## CONTENT

Organizing and Scientific Committee .........................................................................6
Keynotes ..................................................................................................................... 8
Planery Panels .............................................................................................................9
  
  **Track 1. Converging Technologies and Human Enhancement** 11
  **Track 2. Converging Technologies and Engineering Sciences** 44
  **Track 3. Converging Technologies and Risks** 50
  **Track 4. Converging Technologies, General Issues** 65
  **Track 5. Ethics and Politics of Emerging Technologies** 79
  **Track 6. Philosophy and Ethics of Biomedical Nanotechnology** 96
  **Track 7. Philosophy and Ethics of Information Technology** 101
  **Track 8. Environmental Philosophy and Sustainable Technology** 112
  **Track 9. Philosophy of Engineering and Design** 127
  **Track 10. Robots, Cyborgs and Artificial Life** 148
  **Track 11. Technology and Moral Responsibility** 159
  **Track 12. Technology, Culture and Globalisation** 176
  **Track 13. The Good Life and Technology** 188
  **Track 14. Philosophy of Technology: General and Assorted Issues** 206
  **Track 15 Reflective Engineering** 220

Parallel Panels ........................................................................................................ 234
Poster Presentations................................................................................................237
Index ....................................................................................................................... 246
ORGANIZING AND SCIENTIFIC COMMITTEE

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KEYNOTES

Bostrom, Nick
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Planery Panels

Planery Panel 1. Intersections Between Philosophy of Technology and Environmental Philosophy

Chair: Frodeman, Robert

Participants: Briggle, A., Selinger, E., and Jeronimo, H.

Both environmental philosophy and the philosophy of technology address issues at the heart of contemporary social problems from global climate change to healthcare and beyond. Yet both fields have struggled to exert influence on society—while at the same time being marginal to the discipline of philosophy in general. Indeed, not only have both fields largely failed to reach beyond philosophic audiences, they have rarely exchanged ideas with one another. And this is despite the fact that since ancient times phusis and techne have provided one of the great contrasts in the history of thought, and whether in terms of damage or remediation, modern technology is intimately intertwined with environmental problems.

This panel explores some of the connection between these two fields, in particular their shared opportunity to showcase their relevance to social problems and those engaged in their definition and resolution, including policy makers, scientists, engineers, and the broader public. It is part of a larger, three year institutional effort to think through how the two fields can profit from a theoretical and institutional exchange of ideas.

Planery Panel 2. Converging Technologies and the Future

Chair: Brey, Philip

Participants: Bostrom, N., Subramaniam, V., Blank, B. & Aspers, P.

This expert panel on converging technologies will address the prospects of converging technologies. It will address the current state of the art and the implications for society in the near future. Questions that will be addressed are:

• What is the state of the art in converging technologies and what will be technologically possible ten and twenty years from now?
• What technological breakthroughs still have to be realized, and what economic, organizational and political hurdles still have to be taken?
• How will society transform because of converging technologies? How will areas like engineering design, healthcare, science and education, food production, law enforcement, defense, and everyday life be transformed, and will converging technologies help to satisfy our energy needs and create a sustainable society?
• What will be the overall social benefits of converging technologies, and what are the potential harms?
Plenary panel 3: Plenary Session Forthcoming Handbook
Philosophy of Technology and Engineering Sciences

Chair: Meijers, Anthonie

Participants: Goldberg, D., Peterson, M., Radder, H., Kroes, P., Poel, I. van de., Zwart, S., Hansson, S. O. & Houkes, W.

This plenary panel will discuss the forthcoming handbook Philosophy of Technology and the Engineering Sciences, edited by Anthonie Meijers. The book aims at covering the whole field of philosophy of technology and engineering sciences and has five parts: (1) Technology, Engineering, and the Sciences (associate editor Hans Radder), (2) The Ontology and Epistemology of Artifacts (associate editor Wybo Houkes), (3) Philosophy of Engineering Design (associate editor Peter Kroes), (4) Modeling in Engineering Sciences (associate editor Sjoerd Zwart) and (5) Norms and Values in Technology and Engineering (associate editor Sven Ove Hansson). This session will start with an introduction by Anthonie Meijers. Followed by a commentary by David Goldberg and Martin Peterson. And this session will end with a plenary discussion with all the associate editors.

Plenary panel 4: Closing the gap: Innovation, ethics and policy making

Chairs: Brom, F. & Est, R. van

In 2003, Mnyusiwalla, Daar and Singer signalled that ethics was lagging behind a rapidly developing nanoscience. To avoid a moratorium on the deployment of nanomaterials they called up to “immediately close the gap between science and ethics of nanotechnology”. Since then a growth of in ethical studies can be witnessed. Even a dedicated journal called NanoEthics has been set up. As a moratorium has not established, but one could question whether these two developments are related. Recently, the debate on how to close the gap between innovation, ethics and policy making has been fuelled by Nordmann and Rip, who are warning for ‘speculative ethics’, which seem to widen the gap between science and ethics, and politics. In this panel discussion at the end of the conference we want to reflect on the question of how to close the gap between the development of converging technologies, ethics and policy making. The discussion will be led by Frans Brom, head of the Technology Assessment department of the Rathenau Institute. Panel members will be selected among the active and outspoken participants of the conference.
Two Models of Human Enhancement and the Good Life

Arnautu, Robert

Martin Heidegger and Jacques Ellul oppose in their writings traditional techniques to modern technology. This opposition explains two different relations between humans and technology. Traditional techniques are parts of human practices, the principal function of them being that of giving the possibility to humans to enhance and develop their personal skills and knowledges. “There was no great variety of means for attaining a desired result, and there was almost no attempt to perfect the means which did exist. ... Man tended to exploit to the limit such means as he possessed and took care not to replace them or create other means as long as the old ones were effective.” (Ellul, 1965, 67) This model of human enhancement is based on a development of personal particular skills and acceptance of human organic limits by maintaining the scarcity of technological means. In this model, the techniques were diverging: the tool had to be applied only in a specific domain, without breaking the boundaries, and the man had to specialize in that specific domain in order to use that tool at maximum.

Descartes and Bacon, by their new conception of existence, changed this model. They proposed the construction of such machineries that could improve human life by fighting the vicissitudes of nature and by taking up the tasks of humans. The technological device should have been useful in as many domains as possible. The limit of such machines, but also their ideal, was the universal machine that could execute a multitude of tasks. The only reason of limitation, for Descartes, was that the universal application is reserved only for human reason, but, at least, the machines should try to approach that limit. “[T]hey [the machines] may perform many tasks very well or perhaps better than any of us. ... For while reason is a universal instrument that can be of help in all sorts of circumstances, this organs require some particular disposition for each particular action [and] it is for all practical purposes impossible for there to be enough different organs in a machine to make it act in all the contingencies of life in the same way as our reason makes us act.” (Descartes, 2000, 72)

Thus, the modern technology should be converging, covering as many actions as possible. As the consequence for humans, they should be freed from any kind of skilled work as long as this work is replaceable by machines. The human enhancement means thus to use at maximum the technology such that to improve all human potentialities.

Good life does not mean just a technological workless long life neither the general introduction of crafts and focal practices at the detriment of technology. The technological responses to human dreads, the prostheses that improve our well-being, does not necessarily lead to a good life unless there is a rational and critical appropriation of these devices in human practices. I try to show that the good life necessitates the realization of a third model of human enhancement that combines the two previous models such that the appropriation of enhancement technologies follows the “grammatical rules” (Wittgenstein) of both technology and human life. This view is based on the understanding of the technological devices as active mediators of human experience that activate in a network of social norms, of fundamental rules of practice. Only the delegation of such rules to technological devices as well as the correspondence between the grammar of human practice and the grammar of technology can render human enhancement viable.
On the Relation Between Human Beings and Technology: a Peircean Perspective

Aydin, Ciano

Opponents of new technologies that can directly intervene in, for example, our nervous system or DNA often reminisce a still dominant Cartesian-Kantian view: human beings are independent entities that can transcend the empirical world-order by virtue of their very special, supra-temporal reflexive faculty, in more archaic idiom: by virtue of their soul. From this point of view, technologies that do not respect the boundaries of the sphere of the (transcendental) subject and penetrate its autonomous constitution are conceived as a potential threat for its freedom and individuality (cf. Jaspers 1931).

Against this pessimistic conception of the relation between humans and technology, representatives of post-humanism (Haraway 1991) vividly depict the great advantages of human enhancement by virtue of technology. Trans-humanists (Bostrom 2005a, 2005b) go one step further and do not want to improve the human being but, referring to Nietzsche's figure of the Overman (Übermenschen), want to radically overcome it by creating a new, trans-human life form. Paradoxically, the idea of replacing homo sapiens with a superior non-human life form parasites on the Cartesian conception of the human being as an independent entity with a fixed nature, which is in contrast with Nietzsche's anthropology. For Nietzsche's concept of the Overman and his definition of man as the "not yet determined animal" express that the human being 'essentially' does not coincide with its actual state: the "über" in "Übermenschen" indicates that the human being is characterized by a directedness without a beginning in a primary cause and an end in a final goal. By overcoming his present state the human being does justice to what makes him human: becoming (Aydin 2007a).

In this paper I want to challenge the Cartesian presupposition of the human being as an independent substance in more detail and propose an alternative view on the relation between the human being and technology by taking my inspiration from the work of Charles S. Peirce. I will do this in three steps:

- The categorical distinction between the human being, on the one hand, and the world and technology, on the other hand, is based on a false conception of the mind. In his critique of Cartesianism, Peirce stresses that one of the most difficult things is getting rid of the modern view that thinking is an individual activity located in a person’s head. We must, in Peirce’s words: “say that we are in thought, and not that thoughts are in us.” (Peirce 1984)

While writing this abstract for the SPT conference, there is a continuity between my mind and the words that I type on my laptop. As a consequence, I can in a quite literally sense say that my laptop and I are one person – just as one can say that a jockey and his horse are one person. Therefore a part of my mind can be in my laptop and palmtop, in the articles and book(s) that I wrote, and in other artefacts. This also explains why people get so frustrated when their computer crashes. A piece of them dies, literally.

A person is not a fixed, independent entity but is constituted by its relations with the world. I do not have an identity before I interact with the world but I discover who and what I am by virtue of my interactions with the world (Aydin 2007b). Technological devices determine to a great extent our identity.

Although we are constituted by our relations, we can only give ourselves a durable, intelligible identity through a process of giving a general form to our interactions with our social and natural environment. This form can, according to Peirce, only be constituted by virtue of the embodiment of certain goals and ideals – this is why purpose, or rather, final causation is for Peirce the locus of cognition. Good goals and ideals will enable us to react adequately to our environment and generate ever more knowledge and meaning (Aydin, 2008, 2009). Because technology is an intrinsic part of our identity, it will co-determine which goals we can and must pursue in our lives. Ethics is for Peirce not an exclusively human enterprise.
Authors like Ihde (1990), Latour (1992) and Verbeek (2000, 2005) illustrate all in their own specific way that the categorical distinction between an autonomous human being (subject) and the world/technology (object) is inadequate: technology mediates in various ways between the human and its environment, and determines its course of life. Peirce’s view on thought, interaction, and ideals can contribute to strengthening this perspective.

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The impact of ‘anthropotechnology’ on human evolution

Blad, Sylvia

From the time that they diverged from their common ancestor, chimpanzees and humans have had a very different evolutionary path. It seems obvious that the appearance of culture and technology has increasingly alienated humans from the path of natural selection that has informed chimpanzee evolution. Philosopher Peter Sloterdijk (2001) tries to uncover mechanisms for the human ‘coming to be’ in which ‘anthropotechnology’ (a broad term that includes symbolic technologies like speech and writing, and ‘hard’ technologies like tool use) plays a central formative role. I will use Sloterdijk’s theory as a means to reflect on the role of culture and technology in human evolution up until now. This provides a perspective from which to consider the possible impact of the upcoming and converging technologies of our time.
Sloterdijk describes the evolution of the human being as a process that started spontaneously with the first tool use and the first creation of houses and other inner spaces to live in. This process ‘...freed the evolutionary plasticity of the inhabitants of these weird spaces.' (Sloterdijk, 2001, p.197). Considering the strikingly different traits of humans as compared to the other primates, Sloterdijk concludes that this historical first of a mechanism for evolution based on anthropotechnology, besides changing our environment and lifestyle, also has effects on the human genotype. With new data from genomewide comparisons between humans and chimpanzees available it has become possible to analyze whether this is the case.

The striking result from this research is that the genome of humans and chimpanzees only differs in about 4% of the whole DNA sequence (Bradley, 2008). The genetic differences that have been uncovered do seem to be at the root of traits like reduced body hair and different brain size. But how to explain the many other differences between humans and chimpanzees? More is becoming known of the epigenetic level of gene regulation. At this level the coding regions in the DNA can be expressed or silenced; and combined or separated. Also, human DNA contains more gene duplications. Alterations in epigenetic schemes, acquired during a lifetime, could be transmitted to offspring, thus circumventing the process of 'waiting' for serendipitous mutations.

With this epigenetic source for possible variation in mind the unexpected small amount of evidence for an anthropogenetic mechanism in the DNA sequence of humans does not necessarily undermine Sloterdijk's conclusion that anthropogenetic mechanisms affect our biological evolution. In his reading, during the early days of 'lithotechnology' or stone tool use by humans, brain size increased and hand form adapted in tune with the development of more complex technology. But increasingly anthropotechnology started to 'lead the way', changing more quickly than our DNA can. We rely on the enormous plasticity of the brain to keep up with these developments, and signs are that we also rely on our epigenetic plasticity more than we know.

A helpful way of looking at technology to understand how technology might 'lead the way' comes from philosopher Bernard Stiegler (1994), who suggests that technology is like an external memory that is unique to humankind. This 'epiphylogenetic' memory is a new 'place' for storing information that can be transmitted to next generations without having to be 'inscribed' into the genome ('phylogenetic' memory) by chance mutation and natural selection. The individual (neuronal) memory, acquired during a lifetime, he calls 'epigenetic' memory, but perhaps 'ontogenetic' memory is a better term. 'Epigenetic' memory can then be reserved for the (possibly) 'updated' epigenetic information (for example, new DNA-methylation patterns). Together these memories hold the instructions for 'producing' the human being of a next generation, and obviously 'epiphylogenetic memory' can change quickly. With the convergence of nanotechnology, biotechnology, information technology, and cognitive science (NBIC), technology can increasingly become part of the 'internal' memory. It could impact our genes directly or change transcriptomic (or: epigenetic) schemes, or become an essential part of the body (for example, as nanomedicine) that also a next generation has to be 'updated' with. Sloterdijk sees in this the 'short-circuiting' of 'soft' and 'hard' anthropotechnology. Cultural norms of what a human ‘ought to’ be like could be achieved through technological interventions in the body this way.

The impact of anthropotechnology on our biological evolution, relatively subtle (although still rather impressive) in the last 2 million years, will certainly become bigger in the future.

References


Scientific Visualisations as Cognitive Enhancement

Carusi, Annamaria & Hoel, Aud Sissel

Computational images and information visualisations are a predominant mode of experimentation and communication in scientific research. There is an extremely large research and industry community around the production of computational and engineering resources for imaging and visualisation. The discourse in which these developments is embedded makes frequent appeal to the cognitive enhancement brought about by computational methods for visually rendering data; and visualisations are even considered...
to offer a new kind of thinking. In addition, the attempts at explaining what computer-supported visualisation is and how it works manifest a strong reliance on representationalist theories of vision.

The aim of this paper is twofold: 1) to demonstrate the limitations of the cognitive and representationalist discourse surrounding the technologies for imaging and visualisation, and 2) to present an alternative approach, which relates to current developments of phenomenology and points to yet untapped resources in the thinking of the philosophers Gaston Bachelard and Ernst Cassirer.

The main thrust of this investigation is to elucidate the formation of intentionality for scientific purposes in interaction with visualisation technologies. In particular, the form of technologies that will be considered are those which visually render the output of a mathematical model and simulation (or in silico experiment). The questions are 1) what is intended (or seen), in and through these technologies, and 2) how is this domain and mode of intentionality formed?

The computer scientist and phenomenologist Agustín A. Araya uses the term ‘visualisation situation’ to indicate the domain of intentionality in question. For Araya, a visualisation situation includes the measuring device, the measurements and quantifications embodied in the model on which it is based, the thing measured, and the measuring practices and procedures involved. Araya locates computational visualisations within the history of the mathematisation of science, as presented by Edmund Husserl in The Crisis of European Science and Transcendental Phenomenology. Following Husserl, Araya sees scientific methods as embodying (and embedding) a number of ontological biases and operations, which essentially transform human nature by the way that they bring about fundamental transformations of our mode of perceiving and interacting with the ‘objects’ of our world. Thus for Araya, the answer to the question concerning what is seen in a visualisation situation lies in the historical process of mathematisation and idealisation.

Araya’s historicisation of vision and its objects in the visualisation situation must be supplemented by other systematic accounts. A drawback of Araya’s account is that he sees the visualisation technologies involved as essentially subsidiary to progressive mathematisation. However, visualisation technologies are not only neutral vehicles for mathematisation; neither are they merely its concrete embodiment or materialisation. The technologies themselves, the complex of hardware and software, screen and other apparatus, are active players in the particular formation of intentionality that a visualisation situation is. In fact, technologies are involved in constituting or co-constituting the domain of intentionality, including crucially the human perceivers in that domain. This is the view that is supported by Don Ihde’s and Peter-Paul Verbeek’s pragmatic phenomenology – moving towards hybrid and composite intentionality in human-technology interactions. For Verbeek, for instance, composite intentionality occurs when the technological artefacts themselves have an active form of intentionality, in that they are ‘directed at specific aspects of reality’.

The formulation of Verbeek brings to the fore the importance of seeing the technologies involved in a visualisation situation as not only bearers of mathematisation, but as themselves having an intentional force in shaping what is seen in the situation.

However, there is a further level of complexity which has to be taken into account in the visualisation situations that are the output of mathematical modelling. In these cases the intentionality of human perceivers is directed towards a model that is itself intentional in that it is directed towards the entity or process modelled. How do the composite layers of this kind of intentionality operate and interoperate? The intertwining of these forms of intentionality, the processes whereby it occurs in scientific phenomena has not yet been fully explored.

We believe that the work of Ernst Cassirer (1894-1945) on symbolic forms and of Gaston Bachelard (1884-1972) on scientific phenomena are as yet unexploited resources for explicating the intertwining of human and technical intentionality in Technoscience broadly, and in computational visualisation in particular.

Cassirer (to be presented by Aud Sissel Hoel)
Through his philosophy of symbolic forms, and especially, through his understanding of technology, Cassirer offers an approach that radically expands and transforms the concept of logos as traditionally understood. According to Cassirer, logos has not only a ‘theoretical’ significance but an ‘instrumental’ significance as well. Thus, the power of logos resides in the tool. Technologies not only expand human power and reach but open new world aspects. Moreover, through his doctrine of symbolic forms, Cassirer shows that thinking is not opposed to intuition. Rather, the two factors are combined in that thinking is conceived of as technologically and symbolically distributed imagination. Scientific ‘objectivation’ (the activity of rendering terminable and communicable) thus requires human intervention, the introduction of a “terminus medius” in the form of a constructive or dynamic principle that opens up a particular sphere of possible determinations and comparisons. Cassirer’s positive account of the generative and revealing powers of symbols and instruments redraws the borders between the real and ideal, and in this way it may prove helpful when it comes to understanding the cognitive status of computational visualisations, including simulations.

Bachelard (to be presented by Annamaria Carusi)

The interest of Bachelard for our topic resides in his notion of phénoménotechnique as well as in his work on rationality and imagination. With respect to the first, Bachelard critiques Husserl’s dichotomy between mind and data, and proposes instead that scientific entities are never data or givens, but emerge from technical manipulations in interaction with rational and practical judgements. Bachelard takes into account the role of technologies in scientific experimentation, viewing the technologies as reified theories, which, since modern physics, most often take the form of mathematical models. But, he also points out the inter-relationship between the mathematisation of technology, and practical goals and purposes on the one hand and the aesthetic form through which the scientific phenomenon can be perceived on the other. There emerges from this a complex account of the different levels of intentionality involved in scientific perception.

Thus through the lens of Cassirer’s work, we obtain a different perspective on the relationship between thinking and imagination, and through the lens of Bachelard’s work we see different details of the relationship between scientific practice – technical, rational, social, and aesthetic – and the entities it creates for itself. By bringing these two philosophers to the fore we hope to show how they can enrich current phenomenological thinking on science and its images.

References


Enhancement of What? A Capabilities Approach to Ethics of Human Enhancement

Coeckelbergh, Mark

A major issue (or obstacle) in normative philosophical reflection on human enhancement is lack of clarity about what should be enhanced and what counts as enhancement. Both opponents and defenders of human enhancement need to define what should be preserved or transcended. Even those defending a very broad definition of
enhancement (e.g. Harris 2007) need to conceptualize the object of change – if this is not possible, then the term is empty. What does ‘human’ in the term ‘human enhancement’? In other words, an ethics of human enhancement needs an anthropology. Moreover, even if we agree on what the object of enhancement is, we still need to discuss what enhancement of that object consists in.

First, I argue that in addition to more general requirements such as coherence and consistency, an anthropology needs to meet the methodological criterion of pluralism. Most anthropologies are monist: they try to capture what it is to be human by using one concept. This is true for many essentialist definitions of the human, but existentialist, culturalist, or naturalist definitions are usually no less monist. I argue that instead we need a pluralist approach that acknowledges the value of different perspectives on the human.

Then I propose to apply a capabilities approach to human enhancement that, in my interpretation, meets the proposed methodological criterion and allows for a more precise discussion of what should or should not be enhanced. Although at first sight the stress on human dignity and the Aristotelian roots of Nussbaum’s capabilities approach (Nussbaum 2006) seem to support objections to enhancement only, I argue that if we interpret Nussbaum’s capabilities list as an articulation of some important aspects we usually attach to the term ‘human’, it also can provide guidance to those who are more sympathetic to human enhancement. I show that technology can play a role in the maintenance, restoration, and enhancement of capabilities.

By proposing this two-fold methodological shift, I hope to provide a theoretical common ground for a more detailed discussion of (1) whether or not we want to enhance the human at all, (2) if we want to, which aspects of the human we consider open for enhancement, and (3) what enhancement of these aspects consists in.

Defending Human Enhancement Technologies: What Are We Missing?

de Melo-Martín, Immaculada

Recent advances in biotechnologies have lead to speculations about the enhancement of human beings. As is often the case with new technologies, they have advocates and detractors. Hence, proponents have argued that attempts to enhance humans will allow us to live longer and healthier, enhance our emotional and intellectual capacities, and generally achieve a greater degree of control over our own lives (1-5). Critics, on the other hand, have pointed out that the use of these technologies is likely to increase unjust inequalities, that they present serious health risks, that parents may become overbearing, or that expenditures for these types of technologies would come at the cost of basic health care provisions or other social programs (6–9).

Significantly, many of the moral arguments presented to defend or reject the use of human enhancement technologies have been limited to discussions of the risks and benefits of their implementation. Though both critics and proponents of these technologies often argue in these terms, I will focus my discussion on the proponents, as this limitation is more conspicuous in their case. The purpose of this paper is to argue that ethical arguments that focus on the risks and benefits of the use of human enhancement technologies are insufficient to provide a robust defense (or criticism) of such technologies. This is so for at least two reasons. First, the belief that an assessment of risk and benefits can offer an adequate ethical evaluation of these technologies presupposes a problematic conception of science and technology as value-neutral. If scientific and technological advances are value-neutral, then ethical and social issues related to such advances are limited to the assessment of the implementation of scientific knowledge or technological practices. The assumption is that science and technology, and the ethical and social issues that they raise are two separate and distinct spheres. Technoscientists produce knowledge while humanists and social
scientists are charged with evaluating the implications of such knowledge. While this assumption can allow for ethical analysis of scientific and technological impacts, it leaves questions about the scientists and engineers’ work, their assumptions, the values underlying their projects, or the utility of such programs outside of the goals of an adequate ethical assessment. In the case of enhancement technologies then, moral arguments limited to evaluating the risks and benefits of their implementation leave out essential aspects of the scientific and technological process that inextricably affect the kinds of human enhancements technologies that are likely to be developed. An adequate evaluation of such technologies needs to then pay attention to the practices and values of knowledge production.

Second, the idea that an evaluation of the risks and benefits of the use human enhancement technologies is sufficient presupposes a reductionist conception of ethics as merely a risk management instrument. Conceptualized in this way, the goal of an ethical analysis of human enhancement technologies is to address issues related to risks to, for instance, human health, privacy, or autonomy. Ethics is thus a tool to help us manage risks the best we can. Essential ethical questions about the framing of particular problems, the implications that such framing has for the solutions that we take as valid, the value of specific goals, the relations between means and ends, and questions about the use of technology to respond to complicated aspects of human life, such as suffering, death, and disability are thus left off the agenda. But if such normative questions are essential to an adequate evaluation of human enhancement technologies, then an analysis of risks and benefits will fail to provide a compelling assessment of these techniques.

References

Procreative Morality

Devolder, Katrien & Douglas, Thomas

Prospective parents sometimes face choices about what sort of children to have. This is most obviously the case when parents create several embryos through in vitro fertilisation and must then choose which embryos to implant. But similar choices may also arise in natural reproduction. Parents can sometimes influence the characteristics of their children by altering the timing of conception. For example, delaying reproduction increases the
likelihood that the child will suffer from Down’s syndrome. We will refer to decisions about what sort of children to have as selection decisions.

As medical genetics advances, selection decisions will play an increasingly important role in our lives and that of our offspring. Increasing use of genetic information will have major implications for embryonic and fetal testing. Most of the more than 1000 genetic tests currently available are for rare single gene diseases, like cystic fibrosis or Huntington’s disease. But new tools such as micro arrays and karyomapping will allow a quick, inexpensive search for a much broader range of targets simultaneously. Karyomapping will make it possible to detect almost any of the 15,000 known genetic conditions. For example, these methods will enable us to test embryos for predispositions to diseases such as heart disease, Alzheimer’s disease, cancer or late-onset diabetes.

Now individual whole-genome sequencing is on the horizon. Whole-genome sequencing is arguably one of the most exciting fields in medical genetics but also one of the most contentious. Not only will sequencing of individuals' genomes enable us to peer into our biology but also into the nature of our identity and the determinants of our personality, mental abilities and behavior. Whole genome sequencing will enable us to obtain genetic information related to non-disease related trait such as talents, capabilities and disabilities. This will have a major impact on what sort of people we decide to bring into the world.

These developments bring a new urgency and complexity to already challenging questions: Should selection decisions be made on the basis of genetic testing (including genetic testing of ourselves)? If so, who should take such decisions, and according to what principles? Different pro-selection views have been defended. In recent years, Julian Savulescu and collaborators have advocated *Procreative Beneficence*. This principle instructs prospective parents to select, from among the different possible children they could have, the child that will have the best chance at the best life. It implies that we should, for example, select children with better sets of biological traits.

But what makes one set of traits better than another? *Procreative Beneficence* is largely silent on this point; however it does direct those making selection decisions to focus solely on future wellbeing of the selected child. We argue, however, that the wellbeing of others should also be taken into account. We therefore claim that *Procreative Beneficence* must be supplemented with another, arguably weightier, principle: *Procreative Morality*. This principle asserts that prospective parents have significant moral reasons to select, among the available alternative children, the child that can be expected to be most moral. We (1) present the case for adopting this principle, (2) outline some of its possible practical implications, and (3) defend it against a range of objections.

**References**


**Utopian striving for social change by technical means: Figures of technical mediation in the history of design**

**Dorrestijn, Steven**

Bruno Latour has stated that those who complain about the so called decline of morals have overlooked that morality has to a large degree become embodied in our material environment. This statement, directed in the first place at sociologists, deserves the attention of designers as well. It seems that Latour's insight could help to give better account of the
social engagement and responsibility of designers in their working practice. To find clues for the implementation in design of ideas about the social impact of technology, this study looks at the history of design. It appears that during certain periods mainstream design theory has employed strong, sometimes utopian motives of social improvement by means of design. Under postmodernism this theme has largely disappeared. As a contribution to renewing the reflection on the social role of design, I will address the historical and philosophical question: How have utopian designers conceived the social impact of technical products.

The study is historical as it focuses on past movements in design. From the philosophy of technology it takes its frame of reference, namely technical mediation as a key notion. Technical mediation is a term which has turned up in several contemporary approaches to the study of technology (Latour, Ihde, McLuhan). It proofs helpful in linking the practical social considerations of designers with the theoretical reflections in the history of the philosophy of technology. On the hand, the concept of technical mediation makes possible an original look at design history. It affords to see how designers have employed figures of technical mediation in the practice of design long before the concept as such had been coined in philosophy. In this way it helps to better articulate the ideas of designers about the social impact of design, which has so far remained mostly hidden. On the other hand, it appears that there points of reference inside the design profession for the introduction of ideas about technical mediation. Technical mediation is not a theoretical discovery that now searches for application, but there is already a somewhat hidden history of application that can be uncovered and promoted.

The outline of the history of design will focus on three stages which especially stand out for their utopian motive: the Arts and Crafts with William Morris, the Modernism (International Style) of for example Le Corbusier, and the and Gute Form with the related social design theory of Gert Selle.

It appears that in utopian design the predominant figure of technical mediation frames the totality of technology as a basis for the social live of humanity. During the twentieth century philosophers of technology have revealed the role of technology not only as a condition but also as a mediator, a vehicle of change. Technology as a vehicle for change is a powerful notion for a renewal of the reflection on the social impact of technology. To avoid the utopian programs and dystopian fears, it is however necessary to employ and further develop small scale figures of technical mediation like the script of Latour, or the recently proposed terminology of the nudge by Thaler and Sunstein.

**Human Enhancement and Responsible Agency: Amending Habermas’s Bioethics**

_Fritsch, Matthias_

In this paper I consider one prominent argument to the effect that the morality underwriting constitutional democracies is threatened by the (still largely futural, but foreseeable) possibilities of biogenetic manipulation of the organic substrate of equal and free persons. Briefly, the argument suggests that moral action requires that the agent be assumed, by herself and others, to be free. Free agency in turn requires, among other things, that the agent takes himself to be alone responsible for bringing about a state of affairs in the world. Singular authorship, the argument continues, mandates that the agent converts the contingent aspects of his life—the life circumstances and body he happens to be ‘thrown’ into—not into excuses for responsibility, but into enabling features of his freedom. Such taking-charge of one’s life-history and individuating identification with one’s body, however, disallows one’s body having been designed and one’s abilities programmed by other free agents as nominal equals. For in that case, the conversion could not be carried out successfully because the responsibility for one’s abilities and actions would always lie in part with the programmers to which the ‘enhanced’ individual could point. So not only do parents
violate the equal freedom of their (in part) genetically designed child (who, being its object, cannot make their parents' project their own) by abusing their asymmetrical power relation vis-a-vis the child in an irreversible fashion. Rather, and more crucially, such enhancement undermines the, for liberal democratic institutions necessary, presumption of responsible agency.

To defend this argument, I will reconstruct the recent work of Jürgen Habermas on this issue and supplement his version of it with other, phenomenological accounts of the conditions of responsibility. First, we can extrapolate and reconstruct a version of the argument as presented above on the basis of different writings of Habermas’s over the last few years without endorsing his tentative solution in terms of an ethics of a species-wide self-understanding (Gattungsethik) as consisting of responsible individuals. And second, I will argue that the defence of this type of argument must respond to the objection that a person’s psychological state (e.g., feeling asymmetrically instrumentalized by one’s parents) need not affect a person’s normative status (e.g., as an equal, and equally free entity). In other words, normative status is not dependent on a subjective experience that we must expect to be empirically uncertain and variable.

To reply to this worry, I will suggest that Habermas’s metaethical argument as to the preconditions of moral agency indeed needs a stronger, less psychological account of the process of singularization that is claimed to form a necessary part of the genesis of responsibility. Here, the phenomenological account of Levinas and Derrida will help, for it emphasizes that the identification with one’s body as an enabler of freedom does not in the first instance occur in the psychological relation of a self to itself (its body and its life history), but depends on the relation to an other who calls the agent to moral responsibility by her bodily vulnerability. Against Habermas’s own understanding, then, the argument must take into account the intersubjectivity demanded for responsible freedom already at this level, not only at the later level of communicative interaction or discursive reason-giving.

**Ghost in the Machine: Brain-Computer Interfaces in Postphenomenological Terms**

*Heersmink, Richard*

In this paper I will analyze the relationship between brain-computer interfaces (BCIs) and their users from a postphenomenological point of view. As a point of departure for better understanding this particular human-technology relation, I will employ Don Ihde’s framework on human-technology relations. Thereafter I will employ Verbeek’s concept technological intentionality, to develop two novel human-technology relations: the reciprocal relation and the unidirectional relation.

