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FROM ETHICS OF RESTRICTION TO ETHICS OF CONSTRUCTION

ELSA research in Norway

by Rune Nydal, Anne Ingeborg Myhr and Bjørn Myskja

Current trends in ELSA policies are marked by keywords like collaboration, integration and Responsible Research and Innovation (RRI). This article analyzes how these trends have manifested themselves in Norway with the aim to find ways to understand and respond adequately to these policy developments. Recent criticisms of ELSA strategies accompanied by arguments for a turn towards 'post-ELSI' research approaches hold that ELSA research was designed to maintain a sharp unproductive normative division of labor between natural scientists on the one hand and ELSA researchers on the other hand. ELSA strategies consequently have to be overcome and restructured towards collaboration, integration and RRI. Our account of the Norwegian ELSA history does not support this simple analysis of the 'modernist' character of early ELSA strategies. We present and analyze a shift as it took place in two successive ELSA programs in the Research Council of Norway, and argue that ELSA policies that rest only on post-ELSI analyses, risk reinventing the wheel of collaboration. By insisting on the creation of novel designing strategies, one disregards important lessons from the early phases of ELSA research, and even more importantly, fails to recognize that an ethics of construction implies different challenges for different groups of ELSA researchers.

Keywords: ELSA, RRI, integrated research, bioethics, nanoethics

Authors: Rune Nydal, Bjørn Myskja
Department of Philosophy and Religious Studies, Norwegian University of Science and Technology
Email: rune.nydal@ntnu.no, bjorn.myskja@ntnu.no

Anne Ingeborg Myhr
GenØk – Centre for Biosafety, SIVA Innovation Centre, Tromsø
Email: anne.i.myhr@uit.no

What is the role of ELSA research?

ELSA is an acronym for Ethical, Legal and Societal Aspects, signifying these aspects of some kind of technological practice. Originally, ELSA (or the acronym ELSI in the USA) referred to these aspects of modern biotechnology, as the term was first known as the name for a dedicated program within the Human Genome Project in the early nineties (NHGRI 2012). As the ambitious sequencing program approached the completion of its goal, a new effort, often referred to as 'functional genomics' or 'post-genomics' gradually appeared as its heir (Nature 2000). As genomics evolved, ELSA research programs now appeared in a number of different countries as well, including Norway.

In 2005, the Sixth Framework Programme project ERA-SAGE was established to coordinate ELSA activities in eight European countries and Canada. The project name of the ELSA coordinating project, "Societal Aspects of Genomics", reflects how ELSA before 2005 was mainly associated with genomics. But something was about to happen. ELSA was at the time extended to other fields, especially nanotechnology, but also information and communication technology (ICT), synthetic biology, and neurotechnology, collectively often referred to as emerging or enabling technologies (see for instance NSF 2001, RNA 2004, RS/RAE 2004, NFR 2005, Nordmann 2004). In the last decade, ELSA has become a research category that cuts across fields being developed in parallel in different countries.

This paper discusses how we should understand a shift in ELSA research that took place following the extension of the scope of ELSA. This is a process that took place in several countries around the same time, making the Norwegian case we present one example among others. Grunwald (2014) and others have argued that the US National Nanotechnology Initiative provided a context for development of a new ELSA model that has become the dominant one, now presented under the heading of Responsible Research and Innovation. We interpret this as the culmination of the development exemplified in the Norwegian ELSA history.

This paper presents a story of the ELSA research field as it unfolded in Norway, told by three authors that have been part of the story. Our aim is to clarify what is at stake, in a normative sense, in the shift of ELSA policies, questioning the lessons of the standard stories often told of the shift. We claim that the development of the field in Norway is closely related to trends in Europe and the US, and regard it as a particular story with general relevance. We also realize that this is just one of several stories that can be told about this research field, but we hold that this perspective can serve as a supplement to other stories, bringing nuances to the self-reflection of the involved researchers. Let us first clarify what we see as key characteristics of ELSA research.

In being the 'aspect' of something else, ELSA is typically understood as accompanying research that has its own characteristics. First, it is a special kind of interdisciplinary research field, since it consists in research studying other forms of research. Second, it is primarily concerned with the societal issues (in a wide sense of the word) related to technological research, development and utilization. Third, it does not require one specific kind of academic training, as the researchers have a wide range of academic backgrounds. Fourth, it does not require one specific method, but draws on different sets of methodologies from very different traditions. Fifth, and more controversial, technology is not an activity isolated from and, in principle, independent of the society that forms the background and environment of the research and use. The activity itself will be based on and express particular societal values that are thematized in ELSA research.

ELSA as an 'aspect of' a particular research area carries a dual meaning. It is on the one hand something secondary to the main activity, something one has to attach. On the other hand it is also an 'aspect of' in the sense of being part of, something that one should include, as it covers something that is missing in the main activity, but simultaneously not something easily included.

A policy shift occurred in this field ten years ago. The standard ELSA story, as we have argued in a previous article (Myskja et al. 2014), understands this shift as a response to a need for, in Bruno Latour's (1993) terminology, 'non-modern' research strategies, recognizing the limitations of division of normative labor expressed in the 'modern constitution'. In this article, we cite the so-called 'Post-ELSI' manifesto, a short, but influential text that has been circulating in ELSA communities (Balmer et al. 2012). The manifesto is interesting as it presents a critique of ELSA that has been expressed in various forms within STS research circles (Williams 2006, Winner 2004, Rainbow and Bennett 2009 and Fisher 2005), and some central claims are reiterated and expanded in Balmer and Bulpin (2013).

