governing Science", *Minerva*, September 2003, vol 41.

<sup>56</sup> Reference back to Stilgoe's paper, "Shared space and slow science".

<sup>57</sup> As discussed in *Nytt om kvinneforskning* 2/97 "Politikk, kjønn og teknologi i forandring? Samtale med Joan Greenbaum" (Politics, Gender and Technology in Transformation? Dialogue with Joan Greenbaum), Aas, G., H., Gulbrandsen, E.

provide the necessary protections by laying down rules and devising regulatory practices. Jasanoff is not very optimistic about the necessary changes that must follow to ensure that research institutions' activities reflect a responsible concern for the public good: "The problem, of course, is how to institutionalize polycentric, interactive, and multipartite processes of knowledge-making within institutions that have worked for decades at keeping expert knowledge away from the vagaries of populism and politics".

It is challenging for both research communities and policy organisations to see themselves as involved in governance through dynamics, and to figure themselves as societal actors in more horizontal partnerships - as key players amongst other key players. Even if the call for co-evolutionary approaches in STI is often heard, it is hard to implement in practice and as culture. Again; how to walk the talk? The so-called "regime of collective experimentation" suggested in the EC-report from an expert group on science and governance<sup>58</sup> is an interesting figuration of this challenge. How to identify potentials for, design instruments for, promote, manage and evaluate productive interactions between "science and society" or between science, technology and the market?

The expert group collected examples featuring the recent shift from the idea of the centralized organization of innovation to the explicit recognition of the importance of distributed and more diverse innovation. Referring to John Dewey's conception of policy as collective experimentation, the authors contend that: "... the experimentation is now at the technological level as well" (p 26). This move is inspired by earlier experiments with "open innovation" in the business sector and connects to the aforementioned range of suggestive figures from the history of science policy - i.e. mandated science, strategic science, triple helix, mode 2, post-normal science and agora.

## The challenge of addressing Grand Challenges intensifies

In a recent essay published in *Nature*<sup>59</sup>, Dan Sarewitz, co-director of the Consortium for Science, Policy and Outcomes at Arizona State University, presented an assessment of the challenging situation concerning our reliance on and inability to open up the black box of "quality insurance":

More and more, science is tackling questions that are relevant to society and politics. The reliability of such science is often not testable with textbook methods of replication. This means that quality assurance will increasingly become a matter of political interpretation. It also means that the 'self-correcting norm' that has served science well for the past 500 years is no longer enough to protect science's special place in society. Scientists must have the self-awareness to recognize and openly acknowledge the relationship between their political convictions and how they assess scientific evidence.

Kuhlmann and Rip (2018) are touching raw nerves when indicating that the difficulties in addressing Grand Challenges also may relate to received notions of excellence in research: "One example is the December 2015 Lund Declaration revisiting the original Lund Declaration of 2009, including the curious assertion that addressing Grand Challenges primarily requires doing excellent research". The importance of investing in excellence is demonstrated by the research system every day. Few other professions are as protected by or as exposed to the judgement of their peers, while having to recognise that "excellence" is not open to scrutiny. Public research is still dominated by a push for excellence, but there are also voices contending that "excellence" is emerging as deeply problematic. Gulbrandsen & Trojer<sup>60</sup> develop their argument from a feminist technoscience position, but are joined by others, drawing on different critical positionings.<sup>61</sup>

It is not hard to conclude that we have reached a point that is some distance from our comfort zone.

## Vital research questions and methodological approaches

Over the years, and also via the texts presented in this thesis, I have done my best to question the scientific enterprise, including its received approaches and methodologies. I have done my best to deconstruct, argue and mobilize for a deep cultural change regarding this pinnacle of modernity. I have sought inspiration for keeping up the challenge of engaging with the Grand Challenges in more adequate ways, first from the perspective of feminist science studies; later from that of feminist technoscience. I have worked against "kollektiv glömska" trying to infuse 3rd generation research and innovation policy with narratives, perspectives, concepts and figurations from a vast reservoir of "trying transformations" related by feminist analyst-activists. Thus, having argued that science is in need of a deep renewal, including questioning the received conception of excellence, it is rather challenging to try and formulate questions that will pass as "research questions". The "mega" question that I circle through the texts presented here concerns how we might be implicated in the co-creation of the Grand Challenges. I started out by asking: How do we convert this implication into resources for transformative movements in science and society? In this introduction, I have tried to pin it down a bit by asking, along with Donna Haraway and other feminist technoscientists: How to become responsible for what we learn how to see?

As a consequence of this questioning approach, methodologies enhancing reflexivity take centre stage. There are two methodologies that I find conducive to my "trying transformations". The Nordic tradition of action research (or even action learning) has much to offer in this regard, and I will return to this approach when acknowledging "participant provocation"<sup>62</sup> as one of my contributions to the menagerie of mobilizing

<sup>58</sup> Felt, U., et al., (2007) EU Commission, *Taking European Knowledge Society Seriously*.
59 Sarewitz, D., "Reproducibility will not cure what ails science", *Nature*, vol 525, Issue 7568, September 2015.

<sup>60</sup> Gulbrandsen E., Trojer L., "Re-thinking excellence; getting smart between the no longer and the not yet. Comments on the convergence of knowledge and politics" in: *Travelling Thoughtfulness: feminist technoscience stories* Elovaara, P. ed, Institutionen för Informatik, Umeå Universitet, 2010.

<sup>61</sup> Rafols, I., Leydesdorff, L., O'Hare, A., Nightingale, P. and Stirling, A., "How journal rankings can suppress interdisciplinary research: A comparison between Innovation Studies and Business & Management", *Research Policy* 2012. See also link to a seminar initiated by professor Roger Strand at the Centre for Cancer Biomarkers (CCBIO), a Norwegian Centre of Excellence (CoE) at the University of Bergen: https://www.ub.no/en/ccbio/120663/road-excellence

<sup>62</sup> Reference to discussions in the licentiate thesis as well as texts compiled here.

figurations. However, I started out in the 1980s as a student fostered on Norwegian versions of German critical hermeneutics with a touch of French seasoning. I accepted (and still accept) the images they produced of the deplorable situation in *Reason in the Age of Science*<sup>63</sup>, as well as different alternatives prescribed as phenomenology, critical theory, genealogy, archaeology, language games, etc. These approaches all build on basic hermeneutic rules and can provide guidance, enhancing reflexivity. Still, there is one hermeneutic (sub)speciality or methodological approach that I have found more relevant to my "trying transformations" than the others: Paul Ricoeur's "hermeneutics of suspicion".<sup>64</sup> His is an approach to interpretation that seeks to decode and deconstruct meaning but not to restore it, as other hermeneutic approaches set out to do. In other words, I get to retain my focus on bringing out and developing the mobilizing questions.

Another of Ricoeur's contributions is in forging critical hermeneutics with phenomenology.<sup>65</sup> This coupling opens up and suggests that the principles of hermeneutics are applicable outside the textual realm. This connects another important background influence to my methodological approach: the Scandinavian tradition of action research. As master students in the 1980s, we participated in actions to change the curriculum and the teaching practices, as well as the research carried out in our institution.<sup>66</sup> We were inspired by action research, as well as action learning, when we later coined "participant provocation" as figuration for a future research modality suitable for the transformation that, we argued, was needed in our academic institution. As it happened, we were never invited to pursue the process we had initiated through our "participant provocation". But we wrote and talked about it in the years that followed. Participant provocation sets processes in motion, and you may realize that there are limitations to what you can grasp before initiating a "trying transformation". Later, I also presented "participant provocation" as a way of working in my published texts<sup>67</sup>. Looking back at the different arenas and initiatives I have participated in, I think "participant provocation" may be an adequate figuration for my approach in most instances.

Inspiration from action research, combined with my background skills relating to "hermeneutics of suspicion", prepared the ground for the affinity I have for Donna Haraway's material-semiotic approach to sociotechnical practices. Diffraction is a figuration Haraway introduces for the effort required to make a difference in the world through an embodied engagement with the materiality of research data. I take Haraway's discussion and practice of "diffraction" as an alternative to – and a warning against – a practice of reflexivity as a method of self-accounting, which may easily end

up in the dead end of navel-gazing. Haraway raises important points. However, I also think that Ricoeur's hermeneutics of suspicion provides some vaccination against the danger of self-referential circularity in interpretation. Still, I consider Haraway's discussion about the advantages of diffraction<sup>68</sup> a valuable input to the ongoing dialogue with the participant-observer problematics introduced by Hans Skjervheim in the 50s:

Reflexivity has been recommended as a critical practice, but my suspicion is that reflexivity, like reflection, only displaces the same elsewhere, setting up worries about copy and original and the search for the authentic and really real. ... What we need is to make a difference in material-semiotic apparatuses, to diffract the rays of technoscience so that we get more promising interference patterns on the recording films of our lives and bodies. Diffraction is an optical metaphor for the effort to make a difference in the world. (Haraway 1997, p 16).

Haraway's point is that the methodology of reflexivity mirrors the geometrical optics of reflection, and that an emphasis on reflexivity as a critical method of self-positioning remains caught up in the geometries of sameness. By contrast, diffractions are attuned to differences that our knowledge-making practices make and the effects they have on the world. As such, Haraway is exploring ways to figure differences as a critical practice adequate to what I, inspired by Jack Stilgoe, figure as a "shared space".

I imagine the texts I have assembled for the thesis as original communications and invitations to enter ongoing (hermeneutical) processes, while trying to make sense of how STI are playing out in different arenas (or, better, "shared spaces") where the Grand Challenges are on the agenda. The invitations come with a special reference back to Jane Flax (1990): no closure in sight. My approach has been to read and interpret texts, processes and actions for better questions and for mobilizing figurations to further collective experimentations between the "no longer" and the "not yet". All the while observing basic rules of a "hermeneutics of suspicion" and trusting the intersubjectivity that can emerge in shared spaces.

<sup>63</sup> This is the title of a textbook by Hans-Georg Gadamer. Habermas, Benjamin, Adorno, Apel, Jaspers were also on the curriculum. We read Ricoeur, Foucault and, as students in the early 80s, we introduced postmodern texts like Lyotard's to the milieu.

<sup>64</sup> Ricoeur, P. Freud and Philosophy: An Essay on Interpretation. New Haven (1970).

<sup>65</sup> For a recent discussion see Davidson, S. & Vallée, M-E., (eds), *Hermeneutics and Phenomenology* in Paul Ricoeur: Between Text and Phenomenon, Springer (2016).

<sup>66</sup> Gulbrandsen E. et al."Idé-historiske subtekster", Arr - idéhistorisk tidsskrift, 1/1991.

<sup>67</sup> Some of which are reprinted in my licentiate thesis.

<sup>68</sup> See e.g. Haraway's discussion of diffraction in *Modest\_Witness@ Second\_Millennium. Female-Man\_Meets\_OncoMouse: feminism and technoscience,* Routledge, 1997, p 272-274.

# **PART I**

The texts in PART I are encouraged by the turn from the women or gender question in science to Sandra Harding's *The Science Question in Feminism* (1986). They reflect my engagement in, with and sometimes against Nordic women's and gender research.

The first text is reprinted from the licentiate. I hope it might work like a mini research autobiography as it was inspired by Aino Saarinen's doctoral thesis; *Feminist Research - an Intellectual Adventure? A research autobiography and reflections on the development, state and strategies of change of feminist research* (1992).

## The Reality of our Fictions: Notes towards accountability in (techno)science

Perhaps our hopes for accountability, for politics, for ecofeminism, turn on revisioning the world as coding trickster with whom we must learn to converse.<sup>1</sup>

Until we can articulate an adequate response to the question of how «nature» interacts with «culture» in the production of scientific knowledge, until we find an adequate way of integrating the impact of multiple social and political forces, psychological predispositions, experimental constraints, and cognitive demands on the growth of science, working scientists will continue to find their more traditional mind-sets not only more comfortable, but far more adequate. And they will continue to view a mind-set that sometimes seems to grant force to beliefs and interests but not to «nature» as fundamentally incompatible, unintegrable, and laughable.<sup>2</sup>

#### Introduction

In the aftermath of the 1992 UN Conference on Environment and Development in Rio de Janeiro, Wolfgang Sachs presented a fresh image of our predicament as a research-dependent culture. We are no longer driving as mad towards the edge, Sachs contends; we are driving at full speed along the edge equipped with state-of-the-art

<sup>1</sup> Donna Haraway, *Simians, Cyborgs and Women: The Reinvention of Nature*, p 201, Routledge, New York, 1991.

<sup>2</sup> Evelyn Fox Keller, Secrets of Life, Secrets of Death: Essays on Language, Gender, and Science, p 36, Routledge, New York, 1992.

surveillance gear, as well as expertise in risk calculation and environmental management.<sup>3</sup> According to Sachs there is no reason to receive this "news" with relief. He expresses grave doubts whether such later generations of environmental technologies are adequate responses to hazards created by earlier generations of technoscience products.

To those of us who have invested our work in struggles to further research informed by environmental and developmental concerns, Sachs' image is deeply disturbing suggesting that our efforts rapidly are converted into the new growth-industry of environmental management, losing out on transformative power. The impotence of our science<sup>4</sup> critiques seems glaringly exposed – yet again?

At the time I came across Sachs' text, I was engaged in a project at the Centre for Technology and Culture, University of Oslo. We were working to compile a reader in ecological and feminist perspectives on biotechnology. At the outset of this work we found ourselves confronted by a new wave of determinism, the very «initiator» of feminist critiques in/of the natural sciences in the late 70s.<sup>5</sup> To us, these «old» feminist critiques still seemed brilliant. In fact, as we continued our work, the world seemed rather full of excellent critiques as well as full of well-intentioned and radical researchers and activists, of feminist and other brands. The only problem seemed to be the impact, why so meagre?

Some of you may already have answered "power" meaning patriarchy, or late-capitalism, thinking perhaps; "white, heterosexist, capitalist patriarch".<sup>6</sup> And I do not want to contest that. It just doesn't qualify as a sufficient answer to me. In this essay I will explore why it is not a sufficient answer, and hopefully make some suggestions towards how we can do better. In other words, my efforts are directed towards an assessment of our critical traditions (feminism included) with reference to their research-transforming potential.

## Point of Departure

I was fostered on Norwegian versions of German critical traditions with a touch of French seasoning, in the late 70s and early 80s. I accepted (and still accept) the images they produced of the deplorable situation of *Reason in the Age of Science*<sup>7</sup>, as well as

different alternatives prescribed as critical hermeneutics, phenomenology, critical theory, genealogy, archaeology, language games, etc. My problems started when projecting my master thesis. It dawned on me that what would make my teachers happy, was yet another version of a critique of central tenets in positivism. At the same time, we were taught that such critiques were as old as positivism itself, in fact the history of ideas and sciences (my subject at the time) from the scientific revolution onwards, could be read as a struggle with and against positivism specified as e.g. scientism, empiricism, analytic traditions and hypothetic-deductive methodologies. What could I possibly add to this long tradition of brilliant critical analyses? I was not able to satisfy my teachers.

In my ramblings trying to make sense of my frustration, I accidentally came across Dorothy Dinnerstein's *The Mermaid and The Minotaur*. In this book Dinnerstein sets the scene for her work the following way:

... it is not my aim here to help spell out what is intolerable in our gender arrangements. Other writers have for some time been handling that task very well indeed. I shall assume that the reader has assimilated the gist of what they have been saying; I have nothing to add to it. My aim is to help clarify the reasons why people go on consenting to such arrangements.<sup>8</sup>

Dinnerstein was addressing our gender arrangements, but I immediately applied what she said to the academic arrangements I was struggling with. It helped me articulate my frustration and anguish at the time. All these brilliant analyses I had been presented for suddenly seemed to have one thing in common; they were not able to account for the appeal of the more dominant traditions they were criticizing. Just pointing out, demonstrating what was intolerable about them, and/or presenting alternatives was not sufficient. I began to suspect that this inability made the critical traditions impotent when it came to initiating transformative movements in science (and society). My frustration seemed accounted for, and a brand-new project laid out before me.

It may not come as a surprise to you, but this new project of accounting for the appeal of conventional, dominant arrangements, turned out easier said than done. After some years where I have been able to squat in positions in institutions set up with the explicit aim of working transformations in the modern research-complex<sup>9</sup>, I find that I have made single loops where I should have made double ones: I have not been able to account for the appeal of the diagnosed impotence. It does not go away, just because I am pointing to it, describing and mapping it of – course.

So I must make a (re)turn, while admitting that it is very uncomfortable not to be able to get on with things. Producing introduction after introduction trying to make sense, trying to mobilize in yet another way, all the while wondering whether I am becoming part of the problem; of this old gang pointing to and demonstrating the lacks and wrongdoings of others, and/or to the structures they are victimized by. Maybe this complicity can help me account for the appeal of impotence?

<sup>3 &</sup>quot;GIobal Ecology and the Shadow of 'Development'" in Wolfgang Sachs (ed) *Global Ecology: A New Arena of Political Conflict*, Zed Books, London, 1993.

<sup>4</sup> By "science" I denote what is referred to in Norwegian by "vitenskap", Swedish "vetenskap" and in German by "Wissenschaft", all of which include not only the natural sciences, but the social sciences as well as the humanities.

<sup>5</sup> Gulbrandsen "Liv og lære" (Living and learning), Nytt om kvinneforskning 4/86, page 28.

<sup>6</sup> As Donna Haraway put it; "... for lack of a better name" at the seminar *Feminisms, Sciences and Technologies: Locations and Transformations in the 1990s,* Oslo, May 8th, 1992.

<sup>7</sup> Title of a book by one of the great "models" of our "Bildung", Hans-Georg Gadamer. Other prominent figures were Habermas, Benjamin, Adorno, Apel, Jaspers, von Wright. We also read Ricoeur, Foucault, and as students in the early 80s we introduced postmodern texts like Lyotard's to the milieu.

<sup>8</sup> Dinnerstein *The Mermaid and The Minotaur: Sexual Arrangements and Human Malaise*, New York, 1977, page 6.

<sup>9</sup> I was engaged as "research assistant" at the Centre for Women's Research at the University of Oslo (1986 - 1988), and I had various engagements at the Centre for Technology and Culture at the same university (1991-1993).

## Comparing notes with Dinnerstein

Trying to account for the appeal of the impotence in our critical traditions (and my own frustration) in ways that may have some transformative potential, I start my (re) turn by comparing notes with Dinnerstein. Following are parts of a summary I made a few years ago, while I was squatting in a position at the Centre for Technology and Culture:

In October 1991 the Centre for Technology and Culture in cooperation with the Centre for Environment and Development and the Centre for International Climate and Energy Research, all at the University of Oslo, arranged an international conference: «Humanistic Perspectives on Technology, Development and Environment». The conference was funded by the Norwegian Research Council as part of their following up of the Brundtland Report<sup>10</sup>. It was expected from the Research Council that the conference would implement scientific perspectives and tools - included and with a special emphasis on the contributions from the humanities – to have a closer look at the social and cultural bearings on the environmental crises. We now consider the most important outcome of the conference to be focusing what science and technology can contribute to the solution of our survival crises. It becomes necessary also to take these crises as a background for questioning modern science and technology.<sup>11</sup>

At the conference, Vandana Shiva (The Research Foundation for Science, Technology and Natural Resource Policy, Debra Dun) gave an impulse to this turn by her account of how the scientific discourse connected to environmental and developmental issues during the 80s slides *from* a focus on the thinning of the ozone layer caused by industrial overproduction and consumption in the North *to* a focus on the rainforest and the overpopulation in the South. Her description was backed by Patricia Hynes (Institute on Women and Technology, Amherst, and Massachusetts Institute of Technology) who stressed that such externalizing moves happen even in projects that are explicitly geared to develop critique and alternatives to our western ways of living. At her institute they had experienced how the challenges connected to creating alternatives in the more immediate surroundings, again and again became unsurmountable. And as a consequence and despite the will to locate problems nearby, the perspective soon started to slide. Both problems and solutions ended up elsewhere.

Langdon Winner (Rensselaer Polytechnic Institute, New York State) and Hilary Rose (University of Bradford) both went against Hynes account. They contended that the external conditions for developing critique and alternatives were crushed during the Reagan and Thatcher area, and that more autonomy to research and more resources to the researchers, would stop the scientific discourse from sliding. This contention made Fredrik Barth (University of Oslo) present a challenge; we in the Nordic countries ought to ask ourselves what had happened here. Such external conditions for developing critique and alternatives that Winner and Rose focused, had been and still is present in the Nordic countries. In spite of this, neither working critiques nor developed alternatives are easily found, according to Barth.

In the summing-up discussion Vandana Shiva left some traces towards an understanding of the impotence of our science critique programmes. She observed that such sliding, this tendency to place problems and challenges at a good arm's length from our more immediate contexts, seemed to her a characteristic western way of living. She even connected this to the development of the modern research-complex and said that we in the North probably had about 300 years of practice in externalizing problems. This tendency is, as she put it; "deeply entrenched in you." (end of my notes)

As Shiva developed her story at the conference, I was reminded of the externalizing moves that characterized the science critique programmes I was fostered in as a student. The radicalism of the 60s and 70s lived by the saying; "you are either part of the problem or part of the solution". There was no in between. Those who identified with the saying, were of course in their own eyes part of the solution and would only be held accountable for solutions.<sup>12</sup> Another consequence of this dichotomizing read; if you are not (totally) with us, you are against us. I suspect this prepared the ground for narrow understandings of processes of knowledge and learning, for externalizing moves and for easy slides into the impotence of "pointing and demonstrating", into creating mirror images and simple reversals. To borrow some words from Gyatri Spivak; our efforts were directed to the construction of "the self-consolidating other"<sup>13</sup>, more than towards initiating transformative movements in science (and society).

Looking back, remembering the necessity of double loops, that is; trying to account for the appeal of this impotence, I turn up a passage in *The Mermaid and The Minotaur* that spoke strongly to me when I first read Dinnerstein's text. The passage describes a situation that seems to suggest ways of accounting for the appeal of impotence in our critical traditions, for the simple reversals as well as for expressions of powerlessness, even self-inflicted marginalization that I have met during my "trying transformations"<sup>14</sup> in academia.<sup>15</sup>

<sup>10</sup> In the 1980s the UN set up the Commission on Environment and Development, also known as the Brundtland Commission, named after its chair, the Norwegian prime minister Gro Harlem Brundtland. In 1987 the Brundtland Commission published a comprehensive document entitled *Our Common Future*, also known as "the Brundtland Report".

<sup>11</sup> See also *Humanistic Perspectives on Technology, Development and Environment*, Moser, I. & Sejersted, F. (eds) Centre for Technology and Culture, Oslo 1992.

<sup>12</sup> For an articulation of this attitude that usually just works at a more spontaneous level, see Per Strømholm *Farvel til fortida!* (Good-bye to the past!), Oslo, 1989.

<sup>13</sup> Spivak "The Rani of Sirmur", in Europe and Its Others, Francis Barker et al. (eds), Colchester, 1985, vol I, page 131, as referred in *Young White Mythologies: Writing History and the West*, London, 1990, page 170.

<sup>14</sup> See Gulbrandsen, E. "Från kollektiv glömska till kollektiv kompetens?" in *Naistutkimus* 2/90, page 25 ff, for my employment of themes from Aiken et al. 's article "Trying Transformations", *Signs*, vol 12, no 2, 1987.

<sup>15</sup> I have got «confessions» of powerlessness from many people in this system. How are such feelings accounted for? The only reference to this phenomenon I have come across, is in Sven-Eric Liedman's *Utmätning* (Disfraining), Värnamo, 1993, page 251ff.

The situation Dinnerstein is describing, concerns the intellectual climate in the United States in the years following the bombing of Hiroshima and Nagasaki. In these "post-Hiroshima years" many radicals withdrew from emotional involvement in history. Contrary to received belief this was not due to the political persecution of McCartyism, Dinnerstein contends: "McCarthyism, it seems to me, was an assault on a largely paralyzed and comatose prev." (259) And the important reason for this paralysis was a

... slowly, deeply, fatefully altered view of the societal process... What we were working to grasp emotionally was the awesome depth and breadth of the groundswell of human pathology and lifehatred which had erupted under Hitler's and other fascist regimes, an eruption against which massive majestic human courage and love had been marshalled, but to which the climactic answer had proved, after all, to be a statement of the most ultimate insanity: the doom-prophetic Hiroshima explosion. (259-260)

At the same time, those who had been oriented to socialism as a major solution of human problems, was infused with doubt about the capacity for moral leadership in USSR. Such was the background, according to Dinnerstein,

that made Hiroshima - immediately for some of us and gradually in retrospect for others - so paralyzing an event: The forces of unreason, of murder and suicide, came to seem overwhelmingly powerful. What made them overwhelming was not just the scale on which they occurred; it was that they now seemed clearly to spring from human social life itself, not just exist **out there** in the bad guys. (260) (my bolds)

## A Question of Accountability

The parallel to our situation and the possible inheritance of this impotence, comatose and paralysis, may be brought out by looking at the bombings of Hiroshima and Nagasaki as the first symbol of the possibility of (total) man-made environmental destruction. We have no doubt become Freud's "gods by prosthesis"<sup>16</sup> as well as Donna Haraway's cyborgs<sup>17</sup>. As such we are part of the problem at the point of no return. The question of accountability becomes intimately insistent as we are confronting the environmental crisis in our own bodies; the feminization of the world may be imminent, jeopardizing our survival both as individuals and as a species.<sup>18</sup> How do we work as researchers in order to "become answerable for what we learn how to see"?<sup>19</sup>

Pointing to and demonstrating the wrongdoings of others out there will not help us work towards accountability as researchers. Neither will building strong counter-identities help us account for the appeal of the more dominant traditions. Such oppositional ways of handling the challenges of a research-dependent culture are obviously inadequate. To move out of this impasse, we must also work out how to account for the appeal of dichotomies, of simple reversals and mirror imaging in our critical traditions. Is it too overwhelming, is it still too painful to recognize our "cyborg-status"? Do we still need some kind of protection from acknowledging our complicity? Do we need to imagine ourselves as pure and innocent, in order not to withdraw from struggles in science and society? In "A Cyborg Manifesto" Donna Haraway points to a widespread tendency to construct "origin stories". As a countermove she builds an alternative political myth – the cyborg – to lure us out of the desire for rebirths.<sup>20</sup> We no doubt need to build new narratives, new imaginaries, new motivating languages that will lead us to know how to stay committed to the struggle for change and transformation, even while admitting our complicity. Before I move on, I will relate one incident of a trying myth building I took part in.

## From Simple Reversals to Symbiosis

Back then, inspired by Dinnerstein, we suggested a turn in self-imagery on part of the soft and critical traditions against the harder sciences.<sup>21</sup> Conventionally one speaks of the two cultures split and thinks of the soft humanities and the critical social sciences as different from the natural sciences and quantitatively oriented social sciences. The critique against the "hard" sciences is encouraged by representing the humanities and the social sciences as being in possession of a kind of «purity» or critical rationality as a basis for critique and a healing capacity. But what gives us with a background in the softer traditions such innocent and exclusive access to reality?

We found that using Dinnerstein's concept of the symbiosis between the sexes in a trying description of the relationship between the "hard" (masculine) and the "soft" (feminine) sciences, widened our horizons, and pointed to new possibilities for transforming actions. With the concept of the symbiosis between the sexes Dinnerstein focuses men and women's cooperation in recreating the traditional division of labour – one of the strongholds of modernity – to the satisfaction of both parties. White western women's situation as "pure", innocent and oppressed is thus challenged, and accordingly, we wanted to challenge the symbiosis between "the two cultures" and the purity of the "soft" sciences. An understanding of the humanities and critical traditions in the social sciences as supplementary, supportive and at most loyally oppositional to

<sup>16</sup> As developed in Günther Anders *Die Antiquiertheit des Menschen* I, Il, 1980 C.H.Beck München.

<sup>17</sup> Haraway "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth 15 Century" in *Simians, Cyborgs, and Women: The Reinvention of Nature*, London, 1991.
18 It looks as if different chemicals in our environment connect to our receptors for oestrogen, causing cancer in female reproductive organs, low sperm-counts and feminization in males.

 <sup>19</sup> I read this as the core theme in Haraway's "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective", also in *Simians, Cyborgs and Women: The Reinvention of Nature*, London, 1991. To me, this article deals with conditions for our becoming

accountable or respons-able as researchers in a research-dependent culture.

<sup>20 &</sup>quot;A Cyborg Manifesto", see footnote 17.

<sup>21</sup> This suggestion was later presented in print, see Gulbrandsen, Haugestad, Aas "Forskning i forandring?" (Research in transformation?), *Nytt om kvinneforskning*, 3/91. We developed and employed the "symbiosis-imagery"; in the aftermath of our "participant provocation" at the History of Ideas Department, University of Oslo, in the middle 80s. See Gulbrandsen "Från kollektiv glömska til kollektiv kompetens?" (From collective oblivion to collective competence?), *Naistut-kimus* 2/90, and Gulbrandsen, Haugestad, Aas "Idehistoriske subtekster" (Subtexts in History of Ideas) in Arr: *Idéhistorisk tidsskrift*, 1/91.

dominant ideologies and practices in the modern research-complex, points to the need for new and quite different powerfully critiques of modern sciences. But as I already have hinted, it seemed to us also to open new possibilities for transforming actions and movements for change by focusing our active participation in creating and recreating the crises.

This of course, was no way of accounting for the appeal of impotence, for the illusion of purity and innocence in non-complicity. We were just presenting yet another alternative image, a necessary, but obviously not a sufficient move. As I look back on our struggles in the middle 80s, I am reminded of a passage in Evelyn Keller's *Secrets of Life, Secrets of Death.*<sup>22</sup> She is assessing her own work as well as other feminist theorists', when saying: "In short, feminist theory has helped us revision science as a discourse, but not as an agent of change." (76) We have produced new and different representations of science, we need now to ask what different possibilities of change might be entailed by these different kinds of representations. And for this, Keller continues, "... we need to understand the *enmeshing* (my italics) of representation and intervening, how particular representations are already committed to particular kinds of interventions." We need to develop a better and fuller understanding of *how* science works, suffice it no longer just to claim *that* it works. We must also be able to specify what science works at.

Keller's concern springs from and is directed to an engagement with natural science, her disciplinary situation, as well as from an engagement with feminist theory. I also find her reflections relevant for an assessment of our science critiques with reference to their research-transforming potential. As the weft of science increases in everything that surrounds us, developing research as an agent of change in the world, means developing a research-transforming competence. In a research-dependent culture, one of the (obvious) prerequisites both for accountability and for building research-transforming competence, is acknowledging the instrumentality of our critical activities. I fear that we spontaneously tend to understand our activities in terms of discovering, unveiling, revealing, rather than as inventing and intervening. To counter this, I have suggested that a more apt imagery might be built around research as "participant provocation"<sup>23</sup>. What our participant provocations bring about is what I like to think of as "the reality of our fictions"<sup>24</sup> in order to highlight our implication in the production of reality.

In *Secrets of Life, Secrets of Death* Keller suggests a strategy for further work towards "an adequate response to the question of how 'nature' interacts with 'culture' in the production of scientific knowledge" (36). She pursues her project from *Reflections on Gender and Science*<sup>25</sup> by adding this focusing how science works, in that she argues for a grounding of the analysis of research-subjectivity in its socio-political and material ef-

Once feminist standpoint is formulated as this sort of dis-identifying collective subject of critique, the emphasis in its claims for authority can shift from the grounds of knowledges - women's lives or experience - to consideration of the **effects** of knowledge as always invested ways of making sense of the world. (30) (my bolds)

In order to "become answerable for what we learn how to see" as researchers in a research-dependent culture, this turn towards the reality of our fictions, may prove to be an adequate suggestion. But how do we work to exploit this quality of doubleness for our transformative projects? How do we convert this implication into resources for transformative movements in science and society?

## **Science Studies**

While doing science studies this quality of doubleness can become insistent as the "subject" of research more obviously coincides with the "object". But as far as I have been able to check, this quality of doubleness is not exploited in conventional science studies.<sup>27</sup> Even if recognised, a lack of rhetorical strategies seems to hinder a utilization. We end up producing what Sharon Traweek denotes as "leviathans"; "almost all these stories, whether about nature, scientists, or science, are narrative leviathans, producing and reproducing all-encompassing stories of cause and effect through the same rhetorical strategies."28 I suspect a cultural-historical tendency at work here too, and as such deeply entrenched in us. Frigga Haug and others put it like this: "From our earliest schooldays we learn to write 'about' the world, rather than to find a language for the forms within which we live."29 The effect is the same; the perspective comes out as other-directed. It is turned towards something "out there". Consequently, the challenges and problems are also (dis)placed with others, while we as researchers slide into this pure and innocent position that is without potential for initiating transformative processes and accordingly without potential for developing research-transforming competence.