BCIs are an emerging as well as a converging technology that extracts brain activity of its user and converts it into command signals for an external device. The brain signals are extracted with electrodes and converted into command signal by a signal processing unit (Berger, 2007). This technology is mainly being designed to restore functions for disabled persons, e.g., by enabling a paralyzed person to steer a motorized wheelchair or prosthesis. However, at this point in time, other applications like using a BCI for playing video games or to monitor concentration while performing safety critical procedures are also being developed. It is important to note that the entire system has three elements: (1) the human brain, (2) the BCI itself - which are the electrodes and signal processing unit and (3) an application like e.g., a wheelchair or video game. In this paper I will focus on two distinct BCI-applications. The first is a BCI-system that enables its user to steer a motorized wheelchair. And the second is a BCI-system that monitors the concentration of someone who is conducting safety critical procedures (e.g., driving a truck or conducting surgery).
Phenomenologist Don Ihde (1990) has distinguished between four human-technology relationships: the embodiment relation; hermeneutic relation; the alterity relation and the background relation. Embodiment relations have four structural features: (1) the artifact withdraws from attention, (2) is transparent, (3) mediates between its user and the world and (4) the world is experienced through the artifact. Glasses, for example, satisfy all these four structural features. Now consider a BCI-systems used to steer a motorized wheelchair. This BCI-system displays some structural features of embodiment relations. The BCI itself (electrodes and signal processing unit) is between its user and the application in a position of mediation, it is to some extent transparent and withdraws from attention. However, BCIs have a unique feature that distinguishes them from other embodied artifacts. In Ihde’s notion of embodiment relations the world is experienced through the artifact. We see the world through the glasses. But, in case of BCIs, it is the other way around. One can say that the application ‘experiences’ its user through the BCI.

Verbeek’s concept technological intentionality is useful for describing this unique feature. In short, technological intentionality means that artifacts have a form of directedness. A thermometer, e.g., is directed at the temperature. BCI-systems are directed at the brain of its user, which implies they have technological intentionality. The artifacts that, according to Verbeek, have technological intentionality are directed at the world. But, the technological intentionality of BCI-systems is directed at the brain of its user, and - in contrast, the intentionality of the user is directed at the BCI. Consequently, the two types of intentionality are reciprocal, which may be called reciprocal intentionality. This relation can be called the reciprocal relation and may be captured as follows: (I ≻ technology) - world.

Now consider a BCI-system that monitors concentration of a physician who is conducting surgery and warns the physician when his or her concentration is below a certain level. This system remains in the background and is not consciously experienced. Thus, in Ihde’s terminology a background relation is established with this BCI-system. We have seen that there is a reciprocal relation between BCIs and their users. But, the reciprocal relation does not apply for this type of application, because the element of human intentionality is lacking. So there is only technological intentionality involved here. This novel human-technology relation may be referred to as the unidirectional relation and can be captured as follows: I (≪ technology/world).

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Predecessors of the Discourse on Human Enhancement
Heil, Reinhard

Julian Huxley, eminent biologist and humanist, not only coined the term “transhumanism” (Huxley 1957), but was also among the early visionaries of human enhancement. He proposed an improvement of man as early as 1931, based on the biological knowledge of that time. In current discourse the writings of early apologists of human enhancement are scarcely being referred to (but see e.g. Coenen 2007; Rubin 2005; Bostrom 2005), although a number of other well renowned natural scientists, such as John Desmond
Bernal and John Burdon Sanderson Haldane, developed radical visions of the human future already in the 1920s. Be it hive-minds, extension of life span, brain doping, changes in human physiognomy, the taking over of evolution by Man himself or even the splitting of humankind into different species: throughout their writings each of the fundamental ideas of today’s discourse can be found. In 1931, Huxley describes the hopes merged in the contemporary term of human enhancement: “Most of us would like to live longer; to have healthier and happier lives; to be able to control the sex of our children when they are conceived, and afterwards to mould their bodies, intellects and temperaments into the best possible forms; to reduce unnecessary pain to a minimum; to be able at will to whip up our energies to their fullest pitch without later ill effects” (Huxley 1933).

What is new and original about this, as compared to older ideas of improving man such as those in classical humanistic discourse, is the focussing on the human body itself: the intention is no longer the development of human abilities or the adjustment of the environment to human needs, but the radical changing of the human body in order to adjust it to the requirements of a society shaped by new technologies. Huxley’s, Bernal’s und Haldane’s visions mark the transition from the „engineering for the body and for the mind” to the „engineering of the body and of the mind” (Nordmann 2007).

The aforementioned authors apply a paradigm of control (cf. Ferrari 2008): It is their goal to finally overcome the restriction of inner human nature as well as those of nature surrounding man. In 1929; Bernal defined the „Three Enemies of the Rational Soul”: “The World, the Flesh & the Devil” (Bernal 1929), “world” meaning external restrictions, “flesh” the restrictions of man’s physical constitution and “devil” the human psyche. Bernal and Huxley were influenced by Haldane’s „Daedalus and the Future” (1924), which expressed Haldane’s vision of a potential future of human kind.

The talk will reconstruct the basic statements of Huxley, Bernal und Haldane concerning human enhancement and highlight the role of these authors as intellectual harbingers of contemporary discourses of human enhancement and transhumanism. It is striking to find that much of what is understood as a (technological) threat for human nature and dignity in our own days has already been widely disputed almost a hundred years ago: It is not so much the visions and topics that have changed, but rather the possibilities of making the visions become reality as well as their reception throughout society. This will also be demonstrated by comparing the visions of the aforementioned authors to the ideas of John Harris, a contemporary spokesman of human enhancement and author of “Enhancing Evolution. The Ethical Case for Making Better People”(Harris 2007).

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Converging Technologies, Diverging Religions

Huijer, Marli

During millennia, religion has been one of the most important mediums to regulate the rhythms of human existence. Religious prescriptions for the organisation of the day, week, seasons, year, the chronology of life, the alternation of rest and activity, and the celebration of rituals and festivities, gave order to individual and collective life. Rhythms helped to overcome chaos, to achieve social tranquility and stability, to experience transcendence, to canalise excessive behaviour and to give meaning to the natural changes in human life – birth, adolescence, growth, decline and death. In brief, rhythms contributed to the flourishing of human individual life and culture.

Today, religions are no longer the main instances in transmitting the importance of the circadian rhythms. Increased secularisation, progressive dismantling of a monotheistic culture, weakening of hierarchical interpreting elites and democratisation of access to interpretations of holy texts mark the present religious situation in Western societies. Yet, religion has not disappeared. To the contrary, religion, religious experiences and religious practices attract huge attention in the media, politics and humanities. However, rather than being aimed at a return of ancient religious practices and institutions, the renewed interest in religion is aimed at individual fulfilment and individual experiences of transcendence and spirituality (Taylor 2007, Wolfe 2006).

In contemporary culture, religious individuals are more focused on rhythms that diverge than on the ones that correspond. The declining religious interest in circadian rhythms can be traced back to earlier processes of industrialisation, globalisation, individualisation, the rise of 24/7 economies and secularisation. The concurrent vanishing of collective rhythms has brought an era of multiple temporalities, where time can be organized and experienced in many ways. Rhythms to live and celebrate (to ‘party’) have become more and more individualised. The contemporary turn in religion to the (post)-religious active believer seems to (re)enforce the diverging and conflicting potential of religious rhythms.

However, parallel to the disregard of circadian rhythms in the construction of (post)-religious identities, a renewed valuation of circadian rhythms can be seen in the biosciences and neurosciences. As non-religious instances, these converging technologies seem to take over the function that religions previously had in prescribing the need to live according to circadian rhythms. In modern culture, monotheistic beliefs survive in various secular forms, as de Mul argues (De Mul 2002). An example thereof is the belief that living according to rhythms of day and night, of activity and rest, of work and festivities, of daily time and holy time, is the key to human well-being.

Starting from the assumption that rhythms are constitutive for human well-being, this paper investigates if, and if so, to what extent and in what way, converging technologies, i.e. the convergence between biotechnology, neuroscience and ICT, incorporate, transform and mediate ancient religious rhythms, thereby enhancing human life.
Variation and Convergence with Scientific Instruments: A Postphenomenological Analysis

Ihde, Don

Postphenomenology as a mode of analysis is a modification upon classical phenomenology by (a) developing a sensitivity to materiality into its analysis, (b) taking what today is often called ‘the empirical turn’ or a concrete case studies approach such as developed in many ‘science studies’ programs, and (c) adapting both pragmatist and embodiment interpretations into its analysis. This presentation will focus primarily upon very contemporary developments: In earlier works I have argued that science as practiced is embodied technologically through its instruments. I have also argued that instruments in science function as material phenomenological variations. In this presentation I will examine an instrumental trajectory which, beginning with the end of the 19th century and expanding with the 20th and 21st centuries, takes instruments into a new ‘posthuman, postmodern and humanly enhanced’ dimension. The focus will be upon imaging technologies.

The United Nations has proclaimed 2009 as the “Year of Astronomy” with Nature magazine celebrating the 400th year of the telescope (Galileo). Astronomy, however, is amongst the oldest of sciences yielding knowledge from antiquity with primitive instruments and naked eye observations. Early modern science ‘begins’ with an optical revolution, including telescopes and microscopes and other optical technologies. However, until the 20th century astronomy was limited to the optical range of the electromagnetic spectrum. With radio astronomy, accidentally discovered through radio-radar technologies, the spectrum begins to open beyond the optical range of the electromagnetic spectrum until today instruments can image from nanoscale gamma to macroscale radio waves.

This development is particularly interesting for questions of human embodiment, since once imaging takes place beyond human bodily-perceptual experience, new techniques must be invented to make the knowledge produced experientially available to what I call the anthropological constant of embodiment. I will examine here a series of such technologies which produce translation mediations, combining the new instrumentation linked to computer processes, particularly tomographical ones. I argue that these contemporary processes differ from earlier ‘analog’ mediations, but continue to have to mediate for embodied beings. Moreover, such instruments while functioning as material ‘postphenomenological’ variations, can today be seen to provide forms of convergence which produce a more robust scientific knowledge than in previous centuries. Each particular variant operates as a ‘material perspective’ which when multiplied by other such perspectives, can converge and thus provide a robust result.

While the primary emphasis will be upon astronomy and its instrumental variations, other examples from medical, geological and archeological sciences will also be used. I shall demonstrate how such ‘active’ and interventional practices differ from the practices of early modern science, and how these map onto notions of activist bodily perceptual analysis related to postphenomenological interpretations of science in action.

Here the role of an inter-relational ontology comes into play. The ‘intentional arc’ of human > <technology > < world, in which technologies are in ‘mediational position’ also functions as an inter-relational constitutive relation. In astronomy, it is clear that today’s universe is drastically different from even that of the 19th century and I will also look briefly at some of the reflexive transformations which arise therefrom for human self-interpretation and embodiment.
The philosophy of technology is filled with models of human-technology relations that ostensibly blur the line between humans and machines: Latour’s imbroglios and hybrids, post-phenomenology’s co-shaping and co-constitution, Andy Clark’s “extended mind” thesis, post-humanism, and so on. But these and other such models are over-zealous in their attempt to re-interpret human nature in light of technological change. The mistake made by these frameworks is that they misunderstand personal identity. There are two senses of personal identity: sameness-identity and self-identity. Same-identity is numerical identity; it answers to “what?” questions (“What is a self?”, “What is a person?”, “What is a thing?”). The answer is typically given in terms of what caused something to be, or in terms of identifying references and properties. Self-identity is identity proper only to human beings; it answers to “who?” questions (“Who are you?”, “Who is the agent?”, “Who is responsible?”). The answer is typically given in a narrative, or at least a detailed description of a self who maintains his/her integrity over time – not by remaining the same thing over time – but remaining the same kind of person in relation to another. For example, I remain true to you; I keep my word; I do not waiver; I don’t sell out.

Anglo-American philosophers privilege “what?” over “who?” questions given their commitment to causal, impersonal metaphysical/epistemological frameworks. Philosophers of technology also privilege “what?” over “who?” questions given their interest in demonstrating the ways that technology transforms experience and even human nature. But both approaches make the same mistake. Both fail to distinguish “what?” from “who?” questions. They fail to recognize that all question-words are part of the family of interrogatives, and therefore, all have the same linguistic function – except one interrogative enjoys an unusual privilege in the world of philosophy.

The result of the failure to make this distinction is the current fascination with post-humanism. Hybrids and other post-human fantasies make sense as the answer to “who?” questions but not “what?” questions. “Who I am/we are” is always affected by technological change; “What I am/we are” is not affected by it. The first consequence of the failure to appreciate this distinction is metaphysical: post-humanism gets human nature wrong.

The second consequence is moral-political. Normative evaluations are based on a dual notion of identity as self and same. I am ontologically different from a mere thing and have a uniquely human dignity and worth “and” I am composed of my attachments to mere things, which make me “who” I am (e.g., I am a musician, I play basketball, I like to cook, etc). The former is the basis for any normative theory; the latter attests to my involvement in the world of contingent things. An adequate moral theory must account for both norms and facts. But only the latter is affected by technological change. Norms are not.

By disentangling “what?” and “who?” questions we can more precisely understanding humans and technologies are and are not entangled. If philosophers asked more “who?” rather than “what?” questions they would discover entirely different aspects of identity than sameness, they would be able to analyze the moral dimensions of things more intelligently, and their post-humanist fears/anticipations would be diminished considerably.
Mediating Mediapolis: The production of the hypermodern citizen

Kockelkoren, Petran & Lammers, Hans

In the Cartesian tradition knowledge is primarily stored in symbolic form, in texts. This type of knowledge is transmitted from head to head: externalised in books and internalised again by reading. In the pragmatic tradition knowledge is not primarily archived in symbolic form, but has rather been sedimented in skills, practices, know how and in the concomitant tools. The philosophy of technological mediation, as elaborated in the post-phenomenological position, is of course more akin to the pragmatic material turn than to Cartesianism. What post-phenomenology does add however is the idea that tools and apparatuses do not only store knowledge, but in their turn have a backlash on the agent of knowledge-production him self. Not only is the perception of the world changed by mediation, but at the other end of the rope the perceiver is transformed as well. Knowledge is not externalised from the inside of the head, shouldn’t be thought of as just ‘embedded cognition’ out there, but the mediating tools rearrange what counts as knowledge and what we consider to be agency and subjectivity in the first place. The thinking subject loses his vantage point in epistemology and is replaced by a subject who is rather a product of his tools and of his build environment.

An extended concept of embedded cognition operates both ways: knowledge is sedimented in tools and tools coproduce the cognizant subject. In the last decades in many publications authors have considered the diverse subject-productions of optical instruments: from the Camera Obscura in the age of Descartes (which promoted the concept of knowledge as interior representation), to photography, film and PC. A life-story is differently structured and communicated in a book, a film or a website. All these different media subsequently refurbished the inventories of our heads, the way we put our lives in order by means of mediated narratives. In the paper we aim to present, the focus of attention shifts from these already well explored media towards the mediating effects of the build environment in which nowadays many such instruments have been incorporated already. How are self-perceptions affected by buildings, the lay-out of city streets, segregation in gated communities, class hierarchies made concrete in shopping malls observed by surveillance cameras, and ultimately in ‘mediapolis’?

In mediapolis we encounter ‘fused spaces’: a merging of mediating material architecture and the virtual worlds of surveillance cameras, interactive buildings and ambient intelligence. How do we orient ourselves; how do we map the high-tech city in our daily wanderings? We cannot offer a full-fledged phenomenology of architectural mediation in high tech-environments, but we may collect the philosophical building blocs which are on offer, sometimes gathering dust on forgotten shelves. There are three approaches we may take and each of them may benefit from a re-conceptualisation of their basic tenets in terms of the philosophy of mediation. The first approach derives from the history of Dutch architecture, where architects as Aldo van Eijck (1918-1999) and Piet Blom (1934-1999) explicitly tried to evoke intercultural communication by architectural means. The concept of ‘mediation’ may reinstate and invigorate this architectural heritage of building for plural societies. The second approach consists in the philosophical concepts of the ‘flaneur’ - coined and practically explored by Walter Benjamin – and of the ‘derives’ and ‘détournements’ of Guy Débord and his ‘psychogeography’. These authors offer mapping-procedures in heterogeneous city-contexts. The third approach is that of artists already working with mediating technologies such as GPS and the method of psychogeography while exploring the city.
Our contribution to the philosophy of technology will consist in conceptualising and mapping contemporary city life and investigating the production of the hypermodern citizen and his orientations by means of the material mediations exerted by high-tech buildings and streets.

‘Healthier, happier, wittier people’? Some problems with the transhumanist idea of an enhancement of emotions

Kraemer, Felicitas

‘Transhumanist’ authors support an optimistic attitude with respect to technology. Their optimism even extends to the enhancement of our emotional life. In this contribution, I will support the thesis that the new technological enhancement of emotions has to be assessed critically, not only because it bears severe risks and dangers, but also because it is based on a problematic account of our emotions. In the face of the current expansion of the enhancement market, we need instruments to assess the morally problematic consequences of psychopharmacological and other neuro-scientific interventions into our emotional life.

Authors like the ‘transhumanist’ Nick Bostrom who seem to uncritically support the enhancement of emotions via technological means neglect the complexity of our emotional life and underestimate its inherent normativity. The transhumanist aim is the creation of ‘healthier, happier, wittier people’ as Bostrom puts it (Bostrom 2003). In his paper ‘Human Genetic Enhancements: A Transhumanist Perspective’ where he explores the ‘posthuman realm’ of enhanced human beings, Bostrom states:

“The range of thoughts, feelings, experiences, and activities that are accessible to human organisms presumably constitute only a tiny part of what is possible. […] It is not farfetched to suppose that there are parts of this larger space that represent extremely valuable ways of living, feeling, and thinking. We can conceive of aesthetic and contemplative pleasures whose blissfulness vastly exceeds what any human being has ever experienced. […] We can imagine love that is stronger, purer, and more secure than any human being has yet harboured” (Bostrom 2003)

Bostrom’s underlying account of how our emotional life is structured and how it could be ‘improved’ by technological means, however, seems to be an oversimplification. Bostrom suggests that emotional sensitivity and the range of positive emotions should simply be increased and amplified via technical means. Among these devices are for instance emotion intensifying drugs, brain implants, and genetic interventions.

In response to this, I will first elucidate why the uncritical and unlimited enhancement of emotions via technological means as it is suggested by ‘transhumanist’ authors falls short of recognizing the complexity and subtlety of our emotional life. Obviously, the enhancement of emotions is a more sophisticated enterprise than the merely quantititative enhancement of cognitive performance, of athletic skills, or physical beauty. Our emotions depend on each other in a fragile nexus that can easily be destroyed by uncontrolled manipulation. It remains far from clear whether the simple enhancement of positive emotions like e.g. ‘happiness’ or of emotional sensitivity would lead to a good and ‘authentic’ emotional life.

Second, I will point out why a bio-conservative understanding of our emotions as it is to be found e.g. in Beyond Therapy by The President’s Council on Bioethics (Kass et al. 2003), is not adequate, either. Our emotions are not simply ‘natural’ phenomena. Rather, they can be described as bio-cultural processes and are therefore always subject to cultural transformation (Röttger-Rössler 2000). Therefore, it is no option to claim any sort of ‘nature protection’ for our emotions as bio-conservative authors are inclined to do (cf. Kass et. al. 2003). Rather, the idea that there should be limits of technological interventions should not be based on an overly value-laden concept of naturalness.
Third, however, there are some severe concerns to be raised as our emotional life becomes increasingly subject to technological malleability. Changing our emotions means changing our cultural and epistemic norms and our standards of rationality. Following Martha Nussbaum (2004: 19 ff.) and others, emotions play a significant role in ‘judgments of value and importance.’ For example, if our emotional life changes on a large scale, because means are available to drastically alter our emotional reactions, our very standards of appropriateness change as well. For example, is it still appropriate to be deeply sad about a dramatic event in the face of the availability of efficient anti-depressants? Major changes are to be expected with reference to the applied standards of appropriateness and authenticity of emotions that deserve careful discussion in the age of technology.

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Not all in the brain. Some organological reflections on the notion of human cognitive enhancement

Lemmens, Pieter

The two predominant features of the bulk of today’s so-called ‘cognitive sciences’ are (1) a resolute informationist conception of human cognition and (2) a nearly exclusive focus on the brain – i.e., the neurological machinery inside the brain - as the seat of cognitive operativity. Both presuppositions are shared by today’s neurosciences. Human cognition is conceived as a neurological – and as such essentially biological – phenomenon and the human brain, as the operative site of cognition, is understood in informational-machinic terms as a complex computational apparatus, explicitly modelled after a computer. More extreme representatives like Hans Moravec and Ray Kurzweil – as well as a host of other ‘posthumanist’ and ‘transhumanists’ thinkers – affirm a purely informational view of the mind (and of life as such more generally) according to which it can be reduced completely to informational patterns that are open, in principle, to limitless computational manipulation (once ‘downloaded’, that is, into a computer). This view is also widespread in AI-research and robotics, as well as in today’s booming biotech industry, in which biological information has become the prime commodity. Information is here perceived as being (ontologically) prior to, and independent of, its material or ‘spiritual’ instantiation in the body or mind and the human organism is seen as an information-processing machine - not different, in essence, from a computer.

Katherine Hayles, in her influential book on posthumanism (1999), has famously criticized these views for their forgetfulness or neglect of cognition’s (and information’s)
essential embodiedness. She explicitly stressed the constitutive role of the body in cognition, arguing for a more body-conscious critical posthumanism. In my paper, I want to criticize both the informationist as well as the brain-centred or ‘neurocentrist’ approach to cognition of today’s cognitive and neurosciences by arguing, primarily on the basis of Bernard Stiegler’s epiphylogenetic view on cognition, that these sciences tend not only to ‘forget’ the body but are also, and more naively still, ‘forgetful’ of the constitutive role of technology in human cognition. First, in postulating the brain as the basis of mind, cognition, and knowledge, the cognitive and the neurosciences indulge in a kind of ‘neurometaphysics’ that privileges one constitutive element within the phenomenon of human cognition (the brain) while neglecting the other (the brain’s technological supports), thereby ignoring its intrinsic finitude. Human cognition, as I will show, is originally technological, i.e., prosthetic and it can only be understood in terms of an original coupling of brain and technology, a coupling that is more original than either the brain or technology on itself. Second, although conceiving of human consciousness in terms of a computer, the cognitive sciences seem ignorant of the actual role of the computer – and by extension of other ‘mind technologies’ (writing, printing, etc.) as well - in human cognition, excluding it in any case from their beloved models. Paradoxically, technology, as the crucial condition of possibility of human cognition as such, is totally absent in the high tech models of the mind embraced by cognitive and neuroscientists alike. It is their ‘unthought’, to use a Heideggerian term. A truly adequate theory of cognition, I argue, should not only implicate ‘embodiedness’ but also recognize, and critically deploy, the essentially technological - i.e. technologically conditioned and therefore fundamentally accidental – ‘nature’ of human cognition (and of human existence in general). Although there is certainly some recognition within contemporary philosophy of cognition of the essential embodiedness as well as the essential technological nature of human cognition – e.g. in the works of Andy Clark, David Chalmers, Robert K. Logan, George Lakoff and Mark Johnson, among others – a thorough (e.g., ontological) consideration of this fact - and of the implications ensuing from it - is completely lacking, as I will argue.

Human cognition must ultimately be understood in its full technical, cultural and social contextuality and the plasticity of the brain/mind must be conceived accordingly in its historical, permanently changing, transductive relation with (the system of) technical artifacts, i.e., from what Stiegler has called an organological perspective. The final part of my paper will consist in an organologically inspired critique of some of the bolder ideas about human cognitive enhancement currently proposed in trans- and posthumanist circles, all based as they are on questionable informationist and/or neurocentrist premises.

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Looking Forward to Enhancement: ethical thinking before it’s too late

Melendez, Carlos & Hannah, Bill

Part of the promise of nanotechnology is the potential for it to modify both human artifacts and human bodies. Envisioned nanotechnology-based human enhancement tends toward technologies substantially different from existing research. Speculative characterizations of technology influence how it develops; on one hand, the promise of better living makes nano-human enhancement attractive and, on the other hand, perceived harms associated with such enhancements make them risky. In both cases, we are left with inevitable misunderstandings that will result either in irrational, unreflective design and adoption or irrational, unreflective rejection. We argue that thinking about technology requires the kinds of speculation that often radically diverges from ends and means in view and that so often is in line with ends-reached. Maintaining a full technology ethics that does not reduce thinly to research ethics, business ethics, or political considerations, calls for a speculative approach when thinking about the ethical dimension of new technologies; in this case, human enhancement through nanotechnology. By examining the speculative case of human enhancement through agrifood nanotechnology we hope to show how the normative elements of such developments depend upon such speculation, and how development toward democratic, appropriate technology will be aided.
Technological advances have greatly improved our ability to modify human traits in the treatment of disease. But the same or analogous technological advances also bring increased capacity for non-medical enhancements of human traits. The latter development has stimulated much philosophical debate about the moral permissibility of certain forms of enhancement, or even enhancement in general, and about the nature of the very distinction between treatment and enhancement (see, for example, Parens, 1998; Coors, 2003; Sandel, 2004; Kamm 2005). These discussions have by and large not devoted much attention to technological enhancements of human beauty, despite the fact that aesthetic modifications, such as cosmetic surgery and liposuction, are currently the most widely available and most widely sought forms of ex post enhancement. In this paper, I consider the moral status of aesthetic enhancement. More specifically, I evaluate two objections to enhancement that apply principally, if not exclusively, to attempts to enhance the aesthetic qualities of human beings.

The first of these is an objection to the very idea of intentionally manipulating the traits of human beings in order to increase their aesthetic value. This objection is based on the notion that human aesthetic features, and the desire or love for them, possess at best a somewhat shallow or debased kind of value. While not explicitly formulated by critics of enhancement, this objection is suggested by the common tendency to look more favourably on the enhancement of traits connected with character, particularly traits connected to moral awareness and judgement, such as intelligence or emotional sensitivity. A proponent of this objection could allow that the enhancement of some human traits (such as the two just mentioned) may be morally unproblematic, given that such enhancements seek and, when successful, provide something of significant value to the people who get them. But even if this is correct, the proponent will insist that aesthetic enhancements are not unproblematic, given that the ends sought and obtained in these procedures lack a comparable value. To evaluate this objection, I investigate one plausible argument for the assumption that human aesthetic qualities possess only a shallow form of value: the argument that to value a person’s physical features is to fail to value them as a person (Newton-Smith, 1973; Gould, 2005).

The second objection to aesthetic enhancement that I discuss in this paper is not an objection to the very idea of intentionally manipulating the traits of human beings in order to increase their aesthetic value. Rather, it holds that, although there may be nothing objectionable in the goal of increasing the aesthetic value of human beings per se, enhancement is a poor strategy for realizing this goal due to the limitations of human imagination. On this line of thought, limitations of human imagination make us poor predictors of the aesthetic value of hitherto unrealized configurations of traits. Thus, we are more prudent if we leave the distribution of these traits to nature, than if we try to manage it ourselves (Kamm, 2005). I claim that this objection has force, if it has force, only in the context of aesthetic enhancements.

A related concern has sometimes been raised in discussion of aesthetic enhancements, particularly cosmetic surgery, in the form of a worry that widespread aesthetic enhancement will lead to reduced diversity in human appearance, as individuals seek to recreate, in themselves or their children, the appearance of socially dominant paradigms of beauty such as movie stars. In evaluating the second objection, therefore, I first attempt to clarify the sort of risk to diversity that is relevant to aesthetic enhancement by distinguishing this practice from human cloning. I then argue that the objection relies on an assumption concerning the relative value of aesthetically good types and tokens. I offer a critique of this assumption, drawing on some analogous cases arising in aesthetic arguments for nature preservation (Godlovitch, 1989; Parsons, 2008, chapter seven).
References


Is human enhancement a sustainable agenda?

Puech, Michel

1. Is “enhancement” a translation of the Greek “αρετή”? In the first centuries of philosophy, the quest was about αρετή, human excellence: what is the most valuable possible form of human life? Warrior, poet, politician, lover...? This quest lost meaning when philosophy became a search for truth in a more and more absolute meaning of Truth, reaching a first climax with religion and a second climax with science. The very word, translated by “virtue”, lost its meaning and slowly decayed into an obsolete reference, a remnant of a value-system nobody really believes in. Do we have a new value system to replace the old one? Yes, we do. It stems from the overwhelming success of technoscience. It is intensely pragmatic and everyone believes in it: efficiency, progress, enhancement.

2. Technical enhancement and the hermeneutics of the better and best Technology is not only a branch of our multifarious activities, it shapes our world-image and our value system. Enhancement is an project embedded in both. To maintain the humanistic stance, a tempting agenda is to think of the human as a candidate for enhancement. Like any other “thing” in the world, from cars to cattle, from computers to crops. My point is to argue that in so doing, we do not select enhancement from a range of possible projects. We just apply the function “enhance” to the variable “human”. This article will explore a broader hermeneutics for “better and best” in the context of sustainability issues. In this context, we realized lately that we just cannot carry on improving devices and enhancing things, at least in the industrial way we used to. The application to the variable “human” is obvious: technical enhancement of the human is no longer the common implicit agenda but poses a basic question. Transhumanism must be assessed as a passionate, provocative, and almost desperate, attempt to confront this question.

3. Humanity: an essence, a project, or both? Religions and ideologies know the essence of the human so they can prescribe the means to reach it. Hans Jonas’ technophobic ethics relies secretly on this revealed and imposed truth about the human. Modernity doesn’t claim to know the essence of the human, but starts with a definition of the project for humanity: Enlightenment, progress, knowledge giving us the power to change the real world. Do the converging technologies of the present and short-term future really converge in that original project? Do we act on an agenda in which a human nature or essence is somewhere conceived as a definite goal, be it as a vague
image? Or do we now rely on enhancement as a value-in-itself? Without a radical and, I hope, pluralistic view of human essence, nature, and project, our technology might converge in the black hole of its own logic. This article will try to define this situation in ethics as a fundamental case of non-sustainability.

4. Human sustainability, the notion we need

Human sustainability may be the agenda we need to replace these notions of human nature that can no longer stand for common values in the globalized world. Determining what to care about, what is important (H. Frankfurt), will be put forward as sustainable ethics, necessarily prior to any enhancement and questioning enhancement itself. The article will cast doubt upon the importance of enhancement with concrete examples and some case studies. Maybe we want to enhance everything, including ourselves, just because we don’t know what else to do. Therefore, enhancement as the tacit global project is not the contemporary translation for αρετή, but the consequence of this question being lost. We used technology to avoid this sort of question (hence “human enhancement”). We could start from technology assessment issues and the involved personal life choices to reanimate this sort of question. Philosophy of technology may light the way.

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On How to Short Circuit a Cyborg: Cyborgological Reflections

Riis, Søren

The cyborg manifests the converging of technologies, the enhancement of human power and the overcoming of human limitations. The cyborg is the hybrid of humans, machines and animals and at the same time a myth of the future of humanity. The leading thinker in STS on cyborgs, Donna Haraway, states that her cyborg myth “is about transgressed boundaries, potent fusions, and dangerous possibilities” (Haraway, 1990, p. 165). The boundaries that the cyborg according to Haraway shall overcome are especially those between the genders, between humans and tools and not the least those between humans and all other living organisms: “nothing really convincingly settles the separation of human and animal. And many people no longer feel the need for such a separation” (Ibid., p. 165).

Even though Donna Haraway asserts that the cyborgs do not remember cosmos (Ibid., p. 163), cyborgs are indeed in her conception a manifestation of a new cosmological anthropology that emphasizes a continuum between all beings. “Why should our bodies end at the skin, or include at best other beings encapsulated by skin?” (Ibid., p. 172). The myth of
the cyborg is the technological reformulation of divinity and the harmony of a collective of all beings. However, exactly these features reveal the weak point of Haraway’s myth of the cyborg. The cyborg is not able to distinguish between itself and the other and to have a conception of its own "skin". Ask the cyborg who it is, and it will initiate an infinite search for a definition, which makes it unfunctional and eventually lead to its melt down. No definition applies to this unlimited mythical being and as a consequence it can have no desire for self-preservation either. Haraway to some extent sees this eventual malfunctioning, but she fails to reckon the devastating consequence of this insight for her idea of the cyborg: “A stressed system goes awry; its communication processes break down; it fails to recognize the difference between self and other” (Ibid., p. 168).

The only way for any system to function and therefore also for a cybernetic circuit to work, is for it to respect boundaries – to short-circuit the entire myth of the cyborg. The limitation of systems is what makes them capable of being and of having self-consciousness, passion and desire - and it grants essential distinctions such as those between disease and good health, existence and death. This short circuiting of cyborgs does not imply that converging technologies and hybrid systems has to give in to xenophobia, but it means that for these systems to enter into reality and to work, they will have to be a part of a sphere of discreet entities of a world of identity and difference. And within this sphere moral questions arise and where moral is instantiated, there is a strive and a struggle, and a desire for domination. The cyborg world is not only a utopia - it also relies on basic misconceptions, which we need to correct to become realistic conceptions about converging technologies and their future functions.

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A Precautionary Principle for Philosophers of Technology: When Attributions of Human Nature Are Justified

Selinger, Evan

To provide detailed analysis of the thesis that humans are naturally tool-making and tool-using beings is to pursue a path of inquiry that runs contrary to the localism and anti-essentialism that pervades much of the philosophy of technology and science and technology studies. Contemporary work in these fields tends to: (i) emphasize the diversity of situated practices (i.e., historical, cultural, geographical and gendered differences), and (ii) construe appeals to “human nature” as more likely to distort human behavior than edify it. Because philosophical anthropologists attempt to articulate what it means to be a human being at the most fundamental level of existence, they are open to conceiving of technology as what Mary Midgley calls a “structural property” (i.e., a basic feature of a species that is not necessarily a marker of uniqueness nor the basis from which reductive appeals to species excellence can be derived). This openness cuts against the grain of the localism mentioned above, and even holds in cases where technology is not framed as a guiding theme.