In the manifesto, the critique appears in a concentrated form, pointing towards what the authors see as improved and more relevant ways to deal with the challenges ELSA research were meant to handle. The manifesto calls for innovative and radically *new* approaches to social science research on emerging technologies. ELSA research, as portrayed in this manifesto, does not represent the research activity we need. ELSA failed from the start and should have been abandoned since it was framed by the flawed and unproductive modernist division between responsibility for technical and social issues. 'Collaboration' and 'integration' consequently appear as the characteristic key terms of proper socio-humanist activity in the post-ELSI era (i.e. in contrast to what has been done in ELSA research). We would consequently not only need a new name for the activity, but also new research networks, agendas and tools. Although the post-ELSI paper thematizes the field of synthetic biology, there is no reason to read the critique as limited to ELSA work in this field. The critique is general in nature, and if its

caricature of historic ELSA research had been correct, it would be relevant for such research in all relevant fields.

Our previous article questions this analysis, suggesting in contrast that ELSA researchers were never truly modern, as ELSA researchers have from the very start been experimenting on collaboration and integration, gradually expanding the range of intellectual and methodological capacities for analysis and engagement of complex and dynamic science-society relationships. The 'Post-ELSI' approach, we argue, narrows down methodological imaginaries of the research field, in contrast to the intended aim of liberating ELSA from its modernist prison.

In the present article, we situate this discussion in a Norwegian context aiming at providing an alternative analysis of current ELSA challenges. We discuss two successive, but quite different ELSA research programs in Norway. The transition from the first to the second program represented a significant shift about ten years ago. ELSA researchers were to replace their outsider role with an insider role, and their focus was changed from analyzing societal adaption of research outcomes to modulating research processes. The outsider role consists in studying impacts and suggesting regulatory means to enhance benefits and avoid a wide range of potential negative consequences, whereas the insider seeks to intervene in the technology development at early stages in order to participate actively in the technology development processes.

This shift, that also took place internationally, could be interpreted as a turn to more integrative and collaborative modes of working, based on an analysis demonstrating a need for a radical shift to counteract unproductive modernist divisions of labor. In our view, ELSA research was never constrained by the modernist divisions of labor, but has gradually worked its way towards an alternative. A narrow focus on methods is therefore misplaced. What the policy shift makes evident, we suggest, is a general challenge for non-modern ELSA researchers facing a transition from a dominating 'ethics of restriction' perspective to include also an 'ethics of construction' perspective. The first one is characterized by negative duties that are absolute in nature, clearly defined and delimited, and usually formulated as prohibitions. Positive duties, as found in an ethics of construction, are usually imperfect, that is they are wide and open for interpretation on how to fulfil them (Kant 1996: 153). Within this framework of negative and positive duties, we have an absolute, specified duty to refrain from actions that harm others, but we have an open duty to help others, where we are free to decide how much and in which way this should be done.

The original ELSI/ELSA initiatives were strongly influenced by the idea that biotechnology had clear harm potential, and the primary duty of those promoting the technology, was to fulfill their negative duty to refrain from harming others. Then it made sense to fund specific research programs dedicated to analyze potential harms and strategies to avoid them. However, this merely captures part of the scope of ethics, and supports a misleading picture of technology as a kind of neutral, isolated activity. In simple terms: it does not matter what this technology research aims at, as long as it does not harm. Thus, the turn towards a constructive conception of the task of ELSA was a reasonable result of a critique of the conception of technology as isolated and value-neutral.

However, the expansion of the role of the ethicist to include the ethics of construction challenged the professional identities of ELSA researchers across disciplines of ELSA. They now had to turn to the challenging exercise of self-reflection analogous to the one performed by their colleagues in technology. Their work could no longer be seen as detached, analytical and critical, as their role increasingly became seen as being one among many coproducing research agents. To use the language of STS research: ELSA had to become post-normal and work within mode 2.

Shifts in ELSA research in Norway

Two successive ELSA programs of The Research Council of Norway (RCN) (NFR 2002 and 2008) – hereafter ELSA 1 and ELSA 2 – are interesting, as the transition mirrors the international trends expressed in the critique of the modern characteristics of 'ELSI research' in need of being replaced. The previously mentioned ERA-SAGE project participation gives an indication of the increased orientation within the RCN administration towards international cooperation and willingness to learn from external sources. However, the project engagement was ended at an early stage when the RCN decided to follow the Canadian and the project leading Dutch participants out of the project. Thus, the direct impact of the project on Norwegian ELSA policy was minimal[1].

The reasons for these three partners to end their engagement in the project are unclear, but there may have been differences both in approach and dedication among participating institutions. However, the participation is an indication of the RCN turn towards an international orientation, which was followed up in the election of several leading international researchers on the ELSA 2 board, including Ari Rip and Ruth Chadwick, while there were only Scandinavians on the ELSA 1 board.

The two programs are framed by a shift or extension of arenas of research, from genomics to bio-, nano- and neurotechnologies. However, as neurotechnology is still, largely, a research area of the future, for all practical purposes the shift was one of adding nanotechnology to genomics. The main bases for the two ELSA programs were national research initiatives for 'functional genomics'

1 Based on personal communication with Elisabeth Gulbrandsen, who was RCN representative in the ERA-SAGE.

for ELSA 1 and nanotechnology and new materials for ELSA 2. This extension of the realm of ELSA from genomics to nanotechnology also took place in the USA and was soon to be followed by other countries in Europe (Grunwald 2004).