<sup>22</sup> Keller Secrets of Life, Secrets of Death: Essays on Language, Gender and Science, New York, 1992.

<sup>23</sup> Gulbrandsen "Från kollektiv glömska till kollektiv kompetens", Naistutkimus 2/90, page 22ff.

<sup>24</sup> Inspired by Samuel Weber, as referred in the introduction to Diprose & Ferrell (eds) *Cartogra-*

phies: Poststructuralism and the Mapping of Bodies and Spaces, North Sydney, 1991. 25 Keller Reflections on Gender and Science, New Haven, 1985.

fects. Rosemary Hennessy hints at an interesting parallel to Keller's discussion.<sup>26</sup> Hennessy are among those who contends that standpoint epistemology can be developed to serve beyond "grounding" as justification for our knowledge claims. She concludes her discussion of these possibilities in standpoint epistemology by stating:

<sup>26</sup> Hennessy "Women's Lives/Feminist Knowledge: Feminist Standpoint as Ideology Critique" in *Hypatia*, vol 8, no l, 1993, page 30.

<sup>27</sup> See also Steve Woolgar's discussion in "Some Remarks About Positionism: A Reply to Collins and Yearley" in *Science as Practice and Culture Pickering* (ed) London, 1992.

<sup>28</sup> Traweek "Border Crossings: Narrative Strategies in Science Studies and among Physicists in Tsukuba Science City, Japan" in *Science as Practice and Culture* Pickering (ed) London, 1992, page 430ff.

<sup>29</sup> Frigga Haug and Others *Female Sexualization: A Collective Work of Memory*, London, 1987, page 64.

Does this mean we are stuck in an impasse between those "old and tired words"<sup>30</sup>, of "external" perspectives and more "internal" workings? Can feminists do better? I often hear the argument that as we have not invested so much in conventional ways, we are free to make changes. I fear the opposite may be happening, as pressures towards legitimation seem strong.<sup>31</sup> In Norwegian women's research, I have not been able to find attempts at mediating or transcending the old dichotomy between external view-points and more internally based analyses. I have found investigations of publication productivity and career possibilities for women in research<sup>32</sup>, hiring procedures<sup>33</sup>, organisation and work environment focusing conditions for women's participation<sup>34</sup>, but such investigations are consequently conducted without reference to, nor discussions of the contents of the knowledge produced. As such, these analyses are kept at good arm's length from our activities as researchers. Consequently, the quality of doubleness cannot be exploited for transformative struggles in science.

In other words, it is (still) only the woman (or gender) question in science that is focused and discussed, and not *the science question in feminism* - to cite a rather well-known title<sup>35</sup>. As long as such studies do not relate more directly to, discuss and evaluate the substance of the knowledge produced, they are of minimal value for the development of our research-transforming competence. The turn that Sandra Harding's book signals, points to evaluative work based on intense, ongoing and surely painful discussions about what we mean by "feminism".

I miss such discussions, and I find them very hard to initiate. I like to stress that this is not a call for developing "litmus-tests" for feminists, far from it. But I think we need to better our ability to explicate the bases for the evaluations we make and that are made in feminist/women's research. The resources are very limited in this kind of endeavour, and pressing questions concerning criteria are coming up as we increasingly evaluate "each other". In order to make the play of differences in such multicultural and multidisciplinary contexts as women's research constructive, we need to be able to put words to our criteria and evaluations in a much more concrete and specific way than is usually done in conventional research. The more specifically and concretely we are able to describe our criteria, the more able we will be to live and work constructively within the differences that feminism in the late 90s strives to accommodate. This kind of ability also constitute a prerequisite for developing research-transforming competence. A vital ingredient in such projects will be the continuous explication, problematization and transformation of criteria for evaluating research/researchers, suffice it no longer to give the impression that we all know and agree about them. It seems, however, that the ability to recognize authority is hard to make explicit. One way to begin may be by engaging in discussions over feminism.

## There is no Home for Feminists

In order to become part of the solutions, we as feminists may have to reinvent ourselves as part of the problem. Accordingly, feminism needs be developed as a movement for winding up privileges, privileges of knowledge as well as other privileges. The resources in both humanistic ("equality") and gynocentric ("difference") inspired feminism seem emptied when confronting a labour of change that includes transforming our research as well as ourselves. We need to develop feminist traditions that can help us move beyond mirror reflections and simple reversals. Building strong (feminist) counter-identities to established ways of doing research, may have some deconstructive effects, but the danger of getting stuck, mistaking such reversal for transformative work, is imminent. I find Susan Leigh Star's metaphor of moving house<sup>36</sup> suggestive for feminist labour of change and transformation, for the work we have to do in between the "not yet" and the "no longer" which is where Patti Lather locates a version of feminism that I find most intriguing.<sup>37</sup>

Susan Leigh Star's exploration of the significance of "infrastructure", of collective work that disappears into doneness, of the ordinary as opposed to the extraordinary, of banal work full of local detail, a boring topic for social science, but all the more significant; suggest to me that it may be possible to develop strategies that make such significant trivia available for our transformative projects.<sup>38</sup>

It is not only feminists that are confronted by problems with trivia. From time to time, I have sought comfort in an article by Chris Argyris; "Teaching Smart People How to Learn".<sup>39</sup> In this text, Argyris focuses the problem some of the "smartest" people in our culture have with learning. He builds a provoking image of "smart" people as a select group, selected in part on the basis of their inability to see themselves as part of any problem. The smartest people, the most brainy, are most badly prepared when things do not work out as planned – as increasingly seems to be the case in our civilization. Very quickly, almost spontaneously the problems are placed "out there" through badmouthing the clients, bureaucrats, politicians, or bosses.

Argyris also makes a critical distinction between "theory-in-use" and "espoused theory" that may help us avoid such externalizing moves. Ask people to articulate the rules they

<sup>30</sup> Ian Hacking's expression in "The Self-Vindication of the Laboratory Sciences" in Pickering (ed) *Science as Practice and Culture*, London 1992, page 51.

<sup>31</sup> This is developed in Gulbrandsen & Trojer "Authority in Transformation", manuscript, November 1994, for evaluation in *The European Journal of Women 's Studies*.

<sup>32</sup> Thagaard "Hard work and much patience". Career prospects for woman scientists in *Nora* 1/94, as well as other studies conducted at the Institute for Studies in research and Higher Education in Oslo by researchers Kyvik, Teigen, and Tvede.

<sup>33</sup> Fürst Kvinner i Akademia - inntrengere i en mannskultur? (Women in academia - intruders in a male culture?), NAVF, Oslo, 1988.

<sup>34</sup> Kvande & Rasmussen *Nye kvinneliv: Kvinner i menns organisasjoner* (New lives for women: Women in men's organisations), Oslo, 1990.

<sup>35</sup> Reference to Sandra Harding's seminal publication from 1986.

<sup>36</sup> Leigh Star "Misplaced Concretism and Concrete Situations: Feminism, Method and Information Technology", paper for the *Gender, Culture, Nature* network, May 1st, 1994, page 10.
37 Lather *Getting Smart: Feminist Research and Pedagogy With/in the Postmodern*, London, 1991.

 <sup>38</sup> I expand on the importance of such projects in "Objectivity? Reflexivity! Authority?!" in *Conditions of Our Knowing*, Andersson & Kalman (eds) Umeå, 1995.

<sup>39 &</sup>quot;Teaching Smart People How to Learn" Harvard Business Review, May-June 1991.

use to govern their actions, and they will give you their "espoused" theory of action, Argyris contends. But we do not act according to our espoused theory, there is a contradiction between the way we think we are acting and the way we (really) act. Argyris suggests different strategies we can employ to get in touch with our tacit, often banal and simple "theories-in-use". They may turn out as vital resources for our transformative efforts.

## Processes of Research/Processes of Learning

Through the understanding (in progress) upon which this essay is based, I have left an image of the research process as a taxonomic and controlling activity. The researcher is construed as a participant in this process, she or he creates and organizes knowledge through a continual interaction with reality. Following Donna Haraway, Wendy Hollway, Lorraine Code, Jane Flax, Sharon Traweek and others, we struggle to realize relations of interdependence between the "subject" and "object" of research. As Haraway puts it "Accounts of a 'real' world do not . . . depend on a logic of 'discovery' but on a power charged social relation of 'conversation' . . . In some critical sense that is crudely hinted at by the clumsy category of the social or of agency, the world encountered in knowledge projects is an active entity".<sup>40</sup> Following this, processes of research are more aptly understood as processes of learning.

Implicit in this understanding, several other dichotomies are problematized, like the division or boundary between fact and value, between instrumental knowledge or knowledge of "cause and effect", and critical hermeneutic, situationist, constructivist traditions which take interpretation as their 'paradigm'. Such dichotomies are generated by preserving a sharp dividing line between the subject and the object of research. In feminist research we have a rather long history of going against dichotomies. They are discarded as unproductive myths. In spite of such dismissals, these dichotomies have retained a remarkable regulative power. And, as you already may have guessed; the more easily we pay lip service to such abolitions, the more difficult it seems to realize them in practice and as culture.

In order to keep in mind, evolve and realize non-binary understandings, public rooms and ways of working must be established that allow us to inquire, discuss and transform what we in our culture and research communities tend to mark as "trivia"; as "private", "subjective", "emotional" or of "special interest". If this is not achieved, Søren Kjørup's diagnosed anxiety concerning "subjectivity as sources of error"<sup>41</sup> will hinder our development of more complex and integrated understandings as well as hinder a research-transforming competence from evolving. A continual evaluation of the possibilities to reconstruct public rooms and invent new ways of working becomes a critical challenge.

As partakers in the modern research complex, we carry its problems. Through this recognition, we may have a privileged starting point to become part of the solutions. However, such an outcome presupposes that the researcher finds ways to put her processes of merit in play and possibly also at stake. Such a preparedness is directly opposed to more conventional processes of constituting research-subjectivity. Developing such a capacity is a transformative project in its own right. An inclusion of which I think we better regard as a radicalization compared to established discourses on research-subjectivity.

In order to come to grips with research-subjectivity Anglo-American feminist science studies picked frames for understanding and concepts from sociology, social psychology and psychoanalytical traditions, of special interest was object relations theory. It turned out to be impossible to keep the project open and flexible while drawing on these resources. The project closed down for transformative movement and development of research-transforming competence fairly quickly. No simple explanation can be given, but by taking on these traditions, the subject-object dichotomy could not be dissolved, and the processes of learning and knowing could not be reached. Connecting such resources to the "context of discovery" did not yield much.

One reason may be that the researcher's relations to what is being explored are exclusively determined from the side of the subject, hereby disregarding the interactive nature of this process. Definitions of femininity often "build upon unilateral conceptualizations of object-relations with reference to the female subject, thus suggesting the interchangeability and irrelevance of objects. Modes of appropriating an object, however, are always dependent on the object itself».<sup>42</sup>Focusing "context of discovery" never allowed us to reach (into) the interactive processes of knowledge and learning, never allowed us to see research-subjectivity as something that have to be achieved and continually (re)constituted in everyday academic life, as enmeshed in the processes of research.

In the beginning of the 80s, a shift in theoretical framework represented new possibilities regarding such a development of feminist science projects. From the middle of the 80s there have been several attempts to mediate between the Anglo-American tradition with continental – especially French-Italian critical traditions – in the philosophy of language. Such mediation projects take us one step into the context of production and into processes of knowledge and learning that in fundamental ways hinges on reading, writing and interpreting and translating capacities. Interests in such mediations with critical traditions in the philosophy of language have not been poignant in Norwegian women's research.<sup>43</sup>

In Secrets of Life, Secrets of Death Evelyn Fox Keller issues a warning that should be kept in mind while trying out such mediation projects. This cautioning points to

<sup>40</sup> As cited in Code L., *What Can She Know: Feminist Theory and the Construction of Knowledge*, Cornell University Press, Ithaca, 1991, page 153.

<sup>41</sup> Kjørup Forskning og samfund 1985, København.

<sup>42</sup> Gudrun-Axeli Knapp as referred in "Connecting Communities of Practice: Feminism, Science, and Technology" in *Women's Studies Int. Forum*, vol 17, nos 2/3, 1994, page 258.
43 For a brand new example, see *Konstituering av kjønn fra antikken til moderne tid*, Research

<sup>15</sup> For a brand new example, see *Konstituering av kjønn fra antikken til moderne tid*, Researc Council of Norway, Oslo, 1995.

a revival of the old feminist project of interdisciplinary work. Conventional science studies tend towards an ever greater focus on "institutions, politics, cultural contexts, and language", Keller contends (3). Simple reversal may seem imminent; "all is social or cultural relations" could easily become the new slogan. Once again losing out on complexity, interaction and process in "nature's" interacting with "culture"?

The next text was written together with Lena Trojer and published in European Journal of Women's Studies, 3 (2) 1996. It represents our first attempt at making sense of a new situation; a unique initiative in a Nordic setting: a Department of Gender and Technology at a Technical University. This setting provided a fresh perspective on my longstanding engagement in, with and against Nordic women's and gender research.

## Authority in Transformation

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... the declining authority of the West to determine how the rest of the world shall live requires a rethinking of the past, present, and future of Western sciences and their technologies no less than of other important Western institutions and practices. (Harding, 1993: x)

This text comes out of an interdisciplinary discussion through which we want to spell out some challenges to ourselves as researchers and feminists in a Nordic context in the mid-1990s. It is not a presentation of completed, neatly wrapped up research. As part and parcel of neatly wrapped up research often comes an unintended effect of 'othering'; of (dis)placing both problems and challenges on others. A certain understanding of self (however brittle) is also induced or effected when wrapping up is on the agenda: as we peer under the veil to discover or reveal hidden meanings, provide expertise or counter-expertise, we easily slide into understanding our role as 'helping the suffering people out there'. As researchers we are part of the solution: "... developing at home that voice of entitlement, the voice of control, that accompanies the conquest of empires far from home" (Traweek, 1992: 461). <sup>1</sup>

<sup>1</sup> We take such an understanding to be fairly widespread in Nordic women's research, implying that we 'in here' have developed something valuable we want to give to you 'out there'. At a Nordic conference on 'Women, Development and Environment' in Oslo (autumn 1990) the Indian feminist/ activist/researcher Vandana Shiva responded to our wanting to export our knowledge to Indian rural women, by asking back 'Who appointed you? God?'

We argue in this paper that it is high time we make a shift. A shift that may seem simple but, as our own 'trying transformations' tell us, it is certainly not easy.<sup>2</sup> Time is ripe for us, as partakers in the modern research complexes, to develop a readiness to think and feel ourselves as part of the problem and learn how to use our implicatedness as a resource for transformative projects. This shift represents our 'headline' challenge. In this article we aim to expand on this challenge by spelling out some of the motivations for and implications of the shift, as well as pointing to conditions for carrying it through.

#### Context

From the very beginning, the new women's research<sup>3</sup> holds a science critique programme<sup>4</sup>. What motivated the researchers were lacks and biases in established research. In spite of continuous struggles to transform, we have not found discussions of women's research as a *movement for transformation of science* in Nordic literature. We miss discussions of how we work in order to induce change in the knowledge producing apparatuses we so intimately inhabit. Mostly it is the substantial results of research that are presented, when the status is settled. To employ a familiar metaphor, we are given new maps, and few, if any, references to the construction of the maps are included. A narrow understanding of knowledge production, as impelled solely by science's own internal logic, is implicitly conveyed. A similarly naive understanding of how transformation or change is effected is supported.

This emphasis on developing knowledge about the transformation of science we find as relevant in a Nordic context as in an international one. The Nordic circumstances put this clearly on the present agenda as stated ambitions to change or transform the sciences are high in Nordic women's research - an often-used term is 'revolution'. But are the means to accomplish such revolutionary transformations correspondingly developed? One example from the Centre for Women's Research at the University of Oslo may indicate existing state of reflections regarding transformation. Results of the first centre-initiated research project are now available (Taksdal and Widerberg, 1992). This project represented a relatively huge commitment, including a research course for all social science disciplines. We read the book as a central text for discussing the new women's research in Norway. Summing up the project and the course, the editors (head of research and her assistant) state:

We cannot imagine that it will be possible to discuss 'kjønn' [in Norwegian there is just one word 'kjønn', not conveying the sex/gender distinction] in the same old way after the publication of this book, and we see before us the revolution in the understandings of disciplines that has to follow in its wake. That is, when we think logically and intellectually. Our academic experiences tell us, nevertheless, that the resistance to the development of knowledge regarding understandings of 'kjønn' is not located at the intellectual level, but at the emotional. It is about 'kjønn'. . . (Taksdal and Widerberg, 1992: 282; our translation)

The ambition is revolutionary, and the writers admit to not having a clue about how to bring that revolution forward after the breakdown of the belief in the force of 'best' arguments. Hindrances are located at the 'emotional level', and as such they are out of reach, even though this is admitted as a repeated experience. The dreaded 'othering process' is also at work while naming 'women's researchers' as the ones who 'think logically and intellectually'. From this no transformative competence can be recognized.

The centres for women's research in the Nordic countries are small and vulnerable, with a correspondingly strong need for legitimacy. What renders legitimacy to the products of research in a non-feminist world is not always what is helpful for developing transformative projects. Such projects require that we open up for scrutiny and discussion problems and challenges that often are edited out of texts in order for them to pass as authoritative. If we do not keep our justificatory struggles separate from the transformative ones, the result may be a naive thinking about transformation and/or a slide into conventional science that 'means treachery against the great, long range, feminist science projects' (Kaul, 1993:154). Accounts of 'women's research as professional academic work' (Steinfeld, 1993:25) and warnings against 'galloping amateurs in women' s research'<sup>5</sup> give added force to such slides when issued by persons in power. A transformative competence must include continuous explications and problematizations of criteria for evaluating research, it does not suffice to give the impression that we all know and agree about them.

We assume that women's researchers in the Nordic countries have special prerequisites for developing transformative competences. As we have had women in positions of power for so long, it becomes increasingly harder to assume that once women enter positions, change or transformation automatically happens. In the Nordic countries we hold the world record in women representatives in our national assemblies; as we write this article, Sweden takes Norway's record, 41 percent against 39.6 percent. In spite of this high representation alternative policies are hard to discern, even in sectors that are said to be of special relevance to women like child care, care of the elderly, medical care and other welfare issues (Skjeie, 1991). Accordingly, we expect a high recognition of the need to expand on, discuss and intensify our transformative struggles in science and society. All our different 'trying transformations' will provide us with ample material.

<sup>2</sup> We refer here to an article 'Trying Transformations' (Aiken et al. 1987) that has meant a lot to us in so far as it was the first attempt to make sense of transformative work from inside established institutions that we met. This article and the accompanying book *Changing Our Minds* (Aiken et al. 1988), is still one of a handful of texts that we find has potential to enhance our 'transformative competence'. We find this worrying - please tell us if you know of other examples!

<sup>3</sup> We are aware that some would prefer the term 'feminist research' as a translation of the Nordic word 'kvinnoforskning'. We suggest that the term 'feminist' is applied when discussions about what we mean by feminism and about the evaluative frameworks different feminisms can yield are included both in the research activity and in the presentation of results.

<sup>4</sup> By 'science' we mean what is referred to in Norwegian as 'vitenskap', in Swedish as 'vetenskap' and in German as 'Wissenschaft', all of which include not only the natural sciences, but the social sciences as well as the arts and humanities.

<sup>5</sup> A warning issued at a Nordic conference for science policy in women's research, Hässelby slott, November 1993.

What we maintain and will spell out as best we can in the following is the need and the challenge for the new women's research to broaden its understanding of processes of knowledge and learning as an additional prerequisite for the unfolding and evolving of our transformative competence.

## **Crisis? What Crisis?**

Why can't we be satisfied with substantial reports and new maps like *Forståelser av kjønn* (Taksdal and Widerberg, 1992)? Why is it so important to us to try and mobilize for development of transformative competence? That has to do with our assessment of the situation we are in or, better, have brought ourselves into. In view of which we also find it necessary to consider whether a developed transformative competence can turn out to be what renders legitimacy and accordingly authority to women's research in the longer run.

The global environmental and developmental crises make heavy demands on the modern research complex's capacity for renewal and adjustment<sup>6</sup>. Enhanced understanding both of resistance against and possibilities for transformation is emerging as a competence much sought after. Norway may again serve as an example. A relatively strong commitment, including monetary support, to research guided by environmental awareness goes together with being the land not only of the midnight sun but also of the Brundtland report. After twenty years of recognition of environmental and developmental crises, in grassroots movements and in political arenas as well as in the research community, after relatively heavy funding of research into these problems and of research programmes for alternative futures, Norwegian research and research politics were marked by distress and frustration. Strong voices maintain that the research transforming movement that is needed to meet these challenges has proved too difficult to set in motion. Interdisciplinary research was singled out early as one of the most crucial challenges. In 1992, twenty years after the Stockholm-conference, one of the participants at a summing up conference on research and research policies in environment and development in Norway, characterized these efforts as amounting to pouring 'the same old wine into bottles with new labels'.<sup>7</sup> What hinders our realizing such sensible ambitions?

## His-Story only - Or new Alliances?

At times it seems to us that we are trudging in fine programmes from the 1960s and 1970s with little or no transformative power. We have come to fear that this impotence is inherited by the relatively new field of 'science studies' as well as by Nordic women's research. Nordic women's research shares transformative or revolutionary ambitions with the science critique programmes that often are presented as its forerunners: critical theory and critical hermeneutics (Iversen, 1982). A claim that can be connected to such traditions is that there are intimate connections between knowledge producing processes and social and cultural interests. The ideal was formulated as a 'critical theory'. A theory was critical in proportion to its ability to specify its own (pre)conditions. What could be struggled for was a relative objectivity; an objectivity that could specify its own borders, which also indicates a theory's possibilities - even if this point was seldom emphasized in discussions in the 1960s and 1970s. The same explicit ambition to recognize that research develops in contexts, and that different historical, cultural and social relations saturate the products of research, motivates Sandra Harding's work with 'strong objectivity' (Harding, 1991), Donna Haraway's 'situated knowledges' (Haraway, 1988) as well as Rosi Braidotti's struggle to develop what she conceptualizes as 'critical feminist theory/epistemology' (Braidotti, 1991).

In spite of such fine ambitions and ideals existing in Norway for nearly 40 years<sup>8</sup> the consequences of the understanding are never integrated to the extent that the researcher explicitly reflects his point of departure or his role in the research process into the product. The proliferation of statements like 'I am a white, heterosexual, middle-class feminist'... in prefaces and talks, has made us suspect a certain inheritance of this impotence in the new women's research. We read such statements as a symptom that a critical challenge still has to be met: how do we work in order to move from the claim that 'science is in society and society is in science' to be able to say something about how this moulds the product?

Continuities between the critical programmes of the 1950s, 1960s and 1970s and the relatively new field of 'science studies' can easily be traced (Bärmark, 1984; Elzinga, 1988; Lundstøl, 1977). Science studies have produced heaps of historical, sociological, anthropological and science policy texts motivated by an understanding of science as a context-dependent process. This work has localized science in social/historical/ cultural relations, but has to a much lesser degree – if at all – managed to get a grip on 'internal workings' as conventionally understood. To become aware of how 'society works in science' seems to represent a greater challenge than to trace how 'science works in society'.

<sup>6</sup> The 1972 *United Nations Conference on the Human Environment* in Stockholm identified a number of global environmental challenges that were not adequately addressed. The conference can be seen as a starting point for global consciousness raising concerning "the state of the world".

<sup>7</sup> The conference was marked by a humble attitude as well as confessions of doubts and defeats. A report was published by the Council for Social Science Research in the Norwegian Research Council for Science and the Humanities, 'Miljø og utvikling, Rapport fra den forskningspolitiske konferensen på Vettre, 28-29 januar 1992' (Environment and Development: Report from the Conference on Research Policies at Vettre, 28-29 January 1992).

<sup>8</sup> The Norwegian philosopher Hans Skjervheim was an excellent mediator who also expanded on these critical traditions. One of his most influential texts; *Participant and Observer* ('Deltakar og tilskodar', written in New Norwegian) circulated as a working paper from the late 1950s and thus prepared the Norwegian student revolution.

In 1985 Evelyn Keller summed up this situation: 'Yet, while our sensitivity to the influence of social and political forces has certainly grown, our understanding of their actual impact on the production of scientific theory has not' (Keller, 1985: 5). The lack of mediations between the relatively new external perspectives and older, more internally based analyses has grave consequences regarding our possibility to develop a transformative competence as researchers. As a result of this lack, we cannot but regard science's products as being impelled solely by science' s own internal logic. In the everyday life of doing research, we are left without possibilities to understand how macro powers are at play, we are left without the possibility of transforming research in a direction of our own choice.

In a Nordic context, concessions are made that the ambitions from the 1960s and 1970s have as yet to be realized (Gregersen and Køppe, 1985; Håkanson, 1988; Kjørup, 1985; Lundgren, 1993; Rosenbeck, 1992). Work has to be done before processes of knowledge and learning can be more consciously mediated with social/cultural interests. In this situation we – as researchers – are left with judging only the consequences of what we partake in creating: modern science and technology. We have not developed the means to act and transform while we are 'at it', while we are producing science and technical solutions. The chances are high that we will only be prepared to act in a chosen direction when it is too late. Challenges from the global environmental and developmental crises cannot be adequately met before such mediations are realized.

## Implicatedness as Resource

If the diagnosis we have hinted at above is accepted, this impotence becomes an acute problem. Challenges arising from indications that the ecological and poverty crises are intimately linked to our western ways of living are addressed at the self-understanding of the actors in the modern research complex. As participants in this complex, we can no longer see ourselves only as deliverers of solutions, as helpers. We must also see ourselves as part of the problem, and we must learn how to employ our implicatedness as a resource for our transformative projects.

As researchers, we not only observe, unveil, analyse and solve problems 'out there' our knowledge producing activities are a (re)productive force whose effects are not contained by the walls of the ivory towers – if they ever were. As researchers, we do not have a standpoint outside a civilization in crisis; we are implicated in it. Our knowledge constructions are efficient; they produce 'reality'; they produce chances of life and death and distribute the chances unequally. This fundamental tenet of all research is, as Evelyn Keller puts it: 'nowhere more dramatically in evidence than in the successes of nuclear physics and molecular biology, that is, in the production of technologies of life and death' (Keller, 1992: 9).

The softer disciplines, social sciences and the humanities, usually shrink at the thought of being implicated in such instrumental activities as indicated earlier. We agree with Samuel Weber that 'The future of the humanities may well depend on the capacity of society to admit and accept the fictionality of what it assumes to be real, as well as the reality of its fictions' (cited in Diprose and Ferrell, 1991: viii-ix). The social sciences are presented with a similar understanding of their productive/ instrumental role in Dorothy Smith's writings. We will return to this point.

Impacts of our knowledge constructions are independent of whether our results are judged to be true or false, valid or invalid. Following this realization we can trace a shift in focus from what in the Anglo-American philosophy of science is called the 'context of justification' to an interest in developing more complex and integrated understandings of knowledge processes in the modern research complex. In order to handle the political and ethical implications and responsibilities involved in knowledge production, we need understandings and concepts of knowledge that help us become aware of these dimensions, it no longer suffices just to claim our scientific products as 'true' or 'valid'. Jane Flax formulates the necessary shift in the following way: 'I would like to move the terms of the discussion away from the relations between knowledge and truth to those between knowledge, desire, fantasy, and power of various kinds' (Flax, 1992: 457). We read this move or shift as expanding on what we presented as our 'headline challenge' at the beginning of this article. We would like to emphasize that this is not a call for any old or new liberal individualism. But we think Wendy Hollway has made a point by stating that 'Science as we know it could only become dominant because it was preferred' (Hollway, 1989: 122). Struggles to become aware of and change such preferences will be a central part of research transformative projects.

## The Science Question in Feminism – Once Again

It is not difficult to gather support for such a move in international feminist discussions. Sandra Harding's *The Science Question in Feminism* was an important text, convincing us of the need to put our knowledge constructions and ourselves at risk: it convinced us that feminism first and foremost was a movement for winding up privileges, including privileges of knowledge. What distinguishes feminist criticisms of science from other critiques and struggles against racism, colonialism, capitalism and homophobia, from the counter-culture movement of the 1960s as well as the contemporary ecology movement is, according to Harding, that

... the feminist criticisms appear to touch especially raw nerves. ... Perhaps most disturbingly, they challenge our sense of personal identity at its most prerational level, at the core. They challenge the desirability of the gendered aspects of our personalities and the expression of gender in social practices, which for most men and women have provided deeply satisfying parts of self-identity. (Harding, 1986: 16-17)

This characterization of feminist criticisms was reformulated as a challenge to feminists in a text that followed and expanded on the last chapter of The Science Question:

I want to talk here about some challenges for theorizing itself at this moment in history, and, in particular for feminist theorizings. Each has to do with how to use our theories actively to transform ourselves and our social relations, while we and our theories - the agents and visions of reconstruction are themselves under transformation. (Harding, 1987a: 285)

We find that Harding's texts brilliantly argue for and point to a reflexive turn where feminists' labour of change includes ourselves. But how do we deal with such a challenge in everyday research? From what was received in the first round of reading *The Science Question*, we suspect that we lacked both the readiness and the means to meet her challenge, as well as giving in to pressures towards legitimation by reading Harding's text as a guide to different ways to ground women's research. <sup>9</sup>

Harding understands the epistemologies she identifies as strategies for legitimating research, they are produced in and for a 'context of justification'. She also explicitly characterizes them as transitional: 'Gender-sensitive revisions of modernist epistemologies have provided the main justificatory resources for feminism. ... Thus I propose that we think of feminist epistemologies as still transitional meditations upon the substance of feminist claims and practices' (Harding, 1986: 141). This point is also emphasized in *Feminism & Methodology* (Harding, 1987b: 186). But there is also something about these epistemologies that can be of use for feminism's transformative projects, Harding contends. In *The Science Question* she describes the conflicts and the contradictions in and between them (Harding, 1986: 24), because this makes it possible for us to 'formulate new questions about science' (1986: 29). She points to such contradictions and conflicts as resources for our future-oriented, transformative struggles.

We want to follow Harding and maintain that 'reflexivity' is a critical ingredient in a transformative competence. A claim for reflexivity also links up very nicely with Flax's move. Reflexivity is on the agenda in science studies (Woolgar, 1988), as well as in Haraway's and Braidotti's struggle for respectively 'situated knowledges' and 'critical feminist theory/epistemology'. Harding's own *Whose Science? Whose Knowledge?* (1991), can be read as one extended argument for the necessity of reflexivity. This centrality of reflexivity is due to the researcher's obvious role as mediator between 'society and science'. In spite all this struggle, we argue that the claim for reflexivity has as yet to be adequately met.

The reflexive turn that we extract from Harding's recommended strategy demands an open process. The pressures toward legitimation and grounding seem to demand closure. *The Science Question* can be read as a warning not to mix up the work for legitimation with our future-oriented, transformative work. More often than not, the claim for reflexivity has proved its impotence by being directed at 'others'. We have also noted that the claim for reflexivity has deteriorated to a project of grounding one's own knowledge claims. Considering the strong influence of Marxist theory in critical traditions in Nordic countries, this is a very easy slide. To position oneself in relation to marginalized or victimized groups has been interpreted as legitimating one's knowledge claims. Rosemary Hennessy is among those who contend that standpoint epistemology can be developed beyond projects for grounding knowledge claims. She concludes her discussion of the possibilities in standpoint epistemology by stating:

Once the feminist standpoint is formulated as this sort of dis-identifying collective subject of critique, the emphasis in its claims for authority can shift from the grounds for knowledges - women's lives or experience - to consideration of the effects of knowledge as always invested ways of making sense of the world. (Hennessy, 1993: 30)

We find an interesting parallel to Hennessy's discussion in a text from the 'other side', the natural sciences, in Evelyn Keller's *Secrets of Life, Secrets of Death* (1992). Keller pursues here her 'mediation-project' from 1985 by adding a focusing of what science works at. It is not enough to contend that it works.