Far from being a monolithic group, however, philosophical anthropologists differ on core ideas. Crucially, deep debates exist about the merits of the *homo faber* thesis. Given the diversity of opinion, only a highly selective synthesis of insights from philosophical anthropology can support the view that the explanatory advantages associated with attributions of “human nature” warrant philosophers of technology appealing to the category when analyzing basic dimensions of technology. Indeed, some philosophical anthropologists
argue that naturalist categories provide inappropriate concepts for analyzing the basic dimensions of human existence, and others postulate that humans are “animals” and that “world openness” can be conceptualized within biological theory.

In this SPT presentation, I will offer provide an account of how the appeal to “human nature” can illuminate basic relations to technology. This account is informed by a selective reading of philosophical anthropology and revolves around three theses: (1) the “inseparability thesis,” (2) the “technology-is-not inherently-alienating thesis,” and (3) the “incomparability thesis.” Support for these theses is derived from appropriating claims made by David Nye, Frederick Engels, Alfred Crosby, Raymond Tallis, Helmuth Plessner, and Andy Clark.

Upon articulating these theses, I will consider the following objections and concerns: (i) an epistemological rejection of appeals to “human nature” (as expressed by Martin Heidegger and Michel Foucault), (ii) anxiety that associating technology with human nature risks elevating contemporary technological practices to the highest expression of our humanity (a problem that Plessner raises), (iii) anxiety that associating technology with human nature obscures normative issues concerning power and bias (as expressed by Lewis Mumford and feminist scholars), (iv) anxiety that associating technology with human nature demeans a crucial modes of human engagement (as expressed by Hannah Arendt and other phenomenologists), and (v) anxiety that the “incomparability thesis” focuses too much on human exceptionalism (as expressed by Donna Haraway).

Rather than individually addressing these objections and concerns, I conclude by synthesizing all of them into a meta-philosophical account that clarifies the conditions under which responsible attributions of “human nature” can be made. Appealing to this account, I contend that a special precautionary principle applies to any theorist—perhaps especially a philosopher of technology—who wants to make claims about “human nature”. Despite all of the caveats that this principle entails, I argue that greater philosophical insight into technology can be found by endorsing it than by accepting the pervasive standards of localism and anti-essentialism.

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Reterritorialized Nature and Renaturalized Selves: A Critical Posthumanist Reading of Pre-Implantation Genetic Diagnosis and Psychopharmacology

Sharon, Tamar

Recent advances in biotechnology, nanotechnology and information technology have resulted in unprecedented degrees of intervention in matter, life processes and human nature, and are engendering the prospect of technologically modified nature and enhanced humans. Discussion about human enhancement – or “posthuman” technologies – is usually dominated by two positions: transhumanism advocates the desirability of improving the human condition by using new technologies to transcend the biological limits of the human species, while bioconservatism argues that the use of enhancement technologies may lead to the loss of some fundamental human essence. Critical posthumanism, a field informed by earlier poststructuralist critiques of humanism and science and technology studies, offers an alternative approach to the usual utopian vs dystopian polarization of posthuman discourse. For critical posthumanists, posthuman technologies have the potential to undermine the normative authority of nature and to dissolve the subject of liberal humanism that both bioconservatism and transhumanism presuppose. This paper will present a reading of enhancement technologies and contemporary bioscience from a critical posthumanist perspective, through the examples of two converging technologies: pre-implantation genetic diagnosis (PGD) and psychopharmacology.

From this perspective, the discussion on posthuman technologies also lends itself to a dialectical tension, not for or against the use of these technologies, nor even of treatment vs enhancement, but what I will call, borrowing from Deleuzian terminology, schizophrenic vs paranoid tendencies. In this framework, the innovative, liberatory and deterritorializing impact of posthuman technologies – the potential to undermine “normative” and “authentic” categories of self and nature that are foundational to Western modernity – represent bioscience’s schizophrenic potential, which comes up against its paranoid tendencies, that seem to capture and reterritorialize any transgressive or subversive potential new technologies might have.

At the molecular level on which the biosciences currently understand life, nature’s mechanisms can be identified, imitated and recombined. Such an understanding of nature as technologically mediated, as malleable, can result in its “de-naturalization,” in the collapse of the nature/culture or nature/technology divide that critical posthumanism views as cause for celebration. Indeed, if the segregation of the domain of the natural from the social and the human from the technological is a gesture foundational to Western modernity, than their integration, according to critical posthumanism, might offer a renewed relationship between humanity and its others. This is the schizophrenic potential inherent in the biosciences. Thus, for example, assisted reproductive technologies such as pre-implantation genetic diagnosis have a schizophrenic potential to destabilize any axiomatic link between discourses of “natural” process and conception. Similarly, in the case of psychopharmacology coupled with behavioral genetics, this schizophrenic potential is found in the loss of an “ontology of depth” that might open up biological destiny to self-transformation and undermine the notion of authentic subjectivity. But this schizophrenic potential seems to continually come up against paranoid attempts to reinstate nature and self as foundational categories and against a paranoid biopolitics implicit in the prospects of “designer babies” and “cosmetic pharmacology.” Significantly, the critique of this “new eugenics” raised by critical posthumanists is not based on the actual intervention in nature or on a nostalgia of the unitary self, but on the conformism to genetic desirability shaped by dominant groups that it implies.

For critical posthumanists, bioscience’s paranoid drive is usually ultimately viewed as stronger than its schizophrenic drive; it captures, contains and represses, confining schizophrenia to mere potential. But such an analysis portrays schizophrenic and paranoid
tendencies as fixed in a relation of strict opposition, as contradictory trends, and fails to see the degree of interaction between the two. Rather, these tendencies occur simultaneously, they interact and co-evolve in ways that give rise to new assemblages, to borrow again from Deleuze. I will argue that what we are witnessing in reproductive and genetic technologies is not so much a reinstatement of foundational terms such as nature and self resulting from a paranoid “capture” of schizophrenic potential, but the reworking of those terms into new categories.

**Human enhancement in public space: how to keep uneasy questions in the political arena?**

*Smits, Martijntje & Schuijff, Mirjam*

In 2008 and 2009 we have been doing several technology assessment studies on human enhancement technologies, broadly mapping the trends and the social issues these new technologies might raise. In our reports and articles we showed that technologies and artifacts as divergent as deep brain stimulation, gene therapy, prenatal genetic diagnosis (PGD), Ritalin, Provigil, cosmetic surgery and growth hormones have some important traits and uneasy questions in common. Human enhancement is a trend not just fancied by transhumanists: Though society still cherishes a certain taboo on using medical treatments to enhance humans -beyond what is considered as a normal, healthy condition - many of these technologies are accepted with a remarkable pace and eagerness, shifting social norms (e.g. of illness) and reshaping practices, while billion dollar markets are built. In most cases the advantages for the individual seem to wipe out the vague concerns about potential risks for society at large.

We conclude that students of technology and policy makers should not just deal with the issues apart (e.g. the legalization of Ritalin or the indications for which PGD is allowed) but that they first of all need to recognize the intriguing pattern and deal with the overarching tendencies, in a stage long before the issues are settled. We also conclude that the visionary dreams by transhumanists and the pessimist nightmares by bioconservatives should not be taken for granted. In contrast to their visions, the way these technological advancements will shape new preferences, social practices and cultural norms is highly unpredictable. Thus, there is a need to search for middle ground positions to evaluate and influence the trends. Moreover, there is a need for a public arena in which the normative issues and preferences involved and can be widely deliberated, in order to develop new perspectives and to regauge old norms and preferences.

In circles of philosophers of technology this appeal for public debate may not be a surprising one, it even might sound as a platitude. In the SFT conference we therefore like to make a further step in our argument. It often turns out to be difficult to ‘politicize’ the normative questions involved, as we would like to do. The poor fate of the complex normative questions involved seems that of marginalization in the current political arena. Here, the dominant positions of liberal thinkers (stressing the right for self-determination) and bioconservatives (emphasising human dignity) apparently leave poor room for political questions about, for example, the issue whether social progress is about enhancing individual traits. The political crisis in the Dutch cabinet on PGD in the summer of 2008 represented a clear example of the current limits for public deliberation.

In our paper we will analyze current obstacles for public deliberation on human enhancement issues and we will put forward some suggestions to surmount them.

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In this and coming centuries, the convergence of nanoscale, biological and information technologies promises a profound acceleration of the pace of efforts directed toward human enhancement (HE). Through the alteration or expansion of existing human capacities, or the introduction of new ones, transhumanists and other technoptimists expect the natural obstacles presented by age, death, illness and environmental insufficiency to be partly or wholly transcended. ‘Bioconservatives’ reject such human enhancement technologies on the grounds that they pose a threat to human dignity and indicate a disturbing disregard for the meaning and value of the human condition. I begin this paper by addressing the widely acknowledged vagueness of the concept of ‘human dignity’ appealed to by bioconservatives such as Kass, Fukuyama and Sandel, and by identifying within those appeals two basic orientations to human dignity that are in fundamental tension with one another.

While one orientation is rooted in modern conceptions of dignity resting on the capacities for autonomy and rational agency that lead to authentic human striving, the other is rooted in metaphysically essentialist traditions according to which humans have a given ‘nature’ with a substantive and immutable content. This tension can yield divergent moral assessments of proposals for human enhancement – for example, bioconservatives of differing orientations may well disagree about which would pose a more direct threat to human dignity: a proposal to bioengineer humans with the capacity to breathe underwater, or a subdermal implant that automatically releases anxiety-relieving beta-blockers at moments of critical performance.

Thus normative discourse on HE is not likely to be clear or fruitful as long as these disparate moral intuitions are conflated and packaged together under the amorphous heading of ‘human dignity’. Perhaps, then, bioconservatives must declare their individual sympathies with one of these two orientations. An alternative is to reconcile them, by conceiving of human nature as essentially defined and constituted by the evolved capacity for deliberate self-transformation, regarding dignity as the product of this natural capacity. However, this would seem to reinforce the claims of Bostrom and other transhumanists that technology promises nothing more than the acceleration of a natural human process of enhancement that has been taking place for millennia. On this view, transhumanism is just humanism amplified. There is no rejection of the gifts of human nature, but rather a more active and explicit embrace of them. This view cannot be dismissed as a philosophical novelty. It is rooted in a rich humanistic tradition captured by Pico della Mirandola’s 1496 Oration on the Dignity of Man, and reflected in a broad range of philosophical, scientific and artistic perspectives, from Condorcet to Nietzsche to George Bernard Shaw. Its embodiment today

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1 See Nick Bostrom, ‘In Defense of Posthuman Dignity’, Bioethics 19:3 (2005), p. 213. This view is succinctly captured in Ray Kurzweil’s remark that humanity should be defined as “that species that inherently seeks to extend our own horizons. We didn’t stay on the ground. We didn’t stay on the planet. We’re not staying with the limitations of our biology.” (Kurzweil, U.S. Congressional House of Representatives Committee on Science hearing “The Societal Implications of Nanotechnology”, 4/9/03)
on the front lines of transhumanist politics is, in one important sense, simply its newest expression. Yet the prospects of 21st century technological convergence raise the stakes of this vision by several orders of magnitude, offering powers of self-transformation beyond any previously imagined. Confronted with this dizzying potential, contemporary humanists are experiencing a new crisis of confidence in human virtue, one that places the viability of della Mirandola’s vision, and its power to inspire us, in radical jeopardy.

Without a resolution of this crisis, the transhumanist evocation of human creativity, while compelling in the abstract, will remain insufficient to entirely blunt the force of bioconservative objections to HE. For such objections are motivated by more than the oft-ridiculed ‘yuck factor’, or even by provincial ‘human racism’, as transhumanists charge.2 They are also motivated, I argue, by deep uncertainty about the intellectual ability and moral will of today’s humans to transform themselves wisely and well.

Do we today possess the extraordinary ambition, moral imagination and prudential insight needed to wisely and effectively implement such a radical program of self-transformation as the transhumanists propose? The pessimistic answer, that for various concrete reasons contemporary humans lack the necessary virtue to use our expanding technological powers to achieve a qualitatively higher form of life, or even to properly identify one, cannot be rejected on the grounds of its cynicism alone, as some transhumanists have done. Nor, however, can it be confirmed by mere intuition, or by its growing resonance with the popular imagination.3 I conclude then, that the debate over HE will likely remain at an impasse until the plausibility of this speculative thesis can be better evaluated.

**Anthropology beyond Humanity: Understanding the posthuman body-subject**

*Verbeek, Peter-Paul*

Technological development has started to interfere explicitly with human nature. Technologies like tissue engineering, genetic modifications and brain implants make it possible to reshape human beings in various ways. How to understand these new human-technology hybrids? Along which lines could knowledge of our fusion with technology take shape? In order to answer these questions, the paper will organize a confrontation between classical anthropological approaches to technology on the one hand, and contemporary approaches to the posthuman being on the other. All of these approaches, I will argue, are caught in a modernist framework that juxtaposes subject and object: human beings versus technologies, and minds versus bodies. The paper will argue that an alternative framework is needed for an adequate understanding of the posthuman.

1) Technology has played an important role in the history of philosophical anthropology. Arnold Gehlen (1957), for instance, argued that human beings are ‘Mängelwesen’ – infirm creatures that can only survive with the help of aids and tools. Building upon Ernst Kapp’s theory of organ projections (1877), Gehlen classified technologies in terms of organ replacement, organ strengthening, and organ facilitation.

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3 Visions of the technological future in pop culture, cartoonish though they often are, increasingly reflect this thesis: for very recent examples, see the cult hit Idiocracy and the Disney/Pixar film WALL-E. Elements of the thesis also appear in popular techno-futurist literature, e.g. Snow Crash and The Diamond Age.
Hermann Schmidt approached technologies as externalizations of human abilities, developing from tool to machine to automaton. By recognizing technologies as externalizations of one’s own abilities, human beings develop self-understanding through technology. Yet, however illuminating they are, all of these approaches have an externalist view of technology, locating human beings and technologies in two separate domains in which the one uses, designs, or recognizes oneself in the other. The interwoven character of both, in which the one shapes the other, is at best implicit in these approaches.

(2) How could contemporary approaches add to these attempts to understand the posthuman being? I will discuss two radically differing positions. In his novel Possibility of an Island, Michel Houellebecq thinks through a future human condition, in which human reproduction takes the shape of cloning, and where clones develop an identity by reading the life stories of their earlier versions. The work of Hans Moravec and Catherine Hayles finds itself at the other extreme. Rather than reducing humanity to a self-reproducing organism, Moravec speculates about the possibilities to leave the body behind and to download the mind in other ‘carriers of information’, and Hayles speculates about virtual bodies. Here, the body seems to evaporate. In both approaches, technology either merely reproduces the body or abolishes it – it does not constitute a new human being.

(3) All of these approaches, therefore, seem to fail to take into account how humans and technology have always been interwoven and how this interwoven character could take new shapes through new technological developments. Should we add the cyborg and the posthuman being as new stages to Schmidt’s scheme, or does the scheme itself need to be altered? And how to overcome the Cartesian dualism that hides behind much posthumanist discourse, as the work of Houellebecq, Moravec and Hayles shows? In order to answer these questions, the paper will integrate Merleau-Ponty’s notion of the body-subject with postphenomenological analyses of human-technology relations.

**Failures of Convergence**

**Weiss, Dennis M.**

The 2002 report “Converging Technologies for Improving Human Performance,” sponsored by the U.S. National Science Foundation and Department of Commerce, bemoans the current state of fragmentation and specialization in human knowledge and optimistically looks forward to a rekindling of the spirit of the Renaissance brought about the convergence of nano-, bio-, and information technologies and the cognitive sciences. As Roco and Bainbridge state in their overview to the report,

Half a millennium ago, Renaissance artist-engineers like Leonardo da Vinci, Filippo Brunelleschi, and Benvenuto Cellini were masters of several fields simultaneously. Today, however, specialization has splintered the arts and engineering, and no one can master more than a tiny fragment of human creativity. We envision that convergence of the sciences can initiate a new renaissance, embodying a holistic view of technology based on transformative tools, the mathematics of complex systems, and unified understanding of the physical world from the nanoscale to the planetary scale. (13)

These converging technologies (NBIC), it is predicted, will give us the means to enhance human performance. “Caught in the grip of social, political, and economic conflicts, the world hovers between optimism and pessimism. NBIC convergence can give us the means to deal successfully with these challenges by substantially enhancing human mental, physical, and social abilities” (3).

In this conference presentation, I propose to analyze the framework of converging technologies developed in this and other NSF reports by drawing critical comparisons to an alternative framework drawn from the tradition of philosophical anthropologists, especially the philosophical anthropology of Ernst Cassirer. While it may seem somewhat anachronistic to draw on what many perceive to be a moribund area of philosophy to
critically evaluate the convergence of 21st technologies, I will argue that philosophical anthropology offers a number of important insights and correctives to both the framework and the vision spelled out in the converging technologies reports. Cassirer in particular is instructive in this regard, as he too was concerned with the fragmentation of human knowledge and as early as 1906 in *The Problem of Knowledge*, voiced concern over the increasing progress in specialization of the sciences. In calling for synthesis and synopsis, however, Cassirer turned to philosophical anthropology and a philosophy of culture, most notably in his final work *An Essay on Man*, where Cassirer argues that in order to address the crisis in “man’s knowledge of himself,” a product of the state of disconnected and disintegrated knowledge, we must resolve fundamental philosophical questions about the type of creature a human being is.

Cassirer’s framework for addressing the human being’s crisis in self-knowledge stands in stark contrast to the NSF reports on converging technologies where, for all the talk about a new renaissance and a holistic approach to addressing improving human performance, culture, the human being, and our self-knowledge seldom if ever appear. Where for Cassirer, “social, political, and economic conflicts,” occasioned a reflection on human nature and our place in the cosmos, for the authors of “Converging Technology,” it occasions reflection almost exclusively on NBIC convergence, this despite the fact that the stated goal of that convergence is the improvement of human performance. While that goal is a pervasive part of the converging technologies reports, little attention is paid to the human being whose “re-design” is being wrought precisely by that convergence. This is unfortunate and represents a failure of convergence at the heart of the call for converging technology.

While I will argue that Cassirer’s own call for convergence and his faith in the unity of culture and the symbolic forms also fail, he offers a number of tools useful in the critical assessment of the contemporary call for converging technologies. A more adequate account of convergence that addresses the place of the human being in a rapidly changing technological environment will need to begin from a stance that incorporates philosophical anthropology and a critical theory of technology.

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Characterizing the Engineering Sciences as Science

Boon, Mieke

Commonly held pictures of the engineering sciences are often inadequate. The engineering sciences are usually regarded as engineering or technology, rather than science. However, given the fact that the number of scientific publications in the engineering sciences has increased exponentially over the past 100 years or so, we must clarify what makes them scientific. The traditional distinction is between basic sciences and engineering sciences – where the former are traditionally pictured as discovering fundamental laws that somehow represent ‘nature’, and the latter as ‘applied science’: scientific knowledge produced in basic sciences is used in engineering for producing technology. However, engineering sciences produce scientific knowledge as well (published in scientific articles), whereas most research in ‘real’ (basic) sciences, rather than aiming at scientific knowledge of ‘nature’, is directly related to technological uses in a wider sense, including medical and agricultural applications, as well as uses in the forecasting of natural processes. I will claim that the inadequate picture of the engineering sciences goes hand in hand with an inadequate picture of ‘real’ science: they are two sides of the same coin. The only significant distinction that could be maintained, I claim, is between theoretical (mathematical) and laboratory sciences.

My revised picture of science pulls down the traditional distinction between basic and engineering sciences. The crux of this alternative picture is that it places phenomena rather than true theories at the centre of scientific interest. In a commonly held picture of science, the aim of science is the discovery of true theories, while phenomena are considered as tools for achieving that. Browsing through current scientific publications reveals that most of the articles report on phenomena and/or scientific models of phenomena rather than on true theories. This is not only the case for the engineering sciences, but for the laboratory sciences in general. In many cases, fundamental theories play a role in the development of models, but in general, scientific publications do not aim at presenting tests or verifications or confirmations of these theories. Phenomena that are described and modelled in scientific articles can be of many different kinds. In the engineering sciences, properties of materials, the behaviour of processes, and the functioning of technological instruments and devices are all understood in terms of phenomena. These phenomena may already exist, but in many cases, scientific research aims at creating new or better properties, new or better processes, and new or better devices. The scientific approach is in terms of models of phenomena and models of experiments or instruments that create them. Consequently, actual practices of the engineering sciences compel to a reversal of common pictures of science.

A more appropriate picture involves that the purpose of the engineering sciences is contributing by means of scientific research to the development of materials and devices. Scientific research in the engineering sciences, alike other laboratory sciences, basically involves experimentation and modelling. Scientists develop materials or devices of interest, as well as scientific models that represent their understanding of the materials and devices, and often, also of the experimental techniques involved. Hence, through modelling, engineering sciences strive to understand, predict, control or optimize the behaviour of materials or devices (whether actual or possible) that determine the proper functioning of materials and devices. Simultaneously and in a mutual interaction with the modelling, phenomena and data are produced through developing experiments and instruments that produce them. Accordingly, scientific practices of the engineering sciences produce three things simultaneously: they develop in a mutual interplay: (1) experimental techniques and instruments that make possible the creation of, and intervention with phenomena relevant
to the functioning of materials and devices; and (2) scientific models that represent scientists’ understanding of (a) these phenomena, and (b) how these instruments and experimental techniques produce the desired and undesirable phenomena.

Notably, the behaviour of materials and devices, as well as of experimental techniques, is usually specified in terms of phenomena that must be created, controlled, prevented, or improved. Accordingly, instead of depicting an already existing world, the engineering sciences aim at theories and models that provide understanding of *artificially created* phenomena. Moreover, theories and models are means for reasoning and visualizing how to intervene with phenomena, that is, how to create, control, prevent or improve them. As a consequence, rather than being tools for justifying theories and models in the first place, phenomena produced in experiments are an aim in itself – theories and models, on the other hand, are considered as epistemic tools for intervening with, and artificially creating phenomena.

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**The Sciences and Technology. Historical Reflections on the Origins of Engineering Sciences**

*Dijksterhuis, Fokko Jan*

Reconfigurations of technoscientific research constellations are embedded within intellectual, institutional and cultural dynamics. The perspective of recent analyses of such changes (Gibbons, 1994; Roco 2003) tend to be focussed on academic disciplinary research as it has become dominant for the image of science in the late twentieth century. This dominance is also reflected in philosophy and history of science. As a result domains of inquiry outside the classical ‘laboratories of science’ remains relatively little studied as sources of reflection upon the nature and development of scientific practice. A case in question are the engineering sciences as they developed from the early nineteenth century into the present.

The engineering sciences may be characterized as scientific inquiry upon technological objects and this is a relatively modern practice. Assessment of engineering sciences qua science tend to be hampered by conceptions of essences of science. Often they are considered to be ‘applied’ in the sense of the application of knowledge established within natural science to objects and questions of technology. This, however, fails to do justice to the knowledge production practices of engineering scientists. (Boon, 2006) A fundamental and long-standing issue, however, is whether the sciences are one or many. In a classical paper Thomas Kuhn (Kuhn, 1977) raised this question and pointed out that it was mainly a result of preconceptions in terms of modern scientific disciplines. He went beyond the inherent
dilemma by shifting the perspective to ‘traditions’ of scientific inquiry which stratify scientists in terms of their research agendas, problem solving strategies, etc. In this way he managed to solve a haunting historiographical problem of the apparent indecisive outcome of the scientific revolution circa 1700. The conception of ‘scientific traditions’ has proven to be quite fruitful in identifying and characterizing major reconfigurations of technoscientific inquiry and provides a promising perspective on the rise of the engineering sciences.

Kuhn’s approach has recently been developed further in historical and philosophical analyses of the heterogeneity of the sciences. Crombie has expanded the notion of traditions both in number and in their cultural embedding, developing a sedimented picture of the modern sciences. (Crombie, 1994) Pickstone, while also drawing on Foucault’s notion of épistémé, has developed the notion of ‘ways of knowing and making’ to analyse modern practices of inquiry and invention. (2001) More recently, Pickstone has engaged with the original question of Kuhn in an article explicitly focussed on the question of continuity between early modern and modern ‘ways of knowing’. (Pickstone, 2007) A crucial, and important point of these analyses is that convergences of separate traditions usually result in far-reaching transformations of technoscientific configurations, while at the same time fascinating tensions ensue from combining traditions. Still, the question how the engineering sciences may be understood in terms of traditions and their interactions largely remains open. Although Pickstone explicitly discusses both ways of knowing and of making, his approach tends to conflate science and technology to the extent that the potentially specific nature of the engineering sciences is indiscernable. Crombie, on the other hand, explicitly does not consider technology and consequently is unable to analyse the engineering sciences in terms of scientific styles.

In this paper I want to explore the way the nature and development of the engineering sciences can be analyzed in terms of traditions of scientific inquiry. To do so, I will first discuss the way a tradition – or way, or style, or regime – can be defined and put to analytical use. In other words, how the heterogeneity of the sciences can be understood while avoiding our common disciplinary divisions. Then I will discuss the dynamics of the converging and transforming of traditions involved in the development of engineering sciences. I will discuss in detail the aspects of convergence, be they intellectual, institutional or cultural, and the way this is brought about. In this way a historical and philosophical reflection upon the nature and development of the engineering sciences has broader significance regarding the nature of technoscientific reconfigurations in general.

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Knowledge and Technology Transfer as a challenge for scientific practices in the field of advanced materials – Findings from an empirical case study research

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In an early stage technology is comparatively open and only socially “determined”, in contrast to later stages where technology is more and more entrenched and path dependent (Rip 2007:87). But how is technology shaped in the early stage, at the laboratory? Decisions on paths a technology may take are already made here. What role does the research teams’ action play for the path a technology is going to take? To approach this question, we will focus on a critical point in the development of a new Technology: The stage where a development (in this case new materials) is transferred from the scientific field to the economic field, from the laboratory to the market. We will demonstrate how a research teams decisions in the technology transfer process are both restricted and enabled by their organisational context. We will also reflect on how decisions made by research teams concerning the technology transfer of their development have a strong influence on the path the development is going to take.

During the last 20 years research governance in European countries has been transformed towards a more market oriented research governance (de Boer et al. 2008). Germany is a recent case for this transformation. Concerning materials research, one of the key elements of these reforms is technology transfer. The research and development in publicly funded research institutions should lead to applications which guarantee market success to the benefit of the German Innovation System (BMBF 2001). The researchers in the publicly funded research institutions have to face this challenge. But how do they transfer their technological developments into the market? What kind of challenge does this pose for their research practise? To fully understand technology transfer and its implications for the scientific practice in the field of advanced materials R&D the analytical focus has to be directed at the micro-level. Observing the research teams routine allows to gain insight into the decision making process in research teams concerning technology transfer and on the structural and non-structural aspects shaping these decisions and their consequences.

In the research project “Knowledge and Technology Transfer in Materials Research-Characteristics and Conditions of Successful Product Innovation (InnoMat)” nine case studies in the field of advanced materials were conducted. The case studies encompass different research areas of advanced material research: smart materials, nano particles, advanced ceramics and composite materials. Each case was embedded in one of the three major government-financed scientific institutions of the German research system: the Hermann von Helmholtz Association of German Research Centers, the Fraunhofer Society and Technical Universities.

With this proposed paper we would like to present findings from the project InnoMat concerning the ambivalent challenge technology transfer poses for the scientific practice of research teams. On the one hand, these activities enable the research team to gain new knowledge, to demonstrate the feasibility and societal benefit of their research or to enable the group to work continuously by financial means from industry-science collaborations. We were able to observe strategies of research teams which lead to increased autonomy within an organisational setting. On the other hand, technology transfer and related activities endanger basic research activities; a companies’ interest often is exclusiveness of the results where the interest of the research team is publication of the results. Since public founding is of major importance to Technology-transfer activities, research teams have to address research areas that promise good chances of public funding. In this way, research teams feel they “have to” address popular themes such as Nano (or convergence).

In this way, different strategies of planning, conducting and integrating transfer activities into scientific practice emerge, each being a trade-off between different goals:
Pursuing scientific publications versus education of students and junior scientists, versus contributing to the development of their new material versus transferring that material into a market success. We will show that the strategy chosen by a research team is dependent on the research teams’ organisational setting and which consequence this may have possible paths of a development.

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Explanations in Software Engineering: The Pragmatic Point of View

Winter, Jan de

Research on scientific explanation shows that there is not one kind of explanation that guarantees maximal explanatory power. Different kinds of explanation are legitimate (e.g., Pettit, 1996; Weber and Van Bouwel, 2002). A question that then arises, is whether one can randomly choose a kind of explanation without running the risk of choosing a deficient explanation-type (‘anything goes’). If not, one can wonder what is the nature of the factors that determine which explanation-type is best. Philosophical analyses indicate that the following factors can influence the appropriateness of an explanation-type: the information looked for (Pettit, 1996), the explanation-seeking question (e.g., De Langhe, forthcoming; Van Bouwel and Weber, 2008), and the function the explanation should serve (e.g., Weber, 1999; Weber and Vanderbeeken, 2005; Weber, Van Bouwel and Vanderbeeken, 2005).

In this paper, I construct a framework for explanatory practice in software engineering. It is assumed that explanations are answers to why-questions. These questions can have the following formats:

(P-contrast) Why does object a have property P, rather than property P’?
(T-contrast) Why does object a have property P at time t1, but property P’ at time t2?
(O-contrast) Why does object a have property P, while object b has property P’?
(plain fact) Why does object a have property P?

Such questions are motivated by certain reasons or interests. I argue that several explanation-types are legitimate in software engineering, and that the appropriateness of an explanation-type depends on (a) the engineer’s interests, and (b) the format of the why-question he asks, with this format depending on his interests. The explanation-type that best serves the engineer’s interests, and that best fits the question he asks, has most explanatory power.
This point of view is clarified by considering examples of explanatory challenges that turn up while developing a computer program that allows the user to generate a schedule that distributes twenty-one games (each between two different teams) over as few days as possible, given that (a) there are two conferences, each containing three teams, (b) teams of the same conference have to play two times against each other, while teams of different conferences have to compete only once, and (c) a team cannot play more than one game per day. Explanations that can help one to create such a computer program, are proposed, and the relevant explanation-types are spelled out. The resulting survey of different kinds of technological explanation is complementary to other proposals about the nature of technological explanations (e.g., see Kroes, 1998; De Ridder, 2007).

One of the main virtues of the paper is that it demonstrates that the plausibility of explanatory pluralism is not restricted to the human sciences. The idea that more than one explanation-type is legitimate in the human sciences, is widely accepted by philosophers of science (e.g., Forland, 2004; Marchionni, 2008; Van Bouwel & Weber, 2008). However, in my opinion, the explanatory pluralistic framework can be expanded to other contexts as well. In the paper, it is shown that the explanatory pluralistic framework can at least be expanded to software engineering.

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Preparing for the Rise of the Robots: Analysing future risks to the critical functions of society from socially disruptive technologies: the case of autonomous systems

Carlsen, H., Johansson, L. & Wikman-Svahn, P.

Any analysis of the risks of future technologies will depend on yet unidentified consequences and impacts on society. This calls for new methodologies in order to plan and prepare for these potential risks. In a previous paper we outlined a methodological framework for decision-guidance on the potential effects of future technologies (Carlsen et al., forthcoming). Our framework consists of two main parts: First, the development of co-evolutionary scenarios that explores the societal consequences of future technologies by describing the co-evolution of technological artefacts together with different relevant, plausible and challenging future societies. The second part is built on a participatory approach where stakeholders explore the impacts of technology in different future societal contexts in order to find possible decision-nodes which could be used to mitigate the risks of the examined technological development. The main purpose of the present paper is to subject our methodological framework to a practical case of an emerging technology with potential risks for society, namely autonomous systems (for example robots or software agents). The process of applying the framework to a specific technology also necessitates further elaboration of some of the theoretical concepts used in our previous paper.

In recent years the concept disruptive technology has attracted much interest in the technology management and business communities. A disruptive technology radically transforms markets and industries by introducing new performance parameters (Bower and Christensen 1995). It is often the case that disruption emerges when technologies converge – what we have seen during the last decade in IT and telecommunications is an example of this. In our previous paper we argued that in the same way a technology can be disruptive in relation to existing business models, a technology can also be seen as disruptive in relation to society – it may therefore be called a socially disruptive technology.

When assessing the potential risks of future technologies we believe it is functional to link the concept of socially disruptive technologies to critical functions of society. Examples of critical functions of society are the production and distribution of electricity, communication services, payment systems, production and distribution of food, etc. A thorough analysis utilizing the concept of critical functions of society enables a more focused analysis of the risks of future technologies. One central insight is that the critical functions of society are not fixed, but instead changes over time depending on both technological and societal developments. This is something that is taken into consideration in the subsequent analysis.

We then turn to the future development of autonomous systems and the potential risks to critical functions of society. We start by analyzing autonomous systems from the theory of disruptive innovation and argue that the evolution of this technology is likely to introduce new performance parameters and consequently be a disruptive technology. In addition to this, we highlight that open or user centered innovation (von Hippel 1976, Toumi 2002, von Hippel 2005) are likely to play an important role in the evolution of autonomous systems. This is important as user centered innovation is often thought of as an enabling factor for disruptive technological innovation. Furthermore, we argue that user centered innovation in autonomous systems is likely to be conductive to create social disruption.
In order to identify the potential risks of future autonomous systems to the critical functions of society one has to envisage what kind of artefacts will be developed and how these might influence the critical functions of society. Our main methodological tool for studying these aspects builds on the established discipline of scenario planning (Kahn and Wiener 1967, Bradfield et al. 2005). By constructing co-evolutionary scenarios we explore different future paths of innovation and societal impacts. The final part of our methodology is based on our contention that ethical assessments of the risks and decision options related to future technologies are not best performed in armchairs or research labs but in a participatory setting involving both technology experts and policy makers responsible for critical functions of society.