The basic intuitions of the national initiatives of genomics and nanotechnology were the same. Genomics and nanotechnology both represented international research trends, based on resource demanding infrastructures, which called for a Norwegian response at a national level. Large-scale investments were needed if Norwegian research was to be internationally competitive and considered relevant for international research cooperation, implicitly to avoid being left behind as the 'biotrain' or the 'nanotrain' left the platform (NFR 2001: 7; NFR 2003: 3). The basic challenge of ELSA 2, we argue, was not different from ELSA 1. Both ELSA 1 and ELSA 2 responded to initiatives that promised to have large societal impact and thus were in need of incorporating both ethical and political scrutiny. The shift in ELSA policy, however, was quite striking in the Norwegian context, although it reflected international trends. The aim of this paper is philosophical: to clarify, with reference to the Norwegian case, what we see as the rationale for these trends. The shift in policy from ELSA 1 to ELSA 2 reflects a basic challenge of ELSA initiatives that have gradually become more visible – it concerns how to extend the role of ethics with an increased emphasis on positive duties.

In this article, we – the authors – reflect on the story of ELSA research in Norway, a story which we ourselves have experienced and to some extent influenced in various ways. Two of the authors were PhD students in the Ethics Programme preceding the ELSA 1 program. The third analyzed the Norwegian Functional Genomics initiative that gave momentum to ELSA 1 (Nydal 2006). Myskja has been a member of the planning committee (NRF 2000) and the board of ELSA 1, and board member of the last period of ELSA 2. Myskja contributed in one and Myhr in two NRC reports that influenced the framing of ELSA 2 (NFR 2005, NFR 2007b). Myhr was a member of the NANOMAT board. The authors have received funding from either ELSA 1 or ELSA 2, or both, and have been central in organizing and running the ELSA Norway network.

This direct knowledge of the events we discuss is decisive for our method. It is important to note that this is not a work within the fields of sociology, political science or history, but one of empirical ethics understood as a branch of philosophy. Reflecting in retrospect on the story of ELSA Norway, we draw on our own experiences and perceptions of the events, and using this as a guiding thread for selecting relevant information in publicly available documents and reports from the RCN. Our aim is to describe what we take to be a significant change in the perception of the task of ELSA research and to explore how elements of this change are expressed in some central documents. This is a normative shift and we aim to display how this change influenced the questions and approaches taken within ELSA research. In the following, we discuss the shift from ELSA 1 to ELSA 2 in Norway, starting with a description of the background for the ELSA 1 program.

The Ethics Program – building competence

The first ELSA program in Norway was initiated in 2002 as response to a need for a program targeting bioethical issues, reflecting international developments and expectations in genomics on the one hand and trends towards interdisciplinary treatment of ethical issues on the other hand. This program was a follow-up on a relatively large national interdisciplinary program on ethics research financed by the RCN between 1991 and 2001. The Ethics Programme, as it was called, sought to build competence in ethics research in Norway, focusing particularly on the interaction between ethical and scientific competences (Eide 1994). This focus suggested an ethics program that aimed at something different from what previously had been associated with disciplinary ethics research. The program recognized a need for building competence in ethical research on practical issues, especially those emerging in the sciences. Such research would need to be informed by the sciences, hence a need for close interaction or collaboration between ethicists and scientists. The program was led by the Norwegian philosopher Dagfinn Føllesdal and aimed at qualifying 25 persons for a PhD in ethics. The goal was reached, and this marked, together with the institutionalization of national research ethical committees, a new broad focus on ethics in research in Norway (Nygård 1994). The program focused on how to build proper expertise in the ethics of the sciences. If ethics were to be done by trained ethicists, they would need scientific guidance. If, on the other hand, ethics were to be done by trained scientists, they would need similar guidance from ethicists. The Ethics Program was, in other words, a research program that emphasized the need for integration of relevant expertise.

The question of *how* integration of expertise was to be enacted was an essential part of the research program. To avoid the term 'applied ethics', which is often associated with the application of pre-existing theoretical knowledge, the program chose to distinguish between basic ethics and area ethics, i.e. the ethics of a particular problem area or research field. In the latter case, one major aim was to build 'double competence', which meant having PhD-level competence in a professional field as well as in ethics (Stephansen 2006). The program put, in other words, tough methodological standards for area ethics as the ultimate goal was to be scientifically 'bilingual'. As such, the Norwegian Ethics Programme of the nineties actually expressed a more ambitious interdisciplinary program than the ones suggested by leading STS scholars at the time, like Collins and Evans' 'interactional expertise' (2002) or Peter Galison's 'trading zones' (1997).

The Ethics Programme initiative also supported a conception of ethics as belonging to a wider range of human practices and enquiries, not merely being a sub-discipline to philosophy. Some of the researchers, either with science or with social science/humanities background funded by the program, did research on topics within interdisciplinary areas. This included media ethics, environmental ethics, ethics and economy, ethics and religion, medical and health care ethics and ethics of different areas of science and technology, such as nuclear power and genetic modification. Case-based approaches dominated the research within these areas, drawing up concrete dilemmas and problems calling for concrete political solutions through regulation.

Despite this interdisciplinary element, it is fair to describe the program as dominated by moral and political philosophy, including what was generally known as applied ethics. By and large, it is not precise to say that the Ethics Programme was in practice directed at interdisciplinary research, but it did foster interdisciplinary dialogue and stimulated 'experiments of collaboration' as it opened up the possibility of new forms of research drawing on different kinds of competences. It may nevertheless be seen as an early attempt to build national competence in doing ethics research in the field (rather than arm-chair ethics of science making an analogy to arm-chair philosophy of science). The first ELSA program, to which we now return, was a direct offspring of this Ethics Programme.