Aino Saarinen (1992) describes a move from 'different views on reality' to 'different views on science' in *Feminist Research - An Intellectual Adventure?*' We like to connect this move to the one Harding projects as she takes the discussion from 'the woman question in science' to 'the science question in feminism'. If we accept that there are different legitimate understandings of science, it seems to us that we must be prepared to include more of the construction of the map in the map, as any self-evident common grounding for knowledge production has broken down. The claim for reflexivity is given added weight by such a multicultural challenge. This is a challenge that cannot be held at arm's length, or (dis)placed with others. Not just everybody else's (or particular others') science, objectivity and rationality is up for deconstruction, investigation and eventual reconstruction.

## **Reflexivity and Authority**

During graduate studies and postdoctoral work, we learn to pass as researchers with authority in the academic world. Internalizing the rules and norms that constitute the chosen discipline also implies the assimilation of a complex of tacit or informal knowledges. As Gerholm and Gerholm put it: '... the things you learn by acquiring a discipline is by no means only knowledge of a certain kind and technical skill but also a "cultural framework" that may come to define a big part of one's life' (Gerholm and Gerholm, 1992: 14; our translation).

One important aspect of informal knowledge is the notion of authority or lack of authority in a text. The ability to recognize such authority is hard to make explicit and thus difficult to achieve. 'Very few scientists can answer questions about why certain texts give an impression of "competence" while other texts don't (Gerholm and Gerholm, 1992: 25; our translation). Gerholm and Gerholm describe this ability as a feeling for how authority is created in a text or a lecture, for what counts as an argument, for the common attitude towards the surrounding world and for the personal style accepted by colleagues.

Sharon Traweek has studied research cultures within high energy physics in the USA (SLAC) and Japan (KEK). She has also made a thorough investigation of processes of

<sup>9</sup> See, for example, Taksdal and Widerberg (1992), *Kunnskapsproduksjon og kjøn*n, skriftserie 3/91, Centre for Women's Studies, University of Trondheim, as well as the programme for basic feminist research in the humanities, NAVF, Oslo (1989).

knowledge production. In order to exemplify how we learn to achieve authority, we will use an example from the discipline of particle physics in the USA given by Traweek (1988). Renewal of physics takes place by training novices. Particularly important in this process is 'the informal annotations of everyday experience called common sense' (Traweek, 1988: 74). What constitutes common sense seems to be strongly regulated, as this research culture selects only a very narrow, overwhelmingly male, group of researchers. Concerning authority inside the discipline, one important aspect is whose interpretation of physics is not to be challenged. This is mediated through the textbooks and constitutes a kind of context marker in the discipline. Traweek contends that alternative interpretations at the same level of analysis do not exist. The student is taught analogic thinking, not induction or deduction. The sublime messages are 'that science is the product of individual great men; that this product is independent of all social or political contexts; that all knowledge is dependent upon or derivative from physics, and that the boundaries of particle physics are rigidly defined' (Traweek, 1988: 78). Another explicit message to students is the stated fact that there are only a dozen major research laboratories in the world that serve as places with real authority and which determine the agenda in particle physics.

To be recognized as a serious physicist committed to the work you have to develop a certain style. In the United States the focus has been on competition. This is a delicate act of balance in relation to the elders, the supervisors, who are giving tacit and explicit instructions. These intricate factors of achieving authority as a researcher stand in sharp contrast to the physicist's own conception of belonging to an elite, whose membership is based on scientific merits exclusively.

Traweek gives voice to an experimentalist with a certain distance from the experiences of being a successful postdoc. This experimentalist maintains that, to be successful, you have to be a relatively immature person.

... a mature person would have too much difficulty accepting the training without question and limiting doubts to a prescribed sphere. He felt that this precondition kept most women and minorities from doing well; their social experience had taught them to doubt authority only too thoroughly. (Traweek, 1988: 92)

Our transformative ambitions press us beyond this 'doubting' stand and to question how we can become aware of and convert our implicatedness in the problems and crises into resources for transformative projects.

## Legitimacy in and through Texts

Texts are written, read and deeply constructive. As Dorothy Smith (1990: 168) puts it: 'People scattered and unknown to one another are coordinated in an orientation to the same texts.' Public textual discourse creates new forms of relations, social as well as political and economic. Discourse is here understood as an ongoing intertextual process (or an ongoing 'conversation') mediated by texts among speakers and listeners separated from one another in time and space (Smith, 1990: 161). In *Texts, Facts and Femininity*, Dorothy Smith discusses the concept of discourse, in which we find the textual character of the ruling apparatus. If we recognize our established science communities as 'the ruling apparatus', it deepens our understanding to look at 'facts' produced in this apparatus as something arising in processes mediated by texts. Knowledge as facts, as has been discussed with the example in physics given by Traweek,<sup>10</sup> are sanctioned by the ruling apparatus after fulfilling both explicit and implicit conditions. As Smith puts it: 'The notion of "fact" ... indicates a recurrent orderliness of movement from locally ordered observations to the textually mediated discourse ... ' (Smith, 1990: 215). She advances the notion by stating that 'facts' arise in processes mediated by textual forms.

The mediated texts in the science communities constitute the discourse in which the scientific discussion and development take place. Dorothy Smith emphasizes that the discourse is an active social process, which leads us to the assumption that processes of producing facts are far more intricate than we have learnt in our academic education (especially if we are natural scientists or engineers). A more complex understanding of these processes is needed for dealing with transformation and legitimacy inside as well as outside scientific institutions.

Helga Nowotny stresses that knowledge has to be accepted or taken for granted not because of claims on higher scientific authority, but more because of negotiations. This point is grounded in a desire for knowledge that is open to and sensitive to many contact surfaces, where contemporary knowledge, in very heterogeneous contexts, is born. She also finds that these contact surfaces have one thing in common - they are messy. Instead of being distinctly separate, they overlap; instead of clear answers, we get contradictions. Everywhere we have to make choices, only to face a demand for a new choice around the corner. The world seems transformed into a labyrinth (Nowotny, 1994). This is certainly evident in fast growing research areas like biotechnology, although the labyrinth conception is repressed at the expense of a more controllable and straight one.

## Interdiscplinary Challenges and Potentials

From the beginning of the 1970s, interdisciplinary work has been regarded as a central (pre)condition for innovation and as a prerequisite for transforming research in order to meet challenges that did not respect established disciplinary borders. The 'textuality' of research processes that we outlined earlier, represents a relatively new possibility for interdisciplinary research. Still, interdisciplinarity as practice and culture and not just as a dream or programme seems further away than ever in the new Nordic women's

<sup>10</sup> In the context of a natural science like particle physics, communication of knowledge in various kinds of 'texts' is illustrative (Traweek, 1988: 117 ff). The different forms of expressions (texts) have specific functions. Oral communication of results is fundamental in order to maintain the whole complex of the discipline and to operate in the physics community. Written texts as preprints are used to verify results. Finally, knowledge in texts published in scientific journals with referee systems gives property rights of the formulation of the results to the author(s).

research. We find this deeply worrying and are inclined to see this as a symptom of the lack of a developed research transforming competence.

At present there are many hindrances to interdisciplinary experiments and other 'trying transformations'. One impact of the development of the centres for women's research in the Nordic countries is an increasing number of higher academic appointments, which is presented as a precondition for integrating feminist research into the established science community. Such a development demands to an increasing degree - the centres to adapt to existing norms of legitimacy, including pressures towards disciplining<sup>11</sup>. This tendency may be strengthened as women's research also adapts to the extended system including the state financed research councils upon which most research in our countries depend. Feminist research very soon reaches the glass ceiling. One aspect of this phenomenon may be that researchers at the top of their academic careers evaluate projects of feminist research in many different disciplines as well as projects with critical and transforming ambitions. As the evaluators usually have gained authority in their mother disciplines, they may have trouble recognizing heterogeneous, interdisciplinary, critical research projects as legitimate. At present it seems easier to get empirical studies accepted than to develop a critical tradition (Holter, 1995: 13).

In spite of the troubles hinted at earlier we maintain that, in order to advance a more complex understanding of processes of knowledge and learning as well as a transformative competence in modern research, an interdisciplinary approach seems essential:

Until we can articulate an adequate response to the question of how 'nature' interacts with 'culture' in the production of scientific knowledge, until we find an adequate way of integrating the impact of multiple social and political forces, psychological predispositions, experimental constraints, and cognitive demands on the growth of science, working scientists will continue to find their more traditional mind-sets not only more comfortable, but far more adequate. And they will continue to view a mind-set that sometimes seems to grant force to beliefs and interests but not to 'nature' as fundamentally incompatible, unintegrable, and laughable. (Keller, 1992: 36)

In order not to lose the content of the knowledge production in our technoscientific location, we have identified a fruitful feminist work of research with our backgrounds in the humanities and natural/ technoscience.

We have raised some problems in feminist research that oppose interdisciplinary work, such as the othering-processes and the need for achieving academic legitimacy. Nina Lykke, the initiator of the feminist research network 'Gender-Nature-CuIture', questions the discourse in feminist critiques where dichotomies between the hard and the soft sciences are emphasized. She contends that

... if fundamental dichotomies between hard and soft sciences are to be taken into account, the situation for feminist critiques of science is obviously much more intricate than if we take our point of departure in a situation in which these dichotomies are being challenged and destabilized. (Lykke, 1994: 50)

It is in the latter we want to situate our future projects.

Our experiences of interdisciplinary work emphasize that disciplinary boundary crossing functions as a catalyst for getting in touch with vast amounts of informal and tacit knowledge. This knowledge is either too obvious to be noticed or so intimately connected to our sense of self, experience of self or our disciplining, and therefore not available for reflection and transformation in our 'normal' everyday research activities. Trying interdisciplinary transformations thus becomes both a means and an end, which gives a character of process to our work.

We identify interdisciplinary work to be necessary for a fundamental critique. Feminist research in natural science and technology is keenly alive to this critique, because of its direct connections to the framework of the macropolitical arena of the ecological and poverty crises we have touched upon above. We have also argued that not even the humanities are free from being implicated in this framework (Gulbrandsen, 1995). We find a condition for working interdisciplinary alliances in agreeing on such a macropolitical diagnosis.

#### Note

We are grateful to Gro Hanne Aas for valuable suggestions and for pointing out crucial passages in Forståelser av kjønn, (Taksdal and Widerberg, 1992). See also Gro Hanne Aas 'Kjønn, samfunn og vitenskap i endring?' (Gender, society and science in transformation?) in *Kjønn og samfunn i endring: Rapport fra avslutningskonferense*. Program for grunnleggende samfunnsvitenskaplig kvinneforskning (Gender and society: Report from the concluding conference. Programme for basic women's research in the social sciences) Research Council of Norway, 1995.

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They have, over a couple of years, created a transdisciplinary, Nordic collaboration focusing the development of research transformative competence together with a development of feminist theory within technology and natural science. Such projects of critical analysis of scientific foundations demand a collaboration between the Humanities and (Techno)science in order to reach deep enough into the knowledge production of technoscience.

The following text can be read as my first attempt to pass as a policymaker at an international policy arena; a conference in Brussels prepared by participants in the so-called Helsinkigroup, a working group on gender and research set up by the European Commission. Mainstreaming was moving up the agenda at the time and in my intervention I presented challenges emerging in our Nordic contexts drawing on initiatives spanning across disciplines from technoscience to the humanities inviting crossover collaborations between researchers and policymakers. The text is a reprint from the conference report: GENDER & RESEARCH, Brussels, 8-9 November 2001.

# The New Politics of Knowledge: Making (sustained) change happen

Elisabeth Gulbrandsen Research Council of Norway

The questions I raise here concern the knowledge base for working equality at the level of mainstreaming. My argument is that we are underestimating the changes needed to sustain the production of gender equality in research at this level of strategy. My worry is that as a consequence of this, we may give up on mainstreaming too early.

As my questions grow out of what is perhaps a particularly Nordic situation, I will introduce them, and also suggest where to look for new resources and directions, by referring to some "trying transformations" (Aiken et al., 1987) or experiments I participated in during the late 1990s. These trying transformations gave impetus for my intervention at the Helsinki Group meeting in December 2000. Reactions and suggestions I got afterwards indicate that there may be lessons to be learnt, as well as resources and directions to pick for future experiments, if these trying transformations were presented in a fuller format, discussed and compared at a European level.

Moving on to my trying transformations, I will make an introductory remark, which also represents one of the lessons I have learnt. My focus today is on mainstreaming; that is, integration or diffraction, as the American researcher and cultural critic Donna Haraway names such an ambition (Haraway, 2000). But I want to stress that this does not mean that I am arguing against positive action. As you may know, Norway has a

long and fairly strong position on positive action, on special measures, programmes and even on setting up special institutions both where gender equality and women's and gender research are concerned. In fact, Norway is defending the use of quotas or positions, earmarked for female researchers, having been reproached by the EFTA Surveillance Agency (ESA) for discriminatory practices. I am not contesting that it is necessary and important to continue the work for equality at the level of affirmative action. With reference to the three strategy levels for working equality suggested in the ETAN report (2000) *Promoting excellence through mainstreaming gender equality,* I also want to underline that the work on laws and regulations must continue. But the experiments I have taken part in, at the level of mainstreaming, indicate that vital dimensions must be added to the knowledge base established for working at these two other levels, if and when we choose to work at the level of mainstreaming. My trying transformations also suggest that, in order to develop the knowledge base, we must question preconceived perceptions of research, of policies and politics, as well as discuss and develop new figurations (Haraway, 1997) of these rather basic concepts.

## New Edges and Paradigmatic Shifts

My trying transformations have confronted me with questions of a quite fundamental character. We have been asked to identify new edges to the questions concerning women and research. Maybe it is more appropriate to think and talk about paradigmatic shifts, when trying to figure out what it takes to be successful at mainstreaming gender equality in our research systems? I will motivate this move from new edges to paradigmatic shifts and hint at some vital prerequisites for approaching such turns by drawing on three trying transformations. Let me start by presenting questions arising on my "home turf", the Research Council of Norway, and end by drawing your attention to two experiments conducted at the Nordic level.

Taking effect in 1998, the Research Council of Norway reorganised its work on equality and on women's and gender research, in order to put more impetus on integration or mainstreaming. The Research Council is responsible for women's and gender research, as well as for gender equality in research at a national level. This responsibility is carried out in compliance with the Research Council's two main tasks, which are to initiate, fund, implement and follow-up research activities and to serve in an advisory capacity on matters concerning general research policy. This combination of funding agency and policy adviser is near to unique, and that is why I highlight it here. The main responsibility for tasks concerning general research policy rests with the Strategic Planning Division where I worked at the time of the reorganisation in 1998. To make a long and rather complicated story short: our task from 1998 was to mainstream, to make equality in research an integral part of research policy analysis and development, thus producing input for policy-making at governmental level (Gulbrandsen, 1998).

When turning to the received knowledge base for resources and directions developing our policy analysis and development after the reorganisation, we found that much effort had been invested in identifying flaws, biases and barriers in the research system,

as well as uncovering and unveiling causes of these flaws. Much good work had been done by women's and gender researchers to present the complex dynamics of gender differences and gender inequalities and connect them to various historical, cultural and social structures as well as to the Good Old Boys Sitting At the Table (GOBSAT), (see News from NIKK, 1/2000, Marketing Nordic women's and gender researchers' potential contribution to equality in research). Such knowledge functions well as background for appealing to the State to devise and implement special measures to compensate for flaws and overcome barriers. We need this dimension of the knowledge base as we need positive action. But this negative gaze, characterising the knowledge base at present, must be balanced when developing strategies at the level of mainstreaming aimed at structural and cultural transformations of our research systems. When producing input for policy-making, building on the established knowledge base produced by women's and gender research, we felt condemned to always run late while pointing to flaws, biases, barriers as well as bad baseline statistics. We should have been up front facilitating and fostering alternatives, new figures, stories and meanings as well as developing strategies for struggling towards them.

## What do we want to be equal to?

When invited to the table to integrate our concerns, we ought to be able to discuss and suggest, in fairly great detail, what kind of research systems we want to be equal to. In order to mobilise for, develop and later evaluate strategies at the level of mainstreaming, we need to focus more strongly on where we are heading. It is still necessary, but not enough, to represent the problems and point to what we want freedom from. I would like to leave a note here in memory of my late colleague Anne Søyland. Drawing on extensive experience from the Research Council and her network of equality advisers at Norwegian universities, she very quickly put us on track with her reflections on equality work and its relations to women's and gender research (Søyland, 1998).

To illustrate this shift further, I refer you to the ETAN report and its listing of principles of mainstreaming. You may remember that principle number five, visioning, is explained as gendering apparent gender neutral procedures and practices: "It involves recognising the ways in which our current systems and structures, policies and programmes, in effect, discriminate" (page 67). Our trying transformations suggest that we need to extend this principle to include visioning future solutions as well as patterns of past and present gender segregation and discrimination. Solution-oriented approaches do not necessarily entail developing extensive scenarios or utopias for the future. Much can be achieved by initiating processes figuring out "small wins"; with reference made to an approach developed at the Centre for Gender in Organisations at Simmons Graduate School of Management in Boston (Fletcher & Meyerson, 2000). At the same time, we have learnt that we also need to beware not to buy into readymade solutions. As we live cultures that still tend to read gender in a dichotomous way, it is very easy for women's and gender researchers, inadvertently, to end up being read as suggesting that bringing more women in will meet most challenges and solve most
troubles. Representing science as "masculine", "pale, male and exploitative of nature", "misogynist" and so on (Rose, 1999) invites such short circuits, even if the literature is full of explicit warnings against them. If you know anyone still in need of a sobering exercise, I refer you to chapter seven of Sandra Harding's *The Science Question in Feminism* from 1986.

When questioning what we want to be equal to, we are also invited to consider many other broad questions, besides horizontal and vertical gender segregation, confronting and troubling our research systems at present. What will it mean to work in a mainstreamed institution? What will a mainstreamed research institution look like? In her book Mainstreaming Equality in the European Union (1998), Teresa Rees points out how we are still stuck with mostly negative definitions of mainstreaming. To paraphrase Donna Haraway: we need to develop performative images of mainstreaming that can be inhabited (Haraway, 1997). For now, I will cite my Italian colleague in the Helsinki Group addressing the new director of Science and Society on the ambitions of the group: "We do not want to be a forum of women talking to each other. We want to be heard at Commission level and we want to be heard before the decisions are taken, not just comment afterwards". This way of putting it invites further questioning "what does it take to be heard - on our part?" We are convinced champions of equality in research, how do we make sense of this issue, how do we convince others of its importance? What kind of knowledge base, what kind of approach and what resources will help us make an impact negotiating with male and female GOBSATs?

## A Central Tool for Mainstreaming

For equality measures to make sense in a broader constituency, it is helpful to represent them as integral to some of the burning questions of leadership in knowledge organisations, to questions concerning accountability, responsible universities, to questions of governance, science, citizenship and social contact. To make this a bit more concrete, at the time of the reorganisation in the Research Council, the more permanently challenging questions in the Department of Research Policy concerned the co-visioning of research. The discussions turned around "the triple helix" (Etzkowitz and Leydesdorff, eds., 1997) as well as "the new production of knowledge" (Gibbons et al., 1994). We were not able to track down Nordic women's and gender researchers' contribution to this kind of questioning of our research systems. To push it a bit, it seemed to us that Nordic gender expertise (Husu, 2001) had forgotten Evelyn Keller's warning about reducing the complex issue of gender and science to "social relations" (Keller, 1992). I find the Women and Science Unit moving to the Science and Society Directorate very promising. I was happy to read Nicole Dewandre motivating the move in Cordis focus (no 173) by saying that the core of the equality problematic is a science-society one.

As already hinted at, building ownership is, of course, a central tool of mainstreaming, and the knowledge base for mainstreaming must include competencies for opening up, in order to let new voices and alternatives flourish. Ready-made solutions need to be banned for this reason as well. Maybe we ought now to think about co-visioning

of future solutions and small wins made by dominant and marginalised voices together? This may be difficult if the problems (and most of the power) are represented as being localised "out there" belonging to the structures or to the GOBSAT. To be better equipped to deal with co-visioning solutions, we, who take part in the modern research complexes, must strive to develop a readiness to think and feel ourselves as part of the problems, and to learn how to use our sense of implication as resources for our transformative projects. We also have to experiment with forms and organisations, meeting places or arenas that allow us to learn from our failures as well as from our successes. In the 1970s, the slogan was "You're either part of the problem or part of the solution". In order to become part of the solutions for the future, I think we have to try to experience ourselves as part of the problem as well (Trojer and Gulbrandsen, 1996). As the strength of Donna Haraway's figurations rests on this move from either/ or to both-and, I will once again refer you to her work. Also, as demonstrated in Carol Bacchi's excellent Women, Policy and Politics; The Construction of Policy Problems, from 1999, a constructivist approach to research and policy-making is also worth consulting when negotiating to make an impact. In her discussion on the role of gender expertise in equality work, Liisa Husu includes as the third and last point "...the ability to translate this theoretical understanding into organisational policy and practice." (Husu, 2001, p. 182). A constructivist approach invites a much more intense and reciprocal dialogue between researchers and policy-makers right from the start, which I think is indispensable when co-visioning mainstreaming is on the agenda. Reactions from Norwegian women's and gender researchers, when invited to a reorganised arena for dialogue about equality work, were a bit surprising and showed us that the borders between research, policy and politics may have to be put at stake, as well as preconceived perceptions of "research" and "politics". We were asking researchers to meddle with politics, they said. What they could deliver were not politics, but systematic, causal explanations of gender differences and inequalities (Nielsen, 1996, 1998). This brought us to question whether the scientific commitment to systematic, causal explanations of gender differences and inequalities serves our transformative ambitions and struggles as well as we wish to believe.

If we are to win change, it is not enough, as Hilary Rose claims, to focus on improving the statistical data and on improving the explanations (Rose, 1999). These are of course necessary elements in the knowledge base, but which need to be supplemented when mainstreaming is on the agenda. By our continued invitations to gender researchers and policy-makers to a new arena for co-visioning, I think we unwittingly came to question a fairly established, but silent, contract between them. According to this it is expected that researchers work up the knowledge base for delivery to policymakers who, in turn, work out the policies for equality. In return, the researchers expect "policy for science". I have suggested that we name this kind of contract "Statefeminism" (Gulbrandsen, 1998). This designates a fairly established way to think about the relationship between research and policy/politics – not just pertaining to women's and gender research. In fact, it is so common that it has been called "the Nordic way of governance" (Eide, 1996). I will underline that this is not a bad contract. It has been highly effective, but it is not sufficient for mainstreaming. It seems to me that this type of contract must be opened up to new and pressing challenges confronting our research systems at present such as leadership, accountability, responsible universities, and to questions of governance, science and citizenship. An inspiring feminist text representing the investments and anxieties involved in such a trying transformation without closure in sight, is Jane Flax' *The End of Innocence* (Flax, 1992).

## **New Feminist Contracts**

How and where can we develop and articulate elements of a more adequate knowledge base and a more adequate social contract? Where should we look for new resources and directions? Until now, I have mentioned many problems, while advocating a stronger solution orientation. Let me once more stress that both orientations are necessary, as well as interrelated: in every representation of a problem, lies a frustrated dream or solution inviting articulation and discussion.

Still, there are not many feminist versions or discussions about existing or future contracts. We have searched for them at the Nordic level, not being content with only importing feminist analyses of science and technology from the US. But before I point you more explicitly to our findings (which are two more trying transformations), I will, once again, remind you of the shift signaled by Sandra Harding in her book from 1986 *The Science Question in Feminism* and in which she is strongly advising women's and gender researchers to attend to the complex issues of questioning our research complexes, balancing up the hitherto strong focus on "the women or gender question in science".

By referring to a Nordic project conducted by eight Swedish research council experts on integrating or mainstreaming women's and gender research, I hope to inspire future efforts to discuss, suggest and design different feminist contracts at European level. This project dealt with prerequisites for mainstreaming women's and gender research. But as equality is one of the possible policy fields for gender researchers, I would argue that the discussions drawn up in this context are relevant to our struggles to identify prerequisites for working equality at the level of mainstreaming. The initiative for this experiment came from the Swedes, but as the Research Council of Norway was in the process of reorganising to put more emphasis on mainstreaming, we were invited to join in. A report on this work has been published only in Scandinavian languages. (For a presentation of this work, see the contribution by Lena Trojer, who headed this trying transformation, in chapter 5 "Benchmarking the progress of women in science".) The ways of working, as well as the arenas developed during the process of identifying conditions for mainstreaming, are well worth looking into. Here and now it is sufficient to point to the contract suggestions that are presented in the report, which are based upon a discussion of new figurations of politics drawing on the work of Ulrich Beck and Anthony Giddens. One of the conclusions from this experiment, is that in order to be successful at the level of mainstreaming, we need to supplement emancipating politics, the freedom from focus, with life politics; what do we want to use our

relative freedom for? The report draws resources for this move or shift from the field of techno-science. This is not because we find wonderful, ready-made solutions or new contracts there, but because these days, these fields are most intimately challenged to turn up as alternatives to received conceptions of knowledge and politics as well as the relationships between them. The prime mover of this dynamic is the shrinking of the distance in time and space between the production and the application of knowledge. The struggle and questioning resulting from these implosions, where the borders between politics and knowledge are continuously provoked, inspire the contract discussions in the report. This report is the closest we have come to feminist discussions of what I like to call "the new politics of knowledge" in the Nordic countries.

Finally, the last experiment, or trying transformation, was conducted by the Nordic Academy for Advanced Study in May 2001. It took the form of an international conference. The Nordic participants of the Helsinki Group were invited as a working group to plan the conference. One of the ambitions was to try out the balancing act between problem representation and more solution-oriented approaches. On the first day of the conference, we asked what the problems were represented to be. On the second day, the questions centred on what kind of research systems or academia do we want to be equal to? The reactions to this balancing act confirmed the extent to which investments are made in gender expertise unveiling and uncovering causes and structures of inequality and discrimination. It was also emphasised that we need additional resources to work at the level of mainstreaming where we are invited to make sense and to negotiate, because "we are not negotiating with the structures". One single voice also maintained that, because gender experts were so well trained in unveiling and uncovering past and present patterns of discrimination, more "practice" in figuring out small wins and future solutions should be welcomed.

To sum up these two trying transformations, and in order to continue developing the knowledge base for mainstreaming equality at European level, I suggest that a report on the knowledge base is drawn up, based on reciprocal dialogues on new feminist contracts between women's and gender researchers and policy-makers.

This is where I end - by putting the obvious question to you: Does this make sense?

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The next text is an attempt at reading in detail the situation of Norwegian women's and gender research at the turn of the century. The occasion was an invitation from the Committee for Co-operation of eight Swedish Research Councils established by the Swedish Parliament. The specific assignment of the Committee was to further support and co-ordinate activities with regard to interdisciplinary research, gender research and gender equity. My ambition was to invite sharing of lessons relating to mainstreaming or integration of gender research between the Nordic countries. The text is a reprint from the report Genusforskningens relevans (The Relevance of Gender Research. Final Report on Integration within Eight Swedish Research Councils) Trojer L. et al., FRN 2000.

# Integrering av kvinne – og kjønnsforskning i Norges forskningsråd

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## Bakgrunn

I 1993 fikk forskningsrådssystemet i Norge en ny struktur i det de eksisterende fem forskningsråd ble slått sammen til ett. Samtidig ble det nye Norges forskningsråd tillagt et ansvar for forskningspolitisk rådgivning på nasjonalt nivå. Det nye rådet fikk dermed en dobbeltfunksjon som forskningsråd og som forskningspolitisk råd. Det ble nedfelt i vedtektene til Forskningsrådets øverste organ, Hovedstyret, at det skulle sørge for utvikling både av en forskningsadministrativ og en forskningspolitisk kompetanse.

Da det norske Stortinget behandlet reformen av forskningsrådssystemet, ble det understreket at 'kvinneperspektivet'<sup>1</sup> skulle være et tverrgående perspektiv i det nye Forskningsrådet på linje med perspektivet om en bærekraftig utvikling (St.meld. 43, 1991-92, s 10 samt Innst. S. nr 231, 1991-92). Hovedstyret ble gitt ansvar for å sørge

<sup>1</sup> Jeg henviser drøftingen av 'kvinneperspektiv'/'kvinne- og kjønnsperspektiv' som uttrykk for kvinneforskningens samfunnskontrakt i Gro Hanne Aas "Kvinneforskningens samfunnskontrakt", jfr. bilaga 9 i denne rapporten.

for at disse to perspektivene ble ivaretatt av de seks nye områdestyrene<sup>2</sup>. Miljøperspektivet ble i tillegg tilgodesett med et eget fagområde, området for Miljø og utvikling, mens reformen i første omgang fikk mindre organisatoriske konsekvenser for arbeidet med kvinne- og kjønnsforskningen.

Allerede i 1994/95 ble det foretatt en gjennomgang av Forskningsrådets satsning på kvinne- og kjønnsforskning, og i desember 1995 kom hovedstyrevedtaket som bekreftet stortingsbehandlingen, idet Hovedstyret sier at det "...legger til grunn at områdene har ansvar for å integrere kvinne- og kjønnsperspektivene i sin løpende virksomhet" (HS-vedtak 105/95). Dette integreringsvedtaket ble igjen bekreftet og forsterket gjennom Forskningsrådets omorganisering av arbeidet med kvinneforskningen i 1998<sup>3</sup>. Men i denne tredje runden med integreringsambisjonen, bar forarbeidene bud om at integrering ikke er en helt enkel sak. I saksframlegget som lå til grunn for Hovedstyrets forberedende drøfting i november 1996 heter det: "Integrasjonsarbeidet byr på nye utfordringer og problemstillinger av en annen karakter enn etableringen av særtiltak i form av egne kvinne- og kjønnsforskningsprogrammer. Det er en utfordring å finne fram til hvordan ansvaret for integrering av kvinne- og kjønnsperspektiver skal implementeres i praksis".

I tidligere behandlinger av integreringsambisjonen, hadde egne programmer og særorganisering nærmest blitt fremstilt som virkemiddel for integrering. I "Framlegg og anbefalinger fra Sekretariatet for kvinneforskning" til Forskningsrådets hovedstyre i desember 1995, står det for eksempel: "Kvinneforskningsmiljøer i alle nordiske land går derfor inn for en dobbel strategi; særorganisering i egne programmer som forutsetning for integrering i de øvrige programmer. Uten den mulighet til fordypning, teoriutvikling og spisskompetanse som egne programmer kan frambringe, vil ingen reell integrering kunne lykkes". Riktignok påpekes det at "strategier og strukturer som sikrer integrering" må utvikles, men ettersom det eneste konkrete virkemiddel som tas fram er egne programmer for kvinneforskning, gir det grunn til å spørre i hvilken grad integreringsforsøk er møtt med argumenter for sterkere satsing på særorganisering<sup>4</sup>. Ettersom jeg selv har argumentert ivrig for å få integreringsutfordringen opp på dagsorden i Forskningsrådet og i kvinneforskningsoffentligheten, vil jeg understreke at det ikke på noe tidspunkt har vært snakk om å *forlate* den dobbelte strategien. Det handler om å åpne for en tanke om at den kompetanse og de strategier som fremmes gjennom etablering av egne programmer, ikke nødvendigvis fremmer integrering. Selvsagt er det viktig å fortsette arbeidet for egne kvinneforskningsprogrammer, men da som et mål i seg selv og ikke som ledd i en strategi for integrering.

Få måneder etter at integreringsambisjonen for tredje gang var løftet opp og bekreftet, ble Norges forskningsråd oppmerksom på at integrering også var satt på dagsorden i det svenske forskningsrådssystemet gjennom *Regjeringens proposition 1996/97:5, Forskning och samhälle*. I november 1997 ble det arrangert et møte i Norges forskningsråd med den nyutnevnte leder for Samverkansgruppen, Lena Trojer, hvor muligheter for et bilateralt samarbeid om integreringsutfordringen ble drøftet.

## Nordisk samarbeid om integrering

2 år senere og et stykke vei ut i et løfterikt samarbeid om integrering av kvinneforskningsperspektiver på forskningsrådsnivå mellom tre nordiske land, er det fremdeles viktig å understreke diagnosen fra hovedstyrebehandlingen i Norges forskningsråd i november 1996. Jeg vil driste meg til å påstå at det mest verdifulle utkomme av det nordiske samarbeidet i regi av Expertgruppen, har vært en økende forståelsen av dimensjonene ved integreringsarbeidet og en begynnende identifisering og konkretisering av hvilke "nye utfordringer og problemstillinger av en annen karakter" arbeidet for integrering krever. Ikke minst har vi fått demonstrert hvordan integrering aktualiserer behovet for utvikling av en *(kvinne)forskningspolitisk kompetanse* på forskningsrådsnivå så vel som i det forskningsutførende systemet.