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Preliminary considerations on a risk assessment of Converging Technologies
Fiedeler, Ulrich

In the field of Converging Technologies there is a strong call for risk assessment, which has been accompanying the technological development from its early beginning. Its necessity is widely accepted among most stakeholders in this field, not only in specific countries or in the EU but in most industrialised nations. This is especially surprising because at present there is little evidence that these new technologies will raise risks comparable to those from “old” technologies such as mining and oil exploration, waste management, chemical productions facilities, household combustion, diesel engines, power plants etc. This precaution bases on increased awareness about the fact that technical developments could cause undesired and disastrous side effects. This awareness is linked to the general knowledge about the complexity and vulnerability of ecological systems (ozone hole, greenhouse effect), the difficulties to control large and complex systems (Harrisburg, Bhopal, Tschernobyl), and to experiences with chemicals (dioxin, asbestos) which show their harmful potential often only on long term scale (Bechmann et al. 2007). Related with these experiences of negative impacts of new technologies is the reluctance of consumers and civil society towards a number of new technologies. Therefore, innovators fear that new technologies could be rejected by a broader population, as it is the case for several applications of genetic engineering. In the context of the call for a risk assessment of Nanotechnology it is often mentioned that developments similar to the case of genetic engineering have to be avoided.
While widely asked for, the risk assessment of Converging Technologies raises several challenges. The first challenge is related to the vague definition of Converging Technologies. The notion Converging Technology, similarly, the notion Nanotechnology, implies that in both cases a specific technology is subject of the risk assessment. A closer look on both technologies reveals that very different scientific concepts and activities as well as different technologies, analytic tools, processes, and even products are attributed to Converging Technology and Nanotechnology (Roco/Bainbridge 2002; Nordmann/High Level Expert Group 2004; The Royal Society/Royal Academy of Engineering 2004). But these “technologies” are not just a specific collection of particular technologies. They are also a social phenomenon (Fiedeler 2008; Schummer 2004) – not only in the sense that individual researchers are linked together by conventions, common procedures, and institutions that might be different, compared to other fields of research. Instead, these technologies and research activities conceptually depend on, and cannot be separated from, the discourse about these activities. In other words, Converging Technologies cannot be understood without considering its political dimensions.

Therefore, the first step of a risk assessment of Converging Technologies is to introduce several analytical distinctions. For this purpose, I will discuss, firstly, the differences between the various types of technologies usually attributed to Converging Technologies, such as Nanotechnology, Synthetic Biology, etc.

One common characteristic of these “technologies” is their early stage of development. Therefore, it would be more appropriate to call them science instead of technology. A further characteristic, especially for Nanotechnology, is that these technologies are enabling technologies. These are technologies, which are only part of a larger system, but giving products their crucial functionality. Finally, Converging Technologies have essentially an interdisciplinary character. For a risk assessment these characteristics imply several problems. How could one investigate possible negative side effects of technologies from which neither their applications nor the context of use is known? One possible approach is to perform an analysis up front to identify those applications which could possibly be realised in a near term period and to identify criteria and collect indications why a subsequent risk analysis has to focus on these applications (Fiedeler et al. 2004).

A further step in “disentangling” (Nordmann 2006) Converging Technologies is to distinguish between the technical side of Converging Technologies and its existence as social construction. According to each concept of Converging Technologies the risks which are related to Converging Technologies are different. In present discussions, these different risks are not separated. Risks which are related to the dynamic of the debate on Converging Technologies are discussed along with e.g. toxicological risks expected from nanoparticles. In this contribution, I will illustrate in which regard Converging Technologies are social constructions and the implications of this for a risk assessment of Converging Technologies.

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Risks of Technology and Market System

Honda, Kojiro & Yoshimachi, Akihiko

It is generally acceptive that new technology would give the convenience to our life. For example, cell phone has made our life changed drastically. It has changed our way of communication. We can call each other anytime and anywhere with it in our urban life. New technology can be recognized as the source of wealth because it can make new demands among people who want affluence. So they invest in research and development in a lot of institutes from corporation to government. Investigation for R&D becomes indispensable drive force of modern economy.

If new technology gives only convenience, then they will readily accept it. But we have already learned from the history of 20th century that new technology also has another dangerous face. We have experienced dangerousness of technology such as environmental destruction or nuclear accident etc. Thereby contemporary people dread whether the new technology has dangerousness or not. As technological products more gradually circulated as home electric appliance or food adjunct and penetrated into our life, our interest for the safeness of new technology also got bigger. As for revolutionary technology such as biotechnology which can radically change the lifestyle or thanatological view, it is not only sufficient to think about safeness, but also to weigh the pros and cons of acceptance of the new technology.

In this presentation, we would like to contend that it is necessary to combine the risk of technology and the risk of market system when we assess the risk of new technology. Why new technology appears without prior notice and make us faced with the choice of acceptance or not without plenty of time to think about the risk. How does the pressure of making a new technology prevail in the society emerge? What are the implicated risks of making technology prevail via market? For thinking these questions, it is necessary to reexamine the function of technology in the market system fundamentally. We propose three concepts of risk such as ‘Asymmetric Information Risk’, ‘Anonymity Risk’ and ‘Scale Risk’ by abstracting the features of technology and market system. These concepts would provide keys to think about special role of engineer and its special responsibility in the market-oriented economic system.

The ‘asymmetric information risks’ are risks derived from the gaps of information and knowledge about technology between implementer and consumer. Generally consumers don’t have plenty of knowledge about science or technology. By that very fact, they buy commodities and services which are produced by the know-how or the skill of scientists and engineers. But by that very lack of knowledge, they cannot evaluate the safeness of artificial commodities or the environmental destruction which would be caused by the product process of the commodities. This gap means not only the source of benefit for the implementers view but also the source of risk for the consumers.

It is said that anonymity is guaranteed in modern economy. This means everyone who has money can participate freely into market for trade without condition (age, sex, nationality etc.). That is to say they don’t need to make personal relation between seller and buyer. This may sound good, but this anonymity might be used wrongly. Thanks to lack of scientific knowledge consumers cannot evaluate the quality of commodities. That means the monitoring function which should be equipped to market doesn’t go well. In addition to that,
thanks to the market rule of anonymity, sellers need not image the faces of buyers. This situation where the anonymity is guaranteed and monitoring function goes badly tempts to ingenerate misconducts of sellers or implementers. This is the second market’s potential risk which we would like to call ‘anonymity risk.’

Scale Risks’ are risks derived from mass production. Because the mission of company is to maximize the benefit, almost all companies intend to realize mass production which leads to cost-cutting. In the case that consumers accept a faulty commodity by the lack of knowledge, it is impossible to deny the possibility that the commodity has already been widespread before the discovery of the fault. Then the bigger the scale of market is, the greater the scale of risk is, too. This is the third market’s potential risk.

By using these three concepts, we would like to analysis the collusion between technology and market.

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The specificity of risk perception associated with converging technologies

Kermisch, Céline

For several decades, more and more philosophers and sociologists have been diagnosing the end of faith in technoscientific progress. In this perspective, it is worthwhile understanding how converging technologies might affect this scepticism. Their role turns out
to be ambiguous: one of the particularities of NBIC-technologies lies in the fact that they inherently bear the potential either to confirm technoscientific disillusion or to rehabilitate the idea of technoscientific progress. Risks and their perception, which have always played a fundamental role in the public opposition to science and technology, and thereby in questioning the notion of progress, are once again at the centre of the debate.

The analysis of risk perception sheds light on the particular way individuals apprehend converging technologies – compared with conventional technologies – and on the importance of ethical values in people’s acceptance of converging technologies and their risks.

In order to frame the specificity of risk perception associated with converging technologies, I have based my research on the analysis of recent Eurobarometers (European Commission 2006, European Commission 2008) and on a review of psychometric studies (for example, Midden et al. 2002, Scheufele et al. 2007). This approach allows us to isolate the main characteristics of Europeans’ risk perception of converging technologies, including nanotechnologies, GM foods, pharmacogenics, gene therapy or animal cloning. The analysis reveals that none of the classical risk perception schemes is sufficient: neither the psychometric paradigm, nor Mary Douglas’ cultural theory, nor traditional sociodemographic characteristics allows a satisfying interpretation of risk perception associated with converging technologies.

Several reasons explain this insufficiency. We know that classical risk perception models impose frozen snapshots of lay opinion. These appear to be inadequate considering the fluctuation of public perception, which is due to the fact that, confronted with a new kind of uncertainty, individuals are constantly negotiating with new information and solicitations.

Another reason proceeds from the fact that risk perception of converging technologies integrates cultural values and beliefs, even more than in the case of conventional technologies. Indeed, Eurobarometers’ data show a geographical distribution of attitudes towards NBIC-technologies and their risks, which reveals that cultural factors such as ethics, religion or education appear to be more important than psychometric factors like “dread”, “voluntariness”, or “novelty”: the moral inacceptability of NBIC-technologies depends on the perception of a threat to fundamental values such as human nature or nature’s integrity.

These results confirm the results of previous studies conducted in Europe, but also in the United States and in Canada (Sjöberg 2004, Hornig Priest 2006).

The analysis of risk perception associated with NBIC-technologies shows that traditional risk definitions, based on the quantification of physical harm, are not adapted in the case of risks surrounding converging technologies. Indeed, the specificity of these risks lies more in their potential symbolic impacts – the threat to fundamental anthropological categories – than in their potential physical consequences (Bourg 2003).

NBIC-technologies seems thus to increase scepticism regarding progress. However, indirectly, these technologies have a positive effect, forcing more than ever the researcher, the decision maker and the citizen to adopt the same thought process that is imposed on the philosopher: anticipate the future in order to make responsible choices, which preserve human freedom, human dignity and a future as open as possible.

References


**Digital profiling’s silent attack**

*Manders-Huits, Noëmi*

Information Technology has not only inspired a technological revolution, for instance by large-scale automation and the acceleration and specialization of business processes, it has also contributed to an intensified informational structuring of society. Everything is recorded in terms of data, e.g. purchase habits, web surfing and —searching, communication via mobile phones or email, and stored in one of the trillion databases that we have. Using this information and more, elaborate digital profiles on persons are created on the basis of which products and services can be adjusted and improved to better serve their customers.

Following recent discussions concerning the values and politics in design of (information) technologies (see a.o. Winner, 1980, Friedman, 1997, Manders-Huits and Zimmer, 2009), this paper deals with the political dimension of digital profiling. In contrast with the more obvious and common analysis of risks concerning digital profiling, usually construed in terms of practical effects such as identity theft and fraud, I explore the less apparent moral risk of digital profiling. I will demonstrate how tiny little bits and pieces of information coming from innumerable sources gradually and cumulatively contribute to threaten the status of a person as a moral subject. The moral risk involved is thus instigated as a cumulative effect of the collection of seemingly innocent and meaningless data such as shopping behavior. The associated harm, though not apparent in many single cases of information gathering, is only recognized as a collective phenomenon, referred to by Joel Feinberg as “cumulative harm”. (1984)

The collection and mining of so-called attributive and referential identity related data (Manders-Huits and van den Hoven, 2008), amounts to an increased vulnerability towards other harms; in this sense the cumulative harm is instrumental to other harms such as informational harm (van den Hoven, 1997), and privacy breaches. What is more, individuals are increasingly constrained by converging technologies with respect to their self-determination, the interest in making significant decisions about their own lives. A moral person is engaged in self-definition and self-improvement and reflects on, evaluates and identifies with moral choices, ideally without the critical gaze and interference of others and a pressure to conform to the ‘normal’ or socially desired identities (see e.g. Rawls, 1971). Digital profiles of this person however, whether fully accurate or not, facilitate the formation of judgments about him or her, which, in turn, possibly constrain and influence his or her behavior and identity formation compromising the possibility for self-presentation and the construal of the individual as a moral agent, who is capable of acting upon (moral) reasons and defines him- or herself accordingly.

In conclusion, the moral risk of digital profiling as a cumulative phenomenon is, despite its low visibility, at least equally challenging and threatening the status of a person as a moral subject.
Converging Technologies and Tailored Democratization of Risk Assessment

Meghanim, Zahra & Kuzma, Jennifer

The convergence of emerging technologies, such as nanotechnology, biotechnology, informational technology and cognitive technology, renders risk assessment and management complicated and difficult. Emerging converging technologies might interact with one another in unanticipated ways, creating new, complex, and multi-faceted risks. As the risk regulatory mechanisms of various nations were designed for conventional technologies, it is arguable whether they have the wherewithal to deal with converging technologies. For that reason, it is all too likely that possible risks from new converging technologies, such as synthetic biotechnologies, will be a matter of considerable public concern.

We contend given the uncertainty about risks from emerging converging technologies, doing justice to the public’s worries about them requires the adoption of a trans-disciplinary model of risk assessment and management. In our presentation, we sketch the outlines of such a paradigm. The model of risk evaluation and management we formulate is informed by theories and findings in the behavioral sciences about social trust in emerging technologies and it takes into account the science and technology policy literature on the subject (e.g., Lang and Hallman 2005; PIFB 2006; Siegrist 2007). Moreover, it is cognizant of the fact that public democratic deliberative processes can play a crucial role in improving risk characterization (NRC 1996, 2008) as well as management.

In particular, our presentation focuses on the issue of public engagement at the national level entailed by our trans-disciplinary model of risk assessment and management. While we espouse the public’s involvement in risk regulation of converging technologies, we contend that the form of democratic engagement utilized for that purpose should be mindful of the specifics of the nation in question. The relevant particulars include the distribution of power amongst the various constituencies of that country, the heterogeneity or homogeneity of its populace, the nature of its regulatory agencies, etc. To make an argument for our position, we use the U.S. as a case study. We contend that it is because the U.S. has, first, a deeply rooted culture of political patronage favoring industry, second, a heterogeneous population constituted of groups that have complicated political histories with one another, and third, regulatory agencies (such as the U.S.’ Food and Drug Administration) whose key positions are staffed by industry veterans, not just any form of democracy can effectively serve as the

References

means by which the people can express their will about the values that should guide the risk evaluation and management of converging technologies. We examine, in turn, the ability of three different forms of democracy—aggregative, representative, and participatory—to function as the means by which the US citizenry could autonomously decide which normative considerations should shape the risk assessment and management of converging technologies. We contend given the particulars of the U.S., neither aggregative nor representative democracy is suited for that task. Using that case study, we establish that the democratization mandated by our trans-disciplinary model of risk assessment and management requires the mode of the public’s participation in the risk regulatory process be tailored so that it is responsive to the particular political realities of specific nations.

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The philosophy of safety engineering

Ove Hansson, Sven

Since the 19th century, many engineers have specialized in worker’s safety and other safety-related tasks. With the development of technological science, the ideas behind safety engineering have become subject to academic treatments. There are now many ways to systematize the practices of safety engineering, but none of them has gained general acceptance. A major reason for this is that the discussion on safety engineering is fragmented between different areas of technology. In this contribution, some major practices in safety engineering will be discussed. It will be argued that there are underlying principles that unite them all. These principles are not covered by probabilistic safety analysis. A one-sided focus on the latter approach may lead to neglect of valuable engineering principles.

Converging technologies and de-perimeterisation: towards risky active insulation

Pieters, Wolter

In converging technologies (Roco and Bainbridge, 2003), boundaries between previously separated technologies become permeable. A similar process is also taking place within information technology. In what is called de-perimeterisation (Jericho Forum, 2005), the boundaries of the information infrastructures of organisations dissolve. Where previously a firewall was used to separate the untrusted outside from the trusted inside,
outsourcing of information management and mobility of employees make it impossible to rely on such a clearly located security perimeter. In this paper, we ask the question to what extent these developments represent a similar underlying shift in design assumptions, and how this relates to risk management (cf. Perrow, 1999). We investigate this question from the perspective of the system theory of Niklas Luhmann (1979, 1988, 2005 [1993]).

In order for technologies to function, they need to "decide" which influences they let in or out. This is what Luhmann calls causal insulation. We can distinguish between passive and active causal insulation. In passive insulation, the insulation is implicitly realised by "common" physical properties. In active insulation, a special mechanism is included in the design that is supposed to take care of the protection. A piece of paper is in principle not accessible, unless you have the paper in your hands (the so-called "air gap"). A file on the Internet is in principle accessible, unless it is actively protected (e.g. by encryption).

As an example, consider the difference between barcodes and RFID (radio-frequency identification) chips on consumer products. The information in the former can not easily be captured from a distance, since the products mostly reside inside shopping carts and bags. By contrast, the information in RFID chips can be read, unless there are protective measures in place. This makes the security of the RFID information dependent on the adequacy of the security protection mechanism. Such differences also apply when boundaries fade with de-perimeterisation and converging technologies: there is a shift from passive causal insulation to active causal insulation due to increased connectivity.

Active protection, in contrast to passive protection, is by definition based on design decisions. This means that, in Luhmann’s terminology, the possibility of failure is always one of risk instead of danger: one could have made a different design decision, which is not the case with passive protection by physical separation of technologies. Moreover, how the protection works can no longer be understood without specialist knowledge. It is easier to convince the public that barcodes cannot be read from a distance than to achieve the same result for RFID, even when experts find the protection adequate. This means that trust becomes increasingly important. Instead of unconsciously relying on the physical separation of systems, we have to decide consciously whether we trust a security measure to protect our assets.

Simultaneously, increased connectivity often amounts to a shift from causal insulation based on physical separation to causal insulation based on informational separation, called “non-interference” in computing science (Sabelfeld and Myers, 2003). Whereas a traditional pill relies on chemical properties to release its contents, a digital pill may be steered from outside the body, requiring again active protection, which is typically based on informational properties rather than physical properties (e.g. authentication and encryption).

When insulation is insufficient, as in the case of de-perimeterisation, an alternative or complementary approach is to detect when a technology is being misused. In information technology, this is called intrusion detection (Bolzoni and Etalle, 2008). Based on the similarity between de-perimeterisation and converging technologies, we predict that intrusion detection will increasingly be applied in to converging technologies as well, shifting the design assumptions from protection towards detection. When everything is connected in the information domain (Internet of things), lack of protection may lead to for example digital pills being “hacked”. In such a case, pills need to be suspicious about the instructions given to them: If they get a strange sequence of instructions, they may decide not to execute them and generate a warning instead. Moreover, this security mechanism will itself rely on information about the use of the device, which also needs to be protected.

Concluding the argument, converging technologies and de-perimeterisation are similar in that both involve in their design assumptions the dissolution of boundaries, a shift from passive to active protection, and a shift from physical to informational insulation. This makes protection both more risky, in the sense of based on design choices, and more subject to specialist knowledge and therefore trust. Because of the shift towards informational insulation, the complementary use of insulation and intrusion detection in computing science will increasingly apply to converging technologies as well.
Emotions and the Risks of Converging Technologies

Roesser, Sabine

Converging technologies such as human-animal hybrids, cyborgs or brain implants are developing rapidly, getting closer to ideas that have so far mainly been developed in science fiction. Such technologies are met with reservations from the public. Ethical objections to these technologies are often linked to emotional reactions, such as fear and disgust. Such emotions are generally discarded as supposedly irrational responses to new technologies. In direct contrast, the hypothesis explored in this paper is that fear and disgust can be reflective, moral emotions that can point to ethical aspects of risks of converging technologies.

I have previously argued that moral emotions such as sympathy, empathy and indignation should play an important role in political debates about the moral acceptability of risky technologies (Roesser 2006, 2007, 2009a, b). However, fear and disgust are more complicated. Fear and disgust are less clearly focused on moral aspects of risk. They can also be responses to perceived threats that might be based on wrong factual information. Fear and disgust might just reflect our unfounded prejudices and phobias, such as the fear of flying. Even in the light of contrary moral or factual evidence, we might still feel fear or disgust (cf. Sunstein 2005 for the irrationality of fear; cf. Haidt and Graham 2007 for the irrationality of disgust).

On the other hand, there are situations in which fear and disgust enable us to be aware of morally salient features. Interestingly, nanotechnology gives rise to greater worries within the scientific community than amongst the public (Scheufele et al. 2007). Given the newness of nanotechnology, we can assume that scientists are more knowledgeable than the public about nanotechnology and its concomitant risks. Apparently, their fears can be attributed to a rational understanding of the risks involved in nanotechnology. Fear can point to a source of danger to our well-being (Green 1992, Roberts 2003, Roesser 2009a). Fear can be directed towards unwanted consequences, but it can also emphasize the fact that the scientific knowledge about a risky technology is rather uncertain. This is a morally salient aspect of risky technologies (cf. Hansson, Möller 2009): if scientists don’t have reliable knowledge about risky technologies, it might be wise to adopt a precautionary approach.
The emotion of disgust can point to even less secure knowledge about risks. The fact that converging technologies can be uncanny and disgusting is related to risk, but it points to something more vague. Whereas the notion risk involves well-defined consequences about which we have statistical information, the uncanny and disgusting points to possible consequences that are not yet well-defined, let alone that we should have statistical information about them. Disgust and the 'uncanny' feeling we have concerning for example clones, cyborgs, human-animal hybrids and people with brain implants can point to our unclear moral responsibilities to them and the worry that they might develop in an unforeseen way. These are ethical concerns that need to be addressed in developing and dealing with such new technologies and disgust can enable us to detect morally salient issues (cf. Miller 1997, Kahan 2000 on the rationality of disgust).

In this paper I will argue that fear and disgust can be warning signs, making us aware of the moral values involved in converging technologies. In public debates about converging technologies fear and disgust should be explicitly taken into account as a source of insight. This should help scientists who develop new technologies to better understand the ethical considerations of the public that lie behind these emotions and to do justice to these considerations in technological design.

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Biological and medical knowledge, in the last century, and in particular in the last decades have been particularly important to establish normality in the “organic” dimension. Genetic information, expressed in statistical data, provides an explanation of the human being in terms of normality: there are genes that are normal and others that are malfunctioning, defective, mutated, abnormal (the ‘deviant’ genes). The genetic discourse, while employing notions of normality and deviance, also articulates the notion of risk. The detailed knowledge of different genotypes, together with techniques such as in vitro fertilization, prenatal or preimplantatory diagnosis, leads to choices concerning reproduction that are selective along the basis of risk – the calculation of the possible harms in a given scenario, in opposition to the possible gains. While normality is based in statistical calculations to establish an average, the notion of risk goes further, since it uses probabilities to predict a future event. This implies that the calculation of risk is used as device to predict and control future events, avoiding the ‘abnormal’ outcomes.

In 1983, the National Academy of Sciences published a document that standardized the process for health risk assessment in order to “foster a constructive partnership between science and government, mechanisms to ensure that government regulation rests on the best available scientific knowledge and to preserve the integrity of scientific data and judgments in the unavoidable collision of contending interests that accompany most important regulatory decisions”. The authors of this report advocated a clear conceptual distinction between risk assessment and risk management, noting that maintaining this distinction would help to prevent risk assessments from being constructed with “inappropriate policy influences”\(^4\). However, they also recognized that risk-assessment techniques could not be isolated from society’s risk-management goals. In this sense, (and since the report was, even if not exclusively, mainly focused on substances hazardous to health) risk assessment would entail the evaluation of information on the hazardous properties of these substances, on the extent of human exposure to them, and on the characterization of the resulting risk. Risk assessment, rather than being a single fixed method of analysis, would be regarded as a systematic approach to organizing and analyzing scientific knowledge and information.

While public health risk assessment and risk management have traditionally been understood as exercised along a continuum, the red book conceptually separates them in order to promote a better use of science in regulatory decision-making. This division is perceived as an attempt to diminish the intrusion of subjective factors in the scientific process. Risk assessment would only be an area of analytical consideration, through which scientific knowledge and activity would be “organized and integrated”\(^5\), leading to a more profound knowledge of how human health can be harmed. In this way, risk assessment would lead to a systemic consideration of the viability of alternative risk reduction or risk management procedures. Ulrich Beck, in Risk Society, argues that late modernity, as a reflexive social order, ‘manufactures’ new risks and uncertainties: risks become global, rather than territorially specific; risks are contrasted to dangers and natural hazards as they are made by society; and risks cannot be limited and therefore cannot be insured against or


compensated for. Genetic calculations transform biological events once perceived as natural and arbitrary, into calculated occurrences, in which, as with other types of risks, there is an analysis of the costs-benefits for the individual. The idea that individuals should take responsibility for their health is implicitly assumed in this model. While the risk assessment is done in conjunction with a health care professional, and through the devices made available through the healthcare professionals, the management of risk is individualized.

This paper will analyse the discursive and concrete practices of genetic technologies and their relationship with risk conceptions and structures. I will contend that at the light of the new genetic paradigm which informs medical practices, as Beck argues, a new conception of Governance revolves around the concept of risk. The losers, those who do not fit inside the category of normalcy (as determined by risk assessment and management) are usually a target of diverse policies and institutions. Therefore, I propose to clarify how concepts of risk, normality and normalization are expressed in the new genetic discourse, leading to global structures of risk assessment, but making risk management an individual enterprise leading to continuous self-re-examination and re-assessment.

**Conditions of engagement: Learning from the Dutch debate on nanotechnology**

*Walhout, Bart & van Est, Rinie*

The emergence of nanotechnology provides a new case for rethinking the governance of emerging technologies. From the early development of science(policy) agendas on nanotechnology, scientists as well as governments have stressed the need to learn from the controversy on genetic modification. Particularly the need for ‘moving public engagement upstream’ (Wilsdon 2004) is still regarded as an important lesson to be learned. But although ‘upstream public engagement’ is an inspiring and challenging concept for articulating public perspectives in science and technology development, the concept itself doesn’t provide a methodology to organise the required processes in a meaningful way.

Moreover, when applying the idea of public engagement to a broad area as nanotechnology, it turns out to be merely impossible to discuss all various issues in a comprehensive way, let alone to involve the public or even stakeholders in such activities. Policymakers thus face difficult dilemmas: governments have committed themselves to engage society in the governance of nanotechnology, often by initiating dialogue, although it is unclear how such dialogue can be set up in a meaningful way or whether people will be interested in joining it.

To find a way out, normative assumptions – about why certain publics have to be engaged in what kind of issues – should continuously be reconsidered from a practical perspective. It should be recognised that there are not many people out there, whether experts, stakeholders or citizens, that are simply waiting to be involved. Engagement needs to be seen as relevant. When and how these conditions can be met, depends on the political context (existing research programs, expectations of applications, awareness of issues, regulatory framework, etc…) in which dialogue takes shape. This context is also evolving over time. Thoroughly assessing the conditions of engagement is therefore essential to governmental initiatives in stimulating engagement.

In this paper we discuss the results of a study we conducted in the Netherlands with regard to finding conditions on engagement. Anticipating the start of a public dialogue to be organised by the Dutch government in 2009, we addressed the question how to best prepare for this in a report called ‘Ten lessons for a nanodialogue’ (Hanssen 2008). In this study we analysed the development of various discourses: first we have evaluated the agenda setting activities of a relatively small circle of trend watchers, engaged (social) scientists, think tanks and technology assessment organisations. Which issues have been drawn up by these experts and which issues are addressed at policy agendas? Second we provide an overview of the
views of (inter)national NGOs on nanotechnology, regulation and public dialogue. Finally, the study includes studies of public perceptions of nanotechnology. Based on these findings we have drawn up ten lessons for the Dutch government to set up a meaningful debate on nanotechnology.

As such our ‘lessons for a nanodialogue’ do provide a list of conditions that have to be met for meaningful public engagement. The first and most important lesson is to differentiate between the debate which focuses on the potential health and environmental risks of nanomaterials and the broader societal debate which considers the general impact of nanotechnology on society. Although these aspects are not entirely unrelated, they do call for different roles adopted by the government and for a different type of dialogue. Second the risk issue requires firm governmental direction, including the facilitation of small NGOs and the provision of clear information about nanotechnology products, the risk governance strategy and the uncertainties. If these conditions are not met any dialogue on nanotechnology is likely to be dominated by the risk issue. This requires action rather than public debate.

At the same time far more is at stake than the risk issue alone. The broad societal impact of nanotechnology is about how nanotechnology, biotechnology, information technology and cognitive science are merging, known as NBIC-convergence. Opening up the debate on how this next technology wave might contribute to a better future world does represent a true opportunity for upstream public engagement. But this does not automatically call for organising a series of public dialogue initiatives under the all-embracing heading of ‘nanotechnology’. For example, the issue of privacy is already addressed in discussions about RFID and Ambient Intelligence.

While these findings may provide a way out of the current dilemmas in initiating public dialogue on nanotechnology, they also help to address theoretical questions about engagement on what and by whom? Most importantly government itself has to ‘move upstream’. Clearly acting on the risk issue, parcelling out broader social and ethical issues and connecting some of the lots to already existing discussions can set the stage in which experts, stakeholders and the public can be engaged in a meaningful way. Governments thus play a key role in broadening engagement within and between the circles of experts, stakeholders and the public. In this respect it is institutional engagement which to a large extent set the conditions of public engagement.

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Technological convergence and interdisciplinary research

Bluemel, Clemens

One important presupposition for technological convergence is the growing need for interdisciplinary research (Shmulewitz et al. 2006). Since Converging Technologies are seen as the synergistic combination of the four main technologies Nanotechnology, Information and Communication and Biotechnology (Roco/Bainbridge 2003) it is clear that competencies of at least these four fields of science and technology are necessary. The CT program is therefore one expression for the increasing societal and political demand of interdisciplinary cooperation in emerging fields of science. While Roco and Bainbridge (2003) stressed the need for a new model of super interdisciplinarity, STS scholars and philosophers of science and technology focussed on the specific cognitive, methodological and organisational presuppositions for increased interdisciplinarity cooperation in this field.

In this paper we will present some findings about the problems of fostering interdisciplinary cooperation in converging technologies. Empirical (Rafols/Meyer 2007) and theoretical investigations (Schummer 2004; Schmidt 2007) have shown that interdisciplinary cooperation in nanotechnology and converging technology can not be observed to the extent it is expected to be. For the problems of interdisciplinary cooperation in the field of Converging Technologies, two analytical levels will be distinguished: The cognitive (scientific paradigms) and the institutional level. While on the cognitive level questions about the methodological and theoretical basis for convergence are treated, research on the institutional level asks about publication patterns and the emergence of scholarly journals that show disciplinary integration. With the growing importance of nan- and biotechnologies, the interdisciplinary structure of this field of research has been analysed (Schummer 2004; Rafols/Meyer 2007).

In this paper I will argue that this low degree of disciplinary integration makes it hard to integrate scientists in the process of Modeling formulation and funding. Drawing on interviews conducted in the field of neuroprosthetics and computational Modeling during an European Project (Converging Technologies and their impact on Social Sciences and Humanities), we can show that while researchers in these convergent fields scientists practically cooperate, this has so far not led to scholarly integration.

References

Converging Technologies and Ethics of the Good Life

Brey, Philip

The aim of this paper is to assess at a general level the implications of converging technologies for the quality of life, by means of an ethical analysis that draws on philosophical theories of the good life. There is a general expectation among adherents that converging technologies will bring a vast array of benefits and that they will enhance the quality of life for individuals (High Level Expert Group of the European Commission, 2004). I will argue that existing analyses are too superficial. Converging technologies enable a radical restructuring of human beings, their environments or lifeworlds, and their mutual relation. Traditional quality of life indices fail to register such transformations and their implications.

I will argue that nano and info technologies engender a profound transformation of the environment or lifeworld, whereas bio and cogno technologies change human beings or subjects. When they converge, moreover, these technologies help change the relation between subject and lifeworld. Nanotechnologies, first of all, which enable control of matter even at the molecular level, allow for a radical restructuring of the material world, which can be made to be even more artificial and engineered to satisfy human needs than previous technologies have allowed. Information technologies have not just digitized information, they have shown a tendency of transforming everything into information, including communication, social interactions, work and creativity, and of making the environment intelligent and responsive to humans. Together, then, nano and info technologies have the potential to create a lifeworld that is radically different from the lifeworld as it existed before these technologies.

Bio and cogno technologies in a similar way allow for a radical transformation of the human mind and body. While some of its applications will be therapeutic and restorative, both technologies also have great potential for enhancement. That is, they may be used to improve human physical and mental abilities beyond a normal level. In this way, they may even alter human nature, and modify humans to have superhuman abilities. The convergence of NBIC-technologies further strengthens the transformative potential of these technologies and has a special potential to alter the relation between humans and their environment. Key application areas of converging technologies include ambient intelligence and persuasive technologies (info and cogno) and brain–computer interfaces and biocybernetic technologies (bio, info and cogno, and potentially nano). These technologies both transform the relation between humans and their lifeworld.

I will argue that these various transformations result from an idea that goes to the core of converging technologies. This is the idea of total engineering, which is the idea that every object or structure can be improved through re-engineering, including the human body and mind, social structures and interactions, and the material environment, from the molecular level to the macrolevel. Yet, I will argue, this approach presupposes an ideal of technological control that is both untenable and undesirable. It is untenable because it is unlikely that the complexity of biological, social and cognitive-affective systems will for sufficient technological control. It is undesirable because such technological control diminishes human autonomy and spontaneity even as it seeks to enhance it.

As I will argue, converging technologies do have clear benefits for the quality of human life, in that they will lead to all kinds of desired improvements in aspects of the environment, human beings, and their mutual relationships. However, they at the same time undermine human autonomy, which is a prerequisite for high quality of life in most theories of the good life. They could do so, first, by making the environment active and intelligent, rather than passive and mute. This inevitably undermines human autonomy, freedom and responsibility, as I will argue. They could also undermine human autonomy through cognitive and cybernetic technologies that reengineer human cognitive, affective and conative systems or make them dependent on machines, in this way limiting human autonomy and free will. In this way, converging technologies may bring us closer to a Brave
New World: a society in which our desires are satisfied and the quality of life seems to be vastly improved, but in which human autonomy and freedom has also fallen victim to a paradigm of technological control.

