A ferry between cultures

Crafting a new profession at the intersection of science and society

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The new field of research into the ethical, legal and social aspects of scientific and technological developments (ELSA) is rapidly becoming a professional field with grants, research programmes and university departments devoted to it. At first glance, ELSA seems to be a new development intended to address questions and challenges that arise from advances in the natural sciences. The professionalization of ELSA resembles that of 'the history of science', a research field that emerged at the end of the Second World War. The promise that ELSA makes—that it can reacquaint science with society, and the natural sciences with the humanities and the social sciences—was actually first made by science historians in the first half of the twentieth century (van Berkel, 1988). However, although science historians are thought to have failed in respect to this promise, they did manage to craft a new profession at the intersection of science and society (van Berkel, 1988). The question is whether ELSA will be able to succeed where the history of science failed, or whether history will repeat itself.

Reflections on the relationship between science and society are not new, but it is only recently that these have received systematic attention from both scientists and non-scientists. In addition, the public and policy-makers increasingly demand that large-scale research programmes or technological advances should be accompanied by studies of their potential social, political and legal impact. This trend probably began when Nobel laureate James Watson announced that the Human Genome Project would devote a significant amount of its funding to study the so-called ethical, legal and social issues (ELSI) of the full human genome sequence (Kitcher, 2001). Inspired by ELSI and further motivated by

a desire not to inflame the public—as happened with GM crops or stem-cell research, for example—many contemporary international large-scale research initiatives have been setting up projects to study the societal implications of new technologies. Today, these programmes are often called ELSA instead of ELSI, thus replacing 'issues' with 'aspects'.

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If we restrict our analysis to programmes covering recent genetic and molecular biological research, these include the GE3LS (Genomics Ethics Environment Economics Law Society) programme run by Genome Canada (Ottawa, Ontario, Canada); the Centre for Society and Genomics (CSG; Nijmegen, The Netherlands); the Societal Component of Genomics (MCG) programme of the Netherlands Organisation for Scientific Research (NWO; The Hague, The Netherlands); and a number of initiatives funded by the Economic and Social Research Council (ESRC; Swindon, UK). In fact, the ESRC initially funded three distinct centres to address the ethical, legal, economic and social issues of genomics, but these have now merged to form the ESRC Genomics Network. Although the names of these programmes and institutes reflect alternative priorities and areas of focus, each is positioned at the intersection between science

and society—an increasingly crowded place these days. So, what can we learn from the history of this intersection and ELSA's current occupation of it?

To answer this question we need to understand how the historians of science first attempted to overcome the division between science and society. In 1959, the British author and physicist Sir Charles Snow (1905–1980) delivered a Rede Lecture on "The Two Cultures and the Scientific Revolution" at Cambridge University (UK), in which he lamented the increasing gulf between "literary intellectuals" and "scientists". Being both a writer and a scientist, Snow felt that he "was moving among two groups—comparable in intelligence, identical in race, not grossly different in social origin, earning about the same incomes, who had almost ceased to communicate at all" (Snow, 1959). He called these groups "the two cultures", referring to the separation between those involved in the natural sciences and those in the humanities—it was not customary to discriminate between the humanities and the social sciences at the time. His talk provoked a heated debate and was widely criticized both then and still today. That the lecture provoked such passionate responses shows that Snow must have hit a nerve. In fact, little has changed. Jacques Dubochet, Professor of Biophysics at the University of Lausanne, Switzerland, recently highlighted the same problem. He recognized that many biology students and students of the social sciences are largely unable to talk to one another and that, "they [are] put in separate and impregnable compartments" (Dubochet, 2008).