Foreløpig har vi antagelig bare tak i en flik av dette gjennom drøftingene Expertgruppen har ført om nye kontrakter eller legitimeringsmuligheter i nordisk kvinneforskning.<sup>5</sup> Det er et merkbart behov for å utvikle mer komplekse og integrerte forståelser av forholdet mellom vitenskap og samfunn, forskning og politikk. Diskusjonen knyttet til forslaget om å se 'kvinneperspektiv' som et uttrykk for kvinneforskningens samfunnskontrakt<sup>6</sup>, kan tyde på at vi også bør se nærmere på den mer etablerte kvinneforskningens grunnleggende forståelser av politikk og av forskning og de muligheter og begrensninger som ligger i dem. Jeg har derfor valgt å konsentrere min kommentar til Expertgruppen om de (kvinne)forskningspolitiske spørsmål som arbeidet for integrering reiser.

Her ser jeg meg imidlertid nødt til å ta et lite forbehold. Utgangspunktet for Norges forskningsråds engasjement i Expertgruppen, var et annet enn det som fremkommer i Sonja Dahls evaluering av Samverkansgruppen. Forskningsrådet var ute etter et samarbeid for å identifisere og konkretisere "...nye utfordringer og problemstillinger av en annen karakter enn etableringen av særtiltak i form av egne kvinne- og kjønnsforskningsprogrammer." I evalueringsteksten skiller ikke Dahl mellom integreringsarbeidet og det arbeidet som gjøres for eksempel i FRN som har et eget program for "genusforskning". Dahl beskriver arbeidet for integrering som et allment opplysningsprosjekt der Samverkansgruppen konkurrerer med andre instanser med tilnærmet samme

<sup>2</sup> Norges forskningsråd ble opprettet med følgende 6 fagområder: Bioproduksjon og foredling, Kultur og samfunn, Miljø og utvikling, Industri og energi, Medisin og helse samt Naturvitenskap og teknologi.

<sup>3</sup> Se *Kvinneforskning* 1/98 som ble laget i anledning omorganiseringen og spesielt min artikkel "Forskningspolitiske (pr)øvelser" for en beskrivelse av den nye strukturen og samt motiveringen for og mulighetene i den.

<sup>4</sup> Se også debatten om integrering og særorganisering i Kvinneforskning 3-4/98.

<sup>5</sup> Dette temaet ble introdusert allerede på Expertgruppens første møte i mai 1998, drøftet i møtet 26.november 1998 og var hovedtema på seminaret Expertgruppen arrangerte i Norges forskningsråd 29.april 1999 hvor representanter for administrasjon og styringssystem i Norges forskningsråd også deltok.

<sup>6</sup> Diskusjonen ble reist av Gro Hanne Aas i foredraget på seminaret i Norges forskningsråd 29.april 1999. Jfr. bilaga 9 i denne rapporten.

oppdrag ("nærliggande verksamhet") som FRNs genuskomité og det nye nasjonale sekretariatet for "genusforskning".

Jeg tror ikke utgangssituasjonen i våre to land er så ulik som Dahls evaluering kan tyde på. Når jeg i det følgende konkretiserer utfordringene og problemstillingene av forskningspolitisk karakter som ligger til grunn for arbeidet med integrering i Forskningsrådet, håper jeg derfor dette også vil fremstå som relevante kommentarer til arbeidet på svensk side. Dette er for øvrig temaer som ble presentert for Samverkansgruppen 4. juni 1998<sup>7</sup>, og som er utviklet i en artikkel hvor jeg tok fatt i noen erfaringer fra omorganiseringsprosessen og spør hvilke muligheter som kan ligge i den nye strukturen.<sup>8</sup>

## Statsfeminisme og integrering

I omorganiseringen hadde to felt tegnet seg som sentrale for det fortsatte arbeidet med kvinne- og kjønnsforskning på forskningsrådsnivå i Norge. Det handlet om *integrering* og det handlet om *forskningspolitikk*. Hva forstår vi med *integrering*? Og *hvordan* forstår vi det forskningspolitiske oppdraget Forskningsrådet fikk gjennom forskningsrådsreformen, og som traff Rådets kvinneforskningsengasjement med full tyngde gjennom opprettelsen av en seksjon for kvinneforskning i Forskningsrådets forskningspolitisk avdeling.<sup>9</sup> I artikkelen inviterte jeg til debatt gjennom å utdype bakgrunnen for følgende påstand: Dersom vi skal lykkes med integrering, krever det opparbeiding av kompetanse i forskningspolitisk analyse- og utviklingsarbeid på forskningsrådsnivå så vel som på forskningsutførende nivå. Jeg skal repetere noen av bakgrunnsmomentene innledningsvis.

Under arbeidet med omorganisering hadde kvinneforskningens vitenskapskritiske og forskningsforandrende dimensjon blitt fremhevet som stadig mer sentral. I saksframlegget til Hovedstyret i november 1996 ble dette beskrevet slik: "Flere høringsinstanser fremhever at utfordringene for kvinne- og kjønnsforskningen i dag knytter seg til spørsmål om hvordan kvinneperspektivet skal få gjennomslag i etablert forskning, og i mindre grad til almenrettet formidling og brukerkontakt". Påvirkning og endring av etablert forskning var dermed pekt ut som et satsningsområde. Dette ga en ekstra spore til arbeidet med integrering, men det ble etter hvert også nødvendig å spørre om vi hadde maktet å gi det vitenskapskritiske og forskningsforandrende prosjektet tilstrekkelig tyngde i norsk kvinneforskning.

Uten en sterk og velutviklet forandringskompetanse er det lite interessant å arbeide for integrering av kvinneforskning. Integrering uten forskningsforandrende kompetanse, vil utvilsomt føre til usynliggjøring. Uten en velutviklet vitenskapskritisk og forskningsforandrende kompetanse vil integreringsarbeid være meningsløst. I sitt åpningsforedrag på sluttkonferansen for Forskningsrådets Program for grunnleggende samfunnsvitenskapelig kvinneforskning i 1994<sup>10</sup>, koblet Harriet Holter vitenskapskritikk og forskningsforandring sammen med integrering på en måte som illustrerer dette, samtidig som hun antydet at vitenskapskritikken nok hadde hatt bedre betingelser utenfor både programmets og landets grenser: "Kvinneforskningens flere års kritiske orientering overfor normalvitenskapens hovedgrunnlag, kan i alle fall bli ansatser til en integrering av kvinneforskning og tradisjonell forskning, der også kvinneforskningens premisser får gjennomslag. Selv om det vitenskapskritiske perspektivet er litt tynt representert i Programmets prosjekter, er det jo ikke på noen måte forsvunnet fra den internasjonale feministiske arenaen" (Holter 1995 s 13).

Da Holter utformet sin kommentar i 1994, hadde det såkalte vitenskapsproblemet<sup>11</sup> eller vitenskapsspørsmålet lenge stått på den internasjonale kvinneforskningens agenda. Norges allmennvitenskapelige forskningsråd (NAVF) etablerte i 1988 to programmer for grunnleggende kvinneforskning henholdsvis innen samfunnsfag og humaniora, men ingen av programmene hadde maktet å løfte den internasjonale, grunnlagsproblematiserende kvinneforskningen inn i norsk kvinneforskning.<sup>12</sup> Den vitenskapskritiske og forskningsforandrende dimensjonen ved kvinneforskningen stimuleres ikke nødvendigvis av arbeidet med og i egne kvinneforskningsprogrammer, idet usynliggjøring eller "malestreaming" ikke er en konstant trussel gitt særorganiseringen. Men det nærmest totale fravær av vitenskapsspørsmålet i de to programmenes prosjekter i en periode hvor grunnlagsproblemene nærmest eksploderer på den internasjonale arenaen<sup>13</sup>, krever ytterligere forklaringer.

I internasjonal kvinneforskning representerte vitenskapsspørsmålet et skifte av perspektiv. Innsatsen er ikke lenger konsentrert om å avdekke og identifisere barrierer, om å kjempe for at kvinner skal få sin rettmessige representasjon i forskningens produkter

<sup>7</sup> Upublisert manus. Det er noe underlig å se Dahl beskrive innlegget som en presentasjon av "genomförd och pågående genusforskning", jf Utvärdering side 8. Se for øvrig Samverkansgruppens årsrapport for 1998 side 4.

<sup>8 &</sup>quot;Forskningspolitiske (pr)øvelser" i Kvinneforskning 1/98.

<sup>9</sup> Seksjonen ble opprettet 1.september 1998, men dens oppgaver og "mandat" var beskrevet allerede i Hovedstyrets første behandling av omorganiseringen i november 1996.

<sup>10</sup> Konferansen ble avholdt i januar og Holters innledningsforedrag ble senere trykket i *Kjønn og samfunn i endring*, Norges forskningsråd 1995.

<sup>11</sup> Vitenskapsproblemet eller vitenskapsspørsmålet kom for alvor på dagsorden i internasjonal kvinneforskning gjennom Sandra Hardings bok fra 1986; *The Science Question in Feminism*. For et forsøk på å introdusere vitenskapsspørsmålet på nordisk arena, se min artikkel "Från kollektiv glömska till kollektiv kompetens? (Kvinno)forskning och förändring" i *Naistutkimus/Kvinnoforskning* 2/90. Artikkelen ble også trykket i en skriftserie fra Forum för tvärvetenskaliga kvinnostudier, Göteborgs universitet, *Feministisk kunskapsutveckling* (nr 6). *The Science Question in Feminism* var for øvrig en av grunntekstene i seminarrekken "Tekst og erfaring" som gikk over 3 semestre ved Senter for kvinneforskning ved Universitet i Oslo, 1986-87. jf Arbeidsnotat 1/88. I artikkelen "Vitenskap er ingen frøkensport" i *Nytt om kvinneforskning*, 2/90 oppsummerer og videreutvikler jeg noen erfaringene fra arbeidet med denne seminarrekken.

<sup>12</sup> Se rapportene *Kjønn og samfunn i endring*, Norges forskningsråd 1995 for en presentasjon av samfunnsviternes program og *Konstituering av kjønn fra antikken til moderne tid*, Norges forskningsråd 1995, for humaniora.

<sup>13</sup> Keller 1985, Young 1985, de Lauretis 1986, Harding 1986, Weedon 1987, Flax 1983 og 1987, Diamond & Quinby 1988, Spivak 1988, Hollway 1989, Jaggar & Bordo 1989, Armstrong & Tennenhouse 1989, Grozs 1990, se også Whitford 1991 for et glimt av grunnlagsproblematisering på fransk grunn.

og kvinneforskere sin rettmessige representasjon i forskningssystemene. Det vitenskapelige prosjektet i dets hvite, vestlige og moderne former, ble fra midten av 80-tallet opplevd som stadig mer problematisk. I ettertid er Tsjernobyl-katastrofen blitt et symbol for denne uroen på et mer generelt plan. I kvinneforskningen uttrykkes uroen som en vending fra "the woman question in science" og til "the science question in feminism". Forskning fremsto som problematisk også som et "middel" i kampen for å bedre kvinners situasjon. Det er de etablerte forskningssystemenes måter å utvikle og formidle kunnskap på som fokuseres og som undersøkes.

Det er viktig å understreke *dobbeltheten* i disse feministiske diskusjonene om moderne vitenskap og forskning. Utfordringene befinner seg ikke på armlengdes avstand for kvinneforskere med forskningsforandrende ambisjoner. Det er ikke bare alle andres rasjonalitet og (forsker)subjektivitet som skal dekonstrueres. Forskeren er ikke bare hjelper og produsent av løsninger og forbedringer, men også en del av (vitenskaps) problemet. De feministiske drøftingene av moderne vitenskap har gitt rammer for å se denne implisertheten som et privilegert utgangspunkt for forsknings- og sivilisasjonsforandrende arbeid. Hvorfor ble ikke vitenskapsspørsmålet et sentralt tema også for norsk kvinneforskning?

Norge er et av få land i verden, som - basert på en allment akseptert likestillingspolitisk agenda - har utviklet effektive og vellykkede allianser mellom politikere/forvaltere og kvinneforskere. Innen rammen av det Kjell Eide i artikkelen "Hvem skal informere politikken?" kaller "den nordiske styringsmodellen" som statsfeminisme kan betraktes som et eksempel på, er det viktig å trekke tydelige grenser mellom forskning og politikk. I et forsøk på å få opp en forskningspolitiske debatt om kvinneforskningens kontrakter og legitimeringsmuligheter, har mitt forslag vært å betrakte statsfeminisme som et uttrykk for en slik kontrakt<sup>14</sup>.

En statsfeministisk ramme som gir særskilte muligheter, setter også noen grenser. Gitt en slik ramme, kan det for eksempel virke direkte mot sin hensikt å problematisere grunnlaget for det en baserer krav til forvaltere og politikere på; nemlig "vitenskapelighet". Innen en statsfeministisk ramme fostres lett en *vitenskapsoptimisme* på kvinneforskningens vegne.<sup>15</sup> Forskeren opplever seg som en del av løsningene, eventuelt som en motekspert, som produserer forskningsresultater til bruk for forvaltere og politikere "der ute". Enkelt sagt forskes det "her inne" for at forandring skal skje "der ute". Det er ikke først og fremst det egne forskningsarbeidet som trenger til forandring og fornyelse. Og vitenskapskritikk kan bli "tynt representert". Jeg vil understreke at jeg som Harriet Holter - er ute etter vitenskapskritikk koblet med forskningsforandrende kompetanse. Jeg regner derfor ikke den pekende, demonstrerende vitenskapskritikken i det som Aino Saarinen omtaler som den nye kvinneforskningens første dekonstruksjonsfase, som relevant (Saarinen 1989). Integrering – forstått som forskningsforandrende prosjekt - kunne ikke bli et sentralt anliggende, før i den andre dekonstruksjonsfasen der det ikke lenger bare er alle andres rasjonalitet og "vitenskapelighet" som pekes ut som problemet. Det som karakteriserer vitenskapskritikken i den andre dekonstruksjonsfasen er søken etter arbeidsmåter for å kunne utnytte implisertheten i (vitenskaps)problemet som ressurser for et forskningsforandrende arbeid. Dette forutsetter at kvinneforskere også kan oppleve seg som en del av problemet og ikke bare som dets løsning.

# Kvinneforskning og framveksten av det forskningsavhengige samfunn

Internasjonal kvinneforskning har ikke hatt samme mulighet til å legge ut forandringsarbeidet gjennom appeller til en relativt kvinnevennlig stat og definitivt kvinnevennlige politikere.<sup>16</sup> Framveksten av det forskningsavhengige samfunnet har her ført med seg en grunnleggende problematisering av grensene mellom politikk og forskning og av "ekspertkunnskapen". Utviklingen i synet på "ekspertene" har sin parallell i synet på vitenskap.<sup>17</sup> Innslaget av forskning i alt som omgir oss øker, og virkningene er ikke udiskutabelt gode. Samtidig svinner avstanden - hva angår både tid og sted - mellom produksjon og bruk av forskningsbasert kunnskap. Dette er en situasjon som krever et fokus på forskningens mer direkte virkelighetsproduserende effekter. Grensene mellom politikk og forskning provoseres stadig, det er vel så adekvat å betrakte vitenskapelige sannheter som skapt og skapende, enn som oppdaget, avdekket eller avslørt. En slik vitenskapsforståelse åpner også for at spørsmål om demokratiets muligheter og politikkens forandring kan identifiseres inne i kunnskapsprosessene. Det er ikke lenger like sikkert hva som befinner seg "der ute" til forskjell fra "her inne". Gitt denne nye uoversiktligheten er det heller ikke så enkelt å avgjøre hvor grensen går mellom samfunnsforandrende og forskningsforandrende arbeid og kompetanseutvikling.<sup>18</sup> Også de forskningspolitiske grunnsetninger kommer opp til omvurdering.<sup>19</sup> Det er paradoksalt nok på grunn av sitt gjennomslag at forskningen møter de nye forskningspolitiske utfordringene knyttet til vitenskapsspørsmålet.

19 Egil Kallerud 1998.

<sup>14</sup> Dette forslaget ble presentert og begrunnet på møtet i Samverkansgruppen 4.juni 1998, jf Samverkansgruppens årsrapport for 1998 s 4. Gro Hanne Aas får for øvrig fram mange av de samme grunnleggende forskningspolitiske spørsmålene gjennom sin drøfting av 'kvinneperspektivet' som kontraktsformulering.

<sup>15</sup> Se også Beatrice Halsaas relativt ferske kommentar til den norske regjeringens forskningsmelding, KILDENs nettsider 17.11.99. Se for øvrig Wolfgang Sachs behandling av lignende utfordringer for miljøforskning i "Global Ecology and the Shadow of 'Development'" i *Global Ecology* fra 1993.

<sup>16</sup> For Norges del er disse særegne forutsetninger gjort rede for i Hege Skjeies arbeider, se for eksempel "Forskjellenes retorikk. Kvinneintegrasjon i elitepolitikken" (Skjeie 1991). Se også "Politikk, kjønn og teknologi i forandring? Samtale med Joan Greenbaum" i *Kvinneforskning* 2/97.

<sup>17</sup> Se for eksempel Kristin Asdals artikkel "Vitenskap som våpen? Om å bringe meningen tilbake i kunnskapsproduksjonen" i *ARR* 4/97.

<sup>18</sup> Referanse til Bruno Latour og Donna Haraway om hvordan reprodusere en kollektiv uvitenhet som gjør politikken maktesløs ved å opprettholde forestillingen om at samfunnet og politikken er i ett rom, mens naturen og forskningen befinner seg i et annet - jf for eksempel Latour "Naturen som høyesterett" i *Morgenbladet* 10/12 1999.

Det er teknovitenskapene, i særlig grad informasjons- og kommunikasjonsteknologi samt bio- og genteknologi, som tydeligst provoserer grensene mellom vitenskap og samfunn, forskning og politikk. Selv om vitenskapsspørsmålet i internasjonal kvinneforskning har vært mest intens debattert med utgangspunkt i teknovitenskapene, er andre disipliner absolutt på banen. Det er poststrukturalistiske strategier hentet fra den humanistiske fagkrets, som tas i bruk for å åpne teknovitenskapene for feministiske intervensjoner og for et arbeid med grunnleggende spørsmål om demokratiets muligheter og forskernes ansvar i vitenskapsbaserte sivilisasjonsformer.<sup>20</sup> Norske kvinneforskere har altså ikke vært iherdige deltagere i denne debatten foreløpig, og argumentet fra den såkalte KLOK-debatten<sup>21</sup> om å holde politikk og forskning adskilt fra hverandre, synes bekreftet i Beatrice Halsaas nylig publiserte kommentar til Regjeringens forskningsmelding. Halsaa kritiserer der Regjeringen for å blande sammen politikkområder og forskningsområder, og gi det politiske forrang framfor det faglige. Kommentaren ble publisert på KILDENs nettsted i etterkant av en presentasjon på det nasjonale kontaktmøtet i oktober 1999, og antas derfor å oppebære synspunkter som deles av ledende kvinneforskere i Norge.

Grensene mellom forskning og politikk/forvaltning kunne også blitt et tema i den forskningspolitiske debatten i Norges forskningsråd gjennom *Strateginotat for sam-funnsvitenskapelig forskning* (Kultur og samfunn 1997) I en bakgrunnsartikkel med tittel "Studier i det sosiologiserte samfunn" hevder Tian Sørhaug at det sosiologiske språket ikke lenger lager problemer for den etablerte virkeligheten, i stedet definerer og "løser" sosiologien de problemer som er med på å etablere denne virkeligheten (Sørhaug 1997). Betyr dette at også samfunnsforskning i forskningsavhengige samfunn er ugjenkallelig politisk og dermed på vei inn i vitenskapsspørsmålet, inn i debatten om nye kontraktsformer og andre typer ansvarlighet? Må det utvikles mer komplekse og integrerte forståelser av forholdet mellom forskning og politikk, eller kan samfunnsforskningen fremdeles reddes fra politikken gjennom for eksempel å skille ut utredningskomponentene slik at det igjen kan trekkes grenser mellom den "egentlige" forskningen og politikken?

Det ble ingen debatt om strateginotatet verken i kvinneforskningsoffentligheten eller i Forskningsrådet. Sørhaug selv og direktøren i området for Kultur og samfunn i Forskningsrådet, Arvid Hallén, synes å anbefale fortsatte grensedragninger (*Forskning* 7/99). I sin bakgrunnsartikkel tok Sørhaug også opp hvordan skillelinjene mellom natur og kultur transformeres på grunnleggende måter gjennom de nye teknovitenskapene (Sørhaug 1997 s 23). Dersom han hadde forfulgt natur-kultur problematikken inn i den internasjonale feministiske debatten om moderne vitenskap og teknologi<sup>22</sup>, kunne muligens konklusjonen blitt en annen? I *genus* 4/99 er det spor av en debatt om statsfeminsme, ekspertkunnskap, vitenskapsog politikkforståelser også på svensk mark. Det er Goldina Smirthwaite som mener at postmoderne feminister lukker øynene for en "obehaglig verklighet" og derfor ikke kan brukes i feministisk realpolitikk. I sitt svar til Goldina Smirthwaites ønske om at kvinneforskningen skal avsløre og avdekke de virkelige maktforholdene mellom menn og kvinner og dermed gi utgangspunkt for likestillingspolitikken, framholder Lena Martinsson at "Förhoppningen att man med social ingenjörskonst skall kunna lösa samhällsproblem bara man får dem beskrivna på ett förment objektivt sätt är inte så vanlig längre".

## Frigjøringspolitikk, livspolitikk og integrering

Dersom poststrukturalistiske tradisjoner i større grad skal bli sett som fruktbare innslag i norsk og svensk (kvinne)forskningspolitikk, tror jeg vi trenger å se nærmere på hvilke grunnleggende forståelser av politikk som er rådende. Begrepet om en frigjøringspolitikk<sup>23</sup> er introdusert som en forståelsesramme der en er opptatt av å redusere eller fjerne maktrelasjoner som utbytting, undertrykking og andre fordelingsulikheter. Moderne vitenskap og teknologi sees som et av de fremste *midlene* i (fotball)kampen mot undertrykkerne.<sup>24</sup> Frigjøringspolitikken tilhører opplysningsprosjektet, og den er først og fremst en politikk "for de andre". Politikkforståelsen som statsfeminsmen bygger på er grunnleggende frigjøringspolitisk.<sup>25</sup> Innen en frigjøringspolitisk horisont blir posttradisjonene ikke bare meningsløse, de kan til og med fremtre som destruktive; som "feminstiska självmål", slik for eksempel Smirthwaite ser dem.

Livspolitikk er foreslått som en mer adekvat politikkforståelse etter opplysningsprosjektets sammenbrudd, eller for de som mener det er nødvendig også stille spørsmål ved spillereglene og som ønsker et mer fremovervendt forandringsarbeid – spilleregler inkludert. Livspolitikker er avgjørelsespolitikker; det handler om å identifisere sentrale dilemmaer og vanskelige valg, foreta valg, se for seg eller "figurere" nye spill<sup>26</sup> og arbeide for å realisere dem. Livspolitikker forutsetter en viss grad av frigjøring, de kan ikke bedrives uten at en viss frisetting har funnet sted. Men det er kanskje ikke en helt ukjent situasjon for mange kvinneforskere og kvinner i vår del av verden? Livspolitikker forutsetter frihet til å utvikle ulike feminismer som kan gi kraft og retning til forandringsarbeidet. Livspolitikk forutsetter kollektiv mobilisering rundt ulike feministiske utopier. "Kvinneperspektivet" gir ikke mening som uttrykk for kvinneforskningens kontrakt gitt en livspolitisk horisont, men kan fungere godt gitt en frigjøringspolitisk

<sup>20</sup> Se for eksempel Diprose & Ferrell 1991, Keller 1992, Haraway 1991 og 1997, Traweek 1992, Fujimura 1992 og 1996.

<sup>21</sup> Debatten fulgte forslaget fra Barne- og familiedepartementet om å slå sammen Likestillingsrådets sekretariatet og Sekretariatet for kvinneforskning i Norges forskningsråd. Se *Kvinneforskning* 1/98.

<sup>22</sup> Donna Haraway 1997 gir en god presentasjon av denne debatten.

<sup>23</sup> Bilaga 9 i denne rapporten med henvisning til Gro Hanne Aas "Gamle og nye drømmer" i *Kvin*neforskning 1/98.

<sup>24</sup> Se for eksempel Rune Slagstads *De nasjonale strateger* for en fremstilling av moderne vitenskapsforståelser innbakt i en glitrende fortelling om forholdet mellom politikk og forskning.

<sup>25</sup> Se Jane Flax "The End of Innocence" for en meget god diskusjonen av frigjøringspolitikkens begrensninger. For en relativt tidlig diskusjon av ulike politikkforståelser som fremdeles har relevans, se Kirstie McClure; "The Issue of Foundation: Scientized Politics and Politicized Science" (McClure 1992).

<sup>26</sup> Se Donna Haraway for en framstilling og eksemplifisering av "figurering" som arbeidsmåte.

ramme.<sup>27</sup> Gitt en livspolitisk ramme, er det *feminismene* som kommer i fokus. Det oppstår behov for å utvikle nye tolkningsrammer ikke bare for "forståelser av kjønn"<sup>28</sup>, men også for en rekke andre gjenstandsområder eller studieobjekter. "Det är dags att vidga synfältet!"<sup>29</sup> Og i dette er jeg redd norsk kvinneforskning knapt stiller på startstreken. Norsk feminsmedebatt er usedvanlig fattig; den handler ikke engang lenger om forholdet mellom særartsfeminsme og likhetsfeminsime<sup>30</sup>. Diskusjoner av alternative tolknings- og forståelsesrammer, enn si utopier, forekommer knapt i kvinneforskningsoffentligheten.<sup>31</sup>

Det er fristende her å introdusere begrepet om forskjellsfeminisme i 3.potens. En slik feminisme tar ikke bare høyde for forskjellen mellom menn og kvinner, men også for forskjellene kvinner-i-mellom, i tillegg til å plassere seg på veien eller i *forskjellen* mellom "det som er" og "det som ennå ikke er".<sup>32</sup> Eller for å si det med Patti Lather; "between the no longer and the not yet", hvor den vitenskapsanalytiske og forskningsforandrende kompetanser blir avgjørende viktig for å komme seg videre.

Integrering - slik vi forstår det her som et vitenskapskritisk og forskningsforandrende prosjekt - gir først mening innenfor en livspolitisk horisont. Kanskje må *politikk-spørsmålet* opp på dagsorden for å bane vei for vitenskapsspørsmålet i norsk kvinneforskning? Kanskje forutsetter vellykket integreringsarbeid et skifte i politikkforståelse fra frigjøringspolitikk til livspolitikk? Jeg tillater meg fremdeles å mene at det er dimensjoner over dette arbeidet.

## Hva er kvinneforskning?/Vad är genusforskning?

Avslutningsvis skal jeg avlegge identifieringsspørsmålet en liten visitt. Det er dimensjoner også over dette spørsmålet. Det har fått stor oppmerksomhet i Expertgruppens arbeid, og det kan neppe stilles uavhengig av diskusjonene om vitenskapsspørsmålet som igjen aktualiserer spørsmål om kontrakter, om grunnleggende vitenskaps- og politikkforståelser og behovet for å utvikle den (kvinne)forskningspolitiske kompetansen.

Det er kommet meget gode svar på spørsmålet om hva kvinneforskning kan være fra de ulike forskningsrådenes utredere. Likevel vil jeg tillate meg en liten påminnelse om dimensjonene - avslutningsvis. Her må vi også være forberedt på å gå noen runder. Norsk kvinneforskning har sitt absolutte tyngdepunkt innen samfunnsvitenskapelig forskning iblandet noe humaniora<sup>33</sup>. Medisinsk kvinneforskning er også i ferd med å komme på banen, men innen matematisk-naturvitenskapelige og teknologiske fag er det liten om noen aktivitet.<sup>34</sup> Senter for kvinneforskning i Oslo har helt siden starten i 1986 vært et tverrfakultært senter, men ansvar for å initiere kvinneforskning ved alle universitetets fakulteter. Først i år, 14 år etter starten i 1986, utlyses en professor II-stilling i matematisk-naturvitenskapelige fag. Det kan derfor vanskelig oppstå etterspørsel etter finansiering av matematisk-naturvitenskapelige og teknologiske prosjekter blant kvinneforskere. En kan derfor ikke forvente at integrering drives fram som *forskerinitierte* prosjekter, i andre fagområder i Norges forskningsråd enn Kultur og samfunn.

Det kan dermed virke absurd å sette integrering på dagsorden i alle Forskningsrådets fagområder. I dette er det viktig å betenke at Norges forskningsråd har en dobbeltoppgave. Forskningsrådet er både et forskningsråd og et forskningspolitisk råd. Dermed er det mulig å tolke Hovedstyrets vedtak som et *forskningspolitisk råd* til fagområdene og til kvinneforskningsmiljøene om å satse på og utvikle de former for kvinneforskning som kan integreres i andre fagområder enn det humanistisk-samfunnsvitenskapelige.

Slike former for kvinneforskning har foreløpig fått lite gjennomslag på norsk grunn. Prosjekter som drives med utgangspunkt i vitenskapsproblemet, *gjenkjennes* ofte ikke som forskning.<sup>35</sup> For mer etablerte kvinneforskere kan en bevegelse i retning av vitenskapsspørsmålet oppleves som en *avvikling* av en hardt tilkjempet forskerkompetanse, det kan sette legitimiteten og autoriteten en har opparbeidet som forsker i spill. Veien fra "det som er" til "det som ennå ikke er" går *fra* primært å fokusere kvinner og deres vilkår, bidrag og kompetanser, *gjennom* studier av kjønning av organisasjoner og institusjoner og *over til* stadig mer grunnleggende problematiseringer av kunnskaps- og legitimeringsprosesser i moderne vitenskap og forskning. Skal det gi mening å snakke om og arbeide for integrering av kvinneforskning utover humaniora og samfunnsvitenskap, krever det at kvinneforskningen i større grad åpner for at vitenskapsproblematiserende prosjekter også gjenkjennes som kvinneforskning. Det finnes miljøer i Norge og i Sverige, men de usynliggjøres lett når det for eksempel rapporteres fra nasjonale aktiviteter. Jeg har selv deltatt på flere møter med nordiske koordinatorer for kvinneforskning hvor slike miljøer og prosjekter stadig "glemmes" i rapporteringsrundene.<sup>36</sup>

I en artikkel publisert i *Nora* 1/95 beskriver Catharina Landström hvordan hun etter et studieopphold i Tyskland kom hjem med intensjonen om å lage en komparativ studie over svenske og tyske kvinneforskeres arbeid med bio- og genteknologiske spørsmål. Men i den svenske kvinneforskningsoffentligheten var det ingen ting å finne; "Feminist journals in Sweden do not touch on issues of genetic science or technology at all".

<sup>27</sup> Ref til Gro Hanne Aas diskusjon av "kvinneperspektivet" som kontraktsformulering, bilaga 9 i denne rapporten.

<sup>28</sup> Referanse til Taksdal & Widerbergs innflytelsesrike bok fra 1992.

<sup>29</sup> Lena Martinsson i genus 4/99.

<sup>30</sup> Dette er berørt i artikler i *Kvinnovetenskaplig tidskrift*, samt i debatten om kvinnekultur-begrepet i norsk kvinneforskningsoffentlighet.

<sup>31</sup> Anne Haugestads artikkel i Kvinneforskning 4/99.

<sup>32</sup> Forskjellsfeminisme som betegnelse for feminismer som fokuserer forskjellen mellom "det som er" og "det som ennå ikke er" er foreslått av Lis Haugaard i intervju med Jone Salomonsen og opprinnelig trykket i *Kjerringråd*, gjenopptrykk i Haukaa 1986.

<sup>33</sup> Humaniora inkluderer i denne sammenheng teologisk kvinneforskning.

<sup>34</sup> Jeg regner kvinneforskning innen STS-feltet som samfunnsvitenskapelig.