The challenge for the future development of converging technologies is to avoid this Brave New World scenario. I will argue that this seems easier than it is, as much of the promise of converging technologies is currently tied to application areas that push us into the direction of this undesired scenario.

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Converging technologies and NBIC as examples for “knowledge politics”

Büscher, Christian

This presentation will focus on the analysis of the emerging topic “Converging Technologies” (CT) and “NBIC” in order to exemplify forms of knowledge politics: attempts to control or steer the knowledge production from outside the scientific context.

The science and technology topics of CT, and its specific form NBIC, have emerged since the end of the 1990s and infused various debates with a broad range of expectations, especially possible enhancements of human organisms, the individual consciousness and societal conditions (Roco/Bainbridge 2002; Coenen et al. 2004; Coenen 2008; Saage 2007).

Those expectations were countered by an own set of ideas on how converging is working and on what possible consequences CT could have and should not have (Nordmann 2004). Additionally, different disciplines of the “humanities” have tried to understand those expectations in at least four distinctive ways: Prospective approaches attempt to clarify (1) if convergence of Nano-, Bio-, Cogniscience in combination with Information Technology is a real possibility, i.e. if the promised technologies come into reality; (2) what intended or non-intended consequences could derive if those technologies come into being; (3) how those potential consequences could be judged by ethical standards; and finally (4) if it is possible to influence, control or stop such a technological development. Future-oriented assessments refer to different intellectual heuristics, namely “vision assessment” (Grunwald 2008: 115ff.), “If and Then” debates (Nordmann 2007) or the idea of a “projected time” (Dupuy 2004).

Those approaches will be briefly discussed in this presentation, with the goal to offer an additional perspective.

Our take refers to sociological approaches with a retrospective orientation, i.e. the clarification of the notion “knowledge politics” in terms of distinguishing between normative and cognitive expectations (Luhmann 1994) and in terms of describing a process of institutionalization (van Lente 2000, Bender 2005).

If we understand knowledge not as an ontological inventory, but rather as an operation in order to mobilize knowledge in a certain situation which enables us to act or to decide, then we can identify the prospective structure of knowledge: it refers to the future in the form of either cognitive or normative expectations. Both of them relate to contradicting orientations. The cognitive orientation provokes surprises to modify expectations and therefore to learn; the normative orientation avoids surprises to keep orientations stable and therefore to judge and discipline deviations. The first mode is institutionalized as modern science, the latter in politics and law. The notion of knowledge politics intertwines both modes with (possibly) specific consequences: politics and law are both depending on
scientifically generated knowledge, which is hypothetical and therefore might erode the normativity of political and lawful decision-making. Politics and law (and also various social groups) try to introduce strong normative orientations into science (Weingart et al. 2007: 319ff.), which might corrupt the ability of generating knowledge. The consequences have to be further elaborated and observed.

For the case of CT and NBIC we can observe how these topics reach distinguished levels of institutionalization (topic, agenda, paradigm). Even if we do not know exactly if the topics of CT and NBIC is already on the scientific agenda, we can find hints indicating a strong bias in political programs towards convergence as a solution to speed up technical innovation. Those programs demand the organization of interdisciplinary research in order to receive funding. It is taken for granted that inter- and transdisciplinarity is a necessary requirement for successful knowledge production, without further indication what interdisciplinarity means beyond a “coming together” of different disciplines. Assuming only science can develop “scientific problems” or “common paradigms”, the notion of “from promise to requirement” (van Lente 2000) gets a completely new meaning: an extra-scientific definition of how to produce cognitive objects. CT and NBIC could be revealed as political programs to discipline science.

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Methodological Convergence and Integration in Cross-Disciplinary Research

Crist, B., O’Rourke, M., Donovan, S., Looney, C., & Wulfhorst, J.D.

Cross-disciplinary research is a topic of growing interest in academic and research communities, gaining increasing attention from both researchers and funding agencies to address large-scale, insidious societal problems. However, a number of challenges face the successful integration of cross-disciplinary research projects. For researchers, these problems generally include interpersonal friction due to disciplinary bias, obstacles arising from vernacular, and conceptual difficulties in integrating distinct forms of knowledge to bridge methodological variability. Cross-disciplinary researchers often assume these factors do not present barriers to collaboration or can be easily overcome. This paper focuses on the design and management of non-traditional multi-methodologies in successful cross-disciplinary integration and investigation of complex problems.

Disciplines have both unique knowledge perspectives and approaches that emerge along with those that overlap with other disciplines. When a group of cross-disciplinary researchers collaborates, and each is familiar with separate methods of investigating complex problems, the mismatch of approaches and perspectives can lead to inadequate results if these methodological differences are not properly addressed and managed. One technological approach that can be used as a preventative measure to manage integration at a conceptual level is philosophical analysis.

Models of any given object or phenomenon in the world are abstractions designed in accordance with certain natural laws with the purpose of faithfully representing certain qualities of the world. Abstract models gain clarity, in part, by isolating particular qualities that limit the information conveyed. Disciplinary trends, methods, and assumptions are derived from a community and tradition interested in answering questions pertaining to distinct models of the world. The discrepancies between disciplinary models have become more pronounced in modern academia due to the need for individuals to hyper-specialize in order to remain competitive in their respective fields. As a result, individual researchers are vulnerable to and often encouraged toward increasing isolation in the type of investigations they can justify for advancing science or other pursuits. Simultaneously, there is also a greater need for cross-disciplinary collaboration because of complex, multi-faceted problems in the world that require solutions drawing from the knowledge base of several disciplines. These two factors—the increased specialization of researchers and the growing need for solutions of complex problems—create a rift in the conceptual continuum. It is the focus of cross-disciplinary studies to investigate this gap and assess the potential bridges that will allow collaborating disciplinarians to approach their project in the most effective manner.

Organizing academic inquiry through disciplinary affiliation has both extrinsic and intrinsic benefits. Extrinsically, disciplines are useful for the organization of academic institutions. Intrinsically, the basis for disciplinary divisions can be identified as a stable set of practices used to investigate certain properties of the world. These practices, or methods of investigation, can be broken down as the techniques, analysis, spatial–temporal scale, and scope used to investigate a specific target of study. ‘Technique’ refers to the set of methods used to collect data within any particular discipline. ‘Analysis’ refers to the methods of interpreting the data that is collected. ‘Spatial – temporal scale’ identifies the size of the phenomenon to be studied as well as the length of time needed to map changes or draw conclusions about a particular phenomenon. ‘Scope’ refers to the intended range of effects induced by artificial catalysts placed within a given system.

Cross-disciplinary work is formulated in a different manner than traditional disciplinary work and usually involves problem-driven rather than research-driven approaches. This provides researchers with the opportunity to craft experimental means of investigation, but also hints at another pronounced character of cross-disciplinary integration. Problems for which researchers from multiple disciplines are assembled to solve require the consideration...
of several viewpoints. That cross-disciplinary problems can be understood in different ways demonstrates the equivocal nature of cross-disciplinary questions. Typically, an equivocal question is a sign of poor design, but in cross-disciplinary situations equivocal questions are better viewed as a function of the dense relationships underlying any potential solution.

Cross-disciplinary integration has distinct and challenging components. One is that of untangling questions that a cross-disciplinary team is assembled to solve, questions that can often be reasonably interpreted in several different ways. A second challenge is the assembly of an investigation methodology that may need to be experimental. The success of a patchwork methodology may depend on careful and deliberate attention paid to the intersection of this non-traditional combination of methods. This paper elaborates an analysis of the technological applications of multimethod approaches in cross-disciplinary research focused on complex problems.

Assessing NanoSoc’s TA-experiment from a perspective of sustainable development

Deblonde, Marian

The research domain of Technology Assessment originated in the seventies in the US Office of Technology Assessment. At that time, TA was expected to forecast the directions and implications of new areas of innovation; it was mainly expert-oriented; and it was considered a source of information to help decision makers to select promising technologies and technology domains and to develop suitable regulation which anticipates new technologies’ possible impacts (Rodemeyer et al. 2005; Sarewitz 2005). More recent versions of TA—such as Real Time Technology Assessment, Constructive Technology Assessment, Interactive Technology Assessment—do not so much focus on providing information, but on designing improved decision making processes; they aim at integrating public concerns and desires in the assessment of new and emerging technologies; they try to consider processes of technology development from the beginning—‘upstream’—rather than at the end—‘end-of-pipe’ (Wilsdon 2005b). They explore, in short, various ways that could contribute to a new, more democratic governance of science and technology.

According to Kearnes et al., the domain of nano-science and –technology—and, by extension, of converging sciences and technologies—is a possible condensation point, i.e. an occasion and opportunity, for debates about different visions of society through the medium of particular manifestations of the technology itself (Kearnes et al. 2006). The Flemish research project Nanotechnologies for tomorrow’s society – NanoSoc (www.nanosoc.be) is a social-scientific research experiment which took more recent TA versions as its source of inspiration. In the proposed paper, we will explore to what extent the TA approaches and methods used until now in NanoSoc stimulate debates about different visions of society and contribute to a responsible management of technological innovations. We call management of technological innovations responsible if it contributes to sustainable development and, hence, if it succeeds in dealing adequately with two types of uncertainties: a) the uncertain—changing, contextual—meaning of sustainable development, and b) the uncertain impacts of embedding new technologies in particular ways into particular societal contexts. Our actual hypotheses are a) that, since actual TA methodologies take (visions on) new and emerging technologies as their initial frame of reference, the variety of visions of society that receive due attention in public debates is reduced from the very beginning, and b) that this reduction reduces opportunities for a responsible management of technological innovations: various visions on technological opportunities contribute to the selection of particular interpretations of sustainable development rather than that various interpretations of sustainable development contribute to a selection of particular technological innovations. We will, consequently, start exploring whether complementary TA approaches and methods are conceivable and feasible that can bring us one step closer to a responsible management
of techno-scientific innovations. These complementary approaches or methods should take a particular, albeit abstract interpretation of sustainable development as its starting point: sustainable development a) as a collective guiding idea, i.e. a guiding idea that applies to a society as a whole, and b) that allows actual generations to live themselves in decent ways in societies they deem attractive and so that they will be able to leave these societies to their heirs so that future generations will have no less opportunities to live their own decent lives in the kinds of societies they consider attractive, and so on. Questions to be answered in the course of a more responsible TA-process should then be:

1. What societies do we deem attractive enough to live our own lives in a decent way and to hand them over to our heirs?
2. What actual circumstances should we grapple with—in order of importance—in order to realize such attractive societies?
3. Do we have good reasons to take refuge with particular (existing, new or emergent) technologies in order to deal with these problematic circumstances?
4. What are possible advantages and disadvantages of embedding these candidate technologies in our society? Does the balance of advantages and disadvantages justify their embedding, given the good reasons for taking refuge with them? What is the most promising range of technologies to embed given the various dimensions of the problematic circumstances?
5. Can advantages and disadvantages of (the range of) candidate technologies be distributed in fair ways? What actions and initiatives should be taken to guarantee such a fair distribution?

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The Role of Ubiquity and Intransparency for Technology

Fritzsche, Albrecht

1. Ubiquity and Intransparency

Many concerns issued in the discussion on converging technologies are related to the ubiquity and intransparency of technical applications (see [1], [2]). Although the authors participating in the discussion express quite different thoughts in detail, the basic arguments look rather similar. Roughly said, the idea is that technology has penetrated human life so deeply that it has now reached a state of permanent presence in everything we do. At the same time the single technical applications have become so small, efficient and interconnected that we are not able to recognize them any more. Such a combination of ubiquity and intransparency, it is said, leads to a new kind of autonomous, secret technology.
Such conclusions, however, should be drawn very carefully. Considering technology as a general aspect of human life – as it lately was suggested e.g. by Pitt ([3]) or Koen ([4]) – the ubiquity of technology is to some respect a given, which leads to a completely different meaning of the argument. At the same time, one might still assume a state of intransparency in modern technology, but it has to be reconstructed in a different way.

2. Technology as Determinacy

This paper approaches technology by the notion of determinacy ([5], pp112). For the use of a tool or machine, the assumption of its determinate operation is an essential preliminary. The concept of technology depends on the expectation that technical artefacts do what they are supposed to do. Their determinacy enables us to reflect on them, plan their application and establish our authority over them. In fact, determinacy as we find it in technology seems to be not just one, but the only way how we can reflect, plan and respond to our own actions ([6], pp230). One might therefore say that technology in general is, as Hegel would put it, the external institution to execute our action that is necessary for our consciousness to think about what we do. Or, in other words: every time we refer to a determinate structure in our thinking, we can already call that technology. Thus it is also possible to say that technology is the way how we approach the word ([4], pp5, see also [7]), and that in technology we learn from experience ([5], pp16).

3. Incompleteness

With such a general notion, all determinate social and intellectual structures, science, law, economy etc. can be called technology inasmuch as we refer to them in our being in the world. Technology is essential to our existence. It is part of being human. Such a general notion of technology has a very important implication: When technology is understood as a mode of reflection, its determinacy acquires a conceptual quality. Whether something is determinate becomes a matter of how we treat it. Technical determinacy is not a given, but the result of a process. For many tools and machines, this process becomes visible in the efforts of applying norms, writing handbooks or setting up routines etc that are necessary before we can use them. Obviously, such determinacy is incomplete. It is limited to the extent of our efforts to establish it ([5], pp54).

4. Technology as the Problem of Technology

Comparing how technical determinacy was established in previous centuries and today shows two distinctions. On the one hand, it has become much easier today, because we can refer to a larger set of already existing technology. On the other hand, previous centuries did not have to bother a lot with the resources put into these efforts. Where technical structures were created singularly, it was easy to adapt their environment in order to establish determinacy. Converging technologies have changed that situation. Since the environment already is technically determined, it cannot easily be adapted any more. New technologies of energy production, transport, but also new social theories, taxation systems or calculation techniques fail not because they were less efficient or less effective that the present ones, but because they do not fit to the current technology. The problem is therefore not that technology penetrates human life, but that it is about to stop being able to do so. In a similar way, one could say that technology in previous centuries has been much less transparent than today, because the extent to which determinacy was established in tools and machines was much lower. Nowadays, determinacy has reached a level where we actually have to abandon it to reach further progress, e.g. with heuristic approaches, fuzzy techniques or simulations replacing analytic calculation. So, for the first time, there seems to be a serious obstacle for technical progress: technical progress itself.
Nanosystems as Hybrid Nanobiomachines – the problems of the interdisciplinary descriptions in the nanotechnoscience

Gorokhov, Vitaly

Nanotechnology is at the same time a field of scientific knowledge and a sphere of engineering activity, in other words – NanoTechnoScience – similar with Systems Engineering as the analysis and design of large-scale, complex, man/machine systems but micro- and nanosystems. Nano systems engineering is the aggregate of methods of the modeling and design of the different artifacts (fabrication of nanomaterials, assembling technology for construction of comprehensive micro and nano systems, micro processing technology for realizing micromachines etc.). Nano systems engineering as well as Macro systems engineering includes not only systems design but also complex research. Design orientation has influence on the change of the priorities in the complex research and of the relation to the knowledge not only to “the knowledge about something”, but also to the knowledge as the means of activity: from the beginning control and restructuring of matter at the nanoscale is a necessary element of nanoscience.

In the nano systems engineering are produced also an artificial systems for example to transport anything in the natural environment. This is already hybrid nanomachine which can not describe from the mechanical or electronic point of views and also as cybernetic “machine”. These models can not adequate describe living organisms as open systems. The model of open system is applicable to living phenomena such as those of metabolism, growth, metabolic aspects of excitation, etc. The standard definition of nanomachine – a mechanical or electromechanical device whose dimensions are measured in nanometers – more correspond with the notion of machine as mechanical mechanism. But nanotechnological objects are mostly hybrids of nature and art. There are nanotechnological systems (hybrid nanomachines) in which objects of biotic origin are used. Nanomachine can be also a symbiosis of the natural bio self-replicating object and artificial device.8

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The cybernetic model as flow diagram of the transforming inputs into outputs was transferred on the people as parts or human elements of systems (with the sense organ, the brain, and the output transducer) and on the biosystem at all. Flowing through systems (flow systems) are streams of some “working fluid” (which may be matter, energy, or information). This transference has as a consequence the description of the properties of the engineering systems similar with living organisms:

(1) living systems are self-regulating systems and systems with adaptation, that correspond with the phenomenon of homeostasis in the complex technological systems;
(2) self-organization is the major characteristics of complex technological systems and living organisms as well – systems evolve out of lower order to higher order or level of complexity;
(3) design of artificial systems (learning automaton) that are capable of evolving and learning as living organisms;
(4) modeling of the behaviour of the living systems became a basis for the development of the prototypes of the new technological systems, for example in bionic or as biomimetism.

But this model cannot adequate describe living organisms as open systems.

Nanoscientists try to understand and to use the principles of the natural processes. For example two research groups using physical and biochemical approaches investigate the electromechanical coupling of the biological nanomotor $F_0F_1$-ATP synthase. Scientist of the first group to understand and utilize the principles behind those natural processes from the physical point of view “have to deconstruct this biological double-motor $F_0F_1$-ATP synthase, study the function of the individual parts, and learn, what is essential and how to resemble the parts into a functional nanomachine”. Than they designed a mutation of the biological motors as an artificial system. Scientists from the second research group investigated this natural system from a structural biology point of view. The problem for such interdisciplinary research is the organization of the effective conceptual dialog between the different disciplinary researchers groups with the intention to receive the definite engineering results. «The joint collaboration the two research groups using physical and biochemical approaches was supported by a continuous exchange of knowledge through a series of meetings and talks ...»

To receive the general description of the hybrid nanobiomachine, which is compatible at the same time with the engineering-physical and structural biology points of view, we need a philosophical reflexion and systems ontology. “The methodology that the interdisciplinary team adopts solves the jargon problem, not by changing the jargon of every individual discipline because that is impossible and perhaps even undesirable, but by introducing a methodology that includes a common language for communicating ideas about systems and systems phenomena.”

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Once again on the debate on Nanotechnology vs. Patents. What really should be done?

Grauer, Asaf

Nanotech patents have long been debated, but by the time being very little consensus has been reached on if they should be allowed or not. Decision-making is coming these days mostly from unconnected and disperse court decisions and patent-granting bodies, which decide on a case-by-case basis the validity of applications, rather than from a comprehensive regulatory body or school of thought addressing what really should be done about them with regard to their ethical and societal implications.

Patents, unlike the remaining bodies of law we ordinarily know (contract, inheritance, etc.) can certainly be regarded as a macroeconomical policy-making tool, rather than a simple instrument seeking to regulate private relationships (such as contract, inheritance law and the other bodies of law primarily do).

Indeed, this macroeconomical power is something absolutely unique for patent laws: any variation in the patent-allowed-item list will give you a completely new scenario in terms of private and public investors' willingness to put their money in certain projects or withdraw from others.

Nonetheless, a patent has also serious ethical tradeoffs during the (normally) 10-year period in which stays in vigour: competition is surpressed and scientific advance diminish in the areas covered by the application. When it comes to emerging technologies the two sides of the coin must be taken in account to reach the right balance. We support that using the economical logic embedded in the patent laws themselves is the best way to reach that balance.

Do we need a specific kind of Technoscience Assessment? Taking the convergence of science and technology seriously

Kastenhofer, Karen & Torgersen, Helge

The label 'converging technologies' points not only at the convergence of various technologies (esp. the NBIC-technologies: nanotechnology, biotechnology, information technology and cognitive sciences). It can also be interpreted as an indication of the convergence between the scientific and the technological realm within a new technoscience regime (cf. Nordmann 2004). From this point of view, the (propagated) convergence of NBIC-technologies is based upon the preceding existence of a joint technoscience approach (cf. Kastenhofer 2007). It is the emergence of this joint technoscience approach, accompanied by a parallel diminishing of disciplinary boundaries and science / technology demarcations that allows for the propagated convergence at the first place. If this assumption proves true, namely that the convergence between specific technosciences builds upon (and amplifies) the convergence within a joint technoscience regime, a third kind of convergence can be discussed: a convergence of the ways and processes in which emerging technosciences are assessed, problematised and governed in society. This convergence would apply to informal and formal technology assessment and would be based upon the similar characteristics exhibited by all technosciences. It could be complemented by an assessment of the implications of the technoscientific and technological convergence itself.

The presented paper aims at discussing such an approach. It formulates the assumption that a more general change in scientific cultures lies at the heart of the propagated technological convergence. Furthermore, it aims at specifying notable characteristics of the
new technosciences and asks whether a new kind of technoscience assessment could (or does already) effectively complement more traditional forms of technology assessment. As exemplary cases, agrobiotechnology, medical biotechnology and systems biology are introduced. The former two of these technoscience fields are heavily discussed in the public sphere and a more rigorous regulatory system is demanded by various stakeholders. Specific ways of problematisation or issue framing, such as risk hypotheses or ethical concerns, emerged and stabilised during the past decades. These issue framings are likely to be taken up in debates relating to further technoscience developments like synthetic biology or nanotechnology (cf. Kastenhofer 2009).

But it is not only the resulting technological applications that are addressed in debates about possible risks, uncertainties and ethical issues; it is also the very research process, its practices and objects. Hence, a new kind of ‘science assessment’, adding to traditional practices of technology assessment has already been called for in the past (cf. Gill 1994). However attractive such an extended approach seems at first glance, it is significantly handicapped by the complexity of the organisational structures, processes and practices of the technosciences under scrutiny. Various disciplines, different kinds of knowledge(s) and forms of knowing, epistemic practices as well as technological innovation, private and public actors are integrated in distinct processes and networks of agency. If public deliberation and expert assessment concerning the so characterised technosciences is meant to move upstream and to address technological products and applications as well technoscientific research and development, a deepened understanding of the characteristics technoscience itself seems to be of paramount importance.

To contribute to such an understanding, the presentation draws upon existing models and conceptualisations of scientific knowledge generation, esp. on the model of science as practice and culture (Pickering 1992), the concept of epistemic cultures (Knorr-Cetina 1999), of experimental cultures (Rheinberger 1997, 2006) and of technoscience (Haraway 1997, Nordmann 2004, Weber 2006). It refers to analyses of epistemic processes within current biotechnology with a focus on the role of ‘non-knowledge’ (Böschen et al. 2006, Kastenhofer 2007) and within systems biology with a focus on the role of multi-disciplinary cooperation (Torgersen 2009). The presentation does not aim at giving definite answers to this complex issue. It is rather meant to stimulate a debate on the possibility to define common characteristics of present day technoscience in more general terms and to discuss technology assessment approaches which can address current and future technoscience fields.

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Converging Applications for the Ageing Societies

Malanowski, Norbert

Expectations: Many experts believe that technology convergence will lead to groundbreaking innovation in science, business and society in the 21st century. The prospect for large potential has generated a high level of expectation, particularly on the side of the researchers and industries likely to exploit these. Tangible products, however, are still in their early stages, since Converging Applications (CA) are less developed as compared, for example, with more ‘traditional’ biotechnology applications and products. For any possible strategy it is necessary to take into account the long-term nature of CA, the long-term time schedule for socio-economic returns and the risk for pushing a short-term hype.

Economic Potential: The innovative potential of Converging Applications can be leveraged when technological possibilities can be matched with real user needs. To analyze these ‘matching patterns’ the availability of adequate platforms of cooperation between science, industry and other relevant stakeholders is necessary. This would allow the identification of ‘show stoppers’ (in the sense of innovation obstacles and dangers) at an early stage. Such platforms could be based on round-table discussions between all relevant stakeholders (including also representatives of NGOs). A differentiated monitoring of the economic potential may point out trends and possibilities, which may facilitate investment and (public) funding decisions.

Sectorial Considerations (the Case of Health Care): In times of an ageing population in most European countries new diagnostic and therapy procedures offer various opportunities for patients as well as for the health care systems in general. The various uses of the potentials in medicine could be stimulated by an analysis of the broad spectrum of medical applicability and the preventive medicine.

Technology Acceptance: One option to sensitize the acceptance of CA in the ageing European societies is to highlight the potential for future applications by referring to existing products, such as pacemaker or hearing aids. For this, scenario building exercises might be very helpful. From short, medium or long-term societal scenarios we could learn more about societal and individual requirements and reservations concerning Converging Applications. It might also be interesting to think about how to integrate the perspective of intergenerational justice between young and old people, rich and poor people and non-disabled and disabled people in an analysis. The relevant stakeholders, like science, business, politics and NGO follow different logics when acting. Therefore, societal scenarios could also contribute to a common language, clear parameters for the scientific community and a better understanding of the real needs of users and the product world. Furthermore, it might be asked, how successful dialogue processes between experts and citizens can be organized. The effects of Converging Applications on special policy areas and their specific structures (e.g. economic policy, health policy, social policy and housing policy) are unexplored.
It is worthwhile to get more information about the possible intervention of Converging Applications in special policy areas. Converging Applications could be, for instance, one very interesting model to tackle the challenges of the ageing societies in Europe.

The Rhetoric of Converging Technologies

Schummer, Joachim

The science policy concept of the convergence of sciences and technologies did not start with Roco and Bainbridge’s conference proceedings on Converging Technologies for Improving Human Performance (NBIC-proceeding 2002),¹ which was, by the way, not an official governmental report. It was already part of the original concept of nanotechnology in the official US National Nanotechnology Initiative (NNI) as nano-convergence, i.e. the convergence of chemistry, physics, materials science, biology, and some engineering towards “nano”. In addition, even before the founding of the NNI, the broader notion of NBIC-convergence was discussed in the US as an alternative to nano-convergence in 1999.

In this paper I analyze the rhetoric of talking about convergence, first in nano-convergence and then in NBIC-convergence in various American reports.² I argue that the talk of convergence has always switched between different modalities, between convergence is, must, or can be – between convergence-as-fact, convergence-as-higher-necessity, and convergence-as-opportunity. Since convergence-as-fact is plainly wrong by all empirical indicators and since convergence-as-opportunity is badly elaborated on with regard to alternatives, I conclude that the main content of the convergence talk is the desperate science policy message that convergence should happen. More philosophically, I argue that convergence of technologies is, with one exception that arguably does not apply here, a teleological concept that sets science policy goals and agendas in the disguise of putative fact stating. As such it is a most unwelcome science policy concept that undermines any idea of deliberative democracy, because it introduces goals without explicitly stating them and thus with hiding them from public deliberation.

I conclude with a list of new challenges to the philosophy, history, and sociology of science and technology. First, we need more philosophical analyses of science policy concepts and reports in order to point out normative assumptions in the disguise of predictions of the technological future. Second, we need empirical scrutiny of science policy claims about current and recent technological developments, such as claims of converging technologies, by historical and, ideally, scientometric approaches. Third, rather than investigating technologies and their possible consequences, the critical assessment of technological visions and science policy agendas are in need, both with regard to social and ethical acceptability. This indicates a major shift in engineering ethics from investigating technologies and their possible consequences to investigating science policy agendas and their (implicitly) intended consequences. Forth, we need a better sociological understanding of the role and dynamics of technological visions in society, how they originate in one group and interact with other groups to become official science policy agendas.

References


Dialogues from the Lab: Contemporary Maieutics for Socio-Technical Inquiry

Calleja López, Antonio & Fisher, Erik

This paper proposes some conceptual and methodological connections between elements of Socratic style of inquiry and our own endeavors to conduct and investigate collaborations between human and natural scientists in the laboratory.

The Socratic style of inquiry runs through Western history as one of the central calls for examination into the self. With Socrates, kosmos became the background of a new central stage for philosophy and investigation: the polis. For him, the achievement of (self-)knowledge was both a political and an intellectual exercise. The way to know oneself as well as truth itself, arises out of interaction with the other. Two conspicuous examples of Socratic dialogical strategies are maieutics and elenchus. We draw from these and other features of Socratic inquiry (primarily the profession of ignorance, irony, and dialogical inquiry) in order to frame our investigations and narratives on contemporary dialogical practices in the laboratory. Specifically, we explore the value of examining the social, ethical, and political nature and implications of scientific research practices as an integral part of those practices. Thus, while we do not emulate all aspects of Socratic inquiry and may depart significantly from what some might regard as some of its key tenets, we suggest there is both practical and conceptual value in seeing certain aspects of contemporary forms of socio-technical integration as Socratic.

Recent developments in science policy mark a shift from previous roles of the social sciences and humanities vis-a-vis scientific work to more interactive and collaborative modes of “socio-technical integration” (Fisher et al. 2006). Evidence for this shift is seen in policy mandates in the US and EU. These mandates have ostensibly opened a greater practical role for the insights of science studies scholars, who are developing more integrative modes of technology assessment that entail collaborations aimed at reflexive social shaping of emerging science and technology (Barben et al. 2008, Bennett & Rabinow 2007, Van der Burg 2009). What are the overlaps between these modern socio-material practices and Socratic engagement? Can the accounts we have of Socratic practices inform these undertakings?

The STIR (Socio Technical Integration Research) project (http://cns.asu.edu/stir/) coordinates a series of twenty international, comparative “laboratory engagement studies” (Fisher 2007) and employs an approach to collaborative practices that resembles dialogical inquiry. The approach, termed midstream modulation (Fisher et al. 2006), is an attempt to address what is known as Collingridge dilemma (Collingridge, 1981). This approach hypothesizes that in situ reflection on material practices can enhance the capacity of researchers to modestly ameliorate those practices, both immediately and over time. The project attempts to map the possibilities and utilities of articulating societal and ethical vectors in the R&D stages of innovation processes. Situated between upstream (research policy) and downstream (regulation) stages, the midstream or R&D stage represents an opportunity to incrementally expand choices and clarify expectations, since technologies remain flexible, but are already somewhat concrete and defined. We present integrative activities involving social and natural scientists—as well as an interactive protocol that functions as a “maieutic device”—as mechanisms for midstream modulation.

In the process of explicating what we mean by contemporary maieutics in the context of socio-technical collaborations, we will also consider a collection of topics pertinent to both
the philosophy and politics of science and technology. We remain agnostic regarding the ancient search for truth, as well as cautious about psychoanalytic analogies, taking inspiration from a Socratic model of dialogic reflexivity. Our notion of contemporary maieutics seeks also to avoid approaches to laboratory practices centered in description as well as direct normative intervention, both of which may be appropriate in other contexts. We suggest that an internal approach to critique—through the Socratic process of asking questions—may help to articulate (unearthing and redirecting) and potentially increase the variety of social and technical factors present in R&D practices.

References


Human Values at the Intersection of Technoscience and Democracy

Crombie, James

What are the points of convergence and symbiosis – or alternatively the points of tension and incompatibility – between technoscience, on the one hand, and democratic and human values, on the other? In one strand of reflexion, technological progress and the advance of scientific knowledge are represented as essential factors in the increasing liberation of the human spirit and the increasing realization of human potential. This is the optimistic reading of the Baconian aphorism according to which knowledge is power. Another tradition reads the same aphorism in a darker light and sees science and technology as hostile to the spontaneous creativity of the human spirit and conducive to the rise of a technocratic tyranny, reminiscent of Lewis Mumford's "megamachine." As Gilbert Simondon puts it: "It is difficult to liberate oneself by transferring slavery onto other beings, be they men, animals or machines; to reign over a people of machines enslaving the whole world is still to reign [...]".

One particular point on which technocratic rationality seems to come into conflict with basic democratic values is in the area of popular sovereignty and social policy. What is the place and the use of expert advice and testimony? "The [sovereign] people," as Isabelle Stengers puts it, in her characterization of the view she is about to question, "must listen to the experts, agree to be realistic, which is to say grown-up and rational, and then decide, in all lucidity [en conscience]." Should the possession, use and traffic of certain substances be ruled to be a criminal offence? Should a given project to dam a river to regulate flow and produce energy be given the go-ahead? Should the use of fossil fuels be drastically curtailed in order to stave off apprehended catastrophic climatic change? What is the weight and what is the authority of scientific and technological expertise in decisions such as these?
The spectacle of a democratically elected president who expressed disbelief in the efficacy of antiretroviral drugs in slowing the development of the disease known as AIDS – because he didn’t believe that the virus identified as HIV was the cause of that disease – is a grotesque example of democratic sovereignty gone awry to the detriment of the overall welfare of a population. In an ideal view of historical progress, we may go so far as to wonder whether ignorant politicians and gullible electorates should not turn over such important decisions to those who have a more objective view of things! Can technocratic reason replace the democratic process? Should it?

Isabelle Stengers does not think so. The present paper includes a critical examination of Stengers’ account of what makes scientific answers to scientific and technological questions "reliable." This because of the special nature of the "laboratory-entities" in terms which the questions are asked. On Stengers’ view, "the fact that [these special objects] answer the questions which are asked of them in such a reliable way [should] not become the general model [of "submission"] around which all power coalesces." Answers to questions about laboratory-entities can have varying degrees of relevance to factors of social and human concern while, on the other hand, factors of social and human concern can feed back into our choice of the laboratory-entities we ask questions about. This is not relativism. Social acception of pasteurization and antibiotics is not an arbitrary whim. But Stengers also rejects technocratic scientism, arguing that we can legitimately ask whether and how engineers can be forced, by social movements, to "see" certain dangers which they otherwise might have been unwilling to recognize – as western nuclear engineers have, on Stengers’ view, contrary to those of the former Eastern Block?4

Stengers’ view, confirmed by Simondon’s, is that modern techno-scientific rationality arose in opposition to structures of authority and legitimation which were dominant at the beginning of the modern era.5 The situation has perhaps changed, now that the main institutions of techno-scientific rationality have become the allies of the dominant power structures and the categories of thought associated with them – subject, as in Galileo’s day, to being questioned.