In his lecture, Snow also pointed out that the division between the two cultures

is not only seen at the level of academic enquiry—the subjects and topics studied—but also pervades daily life and scientific practice. For example, even today, journals are classified either by the Scientific Citation Index (SCI) or the Social Scientific Citation Index (SSCI) according to their content. On a more physical level, natural science buildings are usually separated from social science buildings on campuses. By way of example, Dubochet noted that the Sorge river is a physical barrier—representative of the intellectual barrier—between the social and natural science buildings at Lausanne (Dubochet, 2008). We would like to add the Meuse river in Maastricht to the list of actual barriers between natural and social science. Although rivers and other physical boundaries such as roads or lawns are relatively small, crossing them intellectually is, in Snow's words, like "crossing an ocean" (Snow, 1959).

Now and Dubochet are certainly not alone in arguing that this division between the two cultures is detrimental. Given the growing importance of the natural sciences to addressing social problems, it seems clear that natural science and the humanities and social sciences increasingly need to communicate and work together. More generally, science cannot be detached from the rest

of society because its products—either knowledge or technology—have important repercussions for society. Moreover, scientific research is mostly funded with public money and, of course, at a fundamental level, scientists are citizens too (Dubochet, 2005, 2008; Gannon, 2006).

What society fears, loathes or wants is at least as important as what science can deliver

There are various other rationales for bridging the gap between natural science and social science. As noted above, a democratic society should certainly be allowed to debate what science can and cannot do, particularly as society is affected by scientific progress. There is also the economic relevance of science. The British historian of science Derek John de Solla Price (1922–1983) commented that "the scientist holds the purse-strings of the entire state" (de Solla Price, 1965), noting the tight connection between science, society and prosperity. Yet, although science has become an important driving force of economic growth, innovation depends not only on what is possible scientifically, but also on what the public considers to be desirable. What society fears,

loathes or wants is at least as important as what science can deliver. Consequently, a "new social contract" for science has been described (Gibbons, 1999) and, once again, it is considered to be of great importance to marry the possibilities that science offers with the desires of the public.

Crossing this ocean between the two cultures, as Snow put it, is not an easy task. Most scientists know that interdisciplinary research is difficult enough, even if all the disciplines involved come from the natural sciences (Penders *et al*, 2008). Yet, there are examples of a few people who have made the considerable effort to combine social and natural scientific research, or at least to bridge the gap between them. Klaas van Berkel cites the American chemist James B. Conant (1893–1978) and the Dutch mathematician Eduard J. Dijksterhuis (1893–1965) as examples (van Berkel, 1988, 1996). Both Conant and Dijksterhuis initially began trying to unite natural and social science as a sideline to their main work, but both later took up the cause as a profession and taught classes, performed interdisciplinary research and wrote papers and books on the subject.

In his 1953 inaugural lecture as chair in the history of mathematics and the natural sciences at Utrecht University (The

Netherlands), Dijksterhuis argued that it is neither fruitful nor feasible to “plunge” into the other culture: “The water separating you is too wide”. Instead, he argued that, “upstream you will find a ferry that can bring you across. The ferry is called the history of the sciences and I will be a happy man if you will allow me to be your ferry-man” (Dijksterhuis, 1953). The metaphor of ferrying used by Dijksterhuis is an apt description. Crossing a river or a sea requires a ferry, a captain, a crew and a dock on either side. In the context of an academic discipline, it involves funding, the body of knowledge, texts, articles, books, journals and lectures to bridge or narrow the ocean between the two cultures. Ferrying is a diverse and, to a certain extent, collective effort.

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In this regard, Dijksterhuis and Conant represented the goal of science historians at large: to become the translators and arbiters between the “literary intellectuals” and “scientists”, as Snow had put it. However, van Berkel argues that the promises made by Conant, Dijksterhuis and others in the history of the scientific community—to reacquire the two cultures—had a profoundly different effect. Instead of crossing the divide, they created another academic discipline: “That people such as Conant and Dijksterhuis drew so much attention to the bridging role of the history of science proved to be an excellent strategy to legitimise professionalizing the community of historians of science. To sell the history of science as more than a hobby, a reason had to be found that would lead to the conclusion that more history of science had to be done” (van Berkel, 1988).