ELSA 1 - expanding area ethics

When the RCN established the first ELSA program (what we refer to as ELSA 1) in 2002, the research topics were restricted to biotechnology, widely conceived. The program was called Etikk, samfunn og bioteknologi - ELSA Norway (Ethics, society and biotechnology - ELSA Norway 2002-2007). The report delivered from the planning committee in 2000 referred to international ELSA programs, such as the US Human Genome Project ELSI Program, and The EU Fourth Framework Programme's ELSA program and its generic follow-up in the Fifth Framework Programme. A Swedish ELSA program of genomics research was also mentioned. Although these were taken as paradigmatic for the proposed ELSA program, the committee did not put much emphasis on the ELSA acronym in their report *Etikk, samfunn og bioteknologi* (NFR 2000). Rather, the report presented the new program as a continuation of the Ethics Programme (1992-2001), but with a specific focus on the building competence within the 'ethics area' of biotechnology.

Ethics was widely conceived as including descriptive social science work as well as science communication and public engagement. The report recommended close collaboration with relevant biotechnology research programs, ensuring allocation of 5% of research funding for ethical, juridical and societal aspects of modern biotechnology (NFR 2000:52). The reason the RCN chose to downplay using the internationally recognized acronym, while acknowledging the importance of this outside influence, may be the perceived success of the Ethics Programme and a wish to emphasize the continuity with this conception of ethics research. However, the acronym gradually took hold and was increasingly used during the Programme's relatively short lifetime, and by the time the second program was established, the ELSA term was generally recognized as name for this interdisciplinary field.

The head of the ELSA 1 board, political scientist Raino Malnes, emphasized the tasks of ELSA as concerned with societal risks and consequences, although he warned against vague threats and fear mongering (Jakobsen 2001). It was important to base the analysis on facts, rather than what Nordmann (2007) later called 'speculative ethics'. Thus the program focus was, in addition to public communication, directed towards preventing negative consequences, what we call 'ethics of restriction'.

The identity as the 'first' ELSA program in Norway followed from, or was at least strengthened by, the emergence of a publically financed program in genomics in Norway, the Functional Genomics Programme (FUGE). The planning period for this program was short, starting late 2000, and initiated in 2002. Functional genomics had been simply described as the 'next step' after the Human Genome Project, which implied that it carried along also high socio-economic expectations. As genomics was taken on to its logical next step, it also inherited the intention of having funds allocated to research on ethical, social and legal issues. This became evident as 'ethics' was included from the start as a non-controversial aspect of the FUGE initiative as it both appeared to be a responsible and strategically sound strategy (Nydal 2006).

The FUGE process included some attempts to clarify what an ethical component of the program could be. There were for instance documents circulating among ethicists formulating how the ELSA component could be seen as part of the FUGE program. A body that could administrate the funds was already institutionally established, namely the ELSA 1 program. The ELSA 1 program alone had a small budget of 5 mill NOK/year. During the program period, the ELSA program board and administration cooperated closely with the FUGE program (2002-2009). FUGE therefore became very important for the first ELSA program, as 2,7% of the funds came to be dedicated ELSA projects, in total about 43 mill NOK of 1.6 billion NOK (Damvad 2011a). The inclusion of FUGE funds meant that the ELSA program suddenly administrated more than twice as much of the funds it otherwise would have, giving a powerful signal to relevant research communities that this was an interesting arena for building research competence.

Towards the end of the ELSA 1 program, an ELSA component of the Norwegian nanotechnology initiative emerged as well. The RCN

NANOMAT program (2002-2011) allocated 10 mill NOK in financing four ELSA projects in 2006 and 2007 (NFR 2007b), following the recommendation of an RCN commissioned report on the ELSA of nanotechnology (NFR 2005). The final report of NANOMAT categorizes ELSA research together with HSE and technological solutions for environmental safety. This area for 'better environment and responsible technology development' represented 6% of the total budget for NANOMAT (48 million NOK), although the total budget for ELSA research was less than 2% (NFR 2012).

The Work Programme of Ethics, Society and Biotechnology – ELSA Norway became in this situation formative for the FUGE and to some extent the NANOMAT ELSA initiatives as well. There were especially close connection between the ELSA Norway board and the FUGE board as the ELSA board recommended projects to the FUGE board (NFR 2007b: 40). Thus, the three initiatives collectively appeared as the one ELSA initiative we refer to as ELSA 1, although the NANOMAT gradually focused more on integrated projects (Damvad 2011b), hence thematically places this research closer to ELSA 2.

The work program of ELSA 1 described a wide range of specific ethical and societal research areas of biotechnology, generally connected to the issues in the two legal acts regulating biotechnology in Norway: The Biotechnology Act and The Gene Technology Act. In the section on "Analytical perspectives", descriptive and explanatory social science perspectives analyzing public opinion, political processes, legislation and activities of private corporations are highlighted, in addition to normative issues classified as 'applied ethics' (NFR 2002: 19). The 25 research projects that were funded by ELSA 1 and FUGE in the period 2002 to 2007 (including four projects financed by NANOMAT) were led by researchers from a broad range of fields, including philosophy, anthropology, theology, sociology, political science, psychology, law, biology and biotechnology (NFR 2007a & NFR 2007b: 35-36). Several of these researchers had previous been involved in projects under the Ethics Programme. By 2007 11 projects had been financed by the ELSA 1 program and 10 from the FUGE program. These projects may be roughly divided into two categories: two thirds focusing on application of biotechnology (eleven projects on human biotechnology and five on animal biotechnology and genetically modified organisms), and one third on law, regulation (three projects) and analysis of public perception (two projects) (NFR 2007a).