<sup>35</sup> Henviser her til diskusjonen ovenfor om hvilke forståelsesrammer som er dominerende i norsk kvinneforskning, og hva de ulike rammene gir muligheter for å identifisere som "kvinneforskning".

<sup>36</sup> Nordisk institutt for kvinne- og kjønnsforskning spiller også en rolle i dette.

Hun spekulerer ikke mye over årsaken til dette, men skriver at "... Swedish academic feminism has had its stronghold in the social sciences and the humanities, and has mainly left the content of the natural sciences and technology unscrutinized. Feminist discussions of these fields in Sweden has focused on the small number of women in them and on the difficulties women encounter when they try to make a career for themselves." Som i Norge er det er kvinneforskning i samfunnsfag og humaniora og deres bidrag til likestilling i forskning som har dominert.

Men er dette fremdeles en gyldig karakteristikk – diagnose – som en må ta høyde for i integeringsarbeidet? Sverige fikk allerede i 1993 et professorat i "genus och teknik", siden har det kommet flere innen teknikkområdet. Likevel tror jeg fremdeles forståelsen av hva kvinneforskning handler om (vad genusforskning är) og hvilke politikkfelt aktiviteten retter seg mot, kan sitte godt fast i statsfeminsmen og frigjøringspolitikkens rammer. I den nye Genussekretariates organ *genus 3/99* under overskriften "Dialog med biologien" får for eksempel biologen Tiiu Hansson beskrive hvordan hun har fått hjelp av genusforskningen<sup>37</sup> til å tolke, til å stille spørsmål ved sin forskerrolle samt å få syn på den undertrykkende "könsordning som ofta råder på institutionerna". Samtidig påkalles formodentlig myke fag som humaniora for å kontrastere det som foregår i naturfagene/biologien; der tar forskerne makten over sitt objekt og manipulerar det.<sup>38</sup>

I et forslag til ny forskningsrådsstruktur<sup>39</sup> i Sverige slås det fast – uten videre begrunnelse - at genusforskning hører hjemme i samfunnsfag og humaniora. Dersom dette tas til følge, vil det også få alvorlige konsekvenser for integreringsarbeidet. Jeg kan avslutningsvis tenke meg å sette det på spissen ved å hevde at også integrering i samfunnsfag og humaniora vil være avhengig av at vi får opp genusforskning i andre fagområder. Arbeidet med vitenskapsspørsmålet som igjen aktualiserer spørsmål om kontrakter, om grunnleggende vitenskaps- og politikkforståelser og dermed behovet for å utvikle den (kvinne)forskningspolitiske kompetansen, ser i et internasjonalt perspektiv foreløpig ut til å trives best i nærkontakt med teknovitenskapene.

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<sup>37</sup> Nærmere bestemt gjennom et kurs i genusforskning ved Centrum för kvinnoforskning; Stockholms universitet.

<sup>38</sup> Om nødvendig; se Keller 1992 og Wagner 1992 for en kraftig kritikk av slik reproduksjon av stereotype forestillinger uten forandringspotensiale.

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**PART II** 

The texts making up PART II are created as invitations to an arena that I interpret as a 'shared space' between researchers and policymakers engaging in crossover collaborations to make sense of a situation where we are challenged not only in our more professional roles, but also as citizens.

The following text is a reprint from *ICT*, *Innovation Systems and the Role of Universities in Societal Development - a (post)colonial Strain?* (2004) This is the first time I explicitly figure responsible innovation as politics by proxy.

## How can Universities become more active Partners in Innovation Systems? Lessons from the Nordic countries?

... innovation is about adapting to changing circumstances and making new things in new ways. New ways to do things always emerge locally (Reijo Miettinen, National Innovation System, 2002)

## Significant question marks

The title of this intervention contains two significant question marks, and my ambition is to help them proliferate. One of the most pressing interrogations for science policymakers the last 20-30 years has centred on output; how to secure an output from research that complies with economic, social, cultural and ethical concerns. Or reformulated to suit our more immediate concern: How can universities assure that choices made by scientists<sup>1</sup> and engineers on campus contribute to responsible innovation? This challenge has by no means been satisfactory answered; hence the first question mark remains important. In the paper possible lessons are drawn with reference to Finnish ventures with National Innovation System (NIS) in the 1980-90s, Swedish universities' experiments with the so- called "third task" or mission from 1996 onwards as well as Nordic women's research contributions to social and cultural innovation.

The second question mark ought perhaps to be doubled as it relates to the possibility of

<sup>1</sup> By "scientist" and "science" I refer not only to the natural sciences, but the social sciences as well as the arts and humanities.

developing 'situated knowledges'. The concept was introduced by Donna Haraway as part of an epistemological and political struggle to create alternatives to "... developing at home that voice of entitlement, the voice of control, that accompanies the conquest of empires far from home" as Sharon Traweek depicts the conventional voice of science (Traweek, 1992). As an approach to knowledge-making, 'situated knowledges' endeavours to dilute the "two indivisible foundations of imperial authority - knowledge and power" (Aschcroft et al., 2002).

Texts produced with an ambition to qualify as situated knowledges, can be read as instances of sensemaking striving to "holds things together well enough so that people can share in that account powerfully".<sup>2</sup> As regards this intervention, I therefore find it appropriate to underline that the contexts for my engagements hitherto mainly have been Nordic. This makes sensemaking in a postcolonial context a rather risky task. So my second question mark may double while asking: Does this make sense?

## Challenges for research and policymaking

Not aspiring to promote a free and unfettered science capable of "speaking truth to power", 'situated knowledges' foregrounds science as deeply embedded, entangled and implicated in world-making processes. It works against various forms of unlocatable and hence, irresponsible, knowledge claims. It strives for partial, critical knowledge es capable of sustaining webs of connections called "solidarity in politics and shared conversations in epistemology" (Haraway, 1991, p. 191). 'Situated knowledges' is an argument for a more open and democratic scientific literacy, for a new doctrine of objectivity struggling to become accountable to the claims research make on people's lives. 'Situated knowledges' was put forward as a challenge for all the sciences/academic fields, though later developed in relation to technoscience (Haraway, 1997).

Sheila Jasanoff directs an echoing challenge to policymakers in a recent article commenting the growing insistence on co-evolutionary and interactive images in models relating to science and technology policy (Jasanoff, 2003). Co-evolution of science and society has led to increased complexity, unpredictability and irregularity in both spheres.<sup>3</sup> Jasanoff expands this discussion by contending that policymakers need to develop a set of 'technologies of humility' for assessing the unknown, unspecified and uncontrollable, the ambiguous and indeterminate aspects of scientific and technological development. 'Technologies of humility' call for different capabilities and different forms of engagement between scientists, experts, decision-makers and the public, than the regulatory and predictive 'technologies of hubris' on which policymakers presently lavish much of their attention. Jasanoff is not alone in addressing issues of complexity and uncertainty in relation to science and policymaking these days. Brian Wynne and Jerry Ravetz recently, in very interesting and provocative proposals, place 'ignorance' on part of the sciences at the heart of the discussion about how to understand, differentiate, express and communicate complexity and uncertainty.<sup>4</sup>

Sheila Jasanoff's article can be read as enhancing policy questions into political questions. Policy questions are often represented as questions concerning merely strategy or tactics.<sup>5</sup> Jasanoff insists that we also see them as constitutional:

There is growing awareness that even technical policy-making needs to get more political - or, more accurately, to be seen more explicitly in terms of its political foundations. Across a widening range of policy choices, technological cultures must learn to supplement the expert's preoccupation with measuring the costs and benefits of innovation with greater attentiveness to the politics of science and technology. (op. cit., p. 225)

## What is at stake?

I find Jasanoff's explication of the challenges for policymaking valuable and her concept of 'technologies of humility' suggestive. She is not very optimistic, however, concerning the necessary changes that have to follow to assure that the research and innovation activities of institutions like universities, will reflect responsible concern for the public good: "The problem, of course, is how to institutionalize polycentric, interactive, and multipartite processes of knowledge-making within institutions that have worked for decades at keeping expert knowledge away from the vagaries of populism and politics" (op. cit., p. 235). What is at stake here? What does it take to enhance our transformative capabilities adequate to this challenge?

The linear model that was dominant in science and technology policy from the 2nd World War until the late 70s, might be declared in trouble and even dead, but it won't lie down that easily. What is stopping us from pulling ourselves and our institutions out of line(arity)? Although it is recognized that interactive knowledge-making with "up-stream" participation from stakeholders foster more socially robust knowledg e, improve accountability and lead to more credible assessments of science and technology, modern institutions still operate with conceptual models that seek to separate science from normative and political questions, and that emphasize prediction, mastery and control at the expense of reflexivity and learning. New policy models based on interactive conceptions have a hard time, being subjected to hash criticism by leading (as well as aspiring) scholars.<sup>6</sup>

<sup>2</sup> As Haraway herself puts it in an interview with Thyza Nichols Goodeve in *How Like a Leaf* (1999).

<sup>3</sup> As developed e.g. by Nowotny, Scott and Gibbons in *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty* (2001).

<sup>4</sup> Jerry Ravetz asks in "Reflections on of the Future of Science": Can we afford, any longer, to maintain ignorance of ignorance at the centre of our scientific culture?" (http://www.others.com/reflect.htm) Brian Wynne contended at EuroNanoForum in Trieste, December 2003, that "Public ignorance is not the cause of mistrust and scepticism, this has been proved by Eurobarometer surveys. The cause is what as seen as a denial by scientists of scientific ignorance."

<sup>5</sup> See Bo Dahlbom "Vem styr tekniken?" (Who governs technology?) and Carol Bacchi *Women, Policy and Politics: The Construction of Policy Problems* (1999).

<sup>6</sup> The new models are criticized for being unscientific, not empirically based, of no analytic value, just empty rhetoric, dangerously misleading, mere propaganda from Brussels and so on. As Nowotny et al. also point out in an article revisiting "mode 2"; such reactions are predictable (Nowotny, Scott and Gibbons, 2003).

It is important not to underestimate the changes required to initiate and sustain transformative processes in research systems. It may require quite fundamental shifts: "I think something is going on in the world vastly different from the constitutional arrangements that established the separations of nature and society proper to "modernity", as early modern Europeans and their offspring understood that historical configuration; and recent technoscience is at the heart of the difference" (Haraway, 1997, p. 43). The breakdown of the linear model leaves little or no intermediary time and no place to develop science's relations with society "... after all the serious epistemological action is over" (Haraway, 1997, p. 68). The transformative challenge doubles as accountability is placed on the agenda. Our scientific struggles are deeply embedded in world-making processes and in order to develop a knowledge base and competencies more adequate to such diffractive endeavours, we may have to question received conceptions of research, of policy and of politics as well as discuss and develop new figurations of these rather basic concepts and their relations.

These are stiff demands, and it is therefore important to make sense both of the institutional and scholarly resistance, as well as exercise our imagination in developing new questions and discussing new figurations, like 'situated knowledges' and 'technologies of humility', that can guide our efforts towards more intimate, immediate and responsible interactions between research, policymaking and politics. Otherwise the critique of the linear model might end up as impotent as the critique of positivism in the 70s.<sup>7</sup> An outcome I fear we cannot afford.

## A very short story of science policy

The conventional short story of science policy starts with "science push" following the 2nd World War, shifting to "societal pull" in the 70s.<sup>8</sup> This narrative can also be interpreted as a dichotomous science policy situation; on the one hand, at one place and time we have a focus on "policy for science" that is input centred, on the other hand we have "science in/for policy" that is focused on securing output from research. As Wenneberg (1999 & 2000) as well as Sarewitz (2000) have demonstrated, the outcome-oriented approaches are still poorly developed: "So we fall back on what we know how to do best: talk about inputs to the system, and assume that we will get the outputs we need and desire" (Sarewitz, 2000, p. 13). The input that is focused most is money, and science policy is consequently preoccupied by asking how to use money on research, by discussing what financial measures to develop. According to Sarewitz, science policy as currently practiced in the U.S: "… operates largely as struggle over allocation of resources" (op. cit., p. 14). If policy/politics in this way disintegrate into

fights over budget, the "success" of the policy endeavours in science is not measurable in terms of increasing quality of life/contributions to particular societal outcomes, only in terms of the size research budgets. It has been suggested that the introduction of New Public Management in research systems contribute to the decline. It is puzzling that in so called knowledge societies, inspiration for developing the system of governance is taken from business and/or bureaucracy, not from universities.<sup>9</sup>

In Sweden, the system of funding and research was institutionalized in a bifurcated way. Research directed to societal needs, was taken care of and funded through the development of separate sectorial agencies that was put up aside the traditional, discipline-oriented research councils. Hence, two different conceptual models of research existed side-by-side, never having to interact. The presumably clean, objective, basic research was catered for through policy for science-institutions, while the presumably societally related and relevant research was handled by sectorial research agencies. Such a consistent dichotomous research system has some rather grave consequences, as suggested by Aant Elzinga (Elzinga, 1994). The societal/political dimensions of research remain invisible to university researchers in their everyday lives, Elzinga contends, and more complex understandings of science's internal dynamics interacting with societal drivers never become an issue, neither by university-based researcher nor for researchers catered for by sectorial agencies.<sup>10</sup> Questions concerning the research system as a central societal stakeholder and political actor were not addressed. As a result, research communities may draw on obsolete and simplistic ideas about the relations between science and society, Elzinga warns, undermining their ability to deal with science as embedded and entangled in world-making processes. An evaluation of Risø National Laboratory in Denmark, seems to confirm that policy questions, in this case represented as "strategic questions", is absent and of little or no interest to the researcher in her everyday activities (International Evaluation of Risø National Laboratories, 1997). In 1994, Elzinga put his hopes for the development of more integrated and complex conceptual models in the proposed concept of "strategic research". A range of other suggestive figures, triggered by anxiety concerning the linear model and dichotomous policy situation, followed suit; e.g. triple helix, innovation system, post-normal science, technoscience, mode 2 and agora.

The anxiety has increased the last 10 years, manifesting itself in the focus on public participation and governance, on prediction and regulatory mechanisms, as well as in the proliferation of ethics committees and ELSA-research; that is research on the ethical, legal and societal aspect of emerging technologies. If we follow Haraway's suggestion and consider technoscience paradigmatic for the predicament, the new production of knowledge empowers society to intervene more directly and on a massive

<sup>7</sup> For a discussion of the impotent critique, see *The Reality of our Fictions: Notes towards account-ability in (techno)science* (Gulbrandsen, 1995). Reference also to Alfred Nordmann, rapporteur of the European Commission's High Level Expert Group on converging technologies, expressing worries about what he points to as a swift return of positivism (at a seminar in Oslo, 5 May 2004).

<sup>8</sup> For excellent reviews and discussions of the policy literature, see Egil Kallerud 1992 and 1998.

<sup>9</sup> Reference made to Johan P. Olsen's paper; "Organisering og styring av universiteter: En kommentar til Mjøs-utvalgets reformforslag", (Organisation and governance of universities: A comment to the proposals for reform from the Mjøs-committee), ARENA Working Papers, 00/20.

<sup>10</sup> As a result of a lack of more complex understandings of the interrelatedness between the sciences' internal and external workings, Sweden may be subjected to rather unfruitful (reactionary) shifts at the policy/politics level; see e.g. Ben Martin (2001, p. 12).

scale into the "nature of nature", both on micro level (biotech to nanotech) and on the macro level (global climate and biodiversity). The transformational potency to what we are creating today is unprecedented in history. "The only possible analogue we have to today's emerging technologies is nuclear weapons", Sarewitz contends, reminding us that we were "... a hair's breath of cataclysmic nuclear war during the Cuban missile crises. We were lucky, not smart." (Sarewitz 2000). The advent of the knowledge society, calls for real-time technology assessment, for identifying choices and making evaluations as part and parcel of (techno)scientific processes.<sup>11</sup>

The linear model still holds sway in Europe, if judged by the recent discussions concerning the establishment of a European Research Council (ERC) and conferences this spring focusing the future of European universities, together with invitations from the European Commission to discussions about the Seventh Framework Programme (FP7). European universities are expected to contribute to innovation, work in partnership with stakeholders in networks "... to ensure better dissemination and exploitation of new knowledge ... be it for commercial applications, to take part in public debates or advise governments at policy level".<sup>12</sup> Implying that first we have knowledge-making, then dissemination, exploitation and/or application. Quite far from dreams of securing societally robust knowledge through "polycentric, interactive, and multipartite processes of knowledge-making" as proposed by Jasanoff (2003) or through different forms of "collaborative assurance" (Guston 2000). The Commission recently proposed to discuss the setting up of a European "agency" for allocating EU-funds for research also to "basic research". While characterizing the FP-side in terms compatible with sectorial research, "basic research" is advocated as based on scientific excellence, peer review, not "political agendas". The only community that will have something to do with setting the research agenda in basic science will be the scientific one.<sup>13</sup>

## Authority in transformation<sup>14</sup>

At times it seems to me that we are trudging in fine programmes for change, with little or no transformative power. Why is that? Again; what is stopping us from pulling ourselves and our institutions out of line(arity)? How to account for the continuing appeal of the linear model and a bifurcated policy system? Enhanced understanding both of the resistance against as well as possibilities for transformation is emerging as a competence much sought after. Continuities between the critical programmes of the 50s, 60s and 70s, critical hermeneutics, women's research as well as the relatively new field of science studies can easily be traced.<sup>15</sup> In the 50s this ideal was formulated as 'critical theory'. A theory was critical in proportion to its ability to specify its own (pre)conditions. What could be struggled for was a relative objectivity; an objectivity that could specify its own limitations, which at the same time also indicates possibilities - even if this point was seldom emphasized. In 1985, Evelyn Keller summed up the struggles for more complex models: "Yet, while our sensitivity to the influence of social and political forces has certainly grown, our understanding of their actual impact on the production of scientific theory has not" (Keller, 1985, p. 5).

As already indicated, this lack of mediation between so-called external perspectives and more internally based analyses has grave consequences regarding our possibility to develop a transformative competence as researchers and as policymakers. As a result of this lack, we cannot but regard science's products as being impelled solely by science's own internal logic. In the everyday life of doing research, we are left without possibilities to understand how macro powers are at play; we are left without the possibility of transforming research in a direction of identified societal concerns. In a Nordic context, concessions are made that the ambitions from the 60s and 70s have as yet to be realized.<sup>16</sup> We are left with judging only the consequences of what we partake in creating; science and technological development. The linear model may be only five decades, but grafted on an older and more ingrained tradition, it will not step down when told to. Does this mean that we are stuck between those "old and tired words"<sup>17</sup>, between external and internal stories of science and technological development?

Impacts of our knowledge constructions are independent of whether our results are judged to be true or false, valid or invalid. Following this realization we can trace a shift in focus from what in the philosophy of science is called the 'context of justification' to an interest in developing more complex and integrated understandings of knowledge processes in the modern research complex. In order to handle the political and

<sup>11</sup> See e.g. Guston & Sarewitz (2002) proposal developing what they call "real-time technology assessment" in Technology in Society 23(4) as well as Arie Rip et al. (1995) work on "constructive technology assessment".

<sup>12</sup> Invitation to the conference in Liege, April 2004, on the future of European universities. 13 *Science and technology, the key to Europe's future,* strategy document from the Commission,

<sup>2004 06 16,</sup> and statements made by Research Commissioner Busquin and Director-General of Research Mitsos, see e.g "Signs of change in EU science", *The Scientist*, 2004 02 18 and "EU proposes science shake-up", *The Scientist*, 2004 06 16. I understand the work of the Commission's High-Level Group on converging technologies as a serious attempt to counter the setting up of such a bifurcated system, by suggesting and struggling to promote agenda-setting policy processes as arenas for stimulating more creative and imaginative research processes (Converging Technologies - Shaping the Future of European Societies, report 2004). This interpretation was supported, I think, by the rapporteur's exclamation directed at his fellow scientists at a meeting in Brussels, 15 September 2004: "Politics is good and can even be fun!"

<sup>14</sup> The discussion of authority is developed in a paper with the same title in *The European Journal of Women's Studies* (Trojer & Gulbrandsen 1996).

Reference made to Lundstøl (1977), Bärmark (1984), Rosenbeck (1992) and Lundgren (1993).
 See Gregersen and Køppe (1985), Håkanson (1988), Kjørup (1985), Lundgren (1993), Rosenbeck (1992).

<sup>17</sup> Ian Hacking's expression in "The Self-Vindication of Laboratory Sciences", in Pickering (ed., 1992, p. 51).

ethical implications and responsibilities involved in the new production of knowledge, we need understandings and concepts of knowledge that help us become aware of these dimensions, it no longer suffices just to claim our scientific products as "true" or valid or that "it works". Following Keller from 1985 onwards, we must also ask what it works at (Keller, 1992). If we consider complementing the context of application with the context of implication in policy models as recommended by Nowotny et al. (2001), we have here another interesting convergence between research questions and science policy questions.

During graduate studies and postdoctoral work we learn to pass as researchers with authority in the academic world. Internalizing the rules and norms that constitute the chosen discipline also implies the assimilation of a complex of tacit or informal knowledges. As Gerholm and Gerholm put it: "... the things you learn by acquiring a discipline is by no means only knowledge of a certain kind and technical skill but also a "cultural framework" that may come to define a big part of one's life" (Gerholm and Gerholm, 1992, p. 14 my translation). One important aspect of informal knowledge is the notion of authority or lack of authority in a text. The ability to recognize such authority is hard to make explicit and thus difficult to achieve. "Very few scientists can answer questions about why certain texts give an impression of "competence" while other texts don't" (op. cit., p. 25, my translation). Gerholm and Gerholm describe this ability as a feeling for how authority is created in a text or a lecture, for what counts as an argument, for the common attitude towards the surrounding world and for the personal style accepted by colleagues. What we want to leave behind as outdated conceptual models may live on as cultural frameworks, showing itself spontaneously in practice as a "theory-in-use".18

This is not a call for any old or new liberalism, but I think Wendy Hollway makes a point by stating that: "Science as we know it could only become dominant because it was preferred" (Hollway, 1989, p. 11). Struggles to become aware of and change such preferences will be a central part of research transformative projects. What I miss in most of the European approaches, is application of and reference to "(techno)science as culture" as developed in science studies in the US. Processes of knowledge and learning hinges, in rather constitutive ways, on capacities for reading, writing, interpreting and translating. Language and communication are cultural products and attending to and developing our cultural and scientific literacy, may also help in mediating between external and internal stories of science and technological development, paving the way for what we may figure as a "politicoscientific competence".<sup>19</sup> Provided that we observe and let us inspire by the elegant turn of the concept 'scientific illiteracy' as performed by Sandra Harding (1998), and manage to keep our justificatory efforts apart from our transformative struggles. The latter will include considering whether a developed

18 See Chris Agyris (1991) for a discussion of espoused theory contra theory-in-use.

transformative competence can turn out to be what renders legitimacy and accordingly authority, to our work in the longer run.<sup>20</sup>

## Situated futures

'Innovation system' was one of the first concepts employed to figure interactive alternatives to the linear model. It has been extensively used in the Nordic countries while pointing to Finland as the paradigmatic case of applying the concept of 'national innovation system' (NIS). Reijo Miettinen's analysis of how the notion of NIS was developed in Finland, may also qualify as paradigmatic I think, focusing NIS' role as a mobilizing metaphor, discussing its development as it doubles as both a scientific and a policy concept (Miettinen, 2002). He introduces and develops: "...an epistemology of transdiscursive terms that are simultaneously and interactively used both by scientific communities and in policymaking". This turns out to be a useful perspective for discussing the changing relations between policy questions and research questions that I focus in this intervention. Examining other suggested figures like mode 2, agora, technoscience, post-normal science, as transdiscursive terms, may further our understanding of the convergence between research questions and policy questions.

Miettinen's text is rich and may serve to induce the much warranted reflexivity both on the part of researchers and policymakers. He manages to bring forth awareness concerning the technocratic and scientistic temptations lurking in NIS, well suited to the tradition of rationalistic policymaking and planning. Miettinen discusses whether Nordic socialdemocractic political cultures may predispose both policymakers and researchers for technocratic and scientistic interpretations of the concept, making them eager to exploit its holistic possibilities thereby connecting NIS to technologies of hubris, or to stick with Haraway; the god-trick<sup>21</sup>. But not necessarily so, Miettinen argues convincingly for a more modest approach, emphasizing reflexivity, learning and context dependent knowledge-making. Thus echoing both figures like situated knowledges and technologies of humility, not seeking "mastery and control", but focusing interaction with ambitions to induce modulations in the diminishing gaps between variation and selection or promotion and control.<sup>22</sup>

What fascinates is Miettinen's analysis of policy questions as related to research questions. I find the transdiscursive perspective valuable, representing possibilities for judging the new suggestive science policy models like mode 2, triple-helix and post-normal science, against another background or project than the conventional scientific one.

<sup>19</sup> Reference made to Michael Flower's figure of "politicoscientific communities" as presented in Haraway (1997).

<sup>20</sup> This argument is developed in my licentiate thesis, especially the article "The Reality of Our Fictions: Notes towards accountability in (techno)science" (Gulbrandsen 1995).

<sup>21</sup> The god-trick according to Haraway; " ... to see everything from nowhere" (Haraway, 1991, p. 189).

<sup>22</sup> See Arie Rip's expert review for the Bundesministerium; *Co-Evolution of Science, Technology and Society* (Enschede, 7 June 2002) for an excellent elaboration on the co-evolutionary perspective on science and technology with society, as well as a brief review of the literature on co-evolution: http://www.sciencepolicystudies.de/expertise/download.htm

What bothers me about his approach, is what I find is a subscription, after all, to a concept of science, that accepts that science cannot cater for anything associated with the future. Miettinen promotes such an understanding by e.g referring to Marx Wartofsky's distinction between models that serve as explanations of present practices and state of affairs, and models that are used in orienting ourselves to the future. Explanatory models of science mostly belong to the first category, Miettinen contends. Policymaking is conditioned on making sense of the future. Since 'the future' is not a sort of thing one can put under microscope, or even test by a knowledge of exactly equivalent conditions in the past, we are involved in decisions that necessarily lie beyond the strictly scientific vocabularies of description. I have positioned myself through throughout this paper in relation to a project of blurring the boundaries between science and policy/politics, not in relation to the intentional separation advocated by Miettinen. I find that blurring the boundaries is unavoidable to a certain extent, as well as productive on both policymaking and research. This approach entails dangers, of course, but if we avoid references to the future, we also avoid references to the desired outcomes and identified concerns, and hence, accountability in other than cost-benefit terms, becomes difficult, if not impossible.

A clear-cut separation also invites a division of labour between scientist and policymakers, reinforcing a social contract thinking that has been called the "Nordic way of governance".<sup>23</sup> In my attempts to double as an advisor to the policymakers, in a so-called intermediary institution (Guston, 2001), The Research Council of Norway, I have come to doubt whether my commitment as a researcher to systematic, causal explanations may serve our transformative ambitions as well as we want to believe. It is not enough to focus on improving the statistical data and on improving the explanations. These are of course necessary elements in the knowledge base, but must be supplemented in ways that allow researchers and policymakers to engage in polycentric, interactive and multipartite processes about future solutions and implications of knowledge claims.<sup>24</sup> My suggestion is that we complement 'situated knowledges' with a new figuration of 'situated futures'.

## In dreams begin responsibility

There seems to be quite a lot of imaginative futures around these days, suffice to mention different foresight exercises swarming the European countries. In a recent article Catherine Lyall and Joyce Tait (2004) discuss these endeavours and conclude that the linear model still reins, in spite of all good intentions to break with it. Lyall and Tait also point out a tendency to narrow the scope again to technological foresight, leaving behind the ambitions to develop and relate to broader societal concerns. I will not, however, end this intervention on a discouraging note, having just advocated a stronger solution orientation. It is important to remember that in every representation of a problem lies a frustrated dream or solution inviting articulation and discussion. Yet again, how do we invite such opening discussions in practice and as culture?

Maybe it is time to change metaphor. In an inspiring account James Moore turns up a lot of suggestions about how to induce quite fundamental transformative processes by developing a new figuration; 'business ecosystem'. The problem with the traditional industry paradigm was that it ignored the context – the environment - within which the business lies, and it ignored the need for co-evolution with others in that environment, a process that involves cooperation as well as conflict.<sup>25</sup> The new metaphor's positive functioning was, however, dependent on the establishment of the institution of a "kitchen cabinet". A generous, open, inviting, allowing arena had to be created for the construction of new questions and new dreams adequate to the fundamental shift denoted by the shift in figuration. Holding both analysts and strategists back, while new questions and visions for future solutions were allowed to mature, was another important prerequisite.

We need a lot of "kitchen cabinets" on our Nordic campuses to cater for the polycentric, interactive and multipartite processes of knowledge-making we may dream of. But first we must figure out what our different, specific, local kitchen cabinets may look, feel and smell like, aiming to turn on transformative processes, changing research cultures and "teaching smart people how to learn".<sup>26</sup> Such transformations cannot be brought about by the kind of measures that universities traditionally have at their disposal. This lesson comes out of Swedish universities' experiments with the so-called "third task" or mission<sup>27</sup>, presented as a challenge to blur the borders between science and society or research and politics, by Carl Tham, minister for Research from 1994 to 1998. Wisely enough, he created new universities where experiments inspired by new figurations like triple helix, post-normal science, technoscience, mode 2 and agora, proliferate.

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<sup>23</sup> As developed in Kjell Eide "Hvem skal informere politikken?" (Who is informing the politicians?) in *Nytt Norsk Tidsskrift* 3-4/94.

<sup>24</sup> Reference to my engagement in Nordic women's research. Some lessons are developed in "The New Politics of Knowledge; making (sustained) Change Happen" unpublished paper prepared for an AIOFE workshop 2002 10 25 in Antwerpen: *Integration of Gender Research in EU's FW6*, distributed by the author on request. See also Gulbrandsen (2002) for an earlier version of the paper, as well as Gulbrandsen (2000).

<sup>25</sup> I hope Moore's initial borrowing from the sciences, will excuse my borrowing from business when models of governance are concerned.

<sup>26</sup> See Argyris (1991) and Nowotny et al. (2002).

<sup>27</sup> See Brulin et al. (2003) as well as conference reports from the Nordic R and D conferences on university and society cooperation.

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The following text is a reprint from The Research Ethics Library (2009-12), an online resource for research ethics education set up by the Norwegian National Research Ethics Committees. It can be read as an attempt at inviting the committees to keep working on the broader concept of research ethics that emerged in Norway at the turn of the century.

## From Science in Society to Society in Science

In the post-World War II period, two different paradigms have characterised the debate on science and society. One is about division of labour and separation between science and society, and the importance of maintaining them. The other is about interaction and societal dialogue, and prerequisites for stimulating them. Interactions, with the associated complexities and dynamics, are perspectives that have been particularly prominent in the European debates on science, technology and society for the past 20 years. Paradoxically, the germs of the interaction paradigm featured more strongly in the Norwegian societal debate of the 1960s and '70s than in the rest of Europe.

- The Nordic model of governance
- The critique of positivism and its impotence
- From contract to dialogue
- Society in Science
- Research quality at stake?

## The Nordic model of governance

Research plays an increasingly larger part in everything surrounding us. However, there is little awareness in the public debate of the fact that this may also apply to what we perceive as Grand Challenges. We have a long tradition in the Nordic countries regarding science and technology as neutral instruments, or "clean power", for fulfilling political goals in different sectors of society. Separation and division of labour characterise the relationship between science and politics in what Kjell Eide (1996) called "the Nordic model of governance".

The relationship between science and society is not addressed to any extent in the Nordic studies of power and democracy. "The retreat of politics" from the established political institutions was diagnosed in the latest Norwegian round of power studies (1998 - 2003). Power and politics are associated with law, the media, economics and business. But not with science, technology and innovation. This does not necessarily mean that the research system in Norway makes only modest contributions to political and societal development compared with other countries. But the fact that studies of power and politics tend not to discuss this, may imply a lack of understanding of the interplay between science and society and the challenges this presents.