According to van Berkel, the role that the history of science claimed it could have helped the early historians of science to solidify and professionalize their discipline. They were able to create departments and chairs at universities and research institutes, and founded their own scholarly journals. Nevertheless, the claims were well meant

and the history of science retained—and still retains—the potential to at least provide a ferry over the ocean separating natural and social science (Cohen, 1997)—an objective that is today phrased in terms of ‘emancipation’ as it became independent from general history and developed a discipline, methodology and body of knowledge (Schot, 2004).

The historians of science are not the only ones who have found the intersection of science and society an interesting location to stake their claim and professionalize their interests. Palmyre Oomen, Professor of Philosophy at the Technological University of Eindhoven in The Netherlands, argues that it is the job of philosophers of science to act “as a boat and navigate between the islands [cultures], to navigate from one to the other, to create a presence of A in B and B in A while leaving the differences between A and B intact” (Oomen, 2003). Indeed, the philosophy of science has, for a very large part, been incorporated into ELSA initiatives in which we can now observe a similar process of professionalization.

ELSA is usually accompanied by a specific suffix such as ELSA genomics or ELSA nanotechnology. In practice, most ELSA initiatives are connected to specific research fields in the life sciences because these have the largest potential to stir and shake society. Nevertheless, the suffix is not as important as the way in which ELSA researchers identify themselves, their position and their goals. To explore this, we conducted interviews with eight ELSA researchers from Europe and some of their comments can be found below. We should point out that, where necessary, some quotes were translated into English and some are cited anonymously where the interviewee requested it.

For some scholars, ELSA is a loose collection of disciplines from the humanities and social sciences, each of which deals with and comments on the consequences or issues arising from scientific research in their own specific way. As one scholar put it: “scientists and social scientists are put together and produce a book [...] or organise a conference [...]. Everybody contributes, but remains who he is.” This view of ELSA implies that the two cultures—science and social science—coexist, but rarely exchange information or

insights, which is in direct contrast to the ambitious idea of ELSA held by other researchers. The same scholar pointed out that ELSA should really be about intercultural interaction and should respond to the divide between the two cultures: “research [should be] based upon real cooperation between science and social science. Scientists are not just the source of information, but are involved in the research and things are literally done together [...] the scientist discovers how much philosophy there is in biology or physics and the philosopher discovers that one needs to become a biologist to reflect upon what is happening in the world [...] a merging of horizons.”

The first strategy—in which scholars stay on their side of the divide—is the one that has been tried time and again to little or no avail. According to various ELSA researchers, the ELSI programme that accompanied the Human Genome Project was an example of this. One of the people involved was Philip Kitcher, Professor of Philosophy at Columbia University in New York (NY, USA), who stated bluntly: “ELSI has failed” because, although the ELSI programme produced thousands of papers, “virtually nothing has been accomplished” (Kitcher, 2001). Scientists and policy-makers were not stimulated to consider the ethical, legal and social issues surrounding their research, for example, and ELSI itself never became a part of the genome research community.

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To ensure that future ELSA initiatives accomplish something, Kitcher suggests that it is “the scientist’s responsibility to engage in socio-political reflection and to let that reflection inform one’s actions” (Kitcher, 2001). Indeed, interaction and integration are much better suited to deal with the divide between the two cultures: the former is a rather modest attempt to narrow it and the latter an ambitious idea about how to overcome it. According to the scholar cited earlier, a full integration of the two cultures would ideally result in a *Totalwissenschaft*—a comprehensive

view of science and society; however, he conceded that this might actually be too ambitious a goal.

Although crossing the ocean of cultural divide between the sciences remains their overall goal, ELSA researchers still have to take care of their own research; after all, they face the same worldly concerns as any other researcher—publication pressure and job uncertainty to name but two. However, this does not make them solely introspective, as Annemiek Nelis, director of the Centre for Society and Genomics in Nijmegen (The Netherlands), points out: “We are trying to theoretically advance science communication, public engagement or societal interaction. That results in interesting events [...] to reach society. Part of our goal is to do this explicitly together with natural scientists.”