ELSA 1 in Norway, one could say, represented to a large extent a continuation and development of the strategies of the Ethics Programme that aimed at building competence on ethics in the field, emphasizing the need for productive integration of expertise. The methodological approaches of such area ethics were not well developed yet, as the approaches tended to be confined within traditionally disciplinary boundaries. The institutional organization added to the complexity, as the main funding for ELSA research was finally approved by the specialized science programs of FUGE (and later also NANOMAT). Furthermore, since researchers not committed to or familiar with the discussions of the Ethics Programme led some ELSA projects, the range of disciplines was also extended.

As a result, it became difficult to define clearly what all the ELSA projects had in common. ELSA included a diversity of research approaches, although related to biotechnology research and development; they focused on different sectors as agriculture, aquaculture, healthcare and industry. Some included normative and descriptive projects, as well as some transcending this divide (NFR 2007a). In 2013, during the conference "The road ahead for ELSA research in Norway: Issues of quality, influence and network cooperation" it was argued by many of the participants that ELSA research in Norway from the start had been marked by high degree of controversy surrounding how to carry out ELSA research (Forsberg 2014). The disagreements have been related to disciplinary differences among the members in the various program boards, to the issue of how to strike the appropriate balance between empirical and theoretical projects in the call for proposals, and to finding the appropriate degree of interdisciplinarity in the projects. Accordingly, it can be argued that ELSA 1 was an important arena for discussions of how the ethics of science and technology should be done in Norway. Ethicists, for instance, were represented in the scientific FUGE boards, and the ELSA program received applications from a wide variety of scholarly fields, which induced discussions on quality and relevance.

The program created, one could say, a Norwegian ELSA community, meaning that there would be a diversity of researchers defining themselves as ELSA researchers, sharing an intuition of the need to maintain and expand on 'ELSA expertise' (Forsberg 2014). As is pointed out by Gläser (2001) in an article on the 'community' term, this understanding is not without its problems, as the dominant definitions fail to capture the empirical realities of how communities are delimited and maintained. The Norwegian ELSA community, as we refer to it here, can be described as a producing community created by the RCN funding structure, "whose social order is primarily maintained by a common subject matter of work" (ibid.: 1). We realize that the existence of this community is highly dependent on the funding structure, but the mere existence of this producing community will contribute to maintaining a funding structure for research within this field, whether it is called ELSA or RRI, as long as there are convincing arguments supporting knowledge production within this field.

In our account, ELSA 1 could be seen as involving a diversity of humanist scholars and social scientist experimenting on ways to build socio-ethical expertise, or produce ethically relevant knowledge, within the area of biotechnology. The subsequent program, ELSA 2, seemed to be based on a quite different understanding, assuming some basic trends and unity of ELSA 1 in communicating a need for radical changes in ELSA approaches. In order to discuss this we first need to understand better the context of the next phase of ELSA research, the ELSA 2 program.

ELSA 2 – the dynamics of innovation

In 2006 the Research Board of the Division for Strategic Priorities of the RCN appointed a planning group to identify challenges for research on ethical, legal and social aspects of biotechnology, nanotechnology and cognitive sciences. The group was also asked to make recommendation on how such research should be organized in the future. The report was published by the RCN in 2007 (NFR 2007b) and prepared the establishment in 2008 of the new ELSA program called "Ethical, legal and social aspects of biotechnology, nanotechnology and neurotechnology – ELSA (2008-2014)" (NFR 2008). The program funding for ELSA research was supplemented by ELSA calls from the programs that followed FUGE and NANOMAT: the Biotek2021 and Nanotek2021 programs, which are still running. As all these programs represented a similar shift of ELSA rhetoric and policy described in the RCN report from 2007, we collectively refer to these initiatives as ELSA 2. The term 'ELSA 2' was also sometimes used as a short name for the second program within RCN.

The web page of ELSA 2 expresses the continuity with the previous ELSA 1 program, but also emphasizes how ELSA 2 broadened the scientific target area of ELSA research. The web page talks about "exciting avenue of study, with some highly significant challenges" in studying these 'new technologies' (NFR ELSA 2). The reference to 'new technologies' here should not only be understood as something that would generally apply to any novel technology. In addition to biotechnology, nanotechnology and technology based on cognitive science were the relatively novel technologies targeted in the new ELSA program. This raises the question whether these technologies share particular characteristics that distinguish them from other 'new' technologies. Answering that question appeared, from that time on, as an integrated and important part of ELSA research. This becomes evident in the report of the planning group and even more in the final work program for ELSA 2. Both documents establish this wider target area for ELSA building on two basic assumptions. First, the 'new technologies' in question are characterized as particularly powerful technologies, and presented as 'enabling' and/or 'generic', having an unspecific potential of societal transformation. The documents commonly refer to these fields as 'emerging technologies' or 'converging technologies' representing novel, 'Mode 2', forms of organizing science. Second, both documents discuss two innovation models in the literature, namely the well-established 'traditional linear model' and a more 'co-evolutionary' model that has been under development since the 1980s, which is regarded as the adequate framework for reflecting on these novel technologies (NFR 2007b: 10-13, NFR: 2008:3-4).