Notes

5. As Stengers puts it, modern science and technology began as a "puissance de contestation et de transformation des rapports d’autorité" (Ibid., p. 89)

Nanomedical Technology Assessment: Some Methodological Suggestions on Its Ethical Dimension

de Cózar-Escalante, José M

“Nanomedicine” broadly refers to the application of nanotechnology in the health sector. As such, it is an umbrella term encompassing any nanotechnological development related to the diagnosis and treatment of illness. Ongoing nanomedical programmes, together with the expectations of future possibilities, give rise to multiple and heterogeneous ethical and social issues. Nanomedical research and innovation raises as many hopes as unknowns (EGE 2007). Under these circumstances, medical researchers, scholars, healthcare professionals, insurance company managers, industry experts, health authorities and concerned groups
Among others, patients associations (e.g., Keulartz et al. 2003) are seeking the appropriate way of dealing with such issues.

Standard (bio)medical ethics too often depends on applying a pre-established, narrow, set of principles to complex ethical situations. It does not take into account to a sufficient degree the ways in which technological development (new artefacts and systems) sometimes raises new, unexpected ethical problems as innovations increase the agency of human and non-human agents. Complex ethical questions are linked to the process by which technological innovations cause the emergence of new entities, new medical practices and even new social interactions around the medical solution generated. This thesis is inspired by a pragmatist philosophy, see e.g., Keulartz et al. 2003.

Put in other words, the "moral significance" of technology has to be assigned to each technological system, that is, the network of technological, natural and human actors that, together, configure what we call a medical resource, innovation or solution. In order to better comprehend the new ethical dilemmas and to look for realistic recommendations to deal with them this is the level of analysis on which we should mainly work. That is the reason why reflection on the ethical and social aspects of nanomedical innovations would benefit from the different strands of the Technology Assessment (TA) literature.

- The TA framework, as a whole, permits us to place ethical and social aspects in a more comprehensive process that goes from problem identification and framing to dissemination and monitoring. This process connects ethical questions, defined in a narrow sense, with broader and related questions: economic impact, regulation, communication and patient needs.

- In addition, it favours the application of a "genealogical" methodology, inspired, among others, by Michel Foucault's work. Today, this methodological approach can be carried out by analyzing the script/technical code of a representative set of nanoinnovations (Actor Network Theory; A. Feenberg's philosophy of technology and Social Studies of Technology in general).

- Finally, it is a useful means to carry out the indispensable "social/participatory experimentation" on nanomedicine.

There are at least two TA trends that converge on the field of nanomed technologies:

- Constructive (Participatory, Ethical, etc.) TA
- Health TA

Despite significant differences between them, they are compatible insofar as all of them agree on the necessity or usefulness of improving standard TA including more sensibility to ethical issues, and a broader social participation (Palm & Hansson 2005; Rip 2007; Schot 2001; Ten Have 2004).

It is clarifying to map the integration of ethical and social concerns in nanomed TA in accordance with the key components/steps of a Health TA. (Lehoux & Williams-Jones 2007) For example, established ethical principles such as autonomy and beneficence take part only in the doctor-patient relationship, whereas broader societal issues—such as fair access to health care—would appear at other levels of the TA process.

The fair distribution of agency among actors is a general ethical criterion to apply during the TA. For instance, nanomedicine promises "individualized" or "personalized" diagnostic tools and treatments that will dramatically improve their effectiveness. At first glance, this appears to be a socially desirable goal, not only because nanotechnological devices would improve human health and quality of life, but also because they would increase personal independence and freedom by giving patients the ability to diagnosis and treat themselves. But a closer inspection reveals important ethical conflicts surrounding these potential
medical and social practices. Firstly, “smart nanodevices” would operate without human (especially patient) supervision. Therefore, the agency of non-human actors could be increased at the expense of human agency and will to choose (Schummer 2007). Secondly, even if the problem of controlling such invisible and smart devices could be mitigated, the question remains of who is going to benefit from them. Emphasizing an individualized approach to disease may jeopardize the very concept of (general) diseases. Moreover, despite the hope of cheaper and faster diagnostic tools, this focus may eventually detract from investment in medicines and treatments that are usually distributed in great quantities, thus worsening the situation of many people in poor countries or citizens of rich countries who simply will not have access to individualized treatment (Callon & Rabeharisoa 2008; Invernizzi & Foladori 2006).

References


Technologies as disclosing moral worlds; Shifting the ethical focus from risks and side effects to ethical learning processes

Driessen, Clemens & Korthals, Michiel

The ethical assumptions of ingrained societal practices often go unquestioned, as ethical concerns not easily arrive on the political agenda. New technological possibilities – offering a moment of system choice and investment in new systems – can open up everyday practices to critical scrutiny. As opposed to a view of technological development being merely the site of a displaced and unreflective politics, new technologies can also be found to offer opportunities to rethink our political agendas and moral responsibilities. The proposal and construction of technological designs, even before they are brought to use, operates in various publics to re-describe a situation and provide new terms in which to understand our moral concerns. To illustrate and elaborate this view on technological designs as disclosing moral landscapes and setting the stage for moral learning and debate, we will describe three concrete examples related to livestock agriculture.

Designs for large scale ‘pig towers’, or ‘agro-production parks’, have been hotly debated in the Netherlands starting a decade ago when they were first proposed. On one hand the design of an organic high-rise farm with integrated slaughterhouse offered a high-tech way of closing substance cycles and minimizing energy use. At the same time this ethically optimized industrial ecology created the image of agriculture completely alienated from the land; for many the final destination of a wrong path. The moral outrage after it was first proposed nevertheless heightened the awareness that moral and political issues are at stake in intensive livestock farming, as it functioned as a three dimensional depiction of how current trends could develop. The designs forced stakeholders to take up positions on various issues, and new coalitions emerged as proponents of the design stressed downsides of current practices.

Biofuels were last year’s hype in research, media, policy making, as well as applied ethics. In a matter of months the promise of clean, CO2 neutral and renewable energy to be made from biomass turned into the view of a nightmarish direction of technological development causing global hunger and the elimination of rainforests. Discussions still rage on whether certain types of biofuels are to be considered ‘crimes against humanity’. Interesting here is the large set of criteria that policy makers produced for bio-energy to meet, in order to be sustainable and worthy of promotion: not just CO2 balance, but also issues of social justice and food distribution have gained prominence as qualities of the bio-based economy. But with this also questions have risen why with respect to climate change, social justice and food distribution using grain for meat production is more acceptable than for fuel? The debates generated by the biofuel technologies not only resulted in a public ethical learning process on types of acceptable biofuels, but along the way also produced a renewed moral outlook on the larger energy and even the livestock farming sectors.

Research on in-vitro meat, meat that is to be produced in the laboratory by means of muscular stem cells, has recently - after thorough internal debate - been endorsed by animal rights organization PETA. The envisioned ‘lab steaks’ are to bring an end to the environmental degradation and animal suffering associated with current meat production. How to assess this new product and its possible eventual characteristics is surrounded by uncertainties, nevertheless many display strong negative reactions. Their reluctance or even outrages against ‘soulless’ meat or ‘fake meat’ can be considered to tell as much about the new design as about current livestock production practices and moral assumptions surrounding it. The gut response of revulsion that many initially show, could gradually change in ensuing debates into a fresh look at ‘normal meat’ production, and its risks of hygiene and zoonotic diseases and lack of animal welfare: the research project implicitly stresses that livestock animals are better-off if never born.

These technologies can be understood as disclosing moral worlds. They are to be appraised ethically not just by technology assessment pinning down their risks and
normative characteristics. Rather their development should be imbedded in an ethical
teaching process, in which the concerns that spring up while thinking through new designs
are reflected upon. Then the moral attention in our technological culture is not to be focused
exclusively on technological problems of risks to and side-effects on an otherwise static and
ethically neutral society. Technological projects can then be considered as part of a co-
evolutionary process, in which not only existing ethical positions are to be reflected in new
technologies, but the functioning of these technologies in questioning existing practices can
be high-lighted and promoted.

**Context Mapping and the End of Historical Theories of
Competition**

*Hays, Sean*

Technology’s present place within the western liberal democratic paradigm can be
summarized as a series of if-competition and ending with then equality of opportunity. This circular understanding of competition is predicated on the
significant influence of historical analogy in contemporary political and economic theory.
This is not to say that historically competition has worked this way but, rather, to say that we
perceive it to have done. In the past this has been fruitful as mankind is a creature of habit
and the structure of his past relations with technology has been a reliable predictor of the
ways in which contemporary technological developments will impact the institutions of
society. A commonly cited analogy—and one that has not panned out I will argue—is the
Gutenberg movable type printing press and the Internet. In short, while the Gutenberg press’
introduction of the mass produced political pamphlet did make it a potent force in
destabilizing Europe’s social and political establishment (the monarchies had learned the
importance of information control from the church), it remains to be seen whether the
Internet will have a similar impact. Direct analogy between the two fails to appreciate the
radical change in context that the Gutenberg press itself

Governments are not necessarily trembling because of the democratizing force of the
Internet because they have adapted to a world in which information has been made more
broadly available by the movable type press.

Ultimately, I will argue that what history fails to account for will be far more informative
that what it consciously examines. The points of failure in the historical analogy—a changing
public, scientific establishment, and political order—will provide a far more accurate model
for anticipating the effects of technological change than history alone is capable of.
Empirically, I have used a series of surveys, focus groups, deliberative forums, and a critical
examination of the literature to produce a map of contemporary context that can help to fill
the lacunae deriving from the strict use of historical analogy.

A more richly nuanced analysis than strict historicity—an analysis I am calling context
mapping—will provide a more useful appreciation for the social and institutional impact of
technological change. Rather than assuming that society continues to react to technology as
it always has my theory makes explicit the changes wrought by technology in the social and
political institutions that are themselves responsible for determining the future progress of
technological development (institutions like the academy and participatory democracy). My
logic is just as circular as the established historical paradigm but more nuanced in its
analysis of each stage of action in the extended if—unfettered competition, then better technology, then greater participation, then greater equity, then
equality of opportunity.

I would note that this is not a critique of the work of historians or of historical disciplines.
Rather, this is an acknowledgment of their importance and an attempt to supplement their
work by examining the changes in context history has wrought for deeper and more useful information about the path technology and society are likely to follow.

The Argument Of Emergence – Converging Technologies And Emergent Ethical Concerns

Henschke, Adam

Nano-, Bio-, Info- and Cognitive (NBIC) technologies shape ourselves and our world, not just as a promise for the distant future, but in the present. Much of this promise comes from the convergence of these technologies: NBIC technologies certainly promise much singularly, but it can be said that it is in their potential for convergence that their greatest power lies. Cognitive technology emerging from computer designed nanotech, embedded via gene-specific bio-engineering is one semi-fantastic future scenario that harnesses the unique strengths of the NBIC to produce a whole, far more powerful than the sum of the parts. It would seem to me that the synergistic effects of NBIC technologies, their convergence, produces emergent properties which are a great virtue of these technologies. Yet, with this emergence, there are also ethical concerns, which I call the ‘Argument Of Emergence’.

The Argument Of Emergence is a specific ethical argument that can be applied generally. The basic premises of the argument are that as different, isolated things converge together, new properties emerge from the synergy of parts. Individually, each component part might not be harmful, but put them together, and you have a new type of harm not found in the individual parts. This can happen in a physical sense – consider fertilizer and nitromethane. Singularly, they may be harmful, but together they form a very dangerous explosive. A similar thing can occur when considering the potential consequences of converging technologies; emergent harms can result from convergence in ways relevantly different from previous harms.

The relevance of this to ethics is two-fold: Firstly, that convergence, in this case, technological convergence, can produce new ethical concerns not originally considered in relation to the relevant technologies when they are viewed in isolation from each other. Secondly, that these ethical concerns can be different in kind to previous ethical concerns relating to similar technologies. The practical utility of the Argument Of Emergence is that it articulates ethical concerns that relate to convergent technologies and provides a philosophically strong and legitimate basis for these concerns.

The theoretical utility of the Argument Of Emergence lies not only in its descriptive power (articulates the valid ethical concerns about convergent technologies) and normative force (sound philosophical argumentation) but also that it differentiates between valid/invalid slippery slope arguments and valid emergence arguments. This is important for two reasons: First – The Argument Of Emergence is different from slippery slope arguments, both valid and invalid. Second – Often philosophers and others don’t quite take slippery slope arguments seriously and assume that labelling an argument as a slippery is a knock-down. So, by presenting an argument as an Argument Of Emergence, one shows that the ethical concerns raised may be valid. The Argument Of Emergence achieves this by first displaying the distinction between the argument being presented and a slippery slope argument, and secondly by immediately having a response to challenge of being a slippery slope.

In relation to converging technologies, I propose to show that some ethical concerns raised are relevant concerns, that are different to pre-convergence concerns about the constituent technologies, and that these concerns are not flimsy slippery slope arguments. I will do this through practical application of the Argument Of Emergence.
Webcams to save nature. Technospace as affective and ethical space

Kamphof, Ike

My contribution will focus on the use of webcam’s on the websites of nature conservation foundations. Through webcams these foundations aim to provide viewers with the space to develop “a unique bond” with the animals they watch, to personally “relate to” them, in the hope and expectation that this “lifeline...with the natural world” will translate into active engagement with conservation efforts (1).

As telepresence media webcams fit in with lives that are increasingly spread out over various remote locations. By allowing users to visually be in different locations at the same time, they serve our practical and emotional connections with these places and the objects and beings in them (e.g. home surveillance cams, nannycams and cams in daycares, travelcams, cams as used in online chat).

Speculations, inspired by different brands of phenomenology, have addressed the kind of connection and quality of connectedness stimulated by webcams. Paul Virilio, remotely basing his work on Merleau-Ponty, has argued that webcams partake in the abolishment of geographical space effected by new media, and in a general virtualising of our perception. Webcams and other ‘vision machines’, he contends, will lead to aesthetical and ethical disorientation of human embodied existence and its engagement with the world (2). J. McGregor Wise, shunning Virilio’s technophobia and focussing instead on corporeal and affective assemblages of human beings and technology, suggests webcams can play a role in present day networks of care. They offer new possibilities for what Heidegger has called the Being-with that is part of our Dasein (3).

While the question how media affect our fundamental being-in-the-world is vital, the encompassing scope chosen in these and other evaluations is problematic. Media are not merely technical and phenomenological objects, they are constituted in different practices of use. A more fruitful approach, I argue, is to focus on one such practice, and supplement (and confront) phenomenological analysis with ethnographic research. The use of webcams by conservation foundations is especially interesting here, because an explicit ethical concern forms the basis of it.

In my contribution I investigate two ways in which webcamsites (aim to) foster emotional and ethical connectedness with nature: firstly, by providing an affective space, and secondly, by opening up an ethical space.

Borrowed from the analysis of online-fandom (4), the notion of ‘affective space’ points to how these sites, in and around the webcam, provide an online place where the love of wildlife can be: experienced on demand, articulated, mirrored as integral part of the user’s identity, shared, (re)affirmed, and further developed by various interactive applications such as the cam, the viewing/posting of highlights, educational information and blogs, and, very importantly, forum discussions with co-viewers about what is being seen in the real-time view. The feelings for wildlife are also channelled into actions, ranging from donations and the buying of merchandise to volunteer work and the developing of an ecological lifestyle.

The term ‘ethical space’ is used by Vivian Sobchack in reference to documentary film (5). It marks the site in visual material that makes the viewer feel responsible for what he sees and for his own (attitude in) seeing it as part of his own lifeworld. Sobchack develops this notion for the viewing of death. Where conservation websites tend to focus on scenes of birth and nurturing, the question is how the viewing of life can be ethically ‘charged’. Of special interest here is the implicit assumption on these websites that seeing wildlife immediately awakens feelings of respect and care. Another important aspect is how and to what extent the camview comes to be experienced as real by viewers.

I will analyse how these two forms of space, affective and ethical, work together, but also which tensions arise between them. To what extent is the view imaginary? And to what extent is an experience of the reality of the view and the viewing necessary for ethical action?
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New Initiatives - Old Patterns

Krabbenburg, Lotte

Purpose
Currently there is much talk and ideals are expressed about upstream engagement within national and international policy making and Science and Technology Studies. The thought behind this is that interactions should not be about just saying ‘yes’ or ‘no’ to certain technological possibilities, but that an environment should be created for sharing thoughts, for expressing different values and for influencing technological options.

Within the development of nanotechnology, a lot of these engagement exercises are being organized, such as dialogues between technology promoters and the general public and societal organizations. As first empirical results are showing, these interactions are not sufficiently productive. Not even in their own - be it sometimes vague - terms. To create better interactions in the future, it is necessary to analyze these interactions and formulate requirements for improvement.

Methods
Through interviews, document analysis and by being present as an observer in three organized interactions between technology promoters and societal organisations in The Netherlands, data is gathered about how these interactions are proceeding. Which (groups of) actors are involved, what topics are being discussed and how do the involved actors evaluate these interactions? What seem to be conditions for success and which elements block meaningful dialogue?

Findings
First of all, there are not a lot of ‘best practices’ to build on. Secondly, the outcomes of these dialogues are often bland, meaning predictable and not very specific. Thirdly, it is not always clear what the objectives are and how they are linked up to decision-making. Finally, actors have different expectations of and take different positions towards the questions on when an interaction should take place and on what conditions need to be met. Technology promoters have the opinion that an interaction with societal organizations can only take place during the implementation-phase. If an interaction will take place earlier, it may interfere with their fundamental right to do basic research, or it may be a hindrance in their
application for a patent. Societal organizations on the other hand want to engage with enactors at a moment when decisions still have to be made, at a moment when they still can influence the process. These standpoints lead to the use of certain repertoires (argumentation structures) by groups of actors which shape interactions, and make them less productive when the repertoires remain unreflected. These repertoires are historically transmitted patterns of argumentation which are not necessarily sufficient to speak and think about new and emerging technologies in the 21st century. It reduces the available differences of opinion, values and questions.

Conclusions

Although a lot of ideals are being expressed - mainly by policymakers and social scientists - about upstream engagement, first empirical results are showing that it is not that easy to go upstream. To create better (upstream) interactions between technology promoters and societal organizations, it is necessary to enhance the reflexivity on the use and effects of repertoires and make better use of already existing spaces for interaction.

Improving expectations: An approach to the assessment of expectations’ feasibility and desirability

Lucivero, Federica

Many current attempts of assessing and/or modulating technology development and scientific research in emerging fields (CTA[1], Vision Assessment[2], Midstream Modulation[3]) start from (and are dependent on) the expectations and future scenarios regarding the technology at hand. However, STS extensively shows that visions on emerging technologies are neither facts nor empirical inductions; they are complex social and narrative configurations, which require a critical analysis[4]. My analysis builds on STS explanations of the phenomenon in the innovation dynamics and addresses some methodological questions for a non-speculative[5] ethical assessment of emergent technologies. How can we analyse expectations of emergent nanotechnologies in order to create a more reliable starting ground for Technology Assessment? And how, grounding on this analysis, can we assess the desirability of the emergent technology?

I will frame these questions in the concrete case of Lab-on-a-chip (LOC). LOC offers a remarkable example of emergent nano-technology that introduces expectations about novel horizons in healthcare: it would provide simple and easy to use forms of diagnosis, fast, with a low sample and reagent consumption and high reliability. These microprocessors offer a challenging case for assessment. First, since this point of care device is supposed to strongly affect users’ daily life, an assessment of its desirability and its impact on morality is a central societal demand. Second, in order to avoid speculations on imaginary future scenarios, the assessment of LOC desirability has to be grounded on realistic expectations about this technology development and opportunity. For this reason, the feasibility of high expectations of this emerging device in providing portable, cheap, fast, and reliable DNA sequencing needs to be analysed.

Based on examples from projects in LOC field, I will face these two challenges of assessing expectations’ feasibility and desirability and I will propose a procedure to deal with them. I will first explain why the analysis of expectations’ feasibility has to anticipate and support the analysis of the desirability of the social and moral impact of the technology under examination. In order to do it, examples of failed expectations from the past will be considered.

Then, I will propose a heuristic tool for the assessor who wants to conduct such an analysis and assessment of expectations with respect to their feasibility, first, and desirability then. Such a tool consists in a list of questions that would help the assessor in gathering relevant information for further assessment. I will introduce those questions explaining the
kind of information they gather and how this information can be used to assess the desirability of the expectations at hand.

I conclude claiming that my analysis concerns not only the practical/methodological issue of how to introduce a more critical analysis of expectations in TA, but also the ethical issue of pointing out responsibilities, rights and obligations in the practice of raising scientific expectations (ethics of promising).


Emerging technologies, mid-level moral principles and deontic indeterminacy

Peterson, Martin

It is sometimes difficult to make an ethical appraisal of emerging technologies simply because we lack crucial pieces of information about their possible effects. In this paper we discuss this rather trivial observation in some detail. We defend two claims. First, the mere fact that we lack crucial pieces of information about the possible effects of a technology implies that a moral evaluation will be more uncertain than it would otherwise have been, in a sense that is not merely epistemic. Second, the best way to understand this moral uncertainty triggered by emerging technologies is to introduce the notion of deontic indeterminacy. The aim of the paper is to render these two claims more precise and develop an argument in support of them.

In order to keep thing reasonably simple, we shall discuss emerging technologies in light of mid-level moral principles, rather than from the point of view of some high-level moral theory. Theoretical constructs such as consequentialism, rights-based theories, duty ethics, contractualism, and virtue ethics are all examples of high-level moral theories. High-level theories aim to provide perfectly general answers to what ought to be done, and why, in every possible situation. However, the term ‘mid-level moral principle’ is closely associated with an approach to practical ethical issues articulated by Beauchamp and Childress in Principles of Biomedical Ethics (5th edition, 2001), in which they develop what has become known as principlism or the four-principles approach to bioethics. Somewhat roughly put, a mid-level moral principle expresses a general ethical statement about how to behave in a particular situation; but the principle does not necessarily help us understand by virtue of what an act is right or wrong. Beauchamp and Childress mention four examples of midlevel moral principles:

1. Respect for autonomy
2. Non-maleficence
3. Beneficence (including utility)
4. Justice
Let us grant Beauchamp and Childress the assumption that mid-level principles are important for analysing practical ethical issues. We may assume that even though there is nothing near a received view on which high-level moral theory is correct, the mid-level principles listed above should bear some moral significance in practical ethical issues, either directly or indirectly. A natural question to ask then is what advocates of such mid-level moral principles ought to think about emerging technologies? Or, to be more precise: Under what conditions is it morally permissible to accept an emerging technology (which we know very little about), and under what conditions is this impermissible, given principlism?

Naturally, Beauchamp and Childress did not write much about emerging technologies. However, in the first part of the paper we nevertheless try to apply their methodological framework to the ethics of emerging technologies, in order to explain the link between their theoretical approach and W. D. Ross’s notion of prima facie obligations. We then introduce our main thesis (claim two) according to which the moral status of emerging technologies is sometimes deontically indeterminate in the sense that introducing the technology is neither right nor wrong. We thereafter give more substance to the claim about deontic indeterminacy by distinguishing the degree to which an obligation is valid and its moral strength. Deontic indeterminacy arises whenever one or more obligations are valid just to some limited degree. Based on this idea we also propose a decision rule for decisions taken in light of deontic indeterminacy. Finally, in the last section of the paper, we apply the notion of deontic indeterminacy to an example, viz. the introduction of the automobile about a century ago.

Converging technologies: new challenges for the bioknowledge economy

Pompidou, Alain

The field of knowledge in Biology is enlarging very fast and will not stop considering the needs for food and medical care: this address scientific as well as traditional knowledge. Genetic engineering, better control of animal breeding, human cells and animal cloning, transformation of natural products biological methods and/or artificial processes, as well as the converging technologies bring new challenges for researchers, firms and governments. Freedom of search has to be properly defined by relevant codes of conduct for scientists. All over Europe, the patentability of biological inventions must follow the rules edicted by the Community Institutions and applied by the European Patent Office.

The modalities of use of patented products and that of know how should not block the disclosure of origin neither the technology transfer further balanced in terms of financial assets. Regulatory policies can only be elaborated by States in the frame of WIPO and WTO negotiations taking into account the TRIPS agreements. Nevertheless falls expectation as well as non documented moratorium outerpass any rational approach. Economy applied to bioknowledge monetisation could represent a factor of major progress in order to improve under nutrition and fight against major diseases. Myth should be challenged by a rational approach based on the proper balance between risks and benefits. Reality presents two different components:

- What can be achieved in terms of marketable products avoiding any side effect whatever material or ethical?
- What is already achieved without taking care of life protection and human rights recognition?
- The new bioknowledge economy raises many questions about:
- the use of natural biological resources
- their technical transformation
- the monopolies related to patent rights and the proper technological transfers
- the recognition of traditional knowledge
- the regulation of exploitation based on market rules.
- A comprehensive and properly balanced policy needs to be addressed and shared by all stakeholders for the socio-economical benefit of the different populations and countries all over our planet.

**Techno-moral change: an analytical approach**

Swierstra, Tsjalling

When new and emerging sciences and technologies [NEST] get introduced to the larger public, the accompanying rhetoric often betrays an interesting asymmetry. While the scientific and technological change is usually welcomed and highlighted, there is rarely any mention of moral changes that might accompany this NEST. It is this asymmetry that generates the impression of an instrumental technology that will help us to realize established values. Techno-moral change, however, is a real possibility, as part of a broader co-evolution of technology and culture (Du Gay et al., 1997) and society (Rip and Kemp 1998). I argue that this type of change should be acknowledged rather than denied, because only then can we start to reflexively guide it (Swierstra et al 2009).

In my paper I will develop an approach to identify and analyse instances of techno-moral change.

First I argue that the multi-level approach (Rip and Kemp 1998) to socio-technical coevolution can be fruitfully adapted to understand moral change: there is a macro level of general principles and values, a meso level of norms and values guiding specific practices, and a micro level of decisions about particular moral questions. I claim that on all three levels change occurs, but with typically different speeds.

Second I discuss two basic attitudes towards moral change: the Platonist who accepts change under the condition that it leads us to moral truth and stability, and a contextualist-pragmatist approach that accepts moral change as a given. Protagonists of both sides, though, tend to a certain moral conservatism, and I will give arguments why it seems justifiable that the burden of proof is on those who advocate moral change.

Third: to theorize moral change it is essential to not focus on isolated norms or values, but on moral constellations: shifts usually take the form of shifts in the relative weight of norms and values. These shifts are not only detectable on the surface level of norms and values that guide our behaviour, but also on the underlying level of ethical justifications in terms of consequences, principles, justice and/or the good life.

On the basis of this conceptualization of moral change, we can turn to the study of the dynamic interaction between technological and moral change. The basic model underlying this study is derived from Dewey’s pragmatism: NEST sometimes disturbs moral routines on all three levels (although in significant different degrees), thus provoking the occasion and need for ethical deliberation/controversy. (Keulartz et al 2004) Technology does this along two avenues: by changing practical constraints and affordances and by changing perceptions of the (moral) world. (Verbeek 2005). I will illustrate my approach with several examples of techno-moral change.
Agrifood Nanotechnology: Is This Anything New?

Thompson, Paul B.

When does a new technology pose novel philosophical questions? The social and ethical implications of technology that exploit nanoscale properties of materials have been the focus of extraordinary attention. Some have questioned whether this attention is warranted by truly new aspects of nanotechnology, and have suggested that the elevated level of research on social and ethical issues is itself a function of “hype” and the unprecedented amounts of research funding that have become available. This paper focuses on one sector in which nanotechnology is being applied: agricultural and food technology (henceforth ‘agrifood’). The agrifood sector provides an interesting case study because there have already been several reports by civil society organizations that highlight agrifood applications in calling for regulation, moratoria and public opposition to nanotechnology.

Finally, the reports connect novel risks to traditional problems by exploiting ambiguities either in the definition of nanotechnology or the scope of agrifood. Risks are associated with nanotechnologies (such as nanoparticles) that in fact have no specific agrifood application, though they may have uses in other consumer products such as cosmetics and may be used in equipment (such as tires) utilized in farming. As such, it is not unreasonable to interpret these reports as utilizing uncertainties associated with nanotechnology as a general phenomenon to mobilize public opposition to further industrialization of the agrifood sector, despite credible evidence that the applications of nanotechnology specific to the sector are among those least subject to these uncertainties.

However, this reasonable conclusion depends upon the following assumption: Risks associated with novel materials such as carbon nanotubes or natural materials that do not typically occur at nano scales can reasonably inferred to be distinct from risks associated with well known materials that are only newly described as having reactivity at the nanoscale. While there are clearly some nanotechnologies that will require new approaches to risk assessment and risk management, there are other technological applications that

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would be more appropriately characterized as extensions of conventional engineering and chemistry. The rationale for this claim in the agrifood sector is that encapsulation, nozzles, filters and barrier technologies each represent approaches that have applications pre-dating the emergence of nanotechnology as a distinct type, and involve functions that do not rely on exploitation of nanoscale properties.

While plausible, the rationale ultimately supports the assumption with pragmatic considerations and broad analogies that may not prove convincing to skeptics. For example, qualitative and conceptual arguments can be given for light regulatory burdens because nanotechnologies arguably lower risks associated with existing technologies. Use of nozzles that apply nanosprays of known toxic chemicals dramatically reduce the total chemical burden, but one cannot be certain that reducing dose also reduces exposure in the absence of detailed studies on the effects of these chemicals when applied at the nanoscale. Nanoencapsulation of agricultural chemicals or food ingredients in putatively inert substances can similarly reduce total burden, but one cannot be certain that encapsulation materials themselves are free of risk in the absence of studies. What is more, although increasingly detailed scientific and epistemic analyses of can generate evidence on risk, basic philosophical skepticism creates burdens of proof that cannot be met by any practically achievable study.

In conclusion, in the agrifood case it is the characterization of a technology as novel that itself becomes the epistemic basis for mobilizing skepticism, and this characterization may be motivated any number of distinct scientific, political and practical considerations. In the agrifood sector, at least, an entrenched opposition to industrial methods motivates strategic skepticism of any approach associated with mainstream industrial actors. But this is, in itself, nothing new.

Bioart, Biotechnology and Social Responsibility: encounters of art and ethics in the crossroads of modernity

Valadas, M. Alexandra & Melendez, Carlos

Nowadays, a new scientific image of society allows for artistic imagination to seek new forms of expression. What happens in the laboratory is the archetype of progress, and development, and its products and results shape and transform the way human beings encounter nature and ultimately we encounter each other. It is in the laboratory that the hybridization between the natural and the artificial gains the legitimacy of power. At the same time the produced scientific and technological structures create a new aesthetic engagement. Thus, with the booming and increasingly widespread accessibility of biotechnologies, it is not surprising that the arts have devised and created new ‘canvas’ and techniques that use biological forms and media that resemble laboratory experiments or biotechnological procedures. Bioart, art manipulating life mechanisms, arises therefore from the intersection of technological culture and art in the BIOS. This new aesthetic form utilizes the laboratory as an art atelier, while at the same time we see art galleries transformed into laboratories. New artforms use as their medium and/or inspiration in biotechnology, genetics, ecology, plants, animals and other lifeforms, be they living, semi-living or artificial. With the development of new biotechnologies, it is also possible to trace back the evolution of bioart. A decade ago, with the emergence of the Human Genome project, most bioart was based on traditional iconographic artforms – genetic representations and representations of the biological hereditary material and processes. But as scientific knowledge and technology have evolved so as Bioart. As discoveries were made in the field of tissue and cell culture, in neurophysiology, in bio robotics, in the synthesis of artificial DNA sequences and in xenotransplants, so has bioart explored and transgressed boundaries between the organic
and inorganic, the material and immaterial, subject and object. Artists as Oron Catts and Ionat Zurr11 or the Portuguese artist Marta de Menezes12 enter the laboratory for their creative practice. Organic materials go through a recomposition of their forms and structures, mimicking the biotechnological procedures, and matter and life undergo metamorphosis under our eyes, involving the audience into the laboratory performance. Bioart is above all a live art transformation and the new installations require direct participation and involvement of the audience in the creative process. At the same time, the audience reinvents its role of passive observers to collaborative subjects that have to perform, to find connections between biotechnologies and economic, politic and social conditions. Hence, faced with some manipulations and uses of the new technologies and science, our aesthetic but also ethical sense is often put in a critical position. This leads necessarily to the question if art as collective and collaborative medium should provide a basis for changes in public perceptions of biotechnology and scientific responsibility. Should this new form of art be the central point of reference to expand moral consciousness about biotechnology? We will explore also the types of epistemological questions that emerge at the intersection of biology, art, and the public sphere, that might lead to new modes or fields of social responsible action. As bioart transports the laboratory into the public sphere we will examine the legitimacy of the hybridization of the natural and artificial while at the same time critique the power gained by legitimization in the laboratory.

Through the analysis of bioartists, such as Critical Art Ensemble13, Tissue Culture and Art Group14, Virgil Wong15, MEART – The Semi Living Artist16, among others, and their work we will question to what extent bioart has genuinely raised public awareness about scientific knowledge, biotechnology and its implications.

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Drug Eluting Stents as a Paradigm for the Application of Nanotechnology in Medicine

Agich, George J.