...ELSA research was set up with a sense of importance and urgency

Nonetheless, it remains a challenge to ferry between the two cultures, as both are riddled with different worldviews and conceptualizations of reality (Cohen, 1997). Everyone involved in ELSA activities or research admits that crossing the ocean is extremely hard. Fons Werrij, head of the nationwide Dutch Societal Component of Genomics programme, commented that, “we intended to set up the [intercultural] interaction. Afterwards it has been the case only very limitedly. It has been very hard to actually realise [it]”. This is not to say that ELSA is not going anywhere. ELSA researchers do a lot of important and relevant research, publish many papers and write lots of books. Furthermore, all attempts to bridge, ferry or cross the divide between the two cultures generates widespread recognition of ELSA activities—from policy circles and from the scientific community, including natural scientists and their colleagues from the humanities and social sciences. The question is whether ELSA will do better than the history of science, or whether it will meet the same fate: professionalization without any significant impact on the cultural divide. Although critics like Kitcher have been skeptical, others believe that ELSA might be able to deliver on its promise.

If we compare the history of science with contemporary ELSA initiatives, we can identify not only several parallels, but also some relevant differences. The early historians of science more or less voluntarily took up the task to reunite the two cultures—regarding it as an intellectual challenge, rather than a social task—whereas ELSA research was set up with a sense of importance and urgency. While the history of science blossomed in an era in which science was associated with prosperity and progress, ELSA research aims to address public fears and prejudices about the use of science and technology: biotechnology, environmental problems, genetically modified organisms, or stem-cell research, for example. There is a long list of hotly debated topics, all of which challenge the relationship between science and society, and that need to be resolved in order to apply new technologies and knowledge to the benefit of society. Consequently, ELSA has been generously funded, more generously than ever was the history of science. This financial support, and the recognition of the importance and urgency of resolving the debates between science and society, has allowed ELSA to spread fast and furiously.

Initial ELSA initiatives were of a somewhat virtual character: they had a budget and people, but no specific locations. However, it did not take long for these early initiatives to become institutionalized as centres or departments, with chairs, offices, staff and directors, organizing regular conferences, meetings and forums or creating specialized journals. The ‘Science & Society’ programme at the European Molecular Biology Laboratory (EMBL; Heidelberg, Germany) is an example of this institutionalization, as is the ‘Science & Society’ section of *EMBO reports* or journals such as *BioSocieties* or *New Genetics and Society*. Moreover, the European Union now requires that research projects funded under its Framework Programmes include a ‘Science & Society’ component. A scientific officer at the European Commission commented that they want to “link what is going on in our research projects to society. We do not do science in the famous scientific ivory tower, but within society”.

This position has also spread to the national level: the Dutch Genomics Initiative requires business plans for Centres of Excellence to contain a discussion of

societal aspects of their research, for example. The list goes on, and it all shows that ELSA has become a professional research field in record time.

The process of professionalization continues today, just as the debates about the ethical, legal and social aspects of science continue

In addition, many academic institutes and organizations have also begun to expand their curricula in order to address the problems and challenges arising at the intersection of science and society. Dubochet, for example, describes the ‘Biology & Society’ programme at the University of Lausanne for BSc, MSc and PhD students (Dubochet, 2008). Similarly, the ELSA professionals that we interviewed spend a significant amount of time educating students and colleagues at nearly all levels to spread the message that the two cultures need to be bridged and that ELSA research is important in doing so.

The researchers and scholars who have teamed up under the umbrella term of ELSA research have been very successful at convincing funding agencies and scientists alike that the two cultures need to be connected, and that ELSA is the way to do it more successfully than did the historians of science. The process of professionalization continues today, just as the debates about the ethical, legal and social aspects of science continue. Whether ELSA will be more successful in reacquainting the two cultures is something that only time will tell—and it will require a collective effort from ELSA professionals, scientists and society. Nevertheless, there is a great sense of urgency among scientists, policy-makers and many others that suggests that the ferryman has a good chance of being welcomed at both shores.

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