However, the climate crisis and the financial crisis are beginning to feature in the Norwegian public debate, and this may prepare the ground for a different, more complex understanding of the relationship between science and society. For example, in an article in the Norwegian daily Aftenposten on 23 January 2008, on the relationship between climate and knowledge:

The connection between climate and knowledge is deep and alarming. The climate appears to be changing because knowledge and technology have undergone explosive development over the past two centuries. In the course of this period, science, technology and industry have ensured growth in prosperity and improved living conditions. As long as money, oil and health continued to flow in without visible problems, there was no reason to make them the subject of extensive political debate, either. There was debate, but it was primarily in the form of questions about distribution. (Strand and Rommetveit 2008)

We have recently heard the Minister for Education and Research<sup>1</sup> describe the climate and financial crisis as two events exposing our established knowledge as not good enough. It is important to stress that this neither mean that science and technology are regarded as the cause of climate, environmental, developmental and financial crises, nor that science and technology alone can "save the world". The point is that science seldom stands out in the singular these days, it can neither be studied nor developed in isolation. Science works together with or intertwined into other societal, cultural and historical relations. Frequently used terms are "co-evolution" and "co-production of science and society" (Nowotny et al. 2001, Jasanoff 2004). This interweaving makes governance structures based on conceptions of separation and a clear division of labour between science and society, such as in the Nordic model, rather unproductive. We need a better grasp of the complexities and dynamics in the interaction between science and society. This is a precondition for the development of new governance styles, new institutions as well as solutions to the Grand Challenges of our times.

It is the so-called technosciences; information and communication technology, biotechnology and gene technology, together with materials technology, that most clearly call into question and erode the boundaries between science and society. These hyphenated technologies are characterised by a reverse logic, in that the knowledge has to be used in order to be tested (Beck 1996). In other words, the time and space between the production of knowledge and its application vanish. The technosciences can have relatively direct reality-shaping effects. Not only new understandings and maps are being produced, the terrain is changing: "Areas such as information technology, biotechnology and materials technology, demonstrate quite clearly that we are moving at full speed towards a society in which production technology builds directly on scientific research-dependent society." (Sejersted 1989). The technosciences can thus provide a template for a change in our understanding of the relationship between science and society, given that the invasive aspects of the sciences come into focus is (Tranøy 1986/1991). Reproduction technology, from in-vitro fertilisation to cloning, is a classic example, while synthetic biology is a more recent illustration.

## The critique of positivism and its impotence

It is not the first time that the duality of the scientific project has been pointed out. It received a great deal of attention in the 1960s and '70s, with the "participant-observer" distinction of the 1950s as a central enigma (Skjervheim 1976). Science and technology not only serve to integrate societal development; they are also already integrated in societal development. In the wake of post-positivism we got studies in sociology of science, history of science, anthropology of knowledge and politics of research. These relatively new "externalist" approaches have placed science in the wider societal contexts, but have been less successful in getting to grips with what is regarded as the internal aspects of science. This applies both to science as a cognitive field (Bärmark 1984, Elzinga 1986, Oden 1989), and to science as practice and culture (Wittrock 1989). Evelyn Fox Keller (1985) sums up the situation as follows: "Yet, while our sensitivity to the influences of social and political forces certainly has grown, our understanding of their actual impact on the production of scientific theory has not."

The ambition of the post-positivists of the 1960s and '70s has not ushered in new and different, more societally robust research (Gregersen and Køppe 1985, Kjørup 1985, Håkanson 1988). In *Vitenskapen og vår hverdag* [Science and everyday life], John Lundstøl (1977) discusses how the "internal relations between the development of science and politics" slipped out of focus, and thus disclosed a distinctive Norwegian feature: "This can in large part be attributed to the popular movement against Norwegian membership of the European Common Market which apparently strengthened the basis for direct political action."

## From contract to dialogue

At the end of the 1980s, the Grøholt Committee, which drew up proposals for new governance structures regarding science, pointed out the need for a new contract between science and society. The breakdown of the old "societal contract", based on separation and division of labour between science and society, had resulted in loss of clarity. The committee argued for a new negotiation process and called attention to a number of the topics that have since characterised the international debate (NOU 1991:24). Today it is maintained that the time for thinking in terms of contracts is past

<sup>1</sup> This is a reference to Tora Aasland, who was Minster for Education and Research in Norway from 2007-2012.

(Guston 2000). Instead, it is argued that closer interplay and more interaction between science and society are necessary to foster "collaborative assurance". The legitimacy of, confidence in and "societal capital" of science must be recreated and constantly earned through various kinds of collaboration.

At the international level, discussions, experiments and development work regarding the relationship between science and society were intense in the 2000s. The temperature of the discussions indicates that fundamental investments - institutional as well as individual - are being shaken up. We are not merely going to have to learn something new that can be added to the knowledge basis forming the background against which we operate; this is about a paradigm shift with respect to basic understanding of the relationship between science and society. This shift is linked to a breakdown in socalled linear forms of understanding (Gibbons et al. 1994): First comes basic science, then applied science, and finally the product or action out there in society. This linear model or form of understanding postulates a separation between science and society making it possible to think in terms of division of labour between science and politics. The model also invites thinking about regulation and governance of the relationship between science and society in contractual terms, reference can (still) be made to various white papers on research.

#### Society in Science

Helga Nowotny, a central figure in EU research policy and head of the European Research Advisory Board (EURAB) for many years, has long insisted (Nowotny et al., 2001) that there is a high degree of reciprocity in the relationship between science and society. She has also argued that greater transparency concerning research and technological processes is needed (Nowotny 2005). It is no longer enough to promote channelling the results of science into society. Nowotny asserts that the research systems must open up. In particular, she stresses, it is essential to impart uncertainties, contradictions and contingencies; everything that cannot be guaranteed as "scientifically" verified and which therefore creates a problem for the perception of science as based on neutral and in part "objective" knowledge processes. It is necessary to develop a new kind of more mature partnership, Nowotny (2005) maintains, and this can only happen if research and technological development processes are made more transparent:

Science can no longer expect unconditional support on the part of society for whatever it wants to do, nor unconditional acceptance of its authority. Society will have to become more involved in understanding better how research actually functions and why it is important" (my bolds).

The same tendency is apparent in the UK, one of the foremost countries in Europe with regard to developing the societal dialogue. In the wake of the scandals surrounding Mad Cow Disease in the 1990s, great emphasis was placed on moving away from the so-called deficit model, in which a classic (public) enlightenment model prevailed. The informative and explanatory monologue from science should be replaced by dialogue. Following a period when emphasis was placed on developing various dialogue mechanisms, such as citizens' juries, stakeholder dialogues, consensus conferences and focus groups, to "help society to talk back to science", the focus is increasingly on the actual science and technology processes in a broad sense (Demos 2004). This move is often described as "upstream", and Demos (2005) expresses the challenges as follows in the report *The Public Value of Science*:

Those who see upstream engagement as a means of providing earlier and better predictions of risks and impacts are missing the point. It is not a matter of asking people, with whatever limited information they have at their disposal, to say what they think the effects of ill-defined innovations might be. Rather, it is about moving away from models of prediction and control, which are in any case likely to be flummoxed by the unpredictability of innovation, towards a richer public discussion about the visions, ends and purposes of science. The aim is to broaden the kinds of social influence that shape science and technology, and hold them to account.

Upstream engagement is primarily about the reflexivity of the science and technology systems. A constructive societal dialogue presupposes that researchers are capable of opening up research processes as well as acknowledging the limits of their knowledge. In this way, the issue of governance becomes a question of whether the choices made in research and the premises for making choices are open to scrutiny and participation (Kallerud 1992). One of the main challenges in the struggle to develop the interplay between research and society concerns the research community's ability to make it possible and interesting for other key societal actors to become involved and engaged. Thus, developing the societal dialogue calls for major changes in expert systems generally and the research system in particular (Jasanoff 2003). One central precept relates to "bringing out the citizen in the scientist". In the preface to Sue Weldon's *Public Engagement in Genetics* (2004), Brian Wynne stresses how this challenge is developing:

The only-recently recognised challenges of two-way understanding between science and its publics, replacing one way of understanding of science, are in their very earliest days. This is emphatically a long haul, of nurturing not merely policy shifts (valuable though they may be), but profound cultural change in such science fields, their policy and technological uses, and the assumption underpinning them. ... The bottom-line issue in the new climate of "public engagement" is not just seeking earnestly for 'public inputs' - preferences, values or knowledge. It is being encouraged, by public dialogues and questions among other things, to question the validity of our own scientific-institutional taken-for-granted assumptions and routines.

If science affects society more directly, it will be necessary to develop the legitimacy and responsibility of research on a broader base than by references to the fact that public grants for research are deployed and distributed through institutions and methods that ensure stringent internal quality requirements and professional ethics norms. The book *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty* (Nowotny et al. 2001) summarises the international debate on the consequences of the breakdown in contract-thinking and points out that societal dialogue is, of necessity, a continuing process:

That the authority of science in the future will have to be established in an ongoing process that needs to be worked out again and again in each concrete situation is the meaning of the somewhat aphoristic title of this final chapter of the book, that re-thinking science is not science re-thought.

## From science to learning

The metaphor of interplay represents an argument that closer interaction with the surrounding world will result in superior, more "robust" science. This is a claim that many researchers still find provocative. How far into research does the interaction arena extend, and what should interaction be concerned with? Relevance, quality, or perhaps both? Collaboration in more horizontal partnerships is a challenge for expert systems more generally. Perhaps this challenge is particularly huge for academia, which has to abandon its assumed neutrality and objectivity in order to create a new role as a visible, distinct societal actor. Developing a role as an interacting partner appears to require humility and a focus on one's own limitations that some find difficult (Jasanoff, 2003; EC 2007). It can in many ways be described as counter-intuitive for the research system to move away from a mastery and control mode and to open up its processes to greater scrutiny and participation from other societal actors.

In the 2000s, debate and experiments on other forms of and approaches to governance increased. The conditions for enabling more horizontal forms of governance to emerge are discussed under the heading Science-Technology-Innovation Governance (STI Governance). This is bringing research institutions close to playing a political part, and it is a prerequisite for constructive development of more horizontal forms of governance that this is recognised: "...the systemic nature of research, which among other things implies a rapprochement between governance and management of research and innovation on the one hand and policy and politics on the other", according to Arne Eriksson (2005), commenting on a study by Technopolis on governance challenges.

The approach to the governance of open, dynamic systems represented by the action learning and action research tradition is highlighted in a recent report by the EU Commission, Taking European Knowledge Society Seriously: Report of the Expert Group on Science and Governance (EC 2007). This tradition is also presented as relevant to the work on science and technology evaluation, for example, Christoph Mandl's "Evaluating Evaluations or the Case for Action Research" in Plattform fteval/Newsletter June 2007, entitled Excellence: to pick or to foster? These discussions indicate the need for science to double as learning processes. Emphasis is placed on the importance of being aware of the need to balance different types of knowledge involved in developing the interplay between research and society productively. In particular, synthesis and figuration signify forms of knowledge that are fundamental for inspiring (self)-leadership and learning in horizontal interaction (Eriksson 2005). The analytical knowledge valued by technocratic rationality does not function in relation to the complexity and rate of change which in most areas condition our collaborative processes today. Francis Sejersted (1991) formulated it as follows in the article "Er det mulig å styre utviklingen?" [Is it possible to steer development?]

Thus we need a technology politics, in the real sense of the word. And politics in this sense does not only mean adequate funding to realise consensual objectives. What is required is that we work, through public reasoning, on our mutual understanding, our symbols and our dreams, and that we provide scope for expressive action as well as instrumental action. A situation with increasingly open systems for knowledge production requires a focus on the direct reality-producing effects of research - its "context of implication" (Nowotny et al., 2001). Or as Donna Haraway (1997) puts it: "The relations of democracy and knowledge are up for materialized refiguring at every level of the onion of doing technoscience, not just after all the serious epistemological action is over". Neither sustainability nor any other values we might want to realise can be safeguarded retrospectively. It is such developmental trends that prompted Ulrich Beck (1996) to ask whether the representative democracy is losing ground as the modern research complex develops as a political area in its own right: "Politics breaks out in a new and different way, beyond the reach of formal responsibilities and hierarchies. So we are looking for politics in the wrong place, with the wrong concepts, on the wrong floors, on the wrong pages of the daily newspapers."

Another indication that more interactive/network-oriented models are emerging, is to be found in the requirement that the ethical, legal, social and cultural dimensions and possible implications of research must be drawn to a greater degree into (techno) scientific research process (Fisher et al. 2006). In a European context, this is now being discussed in relation to the design of next generation ELSA research (where ELSA stands for Ethical, Legal, Societal Aspects of new and emerging technologies). At present, the societal aspects of this research are being discussed as though they apply primarily to the application phase, that is "downstream". To the extent that such issues also have to be handled by and in the knowledge-producing institutions themselves, in collaboration with other societal actors, this will represent major challenges with regard to expertise and demand extensive capacity for change. We see, not least, how the traditional role of the scientist is challenged (Wynne, 2006). In the next phase of ELSA, emphasis is placed on fostering experiments with new governance forms in order to make the knowledge and technology development processes transparent, so that fundamental challenges associated with values, evaluations and choices can be discussed as early as possible. In the aforementioned EU Commission report of 2007 on science and governance issues, this was put on the agenda as follows:

This institutional focus on post-innovation, 'downstream' or output questions as the only ones of interest to publics marginalises legitimate democratic concerns about **inputs** (such as imagined social purposes, needs, benefits and priorities) that drive innovation in the first place. An important change in governance of innovation would be strategic development of improved European institutional capacity to deliberate and resolve normative questions concerning the prior shaping of science and innovation: over their directions as well as their scale and speed. (my bolds)

Learning and development work are in the process of becoming a key topic in the debate on governance challenges. The report introduces its argument for a necessary culture shift in this way:

Our conclusion that questions have to be kept in mind as an on-going element of policy itself, while we nevertheless have to act, suggests that science and governance institutions need to learn to make a shift in policy and practices towards more inclusive, reflective and open forms of learning.

### Research quality at stake?

Science-society interaction models also call for changes in the concept of quality. The ERiC project, which is a collaboration between several policy organisations in the Netherlands, is motivated by the fact that they do not know how best to identify potential for productive interaction between science and society, how to advance such interactions through the means at their disposal, or how to evaluate them (Spaapen et al. 2007). In view of this, and by keeping the questions open, the organisations create opportunities for horizontal interaction, development coalitions and (action) learning. Contributing to effective and productive interactions between science and society becomes a measure of quality (EC 2007):

Recent discussions of Mode-2 science (Gibbons et al. 1994; Nowotny et al. 2001) has (sic) pointed out that ways of producing technoscientific knowledge already extend well beyond the classical 'independent' mode of basic science. Stronger roles of applications contexts and imaginations in the very production of knowledge, transdisciplinarity, and socially as well as epistemically extended peerreview are but a few elements which indicate much broader social involvement in how knowledge is produced and validated. This co-production of science and society changes the very meaning of notions like objectivity and rationality.

It is not (any longer) enough to interact with other societal actors in order to identify what should be researched: for example, identify topics or areas to focus on, or major societal challenges. It is also important to address challenges concerning how research processes are developed as good and productive interactions between science and society; how we develop and how we evaluate societally robust innovation processes (Voss et al. 2006). A more complex, dynamic and, not least, open understanding of the relationship between science and society requires the development of new expertise and new skills in the research system. These challenges are institutional and organisational, as well as individual.

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The next text was written with Lena Trojer. It became a trying transformation as we set out to invite crossover engagements between innovation policy/ politics and feminist technoscience research. The occasion was an invitation from VINNOVA, Sweden's innovation agency, to publish a text in a collection on innovation and gender. We included gender mainstreaming in the Grand Challenges pulling together different inspirations we had assembled over the years. This also explains the extensive self-plagiarism in the text. In case this disturbs, I recommend skipping the sections "gender mainstreaming in hindsight", "a central tool of mainstreaming - and its demands" and "citizen scientists".

We did not succeed in establishing a productive dialogue with the editors. The text printed here is the last version we delivered. Their reaction prompted us to write the included interlude-text where we attempt to explain our approach.

# Co-inventing innovation: Comments on the convergence of knowledge and politics

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### Abstract

In this article we explore conditions for gender mainstreaming in innovation relating to different policy contexts, Nordic as well as African. We contend that the ability to open up and question the validity of our own scientific-institutional taken-for- granted assumptions and routines is vital for walking the talk of gender mainstreaming as well as addressing grand challenges through innovation. The aim of our explorations is to contribute to the practice of "becoming answerable for what we learn how to see" (Haraway, 1991).

## Introduction

At this day and age – following mounting environmental and poverty crises – there is more unease with presenting research and technology as the solution than in the mid-1990s. What is moving up the political agenda and emphasized as key, when it comes to addressing grand and global challenges is innovation.<sup>1</sup> We are referring both to the

<sup>1</sup> A possible exemption here might be NordForsk which still seems optimistic about research providing solutions to grand and global challenges: http://nordforsk00.fe.rzob.gocept.net/files/a-nordic-contribution-to-the-grand-challenges-debate

European Commission's *Innovation Union 2020*<sup>2</sup> and *The OECD Innovation Strategy*<sup>3</sup> as well as innovation policies in a number of developing countries in Africa and Latin America. Innovation policies are accentuated as of crucial importance for emerging from the current crises by turning "challenges to opportunities"<sup>4</sup>. A systemic approach to innovation is stressed both in the recent innovation strategy from OECD as well as in the "Innovation Union" communications from the European Commission. A broad-based approach to innovation is recommended that takes account of the many factors and actors that influence innovation performance, including demand-side policies.

This message is not new to a Nordic audience<sup>5</sup>, and struggles to move beyond supplyside policies focused on R&D and specific technologies have been on the agenda for quite some time<sup>6</sup>. The limitations of a thematic technology push approach in achieving the necessary flexibility, creativity and cross-disciplinary research needed to address societal challenges like energy, health and food security, climate change are noted by most policymakers in the Nordic countries.<sup>7</sup>

A systems and network approach to innovation is near to hegemonic in innovation research as well as in policymaking these days. This entails a valuable focus on how science<sup>8</sup> and technology are accessed, distributed and used. At the same time, a certain black-boxing of the knowledge-processes often comes with a systemic approach to innovation.<sup>9</sup> We argue in this article that if innovation policies in the future shall enable us to "walk the talk" of addressing grand/global challenges - gender mainstreaming included - it is vital that the policies also focus, explore and promote change concerning how science and technology *develop* and is *validated*.

This contention draws on our engagements with mainstreaming gender at the turn of the century and is later encouraged through resources we have consulted; mainly in the

- chure\_en.pdf; the so-called "Lund declaration" from 2009 also deserves mentioning.
- 3 http://www.oecd.org/pages/0,3417,en\_41462537\_41454856\_1\_1\_1\_1\_1,00.html
- 4 https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0048:FIN:EN:PDF
- 5 As evidenced by OECD's director for Science, Technology and Industry (STI) Andy Wyckoff's response to a question about what was new in the OECD strategy at a seminar in the Research Council of Norway: "But this is not for you guys" (2011 01 24).
- 6 See e.g Miettinen 2002, Lundvall 2002.
- 7 Reference to white papers on research and innovation in Nordic countries, e.g. two white papers from Norwegian government; Et nyskapende og bærekraftig Norge (2008) and Klima for forskning 2009 where a systemic approach explicitly outlined in ch 9, as well as Proposals for Finland's National Innovation Strategy (2008).
- 8 By 'science' we not only refer to natural sciences (anglo-saxon usage), but social sciences and the humanities as well.
- 9 In policy-contexts OECD's Technology/Economy Programme (TEP) is often referred to as influential in developing and spreading a systems and network approach to innovation policy. See e.g the synthesis report Technology and the Economy; The Key Relationships (OECD 1992). How science and technology develop in the "context of production" is not on the agenda. For a discussion of the concept of "context of production" as emerging in feminist research, see Gulbrandsen (2003).

form of science and technology studies but also increasingly policy studies.<sup>10</sup> Our ambition is to explore whether these resources can help promoting gender mainstreaming in innovation as well as in technoscience<sup>11</sup>, our own disciplinary situation. To this end we start by revisiting some of the lessons from our engagements with gender mainstreaming in Nordic and European research and policy contexts in the decade before the turn of the century.<sup>12</sup>

## Gender mainstreaming in hindsight

Engaging with gender mainstreaming more than a decade ago confronted us with quite provocating and disturbing questions. The trying transformations we were involved in suggested that we needed to question preconceived perceptions of science, of policies and politics, as well as develop new figurations (Haraway, 1997) of these rather basic concepts. While producing input for policy-making at the turn of the century, building on an established knowledge base produced by Nordic gender research, we felt condemned to always running late while pointing to flaws, biases, barriers as well as bad baseline statistics. These are necessary dimensions of a knowledge base for working equality. But we started to suspect that they function best as background for appealing to the state to devise and implement affirmative actions (measures to compensate for flaws and overcome barriers). We concluded that the knowledge base needed to be supplemented, when developing policies at the level of mainstreaming; that is activities aiming at structural and cultural transformations of our research and innovation systems.

To illustrate this further, we referred to the so-called ETAN-report; *Promoting excellence through mainstreaming gender equality* from the Commission (2000), and its listing of principles of mainstreaming. Principle number five, visioning, is explained as gendering apparent gender neutral procedures and practices: "It involves recognizing the ways in which our current systems and structures, policies and programmes, in effect, discriminate" (page 67). Our trying transformations in Nordic policy contexts suggested that we needed to extend this principle to include visioning future solutions not only patterns of past and present gender segregation and discrimination. We began to question whether the scientific commitment to systematic, causal descriptions of gender differences and inequalities, served our transformative ambitions and struggles as well as we wished to believe.<sup>13</sup>

<sup>2</sup> https://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication-bro-

<sup>10</sup> For an inspiring effort to bring together policy studies and science and technology studies in an exploration of different modes of governance of relevance to societally robust innovation, see Voß, J.-P., Bauknecht, D., and Kemp, R. (eds.) (2006).

<sup>11</sup> Technoscience designates a number of fields where it no longer makes sense to try to distinguish between pure and applied science or between science and technology.

<sup>12</sup> Our most important policy engagements are documented in Gender & Research, EC (2002) as well as reports from the Swedish Committee for Co-operation of eight Research Councils (Samver-kansgruppen) (2000).

<sup>13</sup> See Rosanne Stone's *The War of Desire and Technology at the Close of the Mechanical Age*, page 173. Reference also to Genevieve Lloyd's The Man of Reason as well as an emerging tradition in organizational theory exemplified by the practice and texts of Gro Johnsrud Langslet; the "løft" approach.

When working to mainstream gender, we ought to be able to discuss and suggest in fairly great detail, what kind of innovation system we want to be equal to. In order to mobilize for, develop and evaluate strategies at the level of mainstreaming, we need to focus more strongly on where we are heading. We ought to be up front facilitating and fostering alternatives, new figures, stories and meanings as well as developing strategies for struggling towards them. It was not enough to point to what we want freedom from.

When questioning what we want to be equal to, we are also invited to consider many other broad questions, besides horizontal and vertical gender segregation, confronting and troubling our innovation systems at present. What will it mean to work in a mainstreamed innovation system? In her book *Mainstreaming Equality in the European Union* (1998), Teresa Rees points out how we are still stuck with mostly negative definitions of mainstreaming. To paraphrase Donna Haraway; we need to develop performative images of mainstreaming that can be inhabited (Haraway, 1997).

#### A central tool of mainstreaming - and its demands

Building ownership is a central tool for mainstreaming, and the knowledge base for mainstreaming gender must be supported by skills and competencies for opening up, in order to let new voices and alternatives flourish. Ready-made solutions need to be replaced by processes co-visioning future solutions by dominant and marginalized voices together. This may be difficult, if the problems (and most of the power to deal with them) are represented as being localized "out there" belonging to the structures or to the GOBSAT<sup>14</sup>. To be better equipped to deal with co-visioning solutions, we, who are involved in innovation, must strive to develop a readiness to think and feel ourselves as part of the problems, and learn how to use our sense of being implicated as a vital resource for our transformative projects. We have to experiment with forms and organizations, meeting places or arenas allowing us to learn from our failures as well as from our successes.

In the 1970s, the slogan was "you're either part of the solution or the problem". In order to become part of the solutions for the future, we have to reinvent ourselves as part of the problems.<sup>15</sup> As the strength of Donna Haraway's figurations rests on this move from either/or to both-and, we continue to refer to her work. Also, as demonstrated in Carol Bacchi's *Women, Policy and Politics; The Construction of Policy Problems* from 1999, a constructivist approach to research and policy-making is also worth consulting when negotiating to make an impact. In a discussion on the role of gender expertise in equality work, Liisa Husu includes as the third and last point "... the ability to translate this theoretical understanding into organizational policy and practice." (Husu, 2001, p 182). A constructivist approach invites a much more intense and reciprocal dialogue between researchers and policy-makers right from the start, which we find is indispensable when co-visioning is on the agenda.

14 Reading; Good Old Boys Sitting At the Table. 15 As developed in Trojer and Gulbrandsen (1996). If we are to win change, it is not enough, as e.g Hilary Rose claims, to focus on improving the statistical data and on improving explanations (Rose 1999). By our continued invitations to gender researchers and policy-makers to a new arena for co-visioning, we unwittingly came to question a fairly established, but silent, contract between them. According to contract it is expected that researchers work up the knowledge for delivery to policy-makers, who then, in turn, work out the policies. In return, the researchers expect "policy for science". We have suggested that we name this kind of contract "state-feminism" (Gulbrandsen 1998) designating a fairly widespread way to think about the relationship and the division of labor between research and policy/politics not just pertaining to gender research. In fact, it is so common that it has been called "the Nordic way of governance" (Eide 1996). We like to underline that this is not a bad contract. It has been highly effective when affirmative action is on the agenda, but it is not sufficient for mainstreaming.

## New contracts, skills and directions

As technoscientists we cannot fulfill the contract of "statefeminsm". We have no recluse to an innocent position, that allow us to produce new maps while "reading" nature and/or society. We are "writing" nature as well. This becomes very evident in fields like nanotechnology and synthetic biology. Technoscientists cannot claim that they are "speaking truth to power" from a neutral, objective position. As the weft of technoscience increases in everything that surrounds us, what becomes more important is developing the capacity and skills needed for relating to the invasive effects of our research, which cannot be contained within any kind of knowledge reservoir.<sup>16</sup> This emerging contract of co-production<sup>17</sup> of "science and society" not only disturbs professional identities,<sup>18</sup> it also entails questioning the traditional dichotomy between "theory" and "practice" as witnessed by the emerging proliferation of reference to action learning and even action research in the literature.<sup>19</sup>

Being involved in more horizontal partnerships for learning, development and innovation still seems quite challenging for expert systems in general, and perhaps especially so for academia, which have to shed its cloak of assumed neutrality and objectivity and

<sup>16</sup> Reference to Sheila Jasanoff and Sang-Hyun Kim's article "Containing the Atom" in *Minerva* (2009) and Allenby and Sarewitz' "We've made a world we cannot control" in *New Scientist* (2011) as well as the often cited report by Vannevar Bush; *Science the Endless Frontier* (1945).
17 Many scholars have proposed figures of science-society interactions that direct our attention to

the many processes involved in the co-production of scientific knowledge and the political order. See Gibbons et al (1994) and Nowotny et al (2001) for an introduction to these discussions. It has been suggested that 'contract' is not an apt way of figuring this move from separation to integration, see e.g David Guston's discussions.in "Boundary Organizations in Environmental Policy and Science", *Science, Technology & Human Values* 26(4).

<sup>18</sup> As described e.g in Rune Nydal Ph D thesis (2006) concerning the initiation of the large-scale biotechnology programme FUGE in The Research Council of Norway.

<sup>19</sup> This is a central discussion theme in Nordic feminist research as well, e.g Ewa Gunnarsson's "Other Sides of the Coin" International Journal of Action research (2007).

create for itself a role as a societal actor. This challenge is partly a consequence of research's growing impact and "success". Research is increasingly involved in every aspect of life, including what is represented as grand and global challenges these days. There can be no doubt that research plays a crucial role in the development of innovation, industry and commerce, it affects our decision-making processes, it colors our culture and the development of society. However, research and technology not only have an integrating effect on the development of society, society also influences the processes of developing research and technology. Focusing on "society in science" will thus be at least as important as "science in society".<sup>20</sup>

As technoscientists we are intimately implicated in the grand and global challenges. The societal challenges can therefore be addressed as not only residing "out there", but "in here" as well; as if research and innovation was in crises itself. As there are glimpses of this understanding in the mentioned OECD-strategy and in the recent communications from the Commission<sup>21</sup>, we are encouraged to keep on struggling with this shift and the required un-learning. From time to time we find great comfort in re-reading Jane Flax' inspiring feminist text "The End of Innocence" (1992) concerning the anxieties involved in such trying transformations without closure in sight. And we are inspired by the exploration of new roles for scientists as e.g figured by the concept of 'citizen scientist"<sup>22</sup>.

#### Citizen scientists

Helga Nowotny, a central figure in European research policy and the former head of the European Research Advisory Board (EURAB), has for some time been calling for a renewal of the contract between science and society, promoting a greater degree of reciprocity in the relationship. She is arguing that a renewed partnership presupposes more transparency concerning the processes involved in research and technology. Nowotny contends that the research system needs to be opened up, and she believes it is particularly important to be able to communicate "uncertainties, contradictions and contingencies" - everything that cannot be assured as "scientifically" proven and which therefore turns the spotlight on the idea of science and technology as based on neutral and to a certain extent "objective" knowledge processes. "A new kind of more mature partnership" needs to be developed, Nowotny claims, and this can only be achieved if the processes whereby research and technology are developed, are opened up:

Science can no longer expect unconditional support on the part of society for whatever it wants to do, nor unconditional acceptance of its authority. Society will have to become more involved in understanding better how research actually functions and why it is important. (Nowotny, 2005)

The same tendency is also evident in the United Kingdom, one of the leading countries in Europe in terms of development of the dialogue and new contract between research and society. Here, focus is increasingly on the actual process of developing research and technology. This shift is described as "upstream", and Wilsdon et al (2005) positions the challenges thus in *The Public Value of Science* (2005):

Those who see upstream engagement as a means of providing earlier and better predictions of risks and impacts are missing the point. It is not a matter of asking people, with whatever limited information they have at their disposal, to say what they think the effects of ill-defined innovations might be. Rather, it is about moving away from models of prediction and control, which are in any case likely to be flummoxed by the unpredictability of innovation, towards a richer public discussion about the visions, ends and purposes of science. The aim is to broaden the kinds of social influence that shape science and technology, and hold them to account. (p 34)

"Upstream engagement" refers primarily to the reflexivity of research and technology systems, according to Brian Wynne. The requirements that knowledge must be reflexive and societally robust will only continue to grow in the years to come.<sup>23</sup> The conditions necessary to create a constructive dialogue with society seem to be rooted in the increased ability of the research system to open up and admit the limits of its knowledge. This is necessary in order for research to be able to invite collaboration with other social institutions. The same demand to be able to open up and acknowledge one's limits also applies to interdisciplinary work. One of the main challenges facing efforts to nurture interaction between research and society relates to inviting other parties to participate in dialogue in ways that make it possible and interesting for them to be involved and engaged. This requires what a recent report from the EC (Markus, 2009) calls the development of "further skills" by researchers, as they must be able to explicate their premises, conditions of validity, uncertainties, areas of ignorance, values and conditions of applicability to certain contexts. Because "Involving publics ..., can be more productive if not only the knowledge at the object level is presented and discussed, but also the related meta knowledge."(p 14-15) Developing the dialogue with society thus requires major changes in expert systems in general and the research system in particular. One of the challenges lies in "bringing out the citizen in the researcher". Wynne (in the preface to Weldon, 2004) points out that this kind of understanding is just hatching:

The only recently recognised challenges of two-way understanding between science and its publics, replacing one way understanding of science, are in their very earliest days. This is emphatically a long haul, of nurturing not merely policy shifts, but profound cultural change in such science fields, their policy and technological uses, and the assumption underpinning them. ... The bottom line issue in the new climate of "public engagement" is not just seeking earnestly for 'public inputs' - preferences, values or knowledge. It is being encouraged, by public dialogues and questions among other things, to question the validity of our own scientific-institutional taken-for-granted assumptions and routines".

If research has an impact on society and interacts with other stakeholders in ways that are not linear, it becomes necessary to address the legitimacy and responsibilities of

<sup>20 &</sup>quot;Science in society" has been a catch word for science-society activities of EC during FP7. Lately we have seen how the focus is broadening to include struggles coming to grips also with "society in science" e.g the expert-reports by Felt (2007) and Markus (2009).

<sup>21</sup> See the strong statements in the "science and society" stream of expert group reports from the Commission 1995-2009.