These two assumptions are crucial for the framing of ELSA 2. In contrast to ELSA 1, ELSA 2 is framed by a discussion of theories of science and technology influenced by the STS field having emerged in the period in question. It is quite safe to say that the critique of the linear model is one important unifying topic of STS, implying ELSA 2 as a form of 'STS-ification' of ELSA. Co-production, or co-evolutionary perspectives, have come to be widely used since Jasanoff (2004) suggested co-production to be a, if not *the* most essential, term of STS back in 2004. This STS influence is witnessed in the rhetoric of the ELSA 2 Work Programme. According to the RCN, the reason for establishing it was threefold:

> First, recognition that RCN's technology programmes for research on biotechnology and nanotechnology [...] in their science/technology and society activities can benefit from collaborating with a specialized ELSA programme. Second, ELSA issues relating to emerging technologies have much in common across the technologies/scientific disciplines involved.
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> [...]
>
> Third, RCN is itself an important actor in the borderlands of science/technologies and society, and intend to use the ELSA programme as a learning platform experimenting with modes of integrating science, technology and society. An underlying assumption is that both science and governance institutions need to learn to make a shift in policy and practices towards more inclusive, reflective and open forms of learning.
>
> [...]
>
> The overall objective of the programme is to develop research-based knowledge and competence on ethical, legal and social aspects of biotechnology, nanotechnology and neurotechnology. The programme shall create a platform for doing research that is reflexive and socially robust. The programme should achieve transmission and learning by comparing technological and scientific areas (NFR 2008: 2 and 7)

The transition from ELSA 1 to 2 is not one of a clean break calling for new researchers and other disciplines. The same research groups responding to the first calls are still part of the ELSA 2 research community, although others have joined them, as part of the transition. There are nevertheless noteworthy differences between the work plans of the two successive ELSA programs. While the ELSA 1 program was policy oriented, gaining legitimacy referring to the legal acts regulating biotechnology and gene technology, ELSA 2 was oriented towards the processes where science and innovation were shaped. While the ELSA 1 work plan was oriented towards research aiming at identifying and discussing specific ethical issues like prenatal diagnostics, cloning and genetically modified organisms, ELSA 2 shifts the focus to issues like encouraging "dedicated studies of technological development trajectories and their societal aspects and implications" (NFR 2008: 8).

The focus on the identification of ethical issues in ELSA 2 drifts towards identification of developments/innovation pathways. Part of the reason why this happened, also internationally, as we have suggested elsewhere (Myskja et al. 2014), was the fact that emerging technologies in general was not well developed, as was the case

for biotechnology. The shift from ELSA 1 to ELSA 2 appears against an international background of the larger contextual shift from genomics to emerging technologies. Extending the idea of including an ELSA research component from the domain of genomics to the domain of emerging technologies provided opportunities to include and experiment with ELSA approaches aiming at ethical scrutiny of technologies as they evolve. We do not know the whole range of socio-ethical challenges that will be raised by emerging technologies, as we do not know what the technologies actually will do, still being in early stages of development. Therefore, especially given non-mature fields, it is a reasonable strategy to pay close attention to how the technologies emerge in a range of different cases as they evolve in practice. The call for ELSA of emerging technologies was generally not conditioned by well-articulated, specified ethical and social concerns and imaginaries of the future.

It is in this context the question of the role of ELSA studies itself becomes an issue of renewed concern. We are now at a point where we can discuss how to understand the challenges of this next phase of ELSA. It is quite striking how the ELSA of emerging technologies appeared to be marked by an uncertainty of what good ELSA research strategies should be.

In responding to this uncertainty, 'integration' and 'collaboration' came to be key notions for ELSA 2 approaches and presented as a novelty or as a radical discontinuity with ELSA 1. The implicit critique, as we will discuss in the following, is that ELSA 1 research strategies were not providing the right tools for the work that needed to be done to fulfil the proper role of ELSA research. Novel ELSA approaches were needed in order to make the socio-humanist work productive in ongoing scientific work practice. We suggest in turn, in our closing section, that the question of how to make ELSA productive in real time should be framed as a challenge of expanding from an ethics of restriction to an ethics of construction. This should not be confused with a call for 'integrated projects' in a narrow sense, as seems to be the dominating trend of ELSA studies, as this carries a risk of restricting imaginary venues for enacting an ethics of construction.

ELSA 2 – integration becoming paradigmatic

In Norway, the uncertainty of proper ELSA approaches was explicitly reflected in the two first successive calls for proposals of ELSA 2 having a strong focus on how to do ELSA research. ELSA 2 was initiated by calls for systematic analysis of prior experience with ELSA research that could lead to recommendation for further directions of ELSA research in Norway. In this call, the ELSA program-board invited the established ELSA-milieus to propose evaluative synthesis studies of results of research and experiences on ELSA topics (NFR 2009). Four proposals were funded: two within nanotechnology, one on genetically modified organisms and one on the relationship between religion and human biotechnology. How could it be that the role of ELSA research had come to be a problem so pressing that it was worth taking a step back and making it into an explicit research issue? The ELSA board obviously felt the need for projects clarifying 'how to do ethics' – but why not simply put out calls for ELSA studies? These two ways of relating to research is comparable to 'showing' and 'telling' in narrative theory, where the former is usually considered preferable. In this situation, however, a brake with past ELSA approaches seemed needed.

The call for reviews of the lessons of past ELSA research was followed up by a targeted call for pilot projects 'experimenting' on novel ELSA approaches under the heading of 'integrated projects' (NFR 2009). This was not unique to Norwegian research, as both the EU and the USA initiated similar funding strategies in the same period. In the US, the Centre for Nanotechnology in Society, Arizona State University, was established in 2005 and the Synberc initiative in Synthetic Biology at Berkley in 2006. The central idea, it appears, was to experiment on how ELSA could become an integral component of scientific priority areas. This was, more particularly, as emphasized in the work program, to be achieved through close collaboration between ELSA researchers and the researchers in biotechnology, nanotechnology and neurotechnology. The scientists should ideally be active participants in ELSA studies (NFR 2008: 7).