Much of the literature on the ethics of nanotechnology advocates broad ethical principles such as the precautionary principle, the bioethical principles of autonomy, beneficence, nonmaleficence, and justice, or the ethical concept of professional responsibility. Such approaches are thought to shape ethical considerations relevant for the work of nanoscientists and engineers. However, these approaches often lack specificity or practical salience. They fail to provide appropriate or workable normative guidance for defining areas of ethical concern with any precision; hence, they have limited practical ethical utility. This limitation can discourage or lead to superficial or misleading ethical assessment of nanoscience related ethical concerns, which is a particularly acute problem in the area of medical applications of nanotechnology.

In its capacity to manipulate materials at the nanoscale level, nanotechnology is characterized by a complex hybridity that brings together various disciplines in science, engineering, information systems, and biomedicine. As an emerging field, it is both zealously promoted and vehemently criticized. Whereas it is anticipated to produce technological improvements, including significant health benefits, it is also feared as a Pandora’s box that, once open, will let loose uncontrollable technological perils for humans or other life-forms. Notwithstanding the hype of this controversy, nanotechnology admittedly poses a significant and diverse set of ethical and social value concerns that have proven resistant to collaborative exploration and solution.

I thus argue that a useful nanoethics should provide models for interdisciplinary critical analyses of the complex range of normative values shaping the development and deployment of nanomedical technologies. This requirement can be met by undertaking the identification and study of paradigm cases and the social value and technical frameworks involved in the development of such technologies from bench to bedside. In this paper, I test the feasibility of this approach by exploring the technical, ethical, and social value-related aspects of drug eluting stents (DES), an implantable medical device for the treatment of cardiovascular disease. I argue that due to its hybrid material, mechanical, biochemical, and clinical features, DES is an apt model case that can provide insight into the normative questions associated with future applications of nanoscale technologies to implantable medical devices. Relevant normative issues in medical nanotechnology encompass economic, ethical, regulatory, and policy questions, concerns about social costs and benefits, as well as issues of patient rights and safety, all of which figure prominently in the case of DES. The goal of this exploratory study is to answer the question: “What implications for the ethical use of nanotechnology in medicine can be drawn from the case of drug eluting stents?”
Concepts of disease in molecular medicine

Boenink, Marianne

The convergence of nanotechnology and biomedicine leads to the emergence of a new scientific and technological domain: molecular medicine. This field strives to understand the molecular basis of normal body functioning and the pathogenesis of disease, and to develop specific molecular tools for diagnosis, treatment and prevention. Since definitions of disease are closely linked with technology, developments in molecular medicine are likely to transform current disease definitions. In this paper I will investigate whether these changes amount to a transformation of the conceptualization of disease as well, and if so, in which direction. Moreover, I will discuss how an analysis of emerging disease concepts may be a useful tool for early identification of ethical and social issues related to molecular medicine.

First, the aims of molecular medicine will be outlined and current developments will be discussed, meanwhile separating promises and ideals from reality. Subsequently, an analysis will be presented of the shifting disease definitions implied by these scientific and technological developments. How does the focus on the molecular basis of disease that is enabled by nanotechnology change existing disease definitions? I will discuss in particular developments in molecular diagnosis of Alzheimer’s Disease. It will appear that, on the one hand, developments in molecular medicine tend to reinforce and accelerate shifts in disease definition that have been going on since the advent of predictive and preventive medicine. On the other hand, however, they also point at the limitations of the disease concepts implicit in predictive and preventive medicine.

I will then proceed to discuss how molecular medicine might lead to a more radical transformation of the conceptualization of disease. If the promises of molecular medicine regarding the real time observation of disease processes in individuals come true, we might come to acknowledge the dynamic and highly individual character of disease much more than is currently possible. Instead of conceptualizing disease as an entity or as a linear process, disease may come to be conceptualized as a complex and ever changing phenomenon. Furthermore, if patterns in personal bodily functioning can be continuously monitored, the boundary between disease and health may become even more vague than it is right now.

Although such an ‘individualization’ of disease may have distinct advantages, it also poses difficult questions, for example about the relationship between changes at the molecular level, subjective experience and clinically manifest symptoms, and about the type of evidence that would warrant a decision to intervene in personal bodily functioning. I will conclude, therefore, by explaining how the epistemological analysis of emerging disease concepts may help to set an agenda for early ethical and societal debate regarding the desirability of molecular medicine.

Nanobiosensors, medical applications and the patient: Promise or Peril?

Evers, J., D’Silva, J., Van Calster, G., Nys, H., De Tavernier, J. & Maes, H.

The convergence of nanotechnologies with medicine and medical applications will enable the collection and surveillance of a staggering amount of individual cellular/subcellular level data of the human body. Nanomedical technologies are expected to miniaturize devices that can be wearable, implanted or be part of a mobile/portable system. Nanobiosensors are meant for in vivo and real time diagnosis and monitoring. These sensors use micro-electromechanical systems (or MEMS) and involve a combination of nanotechnology and microfluidics. The entire sensor could be downsized to the nanoscale,
but more likely contains one or more enabling components at this scale. A series of these sensors for health care purposes is often referred to as a lab-on-a-chip, a miniaturized lab that has the capacity to analyze a variety of metabolic parameters and hence increasing the analysis speed, sensitivity and reliability. Nanobiosensors can be used for tracking trace amounts of biomarkers in tissues and sub-compartments of living cells for the fundamental biological understanding of cellular processes and biomarkers for DNA and cell damage. In vivo nanobiosensors are not yet available but they are recognized as short term priorities for research and development in Europe. According to the nanodiagnostics timeline of the European Technology Platform on NanoMedicine – Nanotechnology for Health, various ‘quantum dots for molecular diagnostics and imaging’, and ‘point-of-care analytical devices’ are already on the market. It is also expected that ‘multifunctional nanoparticles for drug release and imaging’ and ‘implantable devices for continuous measurement of blood markers’ will become commercially available around 2010 and 2015 respectively.

Ethical and legal questions related to nanobiosensor technology differ from current approaches in genetic screening and testing, because in vitro screening of a person’s genotype on one hand, and nanobiosensor technology for in vivo monitoring of cellular processes in real time on the other, differ with regard to at least three aspects: the scope of medical actions, the role of the Government, and the physician-patient relationship. Using nanobiosensors as a case study, this paper will analyse these three aspects. First, nanobiosensor monitoring have a much broader impact because in vivo monitoring will be used to inform individuals about their health status, including propensity to disease/medical conditions long before they occur and allowing to take pre-emptive therapeutic measures. It will involve systematically studying blood parameters such as glucose, cholesterol, cancer biomarkers, viruses, environmental pollutants, drugs and hormones, and real-time information of these parameters will empower the patient’s autonomy about his or her health status. Secondly, broad implementation of nanobiosensor technology requires and creates huge medical data bases. These data bases will be highly valuable for a number of stakeholders including the Government, who are expected to have strong incentives to promote the mass distribution of nanobiosensor technology for reasons of cost reduction and efficacy. The Government’s interest and even request to share (intimate) health data is expected to cause tensions with the patient’s autonomy. Thirdly, the ‘classic’ physician-patient relation will be considerably affected because these devices work as an element of individual responsiveness (patients will be able but also are expected to make decisions on their own).

The current relevant legal framework is mainly a response to the testing environment in genetics, and to the ethical/political debate which followed. New converging technologies and applications like nanobiosensors are not only likely to challenge this framework but also highlight the need for alternative models of regulation. How, for instance, can the current legal framework defending an individual’s interest in not knowing vital medical information be harmonised with the potential interest of the Government in knowing and sharing this personal information? By what means is it possible to develop an alternative regulatory framework? Hence, this paper will then proceed to examine what would be the implications of nanobiosensors on the current regulatory climate in particular that relating to patient/data privacy and actual data protection.
Tissue Engineering and the Reduction & Replacement of Laboratory Animals

Vries, Rob de

Tissue engineering (TE) is a promising new field of medical technology. However, like other new technologies, it is not free of ethical challenges. As yet, the ethical aspects of TE have not been extensively discussed and the debate that has taken place has been dominated by the ethical questions raised by the use of human embryonic stem cells and therapeutic cloning (de Vries et al. 2008). One of the ethical issues that has been underexposed is the use of (laboratory) animals in TE research.

Apart from their role as donors of cells or material for xenogeneic TE products, animals are mainly used as experimental subjects in TE research. Laboratory animals are employed both in primary experiments - to study the fundamental biological processes involved in tissue engineering - and in secondary testing, in which the animals function as models of human disease and injury.

From the perspective of animal ethics, several questions may be raised about this use (cf. Nordgren 2004). I will focus on the application of the 3Rs (Reduction, Replacement, Refinement; cf. Eder et al. 2006). In my paper, I will argue that the field of tissue engineering has so far paid too little attention to the 3Rs, particularly in two respects: (1) the possibilities of decreasing the number of laboratory animals used by restricting the variety of animal models (Reduction) and (2) the contribution TE might make to the development of alternatives to animal experiments (Replacement).

Ad (1): There is considerable debate about the adequacy of the current animal models in TE research, and the need for animal models that more closely resemble human diseases is often stressed (e.g. Wakeman et al. 2006, Steindler 2007). I will explore for one field of TE, namely cartilage TE, which animal models are used and what the advantages and disadvantages of the various models are, particularly in terms of extrapolation to the human situation. Based on this comparison, I will determine whether there is indeed room to reduce the number of laboratory animals by selecting and using only those models that have greatest predictive value.

Ad (2): Perhaps more than any other biotechnological field, TE might not only cost but also save animal suffering and lives. TE tissues might be used to replace animals in, for example, toxicology screening, drug discovery and the basic study of human physiology (MATES-IWG 2007, de Brugerolle 2007, Baar 2005). I will map which alternatives based on TE are already available and validated, which are being developed and what other type of TE alternatives could and should be developed in the (near) future. Finally, I will examine to what extent the field of TE itself has a moral responsibility for applying the 3Rs in the ways just described (cf. Vorstenbosch 2005).

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Are Close Friendships Possible On-Line?

Collins, Louise

Are interpersonal relationships conducted via computer mediated communication (CMC) merely ersatz simulacra of their more familiar, face-to-face (FtF) counterparts? Reflection on online relationships is inherently interesting, and also prompts reconsideration of familiar, offline forms of personal interaction.

This paper focuses on close friendship, using the “Drawing Model” developed by Cocking and Kennett (1998), according to which close friends engage in a distinctive kind of identity-shaping interaction, featuring shared activity and reciprocal interpretation. My close friend’s interest in sharing an activity with me gives me a distinctive reason to try that activity, and perhaps come to appreciate it. Thus, through changing my motives, close friendship can change my identity. Also, by sharing activities in a variety of situations, FtF friends gain rich information about each other’s personality, including aspects involuntarily revealed in body language and habitual behaviours. Close friends develop fine-grained interpretations of each other’s character, which inform their subsequent interactions. As my close friend interprets me, and acts on her interpretation of me, so my view of my own character, and my character itself, may shift in response. And vice versa, as I interpret my friend.

According to the Drawing model, whether close friendship is possible online depends on whether would-be friends can engage in a distinctive kind of identity-shaping interaction online. Cocking and Matthews (2001) argue that the right kind of reciprocal interpretation is not possible in text-based CMC relationships, and so friendships cannot be truly close online. Their concerns are epistemic: the narrow bandwidth of text-based CMC filters out too much crucial information from friends’ interactions and allows each one excessive control over what her friend knows about her. Cocking and Matthews rely on their “Diligent Disclosers” thought-experiment, the upshot of which is that even those who sincerely wish to disclose everything about themselves to their friends will be stymied by structural limitations of text-based CMC. Thus, our text-based CMC interactions cannot shape our identities in the manner characteristic of close friendship on the Drawing model.

Briggle (2008) rejects Cocking and Matthews’ claims, noting that some friends online and offline have accomplished extensive self-disclosure via textual, epistolary friendships. Because text-based CMC accords the writer more control and time to reflect on self-presentation, these media can foster close friendship online. Though Briggle establishes the possibility of one species of intimate, even “hyper-personal” (Walther, 1996; Henderson & Gilding, 2004) friendship in cyberspace, I argue this is not close friendship on the “Drawing” model.

I argue further that Cocking and Matthews’ “Diligent Disclosers” thought-experiment is flawed. They assume Disclosers use text-based CMC to exchange descriptions of their psychological states and reactions. But text-based CMC can also be used to perform assorted speech acts in a variety of online venues (Rooksby, 2002). Diligent Disclosers can overcome each purported obstacle to data-gathering, and the reciprocal interpretation condition can be met in text-only CMC, provided friends explore a variety of online venues. Epistemic concerns are allayed.

However, the shared activity condition of the Drawing model must also be satisfied. Two-person friendly activities conducted via CMC prompt us to reconsider exactly why shared activities matter in close friendships offline. According to the original Drawing
model, our psychological identities come to mesh or overlap in some respects, as a result of the shared activities of close friendship. By imagining a pair of Assiduously Amiable cyber-pals, I argue that there is a practical sense in which close friends' lives overlap offline and shape each other's identities, which is not exhausted by psychological tracking. Even granted technological ingenuity, extensive online resources, and a deep commitment to each other's well-being, the Assiduously Amiable cyberpals' interactions are still lacking in important respects rooted in the idea of "being there" for the friend.

Reflection on the Assiduously Amiable online case forces articulation of what is taken for granted about what matters in FtF close friendship: the contribution of close friends' embodied labour in maintaining each other's well-being. The original Drawing account of close friendship speaks of friends' reciprocal contributions to each other's psychological identities. Reflection on the online case suggests that elaboration of relational identities at stake in close friendship should rather track selves related as embodied agents.

As Briggle's paper suggests, however, other kinds of friendship and intimacy may be possible online. In addition to refining the Drawing model of close friendship offline, research should also examine the goods and limits of personal relationships uncoupled from the spatio-temporally located body.

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Questions of Technological Determinism in Information Ethics

Heesen, Jessica

Ubiquitous computing (also called pervasive computing or ambient intelligence) extends electronic communication networks into the objective environment. The idea is to connect local networks and the World Wide Web to intelligent objects of utility. A ubiquitous ICT should disburden people while assisting in their activities in an unobtrusive and invisible manner [Weiser 1991]. The creation of a reliable infrastructure for everyday life will be made possible through wearables and robotics in the field of hardware, as well as by building up a virtual space for bringing people together, a kind of personalised world of electronic interaction. A typical characteristic of ICT in the future will be its omnipresence. ICT's striving toward totality has reached a new level: on the one hand regarding its physical extension through its alliance with other technologies (bio- or nanotechnology); on the other hand in relation to its influence on developing individual consciousness. The establishment of ubiquitous computing is similar to the configuration of an all-embracing system. New context related and ubiquitous applications of ICT also demand a new dimension of
Information Ethics. Information ethics has to question the manner in which ICT, with its totalitarian approach, controls possible courses of action and the apperception of reality.

Pioneers of media theory pointed out that media in a broad sense builds up new forms of infrastructure and influences the organisation of social life [Innis 1951; McLuhan 1964]. Constructivism underlined the relevance of media for the organisation of social reality and the important role media plays in the formation of individual consciousness. But what are the specific ethical problems in dealing with a ubiquitous technology? This paper is concerned with matters and strategies of an ethically justifiable approach to ICT as a comprehensive system. This new quality of ICT demands a specific reflection that goes beyond an isolated assessment of problems like data privacy or lack of competences.

Methodologically, the contribution will discuss positions concerning the problem of inherent necessity produced by technological systems [cf. technological determinism in the concepts of Ellul 1964; Schelsky 1961] and on the other hand positions related to the totality of media [Baudrillard 1985; Virilio 1977]. Combined with the new qualities of ubiquitous computing, it will be shown that there are good reasons to reject the comprehensive dynamics of ICT. These justifications relate to the well known problems of security, data privacy, surveillance, dependency, but also to aspects of “the good life”, plurality of experience, the freedom to take action, in other words problems related to the totality of a medium itself.

Even to eliminate usable and helpful ICT-applications from our everyday environment seems to be illusory and not practicable: To what end can a radical critique of ICT be useful? The contribution will point out that a radically negative critique of ubiquitous computing is the precondition for creating a counter factual basis of reflection. From this perspective for example one is free to ask for alternatives that run parallel to the logic and risks of ICT systems. Another example concerns the possible desire of the individual to not feel part of an ICT-pervaded environment. Why shouldn’t the experience of an ICT-free environment – similar to the experience of nature or art – be a necessary component of a concept of “the good life”?

**CMC and friendship: a valuable addition to our lives or a inferior surrogate?**

Liebregt, Maurice

Social life in a networked world is increasingly mediated through keypads, cameras, and screens. In particular, computer mediation is providing new platforms for initiating, maintaining, and even terminating friendships. This has sparked debate about what computer mediation does to the nature and value of friendship and quality of life in a networked world. The goal of my master thesis is to contribute to this debate by: (Part I) providing an empirically nuanced picture of the realities of computer mediated friendship; (Part II) assembling a flexible philosophical tool-kit for assessing those realities; and (Part III) demonstrating why this tool-kit is superior to most existing theoretical evaluations of computer mediated friendship and indicating how the tool-kit can be applied.

In the first part I aim to provide insight into Computer Mediated Communication (CMC) by discussing the meaning and history of CMC and providing a working definition of CMC. This is followed by a discussion of the different possibilities for communication provided by different popular CMC applications. I then turn to the actual practice of CMC friendship, bracketing for the moment the question of what friendship is. I discuss the participants in CMC friendship, paying attention to user characteristics and identifying technical constraints to user participation by looking at the requirements for use of CMC applications. In addition the motivations of users have for developing CMC friendships, the kinds of friendship they develop and their own expectations and evaluations concerning these
relationships are investigated. This should present us with information that can later serve us in differentiating between different kinds of CMC friendships and deciding whether and if so which CMC friendships can be considered to be actual friendships. In addition this information will be used to evaluate the presuppositions that underlie current evaluations of CMC.

The second part of the thesis surveys philosophical theories surrounding the nature and value of friendship. It aims at providing insight into the meaning of friendship by investigating the different types and conceptions of friendship developed through the ages, their differences and similarities, why they are argued to be value and how they match up to intuitive notions of friendship. Based on this background as well as some additional work by social scientists and psychologists I compose an overview of important characteristics of friendship, conditions that are necessary or beneficial to the development of friendship, the different ways in which friendships can be valuable, as well as reasons people might have for friendship and their justification. At the end of this part a tool-kit is presented that incorporates all these elements. This tool-kit is designed to help in the process of studying practical examples of friendships, demarcating which relationships can be considered friendships and evaluating friendships.

In the third part theories of mediation are discussed with the aim of on the one hand gaining insight into different ways of approaching mediation, which is to inform the application of the toolkit to mediated friendship. On the other hand this gives an overview of the different theories on which many current evaluations of CMC are based. Major theories, mainly from Media Studies (such as Media Richness theory and Social Information Processing theory) are summarized and categorized according to their evaluation of CMC and their similarities and differences are highlighted. On the basis of the insight gained in the earlier parts of the thesis both individual theories and certain trends in media research are criticized. This is followed by an investigation of early steps of philosophers to provide more (philosophically) grounded evaluations of CMC. I argue why these, although still in their infancy, provide an important first step toward addressing my criticisms—they are inchoate attempts to apply my tool-kit. A case study is then used to demonstrate how the tool-kit developed in this thesis can be applied to make more informed evaluations of CMC friendship that counter some of the problems in current evaluations of CMC through the consideration of philosophical theory on the nature and value of friendship combined with theories on different media and their capabilities and limitations. Hopefully this will inspire interdisciplinary collaboration between the philosophy of friendship and scholars from CMC and related social and psychological fields.

Concrete Software

Mills, Simon

This paper proposes to build on Gilbert Simondon’s theory of the concretization of technological objects and apply the developed theory to the emerging area of software studies.

Simondon’s theory of concretization describes the process of development of technical objects by applying his theory of individuation to the technical sphere. It accounts for their development as a process of the progressive convergence of separate functional structural units so that this convergence draws them into a single unit of operation which enhances their overall operation.

Connected to this process of concretisation and convergence is the notion of the milieu, both in the sense that technical individuals create their own associated milieus within them which facilitates their operation as system but also that they adapt the environment around them.
Although Simondon’s concretization is a powerful tool to account for technical development its concentration on purely technical matters “independent of social demand and the pressure it exerts upon the distribution and modifications of such objects” (Dumouchel 1995) makes it unbalanced.

Our contention, and the argument in this paper, is that it is not just technical developments which are involved in the concretization process but that we can discern other processes/forces involved, such as cultural, economic, social and material which also become concretized in any technical development. This assessment of concretization is also discussed by Feenberg (2002) as a ‘technological unconscious’ which is ‘interpreted as purely rational and separate from society’.

Our project is to extend Simondon’s notions of concretization and milieu to transductively account for these other processes and thus give a broader realist interpretation of technologies.

In conjunction with Simondon’s account of psychological and social individuation this aids with the development not just of an account of technical development but also the recursive effect of technology upon these other areas.

This theory can thus be seen as being in opposition to Instrumental theories of technology, which lack an account of the subject as transformed by technology, and is therefore related to a critical theory of technology.

The recognition of software as an important area of contemporary study is reflected in the emerging discipline of Software Studies (Fuller 2003, Manovich 2008). As our encounter with software of different types become increasingly more common, especially with recent developments in networked and ubiquitous computing, we argue that it is of increasing importance to understand software from a realist points of view. We will put forward our interpretation of concretization as one way to describe this.

Theorised as a Universal Turing Machine, the computer in-itself offers no reason for why software should develop in specific directions. The implication being that it’s development should escape constraint by the physical affordances that provide the developmental milieu of seemingly more material technologies.

Of course there is a material side to the development of software, the constraint of processor speeds (as tracked by Moore’s law), restrictions on network bandwidth and data storage are obvious examples. However these material constraints cannot account entirely for the nature of softwares.

What are the aspects that are involved in the concretization of software? How can we use Simondon’s concepts of milieu, transduction and concretization to account for these developments?

To help answer these questions we propose to look at some examples where the Internet is the technical milieu where concretization occurs.

References


Computers in Health Care: A Trust-Based Approach

Nickel, Philip J.

Information technology increasingly administers health care directly to patients. Persons seeking information about health care often turn to the Internet for information. Systems are already used by health care facilities that allow patients to respond to Internet-based questionnaires and receive feedback. Computers can also interact with patients to provide informed consent to therapies, and, in principle, even administer these therapies.

In this paper I raise some philosophical issues about the epistemology and ethics of IT in the context of user-interactive diagnosis and computer-generated medical advice and therapeutic intervention. I will limit my discussion to direct computer-patient interfaces unmediated by clinicians. I propose an approach based on trustworthiness and trust.

Philosophers of trust such as Russell Hardin have noted that trustworthiness and trust are different (though related) concepts. Trustworthiness is the property of a person, animal, tool or object such that its performance can be known or reasonably judged to be reliable (in the sense of "worth relying upon"). Trust, on the other hand, is an attitude taken by the person who chooses willingly to rely on another, expressing the voluntariness of her reliance. It is tempting to say that trust is always based on a judgment of trustworthiness, but this is problematic. In practice the ability of people to make a well-informed judgment about trustworthiness is limited, and yet they must trust anyway (in the sense that they voluntarily rely on others). People with multiple options, good information, and substantial resources for investigation can base their trust on rational judgments of trustworthiness, but people with few options, limited information, and few resources for investigation cannot always or often base their trust on rational judgments of trustworthiness. This is especially important in the context of health care because health problems affect people without much regard to social or epistemic position.

Thus socially and epistemologically disadvantaged persons cannot avoid relying on others for health care. Most people do not have the specialized knowledge necessary to evaluate information about health care providers. In addition, clinicians have little time to communicate with patients. (This last fact is commonly cited as one of the biggest problems in the ethics of medical practice.) Hence patients are put in a position to trust clinicians without having much information about trustworthiness. Their trust is thus based on marks or signs of trustworthiness that have no strong intrinsic connection with reliability. In order to put their trust on a better footing, then, we should find marks or signs of trustworthiness that meet the following desiderata: they are cognitively simple, easy to communicate, yet closely connected with actual reliability.

Computers play an increasing role in the administration of medical care by providing an increased opportunity for patient interaction, communication and even therapeutic


\[21\] In general terms (going beyond health care) this point is emphasized by Baier A, Trust and antitrust. Ethics 96 (1986): 237-60.
intervention without the mediation of physicians or staff. There are some major advantages to this trend. Computer-based health care can be cheaper than alternative methods and can make health care more widely available. Computer programs can spend more time on adequate communication with patients and this communication can happen in more comfortable or convenient contexts (e.g., at the patient’s home). For these same reasons, it can increase the basis for trust by giving patients more information about trustworthiness. But this depends a great deal on both the actual trustworthiness and the apparent trustworthiness of the computer system itself. Patients may lack access to marks or signs indicating that reliance on the computer is a risk worth taking.

I propose that in order to enhance the trustworthiness of health-interface computers they should have the following characteristics, and patients should be able to see this fact: (a) interest-alignment: the interests of those who deploy the computer should be aligned with those of the patient (drawing on Hardin’s notion of trust as “encapsulated interest”); (b) delimitation: it should be clear what tasks the computer is designed to perform as well or better than others and should not deliver information or advice going beyond these limits or encroaching on the decision-making authority of the patient; (c) accountability: the patient should have an means of complaining and demanding redress if the computer system fails to perform acceptably. These three indicators of trustworthiness meet the desiderata mentioned before: they are cognitively simple, (relatively) easy to communicate to patients, and closely connected with actual reliability. Interestingly, statistical evidence of reliability does not meet these standards, because it is not cognitively simple or easy to communicate.22

A Digital Literacy for a Digital Life: Ethical Individualism in the New Media

Environment

O’Neill, Brian

Recent developments in European media policy have given priority to the notion that all citizens need to be digitally literate to fully participate in the emerging Information Society. Media literacy or digital literacy, it is argued, will be required to able to exercise informed choices, understand the nature of content and services and take advantage of the full range of opportunities offered by new communications technologies. Further, being media literate, citizens will be better able to protect themselves and their families from harmful or offensive material. The inclusion of media literacy within the Audiovisual Media Services Directive (Commission of the European Communities 2007), Europe’s main instrument of media policy, and the requirement that the European Commission will be required to report on levels of media literacy across the EU25 is an indication of the significance attached to it at a political level.

Commentators have noted that the new emphasis on media literacy in public policy represents a significant shift of responsibility from collective forms of regulation and control, represented by legislation and regulatory control at member state level, to the individual who is now deemed responsible and assumed to be capable of making informed choices in matters of communication and social interaction in today’s mediated environment (Livingstone, Lunt et al. 2007; Penman and Turnbull 2007). The ideal subject of digital literacy appears to represent a form of ethical individualism in which the source of moral

values and principles, and the basis of ethical evaluation is the individual (Lukes 1973). The collective norms and standards that operated in the ‘old’ media world, whether involving filtering of content or requirements for transparency and fairness, it might be argued, no longer apply or can no longer be imposed. This policy turn raises a number of pressing questions. As the internet and online technologies become embedded in everyday life, vulnerable subjects such as children, young people and their families who tend to be in the vanguard of new media adoption, are exposed to a range of good and bad experiences, risks and opportunities, for which they may be unprepared. The traditional institutional supports of education, regulation and trusted information sources such as public broadcasting have less influence in a more fragmented public sphere and individuals may be required to rely on more tacit forms of knowledge to inform ethical conduct. This paper will examine what ethical individualism in the context of digital literacy might mean. Through a discourse analysis of policy formulations in European Commission, UNESCO and Council of Europe documents, the paper presents a typology of subject positions and asks whether the apparent ethical individualism is in fact what is intended. It examines the practical ethical situations which citizens and consumers now face and contributes to an ongoing policy discussion on the future of regulation in a converged media environment.

References


ICT and the Capability Approach: A Literature Review and Research Proposal

Oosterlaken, Ilse

Although the capability approach of Nussbaum (2000) and Sen (1999) has been widely adopted in development thinking, hardly any work has been done on the interrelations between the capability approach and technology. This is remarkable, since technology by definition aims at expanding human capabilities. There are close, but underexplored relations between technology and the capability approach, so Van den Hoven and Oosterlaken (2008) have recently argued. In my doctoral research project, which I have just started, I will investigate how the interrelations between technology and human capabilities should be understood and explicated, with a special focus on technology for development. Naturally, in my research project I will also address the question if and how applying the capability approach could lead to improvement of our thinking and best practices of technology and development, compared to other approaches which are currently in use.

In preparation of this research project, I have executed an extensive literature review on technology and the capability approach. Only eighteen relevant publications were identified, published over a period of eleven years and a substantial part of them being unconnected (judging from the reference lists). Although I am thus clearly not the first to make the connection between the capability approach and technology, it seems that no systematic research community has arisen yet on the issue. Since it took me a lot of effort to find all these publications, I think it will be useful to share my findings with others. In this paper, I
will limit myself to thirteen of these publications, which all focus on ICTs. Thus, of all engineering areas that of ICTs has so far most often been connected with the capability approach. Nine of these twelve articles explicitly apply the capability approach to ICT for developing countries; three of them do not have this focus. Three of them I would qualify as mainly reflexive in nature (Hellsten 2007; Garnham 1997; Mansell 2001), two others broad and explicitly agenda-setting for further research (Johnstone 2007; Zheng 2007), six of them as a more detailed effort to apply the capability approach to one or more concrete cases (Ratan and Bailur 2007; Wresch 2007; Zheng and Walsham 2007; Garai and Shadrach 2006; Gigler 2004; Madon 2004; Kleine 2009) and one as using ICT mainly as an illustration for a more theoretical contribution to the capability approach (Foster and Handy 2008). In my review of these publications I will focus on two questions: (1) what do the authors perceive to be the added value of the capability approach, as compared with other approaches and (2) what suggestions for further research can be drawn from these publications.

Having reviewed the literature on the capability approach and ICT, I will end my paper with a very brief outline of my research plans for the next couple of years, including two cases from ICT for development that I am considering using.

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Development, 15-16 December 2007, at Bangalore, India.


Enhancing cognition, upgrading epistemology

Vaesen, Krist

Traditional theories of knowledge center around the idea that whatever knowledge is, it is tightly linked to features of the individual knower. Process reliabilism, for example, argues that to know means to have true beliefs that are produced by reliable internal cognitive processes; for virtue epistemologists, knowledge is something for which a subject, given her cognitive character, deserves credit. Recent studies in cognitive science and human factors engineering, I argue in this paper, urge us to revise this classical take on epistemology.

Crucial to my argument is the finding that cognition highly depends on external scaffolding (Clark 1998, 2003; Kirsh 2006; Wheeler 2005). We employ both our brain and features of the environment, such as cognitive artifacts, to reason and to solve problems in real-time. We offload parts of our cognitive work onto paper and pen, calculators, notebooks, GPS's and so forth. Cognition, thus, is not just an internal affair, it is performed by systems that extend beyond the traditional (epistemic, cognitive) boundaries of skin and skull. To be realistic and scientifically respectable, an account of knowledge will have to accommodate this fact.

To make my point, I focus on one exemplary hybrid cognitive system, namely airport baggage control systems. Baggage scanners evidently enhance our human cognitive performance with respect to detecting suspicious goods. They speed up the control process substantially, since the cumbersome work of opening up pieces of luggage now is reduced to only those instances where the inspector first notes a threat on-screen. Reliance on baggage scanners is not problem-free, though, as the events of 9/11 have shown. The single most important factor leading to failure is the fact that illegal objects occur only very rarely, making the job of baggage inspection exceedingly tedious and at the same time exceedingly demanding: people are simply not made to be vigilant for long, uninterrupted periods of time during which they are looking at a monitor displaying nearly only non-life-threatening pieces of luggage (Vicente 2003). A solution that takes into account this simple fact about human psychology is nowadays implemented almost world-wide: to keep inspectors alert, the system periodically introduces false signals, that is, an image of an illegal object is projected over the image of the real content of the piece of luggage in question.

What the example shows is the following—or so I will argue. First, that virtue epistemology (e.g. Greco 2003; Zagzebski 2003) is in bad shape. We don’t deserve credit for everything we know. Correctly finding out that a certain piece of luggage is safe or threatening is not an individual achievement; it is, to a large extent, an achievement of the cognitive aid or, perhaps more aptly, of the designer of the overall system. Put differently, if what makes knowledge distinct relates in some sense to epistemic virtue, it is the virtue not of the individual operator but of the designer (or cognitive engineer) that bears most epistemic weight.
Second, the example challenges process reliabilism. In its original form process reliabilism makes the justificational status of a belief dependent on the psychological (i.e. inner) processes that cause it; the causation in question, thus, appears “beneath the skin” (Goldman 1992, p. 434). The most salient causal feature explaining the more frequent occurrence of true belief in case of the improved baggage control system, however, is not some inner process, occurring beneath the skin; rather, it is the particular set-up of the external environment (c.q. the cognitive artifactual machinery).

Finally, the example points to some of the gaps of recent alternatives to individual epistemology, namely those going under the banner of social epistemology. According to them, knowledge indeed is dependent on more than just the internal architecture of the individual cognizer; their mission then is to determine the social constituents of knowledge. So far, however, social epistemology has focused almost exclusively on sustaining sources of knowledge and justification, in particular, testimonial knowledge, be it acquired directly from person to person, or mediated through technological devices as mobile phones and the internet (as in Goldman 1999). Generative sources of knowledge and justification—i.e. practices leading to the formation of new knowledge claims, as when forming a belief about the contents of a piece of luggage through the use of a cognitive aid—have been underplayed manifestly. In as far as my example of airport security is a case involving social knowledge (which it arguably is), it should provoke social epistemologists' critical interest.