<sup>22</sup> Ref e.g. to the Demos-report Citizen Scientist from 2009.

<sup>23</sup> There is increasing pressure (as articulated by OECD, EC as well as the president of US) on science and technology to address the grand and sometimes global challenges of our times - the 2009 Lund Declaration is just one example.

research on a broader basis than merely through reference to the fact that public research grants are used and distributed by institutions and allocation mechanisms that follow strict internal quality requirements and professional norms. Helga Nowotny et al (2001) stress that the dialogue with society must necessarily be an ongoing process: *That the authority of science in the future will have to be established in an ongoing process that needs* 

to be worked out again and again in each concrete situation is the meaning of the somewhat aphoristic title of this final chapter of the book, that re-thinking science is not science re-thought. (p 249)

## Societally robust innovations

As we have indicated, the realization that complexity and dynamics characterizes innovation systems, is fairly widespread in policy these days perhaps even more so than in the research community. Such systems demand new approaches to governance in order to ensure a societally robust impact (Arne Eriksson, 2005 Nowotny et al, 2001). Climate, energy, poverty and food security are examples of challenges that are of a "systemic" kind; they extend across established sectors, institutions, professions, expertise and disciplines. They are also full of so-called wicked problems; problems that are difficult or impossible to solve because of incomplete, contradictory, and changing requirements often difficult to recognize. Moreover, because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems.

These grand challenges themselves as well as adequate solutions must therefore be identified in distributed processes and dialogues in-between different actors. Catch words like networking logic and organization, partnership development, learning, and open innovation points to new understandings of governance issues. The exploration of more experimental approaches in research like post-normal science, strategic research, triple helix, mode 2 and agora, can be seen as a parallel based on acknowledging the importance of getting a grip on how research processes can be developed as productive interactions in-between 'science and society'.

In contexts of scarce resources the quality issues in Science, Technology and Innovation (STI) get explicit and easy to understand in e.g. research linked income generating activities and solutions encountering fundamental needs for people and society like energy, food, water and communication possibilities. The robustness can be recognized on the ground by the stakeholders and people involved. Knowledge in this context corresponds to concrete relevance, results and sustainability. While knowledge in a Nordic, academic context corresponds more likely to peer reviewed publications and later e.g. proofs of concept to be piloted<sup>24</sup>.

In a recent paper exploring new ways of linking science and innovation to development for a more sustainable, equitable and resilient future, Melissa Leach and Linda Waldman, discuss the assumptions that underpin the establishment of knowledge institutions like centres of excellence within Africa (Leach & Waldman, 2009). They suggest that an alternative image to that of centers is networks; networks that connect people and groups, often across diverse places and around issues of concern. Networks emerge as central ways in which otherwise marginalized people mobilize around the politics of knowledge, in arenas from agricultural biotechnology to global health, seeking to solve local problems in alliance with scientists: "In such networked movements, scientists and citizens, official and local experts, and producers and users of technologies often interact in sometimes unexpected, yet often highly productive, ways. Might 'learning networks' or 'learning alliances' offer valuable alternatives or complements to a knowledge production via 'centres of excellence model' ", Leach and Waldman ask.

Leach and Waldman's discussions correspond well with what we are learning at Blekinge Institute of Technology being involved in cooperation concerning development of innovation systems and clusters in East Africa since 2004. In Zanzibar, the tourist paradise in the Indian Ocean just outside the mainland of Tanzania, researchers at the Institute of Marine Science<sup>25</sup> collaborate with other inhabitants, mostly women, in villages along the coast line of the island. They join in evolving the production of seaweed, in innovative development of seaweed species, production technologies, environment considerations, different seaweed products etcetera. Linked to these activities is a complex work of building conditions like attaching the local and regional government as active stakeholders, fund raising, building infrastructure (like connecting electricity), quality control of products, training, transports, marketing, management as well as care of different kind for the families concerned like conditions for education and health, day care for the youngest children.

The processes involved refer to triple helix processes (Etzkowitz & Leydesdorff, 1997), which are situated in the program frame called Innovation Systems and Clusters Program - East Africa<sup>26</sup>. The triple helix stakeholder of University in this seaweed cluster holds the role of cluster mobilizing actor, facilitator, knowledge and innovation coproducer, technology co-developer as well as legitimate negotiator for funding. The role of Government is to involve Ministries of Agriculture, Fisheries, Trade, Women in leadership groups and task forces, helping cluster groups financially and participating in village leadership of cluster activities. The Business sector includes farmers (core), buyers (participating in cluster activities, teaching how to make value-added products, purchasing seaweed) and middlemen (sales). The learning processes at all levels are substantial and involves today thousands of persons. The exact figure is hard to give as the network of people involved is steadily growing<sup>27</sup>. The challenges in this kind of co-evolution activities are numerous but can be summarized in the understanding and practice of collaboration and competition.

We like to leave a note here concerning the prominent place that the challenges of *implementation* of policies take in policy literature in Europe and the U.S. This focus

<sup>24</sup> For an elaborated discussion see "Normative machineries at work" in chapter IV (Ulrike Felt, 2009).

<sup>25</sup> IMS belongs to University of Dar es Salaam, Tanzania. Dr Flower E. Msuya is the over all facilitator.

<sup>26</sup> ISCP-EA, see //si4cd.wordpress.com/background/

<sup>27</sup> In 2010 more than six villages were active in the seaweed production and that is only at the producer level.

seems irrelevant in contexts where the different actors/stakeholders are involved in modulating ongoing processes like the ones described here.  $^{\rm 28}$ 

Another indication that co-evolutionary and networking models are gaining ground out of Africa can be found in the changes now pertaining to so-called ELSI-research (Ethical, Legal, Societal Implications of new and emerging technologies). In the second phase of ELSI-research - now being developed in US, UK, Canada, the Netherlands and Norway<sup>29</sup> – ELSI is challenged to integrate its activities into technoscience, not to function as a way of outsourcing such concerns from the technological development processes "proper".

Experimentation and the challenge for research processes to take on the shape of learning processes seems to be the order of the day as developed e.g. in Erik Fisher et al.'s "Midstream Modulation" (2006), NWO's programme Responsible Innovation (2008). In parallel to this, the Netherlands, UK as well as the Nordic countries, have put much effort into inviting 'society' to speak back to 'science', of experimenting with different types of stakeholder involvement in order to establish the much sought for two-way dialogues and the productive interactions between science and society. The re-thinking of stakeholder involvement that we have referred in EC and UK, point out how the infamous 'deficit model' is simultaneously laid to rest and resurrected in these experiments. And they point towards a lesson; there seems to be a continuing failure of scientific and policy institutions to place their own science-policy institutional culture into the frame of dialogue, as a possible contributory element that hinders a genuine two-way dialogue. As Brian Wynne puts it; we are "hitting the notes, but missing the music" failing to acknowledge the deeper challenges of opening up our institutions and assumptions to critical debate. The reflexive capacity to acknowledge that one's framing of a problem is positioned and partial, and thus open to challenge from other perspectives, needs to be enhanced as well as assessed as a vital marker of scientific excellence.

#### Co-evolutionary approaches

The weft of science increases in everything that surrounds us and it is at the same time possible to ask: What is progress these days? And how to measure it?<sup>30</sup> Increasingly open systems for knowledge production require a focus on the direct reality-producing effects of research - its "context of implication" (Nowotny et al, 2001). According to Donna Haraway there is neither time nor space to develop research's relations with society "... after all the serious epistemological action is over" (1997, p 68). Neither sustainability nor other values that we would like to live by, can be secured retrospectively. It is these features of the development that made Ulrich Beck query whether

representative democracy is collapsing through the emergence of the modern research complex: "Politics breaks out in a new and different way, beyond the reach of formal responsibilities and hierarchies. So we are looking for politics in the wrong place, with the wrong concepts, on the wrong floors, on the wrong pages of the daily newspapers" (Beck, 1996, p. 24). We want to position our ambitions to promote more complex and integrated understandings of the relationship between research, technology and society, in this grey area that Nowotny et al (2001) ascribe to a dedifferentiation of the societal spheres of modernity.

The boundaries between politics and research are not straightforward and clear in a society that increasingly depends on research and knowledge. As we have already indicated, it is even claimed that research and society are co-produced or co-evolve<sup>31</sup>, which is a long way from the simple, linear understanding of this relationship that has dominated research policy hitherto. We can no longer take the so-called reservoir-model for given, trusting that somebody else takes care of the societal implications while tapping out research results we as researchers have already supplied.<sup>32</sup> Research is no longer merely a means to realise goals in other policy sectors; research is becoming a policy sector in its own right. And as we have stressed repeatedly throughout this paper: It is in the fields of technoscience (information and communication technology, bio- and gene technology, material technology and now neurotechnology) that scientists are most clearly pushing the boundaries - as well as the division of labour - between science and society, research and politics, thereby illuminating the obsolescence of linear figurations of this relationship (Gulbrandsen, 2004).

'Innovation system' was one of the first concepts put forward as an interactive alternative to the linear model in policy making contexts. Strategic research, post-normal science, triple helix, mode 2 and agora are other examples. The term innovation system is in widespread use in the Nordic countries. Finland is usually held up as the paradigmatic case for the concept 'national innovation system' (NIS). Reijo Miettinen's analysis of how the NIS developed in Finland can also be called paradigmatic because of his focus on the role of the NIS as a mobilising metaphor (Miettinen, 2002). Miettinen talks about a double development in that NIS has become both a scientific term and a political term. He introduces and develops: "...an epistemology of transdiscursive terms that are simultaneously and interactively used both by scientific communities and in policymaking" (p 17). We believe that this is a perspective that can provide our transformatory efforts with better tools to process changes in the relationship between research and society or science and politics, as well as help produce more substantial, complex and integrated understandings and images of this relationship. By exploring other figurations like mode 2, the agora, post-normal science and technoscience as transdiscursive terms, we might be able to improve our understanding of the convergence between research questions and policy questions.

<sup>28</sup> Reference also to Arie Rip's discussion of the difference between "governance of" and "governance in" innovation systems (2006).

<sup>29</sup> Link to the Research Council of Norway's ELSA Work programme: [PDF] Work programme 2008 - 2014

<sup>30</sup> Reference to e.g. OECD's Global Project on Measuring the Progress of Societies.

<sup>31</sup> Reference back to footnote 15 p 130.

<sup>32</sup> In January 2010 the Norwegian Minister for Research and Higher Education, Tora Aasland, while addressing the Norwegian Parliament, pointed out that the reservoir model is not the only relevant model.

Miettinen discusses the extent to which Nordic social democracy and its political culture predestines political decision-makers and researchers alike to apply technocratic and pseudoscientific interpretations of the concept of NIS. However, it does not have to be so. Miettinen argues for a more modest way of relating by emphasising reflexivity, learning processes and contextual knowledge production. This is an echo of Haraway's situated knowledges (1997) and Jasanoff's technologies of humility (2003); rather than seeking mastery and control, we should focus on collaboration with ambitions of developing modulations in the diminishing gap between variation and selection or between promotion and control/regulation (Rip, 2002a). This corresponds well with recent discussions in policy studies concerning how a "governance by design" mode of working needs to be supplemented by a "governance through dynamics" approach<sup>33</sup>.

## From re-inventing to co-inventing innovation<sup>34</sup>

Even if the call for co-evolutionary approaches to STI is often heard, it seems hard to realise in practice and as culture. How to walk the talk? The so-called "regime of collective experimentation" suggested in an EC-report from an expert group on science and governance <sup>35</sup> is a recent articulation of this challenge. How to identify potentials for, how to design instruments for, how to promote, manage and evaluate productive interactions between "science and society" or between science, technology and the market? The report collects examples featuring the recent shift from the idea of centralized organization of innovation to explicit recognition of the importance of distributed and more diverse innovation. Referring to John Dewey's conception of policy as collective experimentation, the authors contend that: "... the experimentation is now at the technological level as well" (p 26). This move is inspired by experiments with "open innovation" in the business sector, and connects to the range of suggestive figures from the history of science policy already mentioned such as mandated science, strategic science, triple helix, mode 2, post-normal science, agora. Still, it seems hard for science as well as for policy organisations to see themselves as involved in governance through dynamics, to figure themselves as societal actors in more horizontal partnerships, as key players amongst other key players. How come?

We find encouragement to keep on posing this question in recent literature underlining that the challenges to research and to policy may be quite parallel - e.g. the way Marie Celine Loibl puts it in her contribution to *Reflexive Governance for Sustainable Development* (Voß et al, 2006): "... there (are) striking similarities between steering problems in society and steering problems in complex research settings" (p. 298). And hearing e.g. nanoscientists discussing their knowledge processes today, we are struck by the similarity to discussions raised in *Reflexive Governance* following the acknowledgment of "unintended consequences"; stressing complexity, dynamics, unpredictability, context dependency and so on. Loibl also draws attention to the importance of transforming the actors' tacit knowledge and hidden "driving" forces to what she calls "manifest contributions to the joint ... process". Or as professor in the History of Consciousness at University of California, Santa Cruz, Donna Haraway puts it; how to become responsible for what we learn how to see?<sup>36</sup>

Figurations associating co-production of science and society indicate that such intimate interaction between science and society can further more societally robust science and technology. We must strive to open up a "reflective conversation with the situation" as Donald Schön phrased it in his influential work *The Reflective Practitioner: How Professionals Think in Action* (1983). This argument may still be felt to be provocative in some corners of research. How far into research will the arena for co-production extend? And what will the interaction be concerned with? Quality, relevance or both? To develop a role as co-player seems to be dependent on a mode of humility and ac-knowledgement of limits in singular positionalities, that can be hard to find. (Jasanoff, 2003, Felt, 2007) It might even be felt to be "contraintuitive" for researchers to move away from a "mastery and control" mode in order to ask for help and to open up for input from and collaboration with others.

## Challenging research quality and innovation

Interactive policy models entail changes in the concept of quality. Contributing to productive collaboration and co-production between science and society, becomes an important mark of quality:

Recent discussions of Mode-2 science (Gibbons et al. 1994; Nowotny et al. 2001) has pointed out that ways of producing technoscientific knowledge already extend well beyond the classical 'independent' mode of basic science. Stronger roles of applications contexts and imaginations in the very production of knowledge, transdisciplinarity, and socially as well as epistemically extended peerreview are but a few elements which indicate much broader social involvement in how knowledge is produced and validated. This co-production of science and society changes the very meaning of notions like objectivity and rationality. (Felt, 2007, p. 77)

It no longer suffices only to identify thematic priorities or societal challenges "upfront". We must also explore how research processes can be developed as productive interactions between different actors for relevant innovations; how to develop and how to evaluate them as societally robust processes. (Voß et al, 2006) A more complex, dynamic and open understanding of the relations between science and society, asks for the development of new competencies and skills in the research system. The challenges are of an institutional as well as of an individual kind, and they seem to touch especially raw nerves, may be because assessing the quality of research relates to heavy investments (institutionally as well as individually) in specific forms of rational-

<sup>33</sup> For an introduction to such discussions see Voß, J.-P. (2007): Designs on governance. Development of policy instruments and dynamics in governance.

<sup>34</sup> For an excellent introduction to the theme of re-inventing innovation, see Rip, Callon, Joly (2010).

<sup>35</sup> Felt (2007).

<sup>36</sup> We read this as a core theme in Haraway's "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century" reprinted in *Simians, Cyborgs, and Women: The Reinvention of Nature* (1991).

ity. Indicating that we may have some triple loop learning<sup>37</sup> to do, can be provocative regarding our professional identities. At the same time, if we are not able to discuss and explore alternative figurations of quality<sup>38</sup>, the recourse to traditional academic standards will be imminent.

One of the more promising attempts to meet these challenges is situated in the Netherlands, still being developed by a network involving several policy organisations.<sup>39</sup> Their approach is called Evaluating Research in Context (ERiC). The comprehensive method that they propose takes into account the fact that much current research is produced in a complex socio-economic context in which demands are made by a variety of social actors. Moreover, research that addresses complex questions (for example aids, global warming, migration, renewable energy) is often multi-, inter- and/or transdisciplinary and is conducted in a context in which experts with different backgrounds, knowledge and expertise operate and different demands and interests have to be negotiated. This complexity requires a different approach to evaluation than traditional peer review that mainly emphasizes scientific excellence and relies on publications in high impact journals for its primary indicators. Since quality in the ERIC-approach is defined as a multidimensional concept which includes the expertise of stakeholders in different social domains, they elaborate on the concept of quality by looking at these different dimensions, distinguishing in each the modes of production and interaction of researchers and a variety of stakeholders. This is the how they present their approach to evaluation (Spaapen et al, 2007):

Evaluation is not the same as accounting and control; that is, the evaluation of output in terms of certain benchmarks and indicators. The method we propose aims to include a form of second order learning that also put the meaning of benchmarks and indicators that are used into question. It therefore stimulates not only first order but also second order learning processes by way of reflection, debate and ongoing iteration between goals and methods. (p. 29)

It is a major challenge - in changing times - that the models deeply inscribed in the statistical practices underpinning our monitoring and governance activities, are so hard make explicit and to put into play. The ERIC-network underlines the importance of paying attention not only to the input in research (people, money apparatus), and its output (publication and other products), but also to the 'throughput'. By this they mean the processes to mediate with the environment, for example co-operation and strategic alliances. This implies discussions about the strategic positioning of a research program, thus giving deliberation about goals and public methods weight.

Taken together, these principles form a program that combines some of the lessons of classical pragmatism (notably the anti-dualism) and new governance policy-techniques; especially the mechanism for co-ordination and co-operation, that share a focus on 'learning processes' (Spaapen et al., 2007, p 29). We include a "conclusion" that they arrive at 28 pages later:

The above lead us to the conclusion that we are not looking for an instrument to evaluate a specific research group or a program, but a process of interaction. And we are not so much looking for indicators that can tell us how good or bad the 'quality' of the research is, but we are looking for indicators that can tell us whether the group succeeds in fulfilling its mission in a relevant context. (p 57)

As hinted at earlier, the emerging acknowledgement of "unintended consequences" is stressed as motivating transformative action and experimentation in STI. Another way of approaching this may be through the discussion initiated by Sandra Harding in her introductory chapter to *The "Racial" Economy of Science: Toward a Democratic Future* (1993). Here Harding re-invents 'scientific illiteracy" as pertaining not to "humanists or ... the working classes", but to "many scientists, policymakers, and other highly educated citizens". She contends that: "... most scientists are not in a position to evaluate in a maximally objective way important parts of the evidence that they use in arriving at their results of research, nor is the educated public provided with the information and skills it needs to detect such a problem". This happens because "...elite science educations rarely expose students to systematic analyses of the social origins, traditions, meanings, practices, institutions, technologies, uses, and consequences of the natural sciences that ensure the fully historical character of the results of scientific research" (p 1).

In her *Reflections on Gender and Science* book from 1985 Evelyn Fox Keller comes close to a similar description of the challenges: "Yet, while our sensitivity to the influences of social and political forces certainly has grown, our understanding of their actual impact on the production of scientific theory has not" (p. 5). It was Keller, who some years later, contended that researchers had to supplement the assessment that "it works" with questioning what it works at as well as how it could have worked differently (Keller, 1992, p 74). Keller's diagnosis relates to natural science, but is echoed by Brian Wynne's concerning the social sciences in the "Afterword" to *Governing at the Nanoscale* from 2006:

<sup>37</sup> Triple loop learning entails inquiring how we know that we are doing the right things, while single loop learning entails asking ourselves whether we are doing "things right" (first order learning) and double loop (or second order learning) concerns whether we are doing "the right things".

<sup>38</sup> Developing practices of figuration is still a challenge for feminist research. The one outstanding exemption and inspirator being Donna Haraway.

<sup>39</sup> The network emerged out of a project from the Consultative Committee of Sector Councils for Research and Development (COS) concerning how to measure the social impact of research. Later The Royal Netherlands Academy of Arts and Sciences (KNAW), Netherlands Organisation for Scientific Research (NWO), Netherlands Association of Universities of Applied Sciences (HBO-Raad), and Quality Assurance Netherlands Universities (QANU) have participated in the project, and Hogeschool Utrecht, the Ministry of Education, Culture and Science (OCW) and Rathenau Institute have been involved as observers.

The mode of social science presented here involves more than intellectual dimensions alone. It also involves learning new relationships and responsibilities, with 'the public', with the natural sciences and with policy. And it involves social sciences becoming actors in those worlds as well as commentators. However, this leaves a continuing issue unresolved. If we are to engage in these more politically immersed relationships, and leave behind our well-bounded peer cultures, how are we to ensure that the knowledge we generate can claim validity? (p 77)

If we want to move from "speaking truth to power to making sense together" as Robert Hoppe (1999) has suggested, it also entails exploring how we can evaluate research and technology on the move - between the no longer and the not yet.

In "The Agora and the Role of Research Evaluation" (Frederiksen et al., 2003) the three authors from Copenhagen Business School, note that the evaluation of research is undergoing change and that they want to "... investigate how recent societal developments – epitomized by the concept of the agora – influence research evaluations". The 'agora' here denotes co-evolutionary figuring of the relation between science and society. In summing up they contend that:

The trust in science has traditionally been and to a large degree continues to be based on institutions that are attached to the idea of an autonomous and disinterested science (universities and the peer review system). In this article we have tried to demonstrate that the rise of a whole new field of technical research evaluation systems should be understood as part of the modernization process taking place in all western societies where the close links between social trust, visibility and accountability in any part of society have also reached science. If science is to engage in the developing and changing relationships with society and face the financial interests and power games and at the same time retain the public's trust, demands for a radical change of perspective and implementation of new methods or procedures in relation to the evaluation of scientific knowledge are unavoidable (p 166-167).

The issue of stimulating and developing conflicting and contested perspectives, is also part of what Arie Rip (2003) find is important in realising societally robust science and technology through 4th generation research evaluation. It also figures quite prominently in the section "Knowledge production and assessment" in the before mentioned Reflexive Governance for Sustainable Development (Voß et al, 2006), especially in the contributions by Katy Whitelegg and Marie Celine Loibl. They are more focused on the processes of knowledge production than on the assessment of it, but it can be argued on the basis of their texts, that production processes and assessment or evaluation, should be closely interlinked, reference also to the ERiC approach as well as to the weight placed on reflexivity or triple loop learning in the discussions we have referred to in this article. This is also a point brought forward by Arie Rip in a report to EC, June 2002; "Challenges for Technology Foresight/Assessment and Governance":

The key point, however, is to move away from a focus on our limited knowledge of the nature and extent of impacts (which will remain full of uncertainties) to the process by which they come about, starting with the here and now. The question of technological innovation and its impacts is a complex and real-time challenge for the actors. Prospective technology analysis must therefore also be "real time", and formative (a term from evaluation studies, where real-time evaluation informs, and thus helps to form, subsequent reflection and action). Anticipating outcomes (including impacts of the technology on society) must be an ongoing concern, rather than ad hoc efforts to persuade a sponsor or regulator that the innovation journey can continue (Rip, 2002b, p 52).

# Government and science as key players amongst other key players

Co-evolution in a non-European context e.g. in East Africa, make sense in a very explicit way where the mission of the national universities' and the Governments' coincide in the main objective of poverty reduction. When faculties of technology and engineering position themselves as relatively equal partners with entrepreneurs in society for development in sectors like seaweed production in Tanzania (see above),

ICT in Uganda<sup>40</sup>, beef production in Mozambique<sup>41</sup> we see examples of how the Governments, no matter if local, regional or national, see the relevance and join in coevolution processes.

In the example of our East African collaborations, the R&D&I directions to be considered by Government and research institutions seem simpler in the context of poverty reduction but more complicated in the context of fragile institutions in the country as well as its weak position in the global economy. The energy production sector is a hot issue in the context of avoiding a new colonialism situation (nuclear power material, ethanol production, solar energy etc.). Initiatives for ethanol production in the south of Tanzania and north of Mozambique out of raw material not competing with domestic food production and with foreign business interests involved encounter a number of challenges. One of them is weak negotiation power in the land use because the rights to land are not regulated in a manner in favour for the country and its inhabitants concerned. The Government in Tanzania has used the University (UDSM) to assess the conditions for ethanol production addressing this complex web of implications and interests. A biofuel cluster initiative in Dar es Salaam and Morogoro, Tanzania<sup>42</sup>, is showing how a micro-political articulation can create a diverse and hopefully sustainable environment, where stakeholders like governmental and knowledge institutions can cooperate and deliver concrete results including a number of innovative solutions very much needed.

## Co-inventing innovation between the no longer and the not yet

Addressing gender mainstreaming as well as grand challenges through innovation bring us inevitably to questioning our academic practices. We have tried to bring out, through a number of discussion threads, how the claim for excellence out of the already existing normative machineries at work in the academic world emerge as empty in complex and dynamic situations and thus problematic as bases for societally robust and relevant innovations. The question is what kind of quality in innovative knowledge production that is relevant in what context and for what purpose. Both researchers and policymakers have to create and enter a joint learning space with a learning mindset in order to be able to tackle this never-ending question. If we have learned anything from our experiences in cooperation with colleagues in developing countries, it is that research and politics are deeply intertwined and constitute conditions for innovative processes. One excellent skill needed concerns how to navigate in a more or less totalitarian political system and at the same time keep the university as autonomous as possible through learning alliances in-between scientists and citizens, official and local experts.

We have been discussing transformation processes, that we realize and try to take part in, as figured by mode 2-research. Ulrike Felt and her colleagues are exploring the

<sup>40</sup> For a short comment see //allafrica.com/stories/200808220147

<sup>41 //</sup>si4cd.files.wordpress.com/2009/01/cluster-initiatives-in-east-africa1.pdf

<sup>42</sup> Progress Report August 2008 within the Sida supported program ISCP-EA.

changing academic research environments in a European context and how researchers encounter, transform and oppose these changes. Felt is emphasizing the issue of creating and inhabiting what she calls epistemic living spaces (Felt, 2009). We recognize these discussions as an important prerequisite for ourselves and other inhabitants in the academic world in order to feel "intellectually and socially 'at home" (Felt, 2009, p. 231) and for "becoming answerable for what we learn how to see" (Haraway, 1991).

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### Interlude

# Our comments on the editorial team's various responses and an attempt to address the same

The text we have provided is not a dissemination of research outputs or outcome. In other words, it does not present research already done. We do not have an ambition to send an 'evidence-based' message to those who design (innovation) policy. The latter is not a possible position for us (see page 6 of the text). Our ambition is to *invite* co-production – dialogue and learning – (reference to our employment of the figuration "co-inventing") between different groups or cultures. In this particular setting, our focus is on researchers and policydevelopers. The text is exploratory and as such it exemplifies a form of knowledge which it at the same time motivates.

This 'double perspective' can be confusing. After the first round of comments, we thought it was necessary to provide a clearer justification given the reactions we received to the first version. We see that we have not succeeded in motivating and inviting the readers by providing more references to the backdrop. We have no solution to offer. Should we add even more references? For us, this would be an exercise of little interest.

In the text, we have included resources from debates, which mainly concern different ways of understanding the relationship between research, technology development and society. We are keen to discuss the *implications* for policy development, given that we base our engagement on an understanding of the mentioned relationship as coproduction. We are exploring concepts and frameworks, which can help us to make sense in relation to activities we have participated in – in various policy contexts (as related in the text) - to promote gender mainstreaming and innovation plus being able to address 'grand challenges'/major societal challenges in recent times. We are looking for suggestions (figurations, transdiscursive terms) that can inspire us and future coproducers in the work for, with and in societally robust technology development and innovation.

We see gender mainstreaming as an integral part of a more comprehensive project concerning societally robust technology development and innovation ('responsible innovation' is increasingly used in a European context) and we have used the first 5 pages trying to establish this context. We then continue by showing where we are looking for suggestions and proposals, which can tell something about the conditions necessary for realizing 'gender mainstreamed innovation'. We still think the abstract gives a precise description of this.

Susanne A and Karin B convey that the editorial team is unsure whether the text can be published. They ask us to rewrite the abstract to more clearly state what is included in the text. They also claim that 'co-inventing' innovation means to work together with practitioners. This is not a distinction (we as 'researchers' and others as 'practitioners') we consider fruitful. And we can't see how this can be read out of our text. What we address is how we as practitioners can create meaning and continue to inspire new, collective experiments – together with relevant partners. Unfortunately, we do not understand how "co-visioning" has become a method "where you situate yourself", as Susanne A and Karin B contend. We are concerned about the necessity of research evaluation to be developed in order to work as a condition for societally robust technology and innovation). We discuss various *proposals* providing *direction* for development work under the heading 'challenging research quality and innovation'. It is incomprehensible to us that we would have stated the existence of "common co-evolutionary methods" for evaluation.

Then, it is considered that we have come up with different "blows in the air" against other areas "without developing or specifying how any differences exist". Concerning what we mean by 'state-feminism', we have informed in what context we have launched that proposal. It is about different understandings of the relationship between research and society. In the policy literature, this relationship is often described in contract terms. This provide the background for our proposal (from 1998) to describe a form of contract - characterized by distance and division of labor between politics and research - as 'state-feminism'. This is a way of understanding the relationship between research and politics, which has been very effective in affirmative action, but which we believe has limitations when mainstreaming is on the agenda.

Nor can we see that we are indicating "that all other science is backward striving" while the technosciences are "forerunners". What we are eager forward is how the technosciences are implicated in the production of societal challenges. They change the 'terrain' and it often happens quite directly. They not only produce new maps, which policy developers later on can take as a starting point for policy design (science for

policy). They are more clearly implicated in a 'de facto' policy/politics development. As a consequence, the new requirements for 'responsible innovation' are primarily aimed at them (i.e. us). We use several pages to develop this point – most explicitly on pages 6-7 and pages 12-13. We cannot understand how this can be read as "disconnected reasoning".

Nor do we run "development projects" in Africa. We have described a situation where we learn something significant about our Nordic conditions through the meetings with and through the dialogues we have with our African partners.

In conclusion, we believe it is important for us - as researchers and policy developers - to identify ourselves as part of the problem/societal challenges. We firmly believe this is a prerequisite for becoming part of the solutions. What this might entail is one of the conditions we explore and discuss quite extensively in our article.

We have looked at the comments from the editorial team and discussed various ways of responding to them. Through this discussion we have come to realize that it is probably not possible for us to satisfy the expectations of the editorial team. What we produce seems to have limited opportunity to be recognized as 'sufficiently good research'. Unless the editorial team finds our arguments above convincing, we can do nothing but retract the article.

Elisabeth Gulbrandsen, Lena Trojer

The last text is a slightly revised reprint from *EuroScientist Journal* (2016) discussing the engagement in learning and development the large-scale technology programmes and the SAMANSVAR programme at the Research Council of Norway have mustered under the umbrella term Responsible Research and Innovation (RRI).

Until now, our diagnostics of the role of research and innovation in society and vice versa, has been too simplistic. More to the point, it has been one-dimensional and even naïve. In this opinion piece, Elisabeth Gulbrandsen, special adviser in the Division for Innovation at the Research Council of Norway, shares her view on how RRI can be embedded in the fabric of research programmes.

### **RRI as a wake-up call**

Responsible Research and Innovation (RRI) aims to foster intimate linkages between science, technology and innovation to address the so-called Grand Challenges. These include health, food security, clean energy, sustainable transport, climate change, inclusive societies, freedom and security of Europe and its citizens. RRI has a role to play in ensuring the intricate entanglements of "science and society" in the making.<sup>1</sup>

RRI invites us to deliberate fundamental questions related to what kind of futures we want Science, Technology and Innovation (STI) to bring into the world. The Norwegian experience of integrating RRI in some of the major national research funding programmes also indicates the importance of changing current research and institutional practices to ensure a societally responsible weaving of the research and innovation fabric.

"The challenge of addressing Grand Challenges" as explored in a report by Stefan Kuhlmann and Arie Rip for ERIAB (March 2014) reviewing current approaches, structures and practices, substantiates that the Grand Challenges not only resides "out there" in

<sup>1</sup> For one of the first discussion of science and technology as "society in the making", see Callon, M.: Society in the Making: The Study of Technology as a Tool for Sociological Analysis MIT, 1987.

society for the STI-community to "address".<sup>2</sup> We should not simply take research and innovation as a means to address societal challenges, but invert this approach and make research and innovation an object of inquiry in its own right.