This call for integration was later followed up in the RCN successor programs to FUGE and NANOMAT: the Biotek2021 and Nano2021. Biotek2021 made ELSA components mandatory in their first call for proposals, while Nano2021 required argued reasons for not including such a component (NFR 2013a, NFR 2013b). The integration of an ELSA component is typically framed as contributing with one work package on the projects. Emphasis on close collaboration was further confirmed in the Sandpit of Nano2021 program, where four projects were financed based on a workshop creating venues for researchers across disciplines to formulate research projects together (NFR 2014). The RCN allocated in total around 20 mill NOK for experimentation on integrated project in the initial phase of the ELSA 2 program, in the form of dedicated ELSA projects (the ELSA program) or as components of scientific projects in Biotek2021 and Nano2021.

With ELSA 2, we can say that ELSA enters a 'reflexive' phase. The question of the role of ELSA studies itself becomes an issue of renewed concern. The "[t]hree central concepts for the ELSA [2] Programme" are "recontextualization of science, reflexivity and interactive knowledge production." (NFR 2008: 3). "The program shall create a platform for doing research that is reflexive and socially robust [...] it should increase reflexivity and promote learning among ELSA researchers as well as scientist" (NFR 2008:7). An indication of this concern with learning was the RCN led learning arena for the integrated projects funded by ELSA 2. The aim was enhanced understanding of what is required of the researcher

and of the funding agency, in order to facilitate good interactions between different disciplines (NFR 2013c).

This renewed turn to integration, we suggest, appears as a novelty due to the way 'integration' was based on insights derived from science studies over the last thirty years. It would be misleading to regard it as a direct development of the ideas of interdisciplinarity and integration worked out within the Ethics Programme and ELSA 1. This is at least how the ELSA 2 documents presented it. ELSA 1 was, without much empirical inspection, inscribed into the flawed modernist division of labor associated with the 'linear model':

> The linear model assumes that clear cut boundaries between science and society can be established. According to the linear model knowledge production starts with basic research, followed by applied research, development, production/commercialisation; subsequently leading to economic growth and societal benefits. The task of science is seen as dealing with facts, whereas society takes care of values. (NFR 2008: 3)

The linear model, in other words, reflects a normative order that pictures science as an apolitical activity. The emphasis on the linear model, as this analysis lays a foundation for the ELSA 2 program, carries an implicit critique of 'traditional' ELSA research as bound by a certain normative order. Such an ELSA program would typically be oriented 'downstream', towards consequences of research and policy matters – dealing with how to regulate the final product of research and innovation. Such a construal of 'traditional ELSA' was quite explicit in the international literature (Myskja et al. 2014) as well as in the report from the planning group (NFR 2007b: 15). A short summary of the report from the planning group that appeared in the annual RCN report from 2007 is particularly illustrative.

The planning group, according to the annual RCN rapport from 2007, saw the need to counteract a tendency of 'downstream' oriented ELSA research. The next ELSA program should be in line with international ELSA research trends by being more sensitive to how ethical, social, economic and political questions affect the technology developments. The problem of the dominating ELSA research strategies, according to this analysis, is that it is too oriented towards the end-product of research, where the technology is fixed and embedded in social structures in ways that resist social control. Given this analysis, ELSA research should be integrated into the R&D process – and thereby make a difference at a time when the technology is still malleable. The so-called 'midstream modulation' approach of Erik Fisher and David Guston were presented in the annual report as a paradigmatic case of leading international ELSA trends that should frame the next ELSA program (NFR 2007a). It is generally accepted that this is a challenging task, and the Norwegian scientists and engineers who were 'pressed' into integrate ELSA in their work by the RCN calls, would be expected to choose the pragmatic route of a division of moral labor (Rip 2009). It is however, too early to evaluate the long term effect of this policy intervention. Innovative forms of collaboration may also be initiated from within.

An important aspect of this analysis is that early policy oriented ELSA research was equated with studies that were decoupled from the relevant scientific processes. It followed more or less as a consequence of the perspectives chosen in ELSA 1. "ELSA-research of biotechnology", as the planning group stated, "has to a large extend been concerned with risks and effects. It has situated itself 'downstream' of innovation processes, without ambitions to affect these processes. Ethical and social questions have thereby been free-coupled from the wider economic and political questions regarding common societal questions, control, power and responsibility" (2007b:15 our translation). A natural consequence of this analysis was that ELSA 2 should undo this decoupling and integrate ELSA in the techno-scientific research and development processes.

We hold that this conclusion is based on a simplified analysis (Myskja et al. 2014). The ELSA of biotechnology was to a large extent policy oriented, but it was not decoupled from the workplace and expertise of the scientist. In this phase of ELSA studies, the need for integration of expertise in order to do adequate high quality ethical analysis was certainly on the agenda. What we find to be an important, but largely neglected issue, concerns how to understand the ELSA 2 ambitions to affect techno-scientific research outcomes. The challenge of ELSA 2, we suggest, is not primarily captured in the words of 'integration' and 'collaboration' – but rather in terms of the extension of the ambitions of the field from what we call the ethics of restriction to the ethics of construction.