Following this turn, we might consider RRI a wake-up call to a reality where science, technology and innovation are *always already embedded in society and vice versa*. As a wake-up call, RRI invites a new attempt to mitigate the asymmetry that Jerry Ravetz<sup>3</sup> articulated as follows in 1975: "Science takes credit for penicillin, while Society takes the blame for the Bomb."

### **RRI-experiments at the Research Council of Norway**

In the RRI-experiments and discussions<sup>4</sup> that I value and follow closely at the Research Council of Norway (RCN), the focus on the Grand Challenges now includes the research and innovation system itself – its competencies and skills – not least when it comes to diagnostic and prospective capacities<sup>5</sup>.

Basic understandings and diagnoses always frame the issues at stake and need therefore to be sufficiently explicated and discussed as an integral part of research, innovation as well as policy-making. Developing skills and capacities regarding such "second-order reflexivity" top RCN's RRI-agenda. This challenge was already insistently present in an expert-report from *EC Challenging Futures of Science* in Society<sup>6</sup> published in 2009. Reflexivity requires what the report calls "further skills" as researchers (as well as policymakers) must enhance their ability to provide metaknowledge "… about premises, conditions of validity, uncertainties, areas of ignorance, values and conditions of applicability to certain contexts". RCN's RRI-framework targets skills that are needed to open up research and innovation processes, recognise the limits of one's own knowledge and competence, as well as the ability to ask stakeholders and publics for help in dealing with the potential effects of research and innovation processes.

#### From governance of complexity to governance in complexity

The new RCN main strategy - *Research for Innovation and Sustainability*<sup>7</sup> (2015-2020) - is geared towards greater societal responsibility than before, focusing on research and innovation activities that are likely to yield benefits for society at large, in the long term, and help to engage the grand challenges in particular. The RRI-framework was developed in parallel with the main strategy by the large-scale technology programmes; the Research Programme on Biotechnology for Innovation (BIOTEK2021), the Research Programme on Nanotechnology and Advanced Materials (NANO2021), the Initiative for ICT and digital innovation (IKTPLUSS) and the Programme on Responsible Innovation and Corporate Social Responsibility (SAMANSVAR).

Inspired by international developments - in particular the emerging RRI policy by the Engineering and Physical Sciences Research Council<sup>8</sup> (EPSRC) in the UK - these RCN programmes conducted several RRI-experiments while building their RRI-ambitions. These ambitions were later set down in the RRI-framework formulating expectations not only for the research organisations receiving funding, but also for the programmes themselves as responsible societal actors.

The large-scale technology programmes driving RCN's RRI-engagement, was not by chance. Indeed, research, technology development and innovation entail more than uncovering truth or charting out new and improved maps. These are activities that can, potentially-and often directly-change the landscape in which we live. We are not merely "reading" nature. Increasingly, we are "rewriting" it as well, as e.g Jack Stilgoe explores in his 2015 book *Experiment Earth*<sup>9</sup>.

RCN's RRI-framework designates a key role to governance, as does many other framings of RRI that have emerged in recent years. At the same time, the understanding of governance changes as a result of the distribution of responsibility for governance in dynamic and heterogeneous networks. Governance in complexity seems a wiser strategy than attempt at governance of complexity. Here, the framework points to resources that emerge from the work on Constructive Technology Assessment<sup>10</sup> in the Netherlands, including 'responsible development' and 'transition management', as well as EC's expert report on *Indicators for promoting and monitoring Responsible Research and Innovation*<sup>11</sup> from 2015.

<sup>2</sup> In 2016 RCN commissioned a country-report from the two authors relating to "the challenge of addressing Grand Challenges" for the Norwegian Knowledge, Research and Innovation System: https://ris.utwente.nl/ws/portalfiles/portal/5135889/Kuhlmann%26Rip\_ RCN+and+GC\_22+Febr+2016.pdf

<sup>3</sup> Ravetz J. (1975) "...et augebitur Scientia" in Harré R (ed.) Problems of scientific revolution. Progress and obstacles to progress in the sciences. Oxford university Press, pp 42-57.

<sup>4</sup> The RRI framework (version 1, 2015) that guides these experiments is included in the appendix.

<sup>5</sup> Reference to the two evaluations of RCN by Technopolis, *A Singular Council* (2001) and *A Good Council?* (2011) The last one explicitly challenges the organisation when it comes to diagnostic and prospective skills and capacities.

<sup>6</sup> This report is one of several excellent "science-society" reports from the Commission at the turn of the century. Link: http://www.securepart.eu/download/com-2009\_masis\_report\_expert-group-\_en150625092421.pdf

<sup>7</sup> https://www.kooperation-international.de/uploads/media/Strategie\_Norwegischer\_Forschungsrat\_2015-20.pdf

<sup>8</sup> Link in EPSRC's RRI policy: https://epsrc.ukri.org/index.cfm/research/framework/

<sup>9</sup> Animation based on the book *Experiment Earth*, by Jack Stilgoe: https://www.youtube.com/ watch?v=sekLudN3OkA

<sup>10</sup> Constructive Technology Assessment: A New Paradigm for Managing Technology in Society, by Rip, Misa, Schot (1995): https://www.researchgate.net/publication/254857246\_Constructive\_Technology\_Assessment\_A\_New\_Paradigm\_for\_Managing\_Technology\_in\_Society

<sup>11</sup> Link http://ec.europa.eu/research/swafs/pdf/pub\_rri/rri\_indicators\_final\_version.pdf

### Out of our comfort zone?

Based on ongoing RRI-experiments, e.g in tandem with Digital Life Norway<sup>12</sup>, it is now discussed whether we need a version 2.0 of the RRI-framework. It has been suggested that the dimension of "transition" should be included in addition to version 1.0 's expectations of developing better anticipatory, reflexive, inclusive and responsive research and innovation processes. Collaboration with the newly formed Transformative Innovation Policy Consortium<sup>13</sup> (TIPC) provides background and motivation for including the dimension of transition.

RCN's experiments indicate that RRI is not respecting the traditional boundaries between research, innovation and politics. In discussions amongst researchers following Brexit, we have heard calls for more "RRI-activism".<sup>14</sup> Some find it rather unsettling, individually-as they feel this new order threatens their professional identities - as well as institutionally-as it entails not respecting established divisions of labour.

To others, the RRI-wake-up call rings so loudly that it even disturbs our received notion of excellence in research. The 2014 Rome Declaration on Responsible Research and Innovation in Europe, gave a revised definition of what excellence in research means through the lenses of RRI: "excellence today is about more than ground-breaking discoveries, it includes openness, responsibility and the co-production of knowledge." <sup>15</sup>

This suggests a change of direction from 'outreach '- working to convince the public about the value of research and innovation-towards 'inreach '- presenting expectations about learning and development to ourselves and to the peers in the research and innovation communities. Some of us are by now far out of our comfort zone.

### **RRI's role**

RRI associates a mode of operation<sup>16</sup> – even existence – according to Bruno Latour<sup>17</sup>, required to foster a deep cultural change. For RRI to successfully engage Grand Challenges, we see the need for paradigmatic shifts. It is vital to note that RRI comes in different framings. The RRI-framing that is explicated here, is not e.g. the 5-6 keys-framing that the EU has propagated through Horizon 2020. It is important to designate RRI as a 'figuration', according to Donna Haraway (2003), or a transdiscursive term, as described by Reijo Miettinen (2002), a boundary object, as underlined by Susan Leigh Star and James Griesemer (1989) or an umbrella term, in the words of Arie Rip

and Jan-Peter Voß (2013). As a figuration, RRI cannot be "owned" by any discipline, sector or expert community. As a figuration, RRI invites collaboration across such divides and can further the orchestrating of initiatives, providing spaces while inviting crossover collaborations.

Governance in and through dynamics in "shared spaces"<sup>18</sup> requires "experimentation, learning, reflexivity, and reversibility" according to Jack Stilgoe (2016), while modulating systems transitions so that the Grand Challenges of our times can be engaged more productively.

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<sup>12</sup> Digital Life Norway is a strategic priority of the Biotech2021-programme: https://digitallifenorway.org/gb/

<sup>13</sup> http://tipconsortium.net/

<sup>14</sup> Highly recommended: 10 minutes with Richard Owen's intervention at an RRI Tools event in Barcelona developing future challenges for RRI: https://www.youtube.com/watch?v=FlBU-t4yfi4)

<sup>15</sup> Link: https://ec.europa.eu/research/swafs/pdf/rome\_declaration\_RRI\_final\_21\_November.pdf

<sup>16 &</sup>quot;Living sustainably implies developing relational skills and the awareness of complexity and

ignorance as resources of being" - reference to Alice Benessia et al. (2012).

<sup>17</sup> Latour, An Inquiry into Modes of Existence (2013).

<sup>18</sup> Reference to "Shared space and slow science" by Jack Stilgoe (2016) to be reprinted in von Schomberg and Hankins (eds.) (2019) *International Handbook on Responsible Innovation: A Global Resource.* 

### Epilogue

Thirty years ago, on the significant date of May 17th, 1989, I was invited to the Swedish Parliament to address MPs from the Social Democratic Party about the future of gender research, as seen from an international perspective. The meeting was convened by the centres/forums for gender research in Sweden. As this was three years after *The Science Question* in Feminism had been published to international acclaim, I had prepared speaking notes indicating how science was becoming a question in the Nordic countries, in feminism as well as in environmentalism and for sustainability. In other words, my speaking points emerged from a politicoscientific perspective and asked what capabilities, skills and knowledges we would need in our future role as citizen scientists or analyst-activists. I concluded by arguing the importance of experimentation for learning and development. Here I credited the Swedish gender research movement, contending that the networking approach taken by the centres and forums furthered such an ambition.<sup>1</sup>

I can quite vividly recall the reaction I received from the convenors at the preparatory meeting when I presented my speaking points. It was more than apparent to me that they thought I had misunderstood the task. Our task was to convince MPs that gender research was an indisputable "public good". The science question ought not be mentioned as it would most probably be distracting. We, they argued, were in the Parliament to secure funding for the centres and forums. We should also take care to observe the division of labour between research and politics. MPs should not be asked to relate to research as implicated in creating societal-political challenges or as politics

<sup>1</sup> The presentation is printed in my licentiate; *The Reality of our Fictions: Notes towards accountability in (techno)science,* Luleå University of Technology, 1995:20L.

by proxy. It was even suggested by some of the convenors that I did not give my talk at the meeting later that day.

I stuck with my speaking points, however. Despite my intervention, or because of it - I will never know – the meeting in the Swedish Parliament might be seen as marking the start of thirty years' development of figurations, competencies, knowledges and skills which are now emerging as vital ingredients of  $3^{rd}$  generation research and innovation policy<sup>2</sup>. What I do know, is that it helped me set the direction for my continued engagement both with and against Nordic women's and gender research over the following decade – as demonstrated by the texts presented in part I of the thesis.

At the turn of the century my engagements shifted arenas. I was inspired by the growing international discussions that enhanced science policy questions into vital political questions<sup>3</sup>, but I was also motivated by longstanding discussions in Norway<sup>4</sup> where policy and politics were converging. My continued involvement with feminist technoscience at BTH proved to be a fertile ground for developing the seeds I harvested in policy arenas as the ambition for transformative research and innovation policy/ politics started to emerge more widely, spurred on by the focus on Grand Challenges.

Grand Challenges are generated and sustained by highly complex and strongly dependent relationships between different actors and their behaviour, value chains, institutions and infrastructures. To efficiently engage such challenges, systems transformation is required. I do not think I have to remind the reader that we have been building and nurturing research and innovation (eco)systems in the Nordic countries for a long time. It is now becoming evident that we need to develop skills and capabilities in order to transform them as well.<sup>5</sup> And as repeatedly stressed in the texts compiled for the thesis, systems transformation invites actors from different sectors and disciplines to engage in genuinely uncertain and open-ended processes, as the Grand Challenges are identified by and demonstrate strong "wicked problem" features. Learning through collective experimentation is singled out as a prime mover of transformative innovation policy, or 3rd generation research and innovation policy as it is also designated. Transformative innovation policy is motivated by the third failure of engaging the Grand Challenges. Neither market failure (first generation) nor systems failure (second generation) approaches to policy development, will be sufficient when Grand Challenges are on the agenda.

- 2 For an extensive narration of this development from a politicoscientific perspective, see *Sharing Fragile Future*, Trojer (2018). The Social Democrats came into power in 1994, and the period until 1998 during which Carl Tham was minister for research, was exceptional as related in part III of *Sharing Fragile Future*.
- 3 Reference to e.g. Bruno Latour (1998) "From the world of science to the world of research?" *Science* Vol 280, Issue 5361, Sheila Jasanoff (2003) "Technologies of humility: Citizen participation in Governing Science" and (2004) *States of Knowledge: The Co-Production of Science and the Social Order* Routledge. For a seminal publication preparing the later diffusion of the co-production model; *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, Gibbons et al. (1994).
- 4 This is reflected in most of the texts in part II of the thesis.
- 5 As discussed in the introductory text.

As noted in the introduction, the recent decade has seen a plethora of umbrella terms motived by the complex matter of addressing societal challenges through innovation. Initiatives have been launched that are designated as Open Innovation, Challengedriven or Challenge-led Innovation, Responsible Research and Innovation, Agenda 2030 (Sustainable Development Goals), Transformative Innovation Policy and lastly; Mission-Oriented Innovation and Mission Driven Science and Innovation<sup>6</sup>. These umbrella terms all assign a key role to governance. At the same time, the understanding of governance changes as a result of the distribution of responsibility for governance across dynamic and heterogeneous networks that includes researchers/scientists as well as policymakers. The frequent shifting of umbrella terms suggests that there are rather heavy demands involved. One of the more challenging tasks promoting such initiatives is that of fostering the warranted collective experimentation. Collective experimentation asks for new forms of open interactions between the different worlds of government, public sector, industry/business, scientific institutions and civil society. Governance in complexity and through dynamics has been suggested as a wiser strategy than (ever more) attempts at governance of complexity.<sup>7</sup> Arie Rip contends that this challenge disturbs the professional identity of policymakers. My hope is that the texts compiled for the thesis show how this also affects the professional identity of researchers implicated in the production of Grand Challenges:

"... political actors, and more generally, actors with a governance responsibility, will see themselves as somehow outside the system that they have to govern. This is almost unavoidable: to articulate a strategy one has (or so it appears) to diagnose a situation 'out there' and formulate a response. ... The effects of their strategies, however, are determined by ongoing dynamics outside their influence, and by the response of other actors ... " (p 82)

My dream for the assembled texts is that they will suggest what competencies, capacities and skills that are required for developing governance through dynamics and not merely governance by design for later implementation. Figurations for governance through dynamics emerge from the trying transformations or participant provocations conducted by analyst-activists in STI-worlds. Here it is worth remembering Donna Haraway's trying transformations regarding the figuration of "modest witness".<sup>8</sup>

I find potentials for fostering the dynamics I ask for in feminist technoscience as one of the absolute strengths of this technoscience "brand" is the way in which it caters for the learning imperative, following from focusing research "in practice and as culture". For some, learning still has connotations that does not resonate well with the self-

<sup>6</sup> See e.g. discussion in the context of the new framework programme of the EU, Horizon Europe, to take effect from 2021 " ... pursuing a mission-oriented policy approach": https://ec.europa.eu/ info/designing-next-research-and-innovation-framework-programme/what-shapes-next-framework-programme\_en

<sup>7</sup> Arie Rip «A co-evolutionary approach to reflexive governance - and its ironies» in Voss, Bauknecht, Kemp *Reflexive Governance for Sustainable Development*, Elgar 2006.

<sup>8</sup> Donna Haraway (1997) Modest\_Witness@Second\_Millennium.FemaleMan.© Meets\_Oncomouse™: Feminism and Technoscience, Routledge.

understanding of the "best and the brightest".<sup>9</sup> This became evident in a project set up to enhance OECD's first innovation strategy in 2009 concerning societal challenges.<sup>10</sup> Here, I was told by our project manager to stop talking about learning because her boss thought " it was like going back to school". The ways in which we learn and unlearn can become more sophisticated still. Today the notion of "triple loop learning" is acquiring a certain urgency; we should also ask how we can know that we are doing the right things right. Triple loop learning thus connects to Ricoeur's "hermeneutics of suspicion" but also to action research and action learning as e.g. deliberated by Argyris and Schön in their extensive work on organisational learning and action science. This is also where I would like to acknowledge Karen Barad and the importance of her work for the development of feminist technoscience as a learning enterprise. Having participated in experiments under the umbrella term of Responsible Research and Innovation (RRI)<sup>11</sup> in different contexts over the last ten years, I continue to find myself re-reading Barad's "Reconceiving Scientific Literacy as Agential Literacy - Or, learning How to Intra-act Responsibly within the World" from 2000. The text represents an excellent questioning of what scientific literacy can mean in a technoscientific world. Many continue to be inspired by Barad's suggestions as to how we might understand scientific practices that will make for better, more creative, more responsible participation in various technoscientific enterprises "in which we are all implicated at this historic moment".

Another strength of feminist technoscience is how it caters for the affective dimensions of science as practice and culture. As I have come to see RRI more and more as a modality, the affective dimensions come to the fore. I am here in agreement with Benessia et al.<sup>12</sup> when they contend that: "Living sustainably implies developing relational skills and the awareness of complexity and ignorance as resources of being." I am also reminded of Jack Stilgoe's warning about the focus on ethics and values in for example the EU's conception<sup>13</sup> of RRI, at the same time as he is developing an alternative figuration of "shared space":

But much of the regulatory machinery that seeks to protect our health, environment and rights contributes to the segregation of science from society. Risk assessments and ethics committees promise society safety from the downsides of innovation, but in doing so they exacerbate the illusion that technology is understandable, predictable and controllable. Proponents of shared space make the argument that revealing the uncertainties of road use and prompting greater responsibility makes

their roads less dangerous. Geographer John Adams (2008) argues that shared space 'assumes a very different road user - one who is responsible, alert and responsive to evidence of safety or danger'. By assuming this behaviour, it also nurtures it. The motto is 'unsafe is safe'. (preprint version, p 9)

The 'shared space' imaginary links up nicely with Donna Haraway's more recent development of the figuration "involutionary momentum". As explained by Lena Trojer (2018) this represents a turn towards attention modes of relationality and "becoming with" (p 204). This is again based on a rethinking of received evolutionary theory (and Darwinism), supplementing evolutionary logics with an involuntary *mode* of attention, meaning that focus is on how organisms reach toward one another.

Positions as observers or commentators are sparse these days. The figuration of 'situated futures' that I have suggested<sup>14</sup> complement Donna Haraway's 'situated knowledges' associates strongly to becoming with in shared spaces. RRI is about inviting and fostering a modality conducive to real partnerships and crossover (disciplines as well as societal sectors) collaborations. The situation of being implicated in potentially world-changing activities is what RRI takes as a given and as shared between research institutions/researchers and research councils/board members and advisers as "societal actors":

RRI represents aspirations for learning and development in the research and innovation system broadly enough understood to encompass the research council level. RRI is motivated more by discontinuity than continuity in relation to tools/instruments that are becoming inadequate in the knowledge society. This applies not only to research ethics, but also to risk assessment and various regulatory mechanisms. RRI involves challenging exercises and assumes that the actors have something to learn from crossover collaborations.<sup>15</sup>

Or as David Guston and Jack Stilgoe<sup>16</sup> interpret our RRI-struggles in *The Handbook of Science and Technology Studies*:

The idea of responsibility that is enacted through such efforts is not legalistic and retrospective, but prospective recognizing the profound uncertainties and encouraging and supporting researchers to join intellectual forces to explore them. (page 857)

As I have frequently practiced self-plagiarism throughout the last thirty years, I will repeat an invitation proposed in the introduction, only now extending it to the future: I imagine the texts I have assembled for the thesis (the original communications) as invitations to enter ongoing (hermeneutical) processes trying to make sense of how STI are playing out in different arenas – or better; shared spaces – where the Grand Challenges are on the agenda. The invitation comes with a special reference back to Jane Flax; no closure in sight. It takes a certain modality to endure the frustration of not being able to close a process or a text, as Flax explains. In his book, *Legislators and Interpreters: On Modernity, Post-Modernity and Intellectuals*, Zygmunt Bauman (1987) discusses the role of intellectuals in the world. Bauman argues that the tasks of

<sup>9</sup> See e.g. the discussion relating to Chris Argyris (1991) "Teaching Smart People How to Learn" in the text reprinted from the licentiate; "The reality of our Fictions: Notes towards accountability in (techno)science".

<sup>10</sup> See our report https://www.oecd.org/sti/inno/47861327.pdf

<sup>11</sup> Reference to "RRI as a wake-up call".

<sup>12</sup> Benessia A., et al "Hybridizing sustainability: Towards a new praxis for the present human predicament" in *Sustainability Science* 7, p 75-89, February 2012

<sup>13</sup> The EU concept of RRI relates to 5-6 so-called keys: https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation See e.g. Stilgoe and Guston (2017) "Responsible Research and Innovation" for a discussion of an alternative developed by the RCN (NO), the NWO (NL) and the former EPSRC (UK) as an instance of 3rd generation research and innovation policy engaging the Grand Challenges.

<sup>14</sup> Please see the discussion in "How can universities become more active partners in innovation systems? Lessons from the Nordic countries? As included in part II of the thesis.15 Citation from the RRI-framework included in the appendix.

<sup>16</sup> Felt, U., Fouché, R., Miller, C. A., Smith-Doerr, L. eds. (2017) *The Handbook of Science and Technology Studies*, Cambridge MA, MIT Press.

intellectuals change from being 'legislators' to 'interpreters', paralleling the transition from Modernity to Post-Modernity. My approach has been to read and interpret texts, processes and actions for better questions and for mobilizing figurations to further collective experimentation between the no longer and the not yet. All the while observing basic rules of a "hermeneutics of suspicion" as well as trusting the intersubjectivity that can emerge in shared spaces.

But will this approach make sense in spaces where Janice Moulton's "adversary method" (Moulton 1983)<sup>17</sup> still might be the hegemonic one? Only time will tell ...

### Appendix: A Framework for Responsible Innovation

https://www.forskningsradet.no/contentassets/1975cf4657c24ffea33d274adfff0319/ rri-rammeverk.pdf

A framework for Responsible Innovation – under BIOTEK2021, IKTPLUSS, NANO2021 and SAMANSVAR Version 1.0

### 1. Societal responsibility and grand challenges

The new main strategy for the Research Council of Norway, *Research for Innovation and Sustainability* (2015-2020), clearly stresses the role of research in society and the societal mission of the Research Council. Societal responsibility is also emphasised in the current *Innovation Strategy for the Research Council of Norway*, which states that the Council will give priority to activities that are sustainable on three fronts: economic, environmental and social. The main strategy asserts that the Research Council must assume greater societal responsibility by promoting research and innovation activities that will yield benefits for society at large in the long term. This means ensuring that research is conducted in a societally responsible way, and that greater importance is attached to how research might contribute to solving the grand societal challenges.

<sup>17</sup> In "A Paradigm of Philosophy: The Adversary Paradigm," Harding, S. & Hintikka, M. B. (eds.) *Discovering Reality*, Janice Moulton questioned whether the ideal way to examine a viewpoint is to subject it to adversarial opposition. Moulton's disciplinary background was analytic philosophy, but it can be argued that the disputation displays similar features, while claiming to distinguish excellence in research.

### 2. Co-production and governance challenges

Research, technology development and innovation entail more than uncovering truth or charting out new and improved maps. These are activities that can potentially, and often directly, change the landscape in which we live. We are not only "reading" nature, more and more we are "writing" it as well. It is this trend - exemplified by e.g. synthetic biology or geoengineering<sup>1</sup>- that provides the background and motivation for our engagement in and for Responsible Research and Innovation (RRI). Research interacts and is interwoven with other social, cultural and historical factors. The intermingling, complexity and dynamics of this co-production means that governance schemes based on distance and clear task distribution between research, technology, innovation and policy are unproductive. It is in recognition of this systemic complexity and dynamics that the vision of Responsible Research and Innovation has emerged. RRI represents a new attempt to mitigate the asymmetry that Jerry Ravetz articulated as follows in 1975: "Science takes credit for penicillin, while Society takes the blame for the Bomb."

### 3. Ambitions

Ambitions relating to RRI are formidable. As an expert group appointed by the European Commission states: "RRI seeks to connect research and innovation with the futures in which they play a part." (Directorate-General for Research and Innovation (DG RTD), 2013). RRI has become an important concept in political narratives in recent years, particularly in Europe. RRI is a cross-cutting issue under Horizon 2020, and in November 2014 the Italian Presidency of the Council of the European Union presented The Rome Declaration on Responsible Research and Innovation. It is important to stress that RRI is a figuration; it is open, not "owned" by anyone and therefore invites and inspires experimentation, development activities and learning across established boundaries, sectors and disciplines. In this respect RRI is a means unto itself; in the words of René von Schomberg, a driving force behind early RRI efforts under the European Commission: "RRI is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other...". In October 2013, the UK's Engineering and Physical Sciences Research Council (EPSRC) became the first European research council to draw up an RRI policy, creating a Framework for Responsible Innovation focusing on aspects that it expects will characterise RRI processes.



Framework for Responsible Innovation

EPSRC is committed to develop and promote Responsible Innovation. This site reaffirms our own commitment and sets out our expectations for the researchers we fund and their research organisations.

### 4. RRI activities at the Research Council

International RRI efforts have inspired the Research Programme on Biotechnology for Innovation (BIOTEK2021), the Research Programme on Nanotechnology and Advanced Materials (NANO2021), the Initiative for ICT and digital innovation (IKTPLUSS) and the Programme on Responsible Innovation and Corporate Social Responsibility (SAMANSVAR) to experiment together on several RRI-related activities<sup>2</sup>. The Research Council's Programme on Ethical, Legal and Social Aspects of Biotechnology, Nanotechnology and Neurotechnology (ELSA) (2008-2014) was part of the overall international development<sup>3</sup>. RRI projects under the large-scale technology programmes mentioned above are based on a paradigm shift in the fundamental understanding of the relationship between research and society; from linear models to interactive models that focus on interaction and networks across disciplines and societal sectors. The experimental activities show that further development of RRI will require building new knowledge, expertise, skills and capacity in the research and innovation system. At the same time, we see that the RRI dimensions identified by EPSRC have generic value. Parallels may also be drawn to needs for learning and development identified through long-term efforts in Constructive Technology Assessment (CTA) in the Netherlands and Real-time Technology Assessment (RTTA) in the US.

### 5. Dimensions of RRI

The programmes referred to are seeking to advance efforts in and for RRI through learning and development activities in dialogue with the research environments they fund. In its RRI framework, EPSRC formulates new expectations not only for the research organisations receiving EPSRC funding but also for the organisation itself as a responsible societal actor. We will build further on an adapted version of the four dimensions of RRI identified by EPSRC. The expectation is that the processes in the research and innovation system will be increasingly characterised as:

<sup>1</sup> See, for example, Jack Stilgoe's discussion of geoengineering as an "archetype of technology as social experiment" in Routledge: *Experiment Earth*, 2015. Link to Stilgoe's Experiment Earth blog: http://experimentearth.org/author/jackstilgoe/.

<sup>2</sup> Relevant activities include: the joint funding announcement on RRI issued by the IKTPLUSS initiative and SAMANSVAR programme with a deadline in February 2015; the NANO2021 programme's RRI workshop for its research fellows in April 2015; the BIOTEK2021's strate-gic initiative "Digital Life - Convergence for Innovation"; the learning platform for large-scale industry-relevant Researcher Projects; and the testing of the walkshop method in autumn 2015.

<sup>3</sup> See references to the Research Council's work and programmes in: Challenging Futures of Science in Society (EC 2009); Owen et al. (Eds): *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society* (2013); "Responsible Research and Innovation" - report to ERIAB (March 2014).

- 1. Anticipatory: The Research Council has been repeatedly challenged when it comes to diagnostic and prospective competence and capacity. It has proven difficult to develop substantive diagnoses and correspondingly good prospects or figurations<sup>4</sup>. Technologies may potentially have terrain-changing effects that are realised in complex, dynamic interplay with other societal forces. There is lack of knowledge and understanding concerning how to realise this potential in relation to desired societal development.
- 2. **Reflexive**: This involves employing expertise and capacity to better identify and discuss prerequisites for research and innovation activities, in the form of fundamental, often implicit, assumptions and frameworks of understanding, irreducible uncertainty and areas of ignorance. A greater degree of reflexivity is vital in order to provide directionality in research and innovation processes.
- **3. Inclusive:** Societal dialogue has long been high on the agenda of the research and innovation system. The informative, explanatory monologue on the part of research was to be replaced by (societal) dialogue. After a period of seeking to develop various types of dialogue mechanisms, such as people's juries, lay public conferences, consensus conferences and focus groups, to "enable society to speak back to science," attention is now increasingly being directed towards the research environments themselves. What is being targeted are the skills needed to open up research and innovation processes, recognise the limits of one's own knowledge and competence, and the ability to ask for help in dealing with the potentially landscape-changing effects of these processes.
- 4. **Responsive:** Activities involving the first three dimensions are intended to provide continual input and substance to new governance practices. This entails the development of horizontal or distributed governance schemes that encourage collaboration with partners that may be affected by a research and innovation process. There is a need to open up different perspectives relating to dilemmas and irreducible uncertainty. This must take place via broad-based involvement, not only on the part of researchers from different disciplines, but also bringing on board policy actors, including research councils, trade and industry, interest organisations and society at large. The RRI method is a learning process with no fixed answers ("beyond rules and regulations").

### 6. Promoting and monitoring RRI

RRI represents aspirations for development and learning in the research and innovation system broadly enough understood to encompass the research council level. RRI is motivated more by discontinuity than continuity in relation to tools/instruments that are becoming inadequate in the knowledge society. This applies not only to research ethics, but also to risk assessment and various regulatory mechanisms. RRI involves challenging exercises and assumes that the actors have something to learn from crossover collaborations. In 2015, the European Commission published a new expert group report entitled *Indicators for promoting and monitoring Responsible Research and Innovation*<sup>5</sup>. The report represents to a certain extent a Norwegian contribution to international RRI efforts, as the expert group was led by Professor Roger Strand of the University of Bergen. The report provides valuable input and inspiration for continued work with societal responsibility. For future RRI activities, the expert group contends that it is important to keep the following three issues in mind:

- The report *clarifies and discusses the knowledge base* in an exemplary fashion. The linear trajectory from basic research to applied research and then to development of products and services for the private and public sectors is rejected as a universal model. Given this framework of understanding, the report states that "RRI is ... a matter of the interface and interplay between R & I and the context in which it takes place...." (p. 5). This places new demands on the knowledge base, expertise, capacities and skills in the research and innovation system both at an individual and institutional level.
- Based on an allotted mandate rooted in New Public Management, the expert group opens up RRI as a *learning and development project* for the research and innovation system, so broadly understood that it extends to the European Commission itself, along with other research funders. The discussion of the mandate concludes as follows: "the emphasis of impact evaluation is shifting from (end) product to process, and from verdicts/judgements to learning and improving" (pp. 12-13). The importance of productive interaction, also in the development of indicators, is emphasised: "From a network perspective, RRI is governed through the active participation of all relevant stakeholders in developing a monitoring policy and indicators.... These stakeholders should jointly decide what indicators best represent the kind of R & I that takes place in their particular network." (p. 6)
- The expert group gives governance a key role in the realisation of RRI. At the same time, the understanding of governance changes as a result of the distribution of responsibility for governance: "The governance of science and innovation then becomes of central importance in this process. The question is, how does governance work in such dynamic and heterogeneous networks? ... Research and innovation is a complex system and *governance in complexity* is a wiser strategy than attempt at *governance of complexity*." (p. 12). Here, the expert group points to the resources that have emerged from the work on CTA in the Netherlands, such as frameworks of responsible development, transition management and strategic niche management.

<sup>4</sup> See "A Good Council? Evaluation of the Research Council of Norway", Technopolis (2012); *Egenvurdering av satsingen på foresight og dialogbaserte arbeidsformer i Norges forskningsråd 2003-2005* (internal assessment of the Research Council's foresight initiative), Research Council of Norway (2006); *21-prosessenes samfunnsansvar* (societal responsibility in the "21" R&D strategy processes for the 21st century), Norwegian Board of Technology and Research Council of Norway (2015).

<sup>5</sup> http://ec.europa.eu/research/swafs/pdf/pub\_rri/rri\_indicators\_final\_version.pdf

## The RRI Poster

Look forward!

Think through!

Invite along!

Work together!