The analysis of the flaws of the initial ELSA approaches is perhaps still influential, as the current ELSA trends turn towards the rhetoric of responsibility or RRI. The RCN ELSA 2 program collaborated with Biotek2021 and Nano2021 in issuing a common call for dedicated ELSA projects. This joint call, as stated in a RCN newletter "foreshadows increased emphasis on social responsibility in research and innovation" (Abelsen 2014). The new program called Ansvarlig innovasjon og bedriftenes samfunnsansvar - SAMANSVAR (Responsible innovation and corporate social responsibility), was announced December 2014 as this new program issued a large joint call with the RCN program ICT-pluss (100 mill NOK). Likewise, in the 2015 call for a national transdisciplinary Digital Life Center, Biotek2021 has replaced all references to ELSA with a requirement of fully integrated RRI in governance of the center and in the research projects. Thus, the next step of ELSA is the turn towards RRI. This is clearly a result of international developments influencing the Norwegian research policy through administrative decisions made within the RCN. As this funding agency has a clear political mandate of being an 'agent of change' for Norwegian research, this second shift is not arbitrary. There is a clear pattern from the failed engagement in the ERA-SAGE project through the learning arena for the integrated projects in ELSA 2, to the RRI program run by the RCN administration without any scientific board. In our perspective, this represents a further strengthening of the normative shift from restriction to construction, for good and bad.

From ethics of restriction to ethics of construction

A key problem concerning the role of ELSA research derives from the simple question of what it means to be 'part of' a strategic initiative like the Human Genome Project of the NIH in the USA, or the FUGE initiative of the RCN in Norway. We suggest the challenge has not changed essentially throughout the period of ELSA research. The change during the time span encompassing the ELSA 1 and ELSA 2 programs consists in an extension or a widening of the horizon. This implies, as it is stated in the work program of ELSA 2, the inclusion of work that is measured against its ability to "clarify and deliberate normative questions concerning the shaping of science and innovation" (NFR 2008: 7).

The shift from ELSA 1 to ELSA 2 can be clarified in terms of two asymmetries. The first asymmetry is the ethical asymmetry between obligations to avoid harm and the obligation to do good. As pointed out above, there is a well-established ethical asymmetry between the two in the sense that there is a stronger obligation to avoid harm than doing good, generally speaking (for a more extended discussion of this, see Pogge 2002: 132). As such, the most sensible and important task of an ELSA component of a scientific project or program (especially such that aims to radically transform society) is to identify problematic ethical issues as soon as possible in order to minimize negative societal impacts. This ethical asymmetry, the expectation of ethics to avoid harm, fits well with expectations associated with the critical role of social scientists and ethicists. They are to take on an independent, critical and brave role and 'speak truth to power'. Such professional identities lend support to a division of labor often framed in terms of the second asymmetry, the epistemic asymmetry between the technical and the social. This asymmetry was forcefully targeted by the pioneers of STS following David Bloor's (1976) symmetry principle: scientific success and failure should be studied symmetrically (that is, avoiding resorting to social explanations when something goes wrong while sticking to technical explanation in case of scientific success).

The two asymmetries, the ethical and the epistemic, mutually support each other. ELSA research disturbs both these professional identities from the very start. Being enrolled in a scientific project draws attention to the critical potential of ELSA researchers and to the danger of being co-opted. On the other hand, being enrolled focuses the attention on what type of expertise is required for ELSA research. What do ELSA researchers put on the table and with what authority do they speak as they take on a role inscribed in an ethics of construction?

Although it is no longer particularly controversial to state that science and technology is not conducted in isolation from society (discussed as epistemic asymmetry), the ethical ramifications of this are not well worked out (the ethical asymmetry). ELSA research programs provide one promising arena for working out ways of extending professional identities from an ethics of restriction to an ethics of construction. In particular, the ELSA researchers are now better positioned to do so as the research context of emerging technologies presently include consciousness of the social and normative dimension of research. ELSA research programs that set the agenda in terms of key notions of integration and collaboration are extending the ELSA 1 program in so far as they emphasize the challenge of how to integrate normative perspectives in the study of processes of technology development. This task can be articulated as a question of enacting a responsible, just or good technological development process, rather than as one of avoiding harm, while maintaining critical distance.

Conclusion: The challenges of ELSA as constructive ethics

Evaluating the quality of current ELSA research in Norway and other countries now includes a challenge concerning how to measure the projects' ability to make a constructive difference. To what extent does ELSA involvement contribute to a good technology development? The issue, in this perspective, is not to avoid disciplinary ELSA research as such, but to conduct adequate research contributing to socially robust technology. The issue is not to avoid studies that seek understanding or analytical clarity, arguably dominant in ELSA 1, but rather the one of taking responsibility for these analyses by making them susceptible to critique in light of how these understandings translate to matters that make a difference for the scientific activity under discussion.

The ethics of construction is more challenging than the ethics of restriction. Construction requires interdisciplinary cooperation, and sometimes this includes convincing the technology research community of the value of such collaborations. It requires that both parties develop identities as co-constructors, and the reciprocal recognition of the complementarity of these roles. Finally, as Kant (1996) has pointed out, fulfilling imperfect and wide positive duties mean engaging in an activity that is not clearly delimited. One has to engage in a continuous interpretation of the responsibilities associated with the ongoing research project, always with the possibility of failing in this hermeneutic activity.

Competing interests
The authors have received funding from the Research Council of Norway's ELSA programs and other RCN programs during ELSA 1 and ELSA 2. The authors have also appeared as program board members as well as members of planning committees. The authors consequently have analyzed documents they partly have been co-authoring and policy shifts they partly have been co-responsible for implementing.

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