These three challenges (i.e. to virtue epistemology, process reliabilism, and social epistemology), I argue, urge for an update of contemporary epistemology. The case study I present point to a first set of traits the update should exhibit.

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Normativity in the discursive assessment of climate change technologies. Normative assumptions of European NGOs on what “we” ought to do to achieve sustainable mobility.

Dekker, Cornelis

I shall discuss some normative assumptions of European environmental NGOs with regard to how “we” ought to be mobile in the future in order to realize the targets of reducing the emissions of CO$_2$ in the long term. Normativity is an issue for the discursive assessment of climate change technologies since these technologies influence our lifeworlds. They are inherently normative in telling us how to travel.

It has been argued that science and technology will increasingly become the factors that will allow us to solve environmental problems. I examine to which extent environmental NGOs endorse this belief that ‘technology can save us’ and whether also changes in lifestyle are proposed. This would be contrary to the expectation in ‘ecological modernization’ that technology can be developed according to certain ‘ecological norms’, without disrupting social patterns.

If we expect, however, that technology can have an important role in achieving sustainable mobility, an expectation that is now widespread, the question is which consequences several technological alternatives have for our travel patterns. To this end, I defend that we need a discursive assessment of climate change technologies in which normative assumptions are made explicit. I refer to such an assessment as discursive TA. I shall regard discourse as both a set of assumptions, ideas, and concepts through which meaning is given to a phenomenon, and as an activity of discussion or debate.

I shall consider a number of assumptions of five European environmental NGOs: WWF European Union, Climate Action Network Europe, Greenpeace Europe, Friend of the Earth Europe, and the European Federation for Transport and Environment. These NGOs are important in the European public sphere which is, given the ‘normative force’ of the EU regarding the issue of climate change, one of the arenas in which a discursive assessment of...
climate change technologies with a focus on their normative implications – how do we ought to travel – ought to take place. I shall argue that we need a vibrant European public sphere to ensure the legitimacy of decisions concerning technologies with normative implications that concern many citizens.  

After discussing some normative assumptions of NGOs I shall relate the concept of normativity to the idea of a discursive TA. Two questions will, furthermore, be addressed: what do we mean by discursive TA and what do we mean with normative assumptions regarding climate change technologies. 

As far as the first question is addressed, I related discursive TA to constructive TA that presupposes that we have choices during the development of technologies: choices about the form, the function, and the use of a technology. This entails, consequently, that technology can be steered, at least to a certain extent. TA in general has as its aim to understand what is likely to happen when a particular technology is created and attempts to devise policies to reduce unwanted consequences. I shall argue that we indeed face choices. For instance, governments now controversially encourage the use of alternative biofuels in order to ensure current patterns of personal car transport and there are also, for example, choices in the planning of public transportation and the introduction of the ‘polluters pay’ principle. 

Being faced with choices, the method of backcasting is of relevance: we construct a normative scenario followed by looking back from the future and then creating a plan how to proceed from the present towards that future. The method of backcasting presupposes in my view discursive TA. Environmental NGOs and other organizations representing citizens should have a say. Given the normative implications of climate change technologies for sustainable mobility, we cannot leave the question of sustainable mobility merely to experts and politicians. Since we have a choice, we can raise ethical questions regarding applications of future technologies at an early stage: an important task is to stage reasoned discussions on ethical dilemmas before the technology is too entrenched in society. 

I shall based my account of normative assumptions in discursive TA on the theory of Ralph Wedgwood and relate to his realist and internalist theory of normativity. Normative thinking is not thinking just about what is the case, but about what ought to be the case. I shall be concerned with our thought and talk – our normative assumptions in the discourse in which we participate – about what ought to be the case. I agree with Wedgwood that, in order to have an account of what ‘ought’ means, we cannot have recourse to mere non-normative terms. 

I conclude that climate change technologies for sustainable mobility have normative implications and hence, the assumptions with regard to how we ought to be mobile. These assumptions have to be made explicit in discursive TA.

References


28 I defend the thesis that discussion in the public sphere matters in order to ensure the procedural and substantive legitimacy of decisions elsewhere (Dekker 2009). 


32 Palm and Hansson (2006).
CONVERGENT TECHNOLOGIES AND REAL-WORLD ISSUES

Durbin, Paul

What I do here is invite a "convergent" group of technical professionals, including philosophers, to join in the search for socially responsible solutions to the problems of our so-called globalized world. I believe that there are possibilities, but with what other activists should we join forces? The most obvious example would be activist groups of biologists, such as those associated with Conservation International. And there are other environmental NGOs, such as the Nature Conservancy, which are involved in equally ambitious efforts to preserve wilderness and other prize environmental sites. To these we should obviously add governmental organizations, beginning with the United Nations and its World Conservation Union, but also including the governments of particular countries. My favorite example is Costa Rica. So what I really offer is a question: What could we hope for from our group of philosophers in terms of joining in the planet-wide crusade to save biological diversity and biological resources generally? And I answer that we have a great deal to offer.

Environmental philosophy and sustainable technology through Biomass.

Jagadeesh, Anumakonda.

A variety of technologies already exist to use the biomass available in developing countries. What are needed are a policy framework, industrial promotion and the organizational modalities for the generation and collection of biomass. In addition to the existing technologies, there are possibilities for developing new technologies through research and development. The goal of any country is development. Development is the development of people; improving their standards of living and quality of life. This can be achieved only through optimal generation, mobilization and utilization of natural and human resources. Biomass is a major resource in rural areas and is often used with very low
efficiency. In fact, the quantity of biomass consumed in the form of food, fodder and fuel is growing, resulting in deforestation, demadation, desertification and flooding, causing great economic and social costs. The traditional thinking that “agriculture is for food” and “forest is for wood” has to change for good. Biomass is a bulk material with a large water content it perishes easily and is reasonably variable. Therefore, technologies are needed to dry, handle, package, store, preserve and standardise the raw material product. Since this bulk produce is in rural areas, industrialization in rural areas centered around it would be ideal. Biomass technologies include chemical, thermo-chemical and biological conversion processes. Destructive distillation, combustion, gasification, pyrolysis and liquefaction are various techniques, each utilising different routes. Much of the feedstock with large water content may require high temperatures and capital-intensive equipment. Twenty five industries are centred around sugar cane; using the leaf, rind, fibre, bagasse, molasses and sugar to produce feed, fodder, paper, alcohols, chemicals etc., The list can be extended to several other plants such as rice plants (about 70 industries) cotton (about 10 industries) eg, castor and ground nut. Pilot plants that need scaling and product marketing discussed in the paper.

Geoengineering, Ethics and Emergency
Joronen, Sanna & Oksanen, Markku

Geoengineering, that is intentional climate modification, has seen the light of a day as a new possibility to tackle the adverse impacts of global warming. ‘Geoengineering’ is used as an umbrella term which covers a set of diverse techniques that are designed either to reflect sunlight away from the Earth with reflective mirrors (Angel 2006), lenses, clouds and particles or to capture and store greenhouse gases, especially carbon dioxide from the atmosphere (e.g. ocean iron fertilization OIF, see Boyd 2008). The primary aim is to cool the warming planet but there can also be some secondary aims such as to modify local weather conditions. At first sight it may seem as an attractive idea to combat the undesired effects of global warming by manipulating the atmosphere and by managing the climate but a closer look at it reveals a number of ethical and social issues. For example, geoengineering is often regarded as a risky enterprise because it can inflict unknown side-effects which can cause complex complications, at worst irreversible damages (Robock 2008).

The new branches of climate ethics – weather ethics and ethics of geoengineering – offer a possibility of lateral thinking concerning intentional weather and climate modification. For example, there are various motives for managing weather and climate notwithstanding the fact that the debate on weather and climate modification is linked very closely to discussions about global warming mitigation and adaptation strategy options. In the 20th century there were high hopes to develop weather management procedures in order to relieve drought and increase precipitation artificially. Accordingly, a lot of time and money were invested in these efforts but they largely failed to fulfil the hopes. There are many similarities with respect to the intentional weather and climate modification enterprises a few decades later; high expectations and a need to find a clear solution are imposed on geoengineering to solve the problems which a combination of global warming and increasing greenhouse gas emissions produce. The atmosphere of haste in global warming research and decision-making processes could be clouded by irrational judgements unless all the aspects, including ethical analysis on geoengineering, are thoroughly dealt with.

In this paper, we will first briefly summarize some main arguments presented in favour of and against intentional climate modification from the viewpoint of environmental ethics. We emphasize that developing geoengineering techniques is not an excuse for the rejection of other mitigation and adaptation options relevant to climate policy. We will pay particular attention to the argument from moral emergency (see Gardiner 2007). According to this argument there are only two options open to us, either we should develop and use extensively geoengineering means or we have to prepare ourselves to face the catastrophic
effects of global warming. Because we naturally want to avoid the latter, geoengineering is a justified enterprise. Why is this argument not convincing? One of the problems of accepting geoengineering as a justified adaptation strategy to the inconvenient effects of global warming is that it may well hinder the political will to engage in mitigation policies. Also, there are considerable amount of risks and no existing international body to organize these kinds of global enterprises. As we see it, different intentional climate modification implementations need careful ethical analysis before they can avoid moral hazards and are sound in order to step on the international climate policy arena.

References


Nanotechnology and Climate Justice

Light, Andrew

With the election of Barack Obama the United States is now committed to joining the international community to take on the problem of climate change. As a result the next few years will see a rapid and dramatic move toward finding a feasible technological pathway to meeting global energy needs without pumping more carbon into the atmosphere. Global energy demand is now approximately 15 terawatts with 86% coming from fossil fuels. Even with ambitious conservation efforts global consumption may double by 2050. Borrowing from the "stabilization wedge" literature used to forecast the possibility of decreasing production of atmospheric carbon and increasing sequestration across multiple sectors to achieve a designated carbon reduction target I will argue that we can not feasibly combine enough sources of traditional alternative energies to meet projected energy demands. Three possibilities appear feasible: (1) continued reliance on coal with aggressive development of carbon capture and sequestration, (2) creation of more ambitious forms of geo-engineering to mitigate the impacts of future carbon emissions, and (3) development of new solar technologies which can take advantage of the approximately 800 terawatts of solar energy which hit the Earth at any given time.

After establishing some criteria for assessing these three energy pathways – from the perspectives of energy independence, energy security, and energy portability – I will argue that the best route to a carbon neutral future is solar. Of the many proposals for new forms of solar energy the ones most attractive, again from the same assessment criteria, may well involve new applications of nanotechnology either to create a new generation of "printable" solar cells or as the basis of a form of artificial photosynthesis (a form of synthetic biology) capable of both sequestering carbon and producing a biofuel. If this analysis is correct then the necessity of an aggressive response to climate change requires substantial national investment in these emerging technologies.

If we go this route however questions of distributive justice, involving both the techniques used to create this new clean energy, as well as its products, will quickly become crucial. As we enter the next round of the UN climate change talks developing countries will
face increased pressure to accept some mitigation targets. If the only feasible way for them to meet these targets is to pay for a technology we have created then we have a problem. In fact, last year’s UN climate talks in Poland saw a deadlock emerge over the tradeoff between technology transfer from developed to developing countries and the acceptance by developing countries of emission reduction targets. I will argue that this constraint presents us with some critical ethical choices on how this new energy technology can be funded and distributed potentially constraining the evolution of a small number of energy firms controlling rights of access to this technology.

Reasons for discounting

Lowry, Rosemary

There has been much recent debate surrounding the issue of ‘discounting’ the future when assessing policies which aim at mitigating the harmful effects of climate change. Discounting is a commonplace practice which has arisen from the recognition that the weighting we should give to a future benefit or loss incurred by a policy may not be the weight that the benefit or loss should be given if it were received today. For example, certain factors such as the future conditions under which a benefit or loss will be received, or the probability of a future benefit or loss occurring, may warrant a lower weighting being attached to the future benefit or loss. If a future benefit or loss is given less weight in a policy evaluation than it would be were the benefit or loss received now, we can say that it is discounted. It is standard practice to apply a discount rate to future benefits and losses when evaluating a policy or project. There is not, however, consensus about what the discount rate should be. Moreover, long-term projects are “notoriously hypersensitive” to the rate chosen. Discounting is thus particularly relevant when evaluating the viability of energy technologies. That is, energy technologies may incur costs now, but typically their benefits are not seen until sometime in the future. The viability of particular energy technologies will therefore depend on the rate at which their future benefits are discounted. For example, because nuclear energy has a high capital cost and low operating cost, choosing a high discount rate makes nuclear energy look much more expensive.

Among others, Parfit and Cowen have pointed out that economists offer many different rationales for the employment of a discount rate. Moreover, often different reasons for discounting are buried in one discount rate, and a benefit or loss is given less weight depending on when it occurs in time. This makes it difficult to identify whether the discount rate used is justified. An additional problem with the application of a discount rate is that the importance of the difference between kinds of consequence is rarely recognised. For instance, the U.S’s national coastal services centre which selects projects that ‘foster and sustain the environmental, social and economic well being of the nation’s coast’, state on their website that: “the discount rate is a key determinant in the outcome of an analysis, and for each project, a single rate must be applied to all future benefits and costs.” As will be discussed however, many of the reasons for discounting only apply to some kinds of benefit.


35 The NOAA is housed within the United States Department of Commerce. For information, see http://www.csc.noaa.gov/coastal/economics/discounting.htm
My aim in this paper is to examine two of the main justifications cited for discounting future benefits and losses: future increases in wealth and our preferences. I conclude that the justification these considerations offer is situation and consequence specific. Consequently, these considerations cannot justify a uniform application of a single discount rate, in which a benefit or loss is given less weight depending on when it occurs in time. Our aim, then, should not be to determine the appropriate discount rate, but rather to identify the relevant reasons for discounting in a given case. If we follow the approach I suggest, then the viability of long-term projects such as the development of energy technologies will not vary from evaluation to evaluation as a result of their hypersensitivity to the choice of discount rate. Moreover, this method of discounting requires us to distinguish different reasons for discounting, and assess whether they are justified in a given case. This method is thus a transparent and reliable approach to discounting.

### Metrics of Sustainable Architecture in Frameworks of Environmental Ethics

**Moore, Erin**

What can be learned about the way that architects measure sustainability by categorizing existing definitions of sustainable architecture into frameworks of environmental ethics? In this paper I place architectural design guidelines for green architecture into categories of environmental ethics in order to discover the moral foundations and ethical limitations of defining sustainability in buildings.

There are a number of guidelines in the discipline of architecture that direct the design and measure the sustainability of green buildings. These metrics apply design principles related to energy, carbon emissions, material resources, waste, and occupant health. Each set of design principles—in the form of guidelines or benchmarks—is rooted in a particular idea of what it means for a building to be sustainable or green. As documents, these design principles are indicators of the authors’ value systems or ethical positions on the environment.

Categorizing metrics of sustainable architecture into frameworks of environmental ethics reveals some of the moral paradigms that underlie the green building movement. For example, most of the current guidelines for sustainable architecture reflect environmental ethics that are teleological rather than virtue or duty based—building green is good because of its benefits (or lesser harm) not because people who are inherently good or right build green. Metrics of sustainable architecture are less consistent in determining what groups benefit from particular design principles and so are more difficult to categorize in terms of how they reflect the assignment of moral worth. These inconsistencies suggest opportunities for revisiting guiding principles in sustainable architecture to make them more in keeping with or to hone their ethical foundations.

### Switching to Switchgrass

**Ouden, Bernard den**

In energy sources and in philosophy pluralism is needed. Varieties of perspectives and diverse world views enhance the process of knowing and add to the richness and complexity of experience. In deliberative discourses this means that we allow ourselves to be informed by many voices. Addressing the compelling need for energy sources will also require a diversity of approaches. We need wind energy, clean coal, geo-thermal and solar just to cite a few.
Much has been written about the zero sum game of growing maize or soybeans for ethanol. Some studies show a slight gain in energy output. Maize requires high levels of nitrogen for productive growth, which is not the case for soybeans. Soy often commands a higher price than maize and is in high demand for human and animal consumption. Given the growing need for food worldwide, grain producing lands should be protected for human and perhaps animal consumption. The most fertile lands should be kept in the food chain. Marginal lands, and by that I mean where top soil is thin and/or small stones are plentiful, are ideal places for prairie grasses to thrive. Switchgrass is one such species. It requires very little fertilizer and does not have to be reseeded every year. Maximum production appears to require new plantings every 10 to 12 years. Switchgrass not only produces considerable tonnage of stems and stalk per acre or hectare per year which makes it a highly desirable "biomass" for ethanol, it also holds the soil. It is as result an excellent crop to plant on highly erodible land and comparatively rough terrain. It forms a tight matt with its wonderfully powerful root structure. It is an ideal crop for lands, those in particular that should not be plowed or intensively tilled every year. If the pressure for food and fuel increase, as seems likely, conservation acres could be brought back in production such as those set aside through the U.S. Department of Agriculture’s Conservation Reserve Program. The key to the success of switchgrass as a bio-base for energy will be the development of modest size regional technologies for processing it into fuel. Possibilities include locating processing plants near other infrastructure which have surplus energy or co-generation potential.

**Cities, Environmentalism, and the Built Environment as a Sustainable Technology**

*Stevens, Christopher*

In the entry for ‘Architecture Ethics’ in the Blackwell Companion to the Philosophy of Technology, Warwick Fox rightly claims that, despite the massive impact the built environment has on people’s quality of life and the planet’s ecosystems, too little attention has been paid, by both philosophers and design professionals, to the ethical issues involved in thinking carefully about how we build.1 We can recognize this dearth of attention as a serious matter, if we recognize also that, given an increasing population, given an increasing percentage of the world’s population shifting toward the urban, and given the advantages for environmentally sustainable ways of life which cities’ population density offers relative to, say, urban sprawl, then attention paid to the design of sustainable cities, plus the theoretical underpinnings which justify and motivate such design, are probably best thought to form a lynchpin in any successful, long-term, practical approach to addressing the pressing environmental problems we now face in the age of global warming. I first present five main reasons for this dearth of attention, three having to do with philosophers’ predilections and two having to do with the predilections and oversights of design professionals, including the following: the predilection of members of the more technically-oriented design disciplines for treating the key issue connecting design and environmentalism—sustainable development—as a wholly technical problem rather than also an issue about psychological motivation and the motivational power a novel design aesthetic might provide both designers and consumers; and the failure of those in the more aesthetically-oriented design disciplines like architecture to transform the environmental-ethical and quality of life values inherent in the notion of sustainable development into a coherent set of aesthetic values that fundamentally affect what those disciplines mainly emphasize, viz., aesthetic form.2 Second, I discuss why the five reasons for neglect ought be thought not only an impediment to serious, engaged thinking about sustainability and the built environment, but also ought be thought guideposts to the form any plausible, potentially effective ethics of the built
environment ought be put into. Third, I assess Warwick Fox’s theory of responsive cohesion, the only comprehensive theory of the ethics of the built environment on offer, make clear what I take to be its inadequacies in the light of considerations with regard to the guideposts discussed in section two, and, borrowing from recent work in metaethics, the formal theory of value, practical rationality, and environmental ethics, sketch an alternative ethics of the built environment intended to remedy those inadequacies. I conclude that while Fox’s theory and mine differ substantially in approach, they nevertheless coincide with respect to normative claims about the design of built environments, and this consilience provides reason, I argue, to believe that behind our differing approaches exists a substantive core of fundamental ideas that may be the mark of a promising way forward in thinking about the ethics of how we build, design, and live in an age marked by the demands of environmental sustainability, an ever-increasing technological capability, and the rise of thought about ways in which the meeting of those two might best be conceived to yield increases in both ecological health and quality of life.


3 Fox describes his theory of responsive cohesion in detail and then applies it not only to issues having to do with the built environment, but also to many other more standard, widely-recognized problems in applied ethics in his A Theory of General Ethics (Cambridge, MA: MIT Press, 2006). He discusses his theory more briefly, but in the context of a discussion devoted to the ethics of the built environment, in the following: “Architecture,


**Sustainability as preserving intergenerational equity: The acceptable course of action in nuclear power production**

**Taebi, Behnam**

Nuclear power is attracting increasing interest due to the growing world-wide energy demand and the mounting climate change concerns. At the same time, the controversy surrounding nuclear power continues with many people drawing on the notion of sustainability to either reject or accept this technology. I argue that before reflecting on the desirability of nuclear power we first need to narrow the focus on all the potential and impediments behind this technology. Within the boundaries of the nuclear power option I introduce the notion of acceptable course of action, which I approach in terms of our duties towards future generations.

**Current nuclear power production**

Uranium is currently deployed in most operational energy reactors; namely Light Water Reactors (LWR). Naturally occurring uranium contains different constituents (isotopes): i.e. the minor fissile $^{235}\text{U}$ that is capable of producing energy but present in less that 1% and the major $^{238}\text{U}$ isotope (>99%) that is not deployable in an LWR. In a once-through fuel cycle enriched uranium (with increased $^{235}\text{U}$ concentration) will be irradiated once in a reactor before being disposed of as waste for 200,000 years. An alternative method is applying reprocessing and extracting fissile material (uranium and plutonium) from the waste in order to reuse as fuel, reprocessing also diminishes the long-term radiotoxicity of waste with a factor 100.
Sustainability, intergenerational equity and temporal prima facie duties

Sustainability to meet “the needs of the present without compromising the ability of future generations to meet their own needs” [1], inherently entails a degree of equity between generations or intergenerational equity [3, 4]. Assuming that all generations (ours and those that follow) have access to the same finite resources (uranium) and that we might be able to asymmetrically influence their interest, the production of nuclear power - in addition to the longevity of nuclear waste - raises the problem of fairness across generations. Elsewhere I argue that these intergenerational concerns require a commitment on the part of the present generation to ensuring future people’s well-being (understood as resources) and not harming them [6]. In this paper I formulate prima facie duties to the latter if we are to adequately safeguard the interests of future generations. Prima facie duties, as introduced by David Ross, are mandatory unless they are overridden by other morally more important duties [7].

The duty to sustain future well-being

A fundamental issue in theories of intergenerational equity is the appropriate consumption of non-renewable resources over the course of time. Brian Barry proposes that the consumption of natural resources “should be compensated for in the sense that later generations should be left no worse off [...] than they would have been without depletion” [8, p. 519]. This compensation could be provided in case of nuclear power in four different ways. 1) Reprocessing spent fuel and reusing fissile materials as fuel [9]. 2) Applying Nuclear Breeders to produce (or breed) more fuel. 3) Extracting more natural uranium from phosphate deposits and seawater [10]. 4) Deploying naturally more abundant thorium as nuclear fuel [11].

The duty not to harm future people

Leaving behind as few as possible burdens for future generations is another way of preserving intergenerational equity. Reprocessing could be applied from the perspective of reducing the waste life-time, as major constituents of spent fuel (uranium and plutonium) are isolated and recovered in a chemical process (to be reused as fuel) and the waste life-time of the remainder is reduced to 10,000 years [12]. In addition to reprocessing, further deactivating of the waste can be achieved via Partitioning and Transmutation (P&T), which can bring the waste lifetime back to 500 to 1,000 years [13].

Does intergenerational equity provide sufficient moral justification for current action?

Fulfilling these duties require that we apply certain technology which will bring about different burdens and benefits for different generations. The second ‘not harming duty’ could - for instance - stimulate action in favor of P&T thus maximally reducing long-term concerns. However, this scientifically feasible technology requires substantial current investments and developments before it can become an industrial reality [14]. In addition, its application bring about different safety and security concerns for the present generation [15]. To what extent should we expect sacrifices to be made by our contemporaries in order to reduce burdens on future generations? By addressing the arising conflicts between the interests of people belonging to different generations, I argue that preserving equity between generations should be the leitmotiv in all discussions on acceptable courses of action.

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36 Much has been written about the relationship between sustainability and intergenerational equity; see Dobson’s “Fairness and Futurity” [2].

37 In defending this claim I follow Gardiner’s “The Pure Intergenerational Problem” argument [5]; See [6, Sec. 3].
References


A Transition to Sustainable Development for Pakistan: Interfacing Philosophy With Science and Technology in Social Action Research

Ullah Khan, S., Asad Zaman, M., Mandolini, C., Moeller, H.V. & Wensing, E.J.

Taken from an environmental perspective, ontology describes our human relation to all of nature, the ecosphere and our place in it. On the historic heels of postmodernism some within the environmental movement have taken an environmental ontologist’s stance, which encourages selfexploration and personal transformation in our relation to nature. Others have taken an environmental materialist stance, focusing on economic and societal institutional reform (1). Regardless of philosophical stance, the planet, or at least our place on it, is in peril.

Should we charge the environmental ontologists with ineffectual introspection in the face of global crisis? Should we charge the environmental materialists with trying to generate
a pragmatic, weak anthropocentrism one in which, under the guise of corporate social responsibility, social entrepreneurs continue to move humans toward ecosystem collapse even as they attempt to improve human development through a quest to promote a fortune at the bottom of the socioeconomic pyramid?

In this paper we argue that environmental ontology and environmental materialism are not contradictory and must not remain mutually exclusive. Rather, their interface with environmental pragmatism can generate a transition to sustainable development that ensures necessary progress within a sustainable framework (2). Together these perspectives can produce an awareness that a new sustainability ethos is in order and a shift in values is needed: one which we co-develop democratically across all cultures, one in which a high standard of living does not have to correlate with high rate of consumption. To make our argument we utilize the example of our vision for Pakistan and the country’s current capacity for a transition to sustainable development, a future in which science and technology are interfaced with philosophy in a multi-scalar social action research learning network.

Pakistan is currently experiencing a water crisis of scarcity and sanitation (3,4,5,6,7). Each year an estimated 250,000 children die in Pakistan due to water-borne disease (7). This paper introduces the conceptual groundwork underway toward the research and development of multi-scalar action based learning systems that seek to provide safe water throughout the country. Safe and sufficient water is linked to reduced child mortality, reduced poverty, improved education, women's rights, as well as all other key factors toward sustainable development for Pakistan and our world (9,10). Thus, the effective implementation of safe water science and technology will require the convergence of other technologies as well as the interface of broad domestic learning systems not only with regard to water, but as part of a larger network for sustainable development (SD) within Pakistan and in connection with the larger global SD community. Humanitarianism aside, the driver for the development of the SD networks will be the incentives of the economic benefits of becoming an active participant of a socially responsible domestic and international corporate citizenry.

Bordered by Iran and Afghanistan, Pakistan may be a transition zone between militancy and stability. With a historically unstable government, an estimated stockpile of 50 - 120 nuclear weapons, and gradual incursion and settlement of militant groups across its borders, most notably the Taliban, we argue that Pakistan is a pivotal stakeholder in our necessary international effort to achieve lasting global sustainability (11).

Optimistically, Pakistan currently remains an opportunity to bridge science and technology with corporate social responsibility (CSR) and social learning to further sustainable development, stability and security in the region and in our world. As argued in this paper, these broader objectives can be achieved while developing a safe water network throughout the country by engaging the citizenry in local action research/learning to solve domestic problems that includes the transfer of more broad based sustainability science knowledge and technology than the resolution of the water crisis requires.

Environmental pragmatism can play a key role in this “Trojan Horse” approach by reconciling theoretical methodological dilemmas that will continue to flow into ethical problems, not only in the relation of man-nature, but also - and at the same time - man-man and society-individual. The current global crisis is becoming an increasingly profound ethical imperative for us to cogently face and solve, to the best of our current ability, the real-life problems of humanity’s relationship with the environment. We argue that the case of the transition toward sustainable development for Pakistan includes not only regional and global benefits, but will also provide learning systems and research results that, while likely not providing a panacea, will be transposable to other cultural contexts in other countries because it will provide experience with some of the most complex issues of sustainable development currently facing humanity.
A Utilitarian Framework for Assessing Sustainable Technology Transfers

Varner, Gary

Visions of sustainability always include, at least implicitly, both descriptive and normative elements. Everyone agrees that a social system is sustainable only if it is structured in such a way that it will remain practicable into the indefinite future. This is the descriptive element of sustainability. But sustainability always includes – at least implicitly – another, normative element. This consists of a value commitment that allows the user of the term “sustainability” to choose among or prioritize various systems that are each sustainable in the purely descriptive sense. In this paper, I will describe a utilitarian framework for assessing sustainability, illustrating its implications with examples of technology transfers, specifically.

At first blush, the utilitarian perspective would seem to be unsatisfying in its simplicity. For it seems to say only that a technology transfer is good to the extent that it will increase the aggregate happiness of those affected by the transfer, and that a transfer is sustainable if it will do so into the indefinite future. As I will stress, however, this is an oversimplification, and when various complications are taken into account, a utilitarian framework embodies a range of ethical considerations as complex and diverse as those that arise in common sense thinking about sustainability and technology transfer.

Utilitarians are committed to considering – at least in principle – all of the consequences of technology transfers. This includes economic impacts on various segments of the population, but also effects on background social institutions and culturally grounded expectations. This is why utilitarian thinking in general has a degree of conservative bias or inertia. The higher the transition costs are, the larger the benefits have to be in order to justify a technology transfer, and the costs include not only economic hardships imposed on people who benefited from the society’s reliance on earlier, less efficient, less healthy, or less environment-friendly technologies, but also negative emotional reactions rooted in societal customs – however arbitrary those may be from an etic perspective. Reformers find this feature of utilitarianism repulsive, because transition costs include, for instance, economic losses that slave owners suffer during abolition, as well as the feelings of offense that racists suffer in the process and afterwards. Of course when the benefits of a technology transfer are

References


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Visions of sustainability always include, at least implicitly, both descriptive and normative elements. Everyone agrees that a social system is sustainable only if it is structured in such a way that it will remain practicable into the indefinite future. This is the descriptive element of sustainability. But sustainability always includes – at least implicitly – another, normative element. This consists of a value commitment that allows the user of the term “sustainability” to choose among or prioritize various systems that are each sustainable in the purely descriptive sense. In this paper, I will describe a utilitarian framework for assessing sustainability, illustrating its implications with examples of technology transfers, specifically.

At first blush, the utilitarian perspective would seem to be unsatisfying in its simplicity. For it seems to say only that a technology transfer is good to the extent that it will increase the aggregate happiness of those affected by the transfer, and that a transfer is sustainable if it will do so into the indefinite future. As I will stress, however, this is an oversimplification, and when various complications are taken into account, a utilitarian framework embodies a range of ethical considerations as complex and diverse as those that arise in common sense thinking about sustainability and technology transfer.

Utilitarians are committed to considering – at least in principle – all of the consequences of technology transfers. This includes economic impacts on various segments of the population, but also effects on background social institutions and culturally grounded expectations. This is why utilitarian thinking in general has a degree of conservative bias or inertia. The higher the transition costs are, the larger the benefits have to be in order to justify a technology transfer, and the costs include not only economic hardships imposed on people who benefited from the society’s reliance on earlier, less efficient, less healthy, or less environment-friendly technologies, but also negative emotional reactions rooted in societal customs – however arbitrary those may be from an etic perspective. Reformers find this feature of utilitarianism repulsive, because transition costs include, for instance, economic losses that slave owners suffer during abolition, as well as the feelings of offense that racists suffer in the process and afterwards. Of course when the benefits of a technology transfer are
clear enough and large enough in the aggregate – even if only in the long-haul – a technology transfer that significantly disrupts the socio-economic and cultural status quo can be justified. The conservative bias or inertia of utilitarian thinking reflects, however, a healthy concern for the broad range of socioeconomic and cultural effects that should be weighed when assessing technology transfer proposals.

The specific version that I endorse – R.M. Hare’s “two-level” utilitarianism – adds additional nuance to the foregoing account, insofar as Hare argues that good utilitarian grounds can be given for not thinking in explicitly utilitarian terms most of the time. This is because real-world human beings are often (or usually) not in possession of all the data relevant to assessing decisions in utilitarian terms, and even when we are, we are prone to “cook the data” in favor of self-interest. According to Hare, we should therefore internalize a set of “intuitive-level rules” for use in commonly encountered situations, reserving explicitly utilitarian “critical thinking” for unusual cases, for cases in which intuitive-level rules conflict, and for assessing revisions to those intuitive-level rules. The intuitive-level systems of rules appropriate for various societies will differ as a function of background ecological, economic, and technological circumstances, and these rules will give a distinctively non-utilitarian “flavor” to the intuitive moral thinking of different societies. From a Harean perspective, then, intuitive-level system rules help shape the emic perspective of the members of different societies, and technology transfers can alter these emic perspectives by altering the intuitive-level rules that members of those societies should internalize. So from a Harean perspective, although technology transfers should ultimately be evaluated from the explicitly utilitarian perspective of “critical thinking,” the analysis must include effects on the system of intuitive level rules – and therefore the emic perspective – of the target culture and how this will change what it means to be a member of that culture now and in future generations.

In my presentation, I will use actual and hypothetical examples of proposed technology transfers to illustrate all of these surprising complexities of a utilitarian – and specifically Harean – framework for assessing sustainability.
Making Construction Knowledge Explicit: How Architectural Drawings are used in the design process

Ammon, Sabine

Architectural drawings play an important role in the design process. As drawings and plans they convey the impression of the building which is yet to be realized. They serve as a tool for planners when they need to develop their ideas, they serve as a tool for investigators to test their conceptions, they serve as a tool for practitioners as an instruction how to build and they serve as a tool for documentation and further planning.

In my contribution, I am going to explore the functions of architectural drawings in planning and constructing. A special emphasis will be on the question to what extent implicit, practical construction knowledge can be transformed into an explicit form of knowledge. Architectural plans can be seen as knowledge manifestations which represent knowledge in notational systems. However, not any practical knowledge can be transformed into symbols; obviously, there are interesting limitations.

To this day, the major part of the knowledge of architecture is tacit knowledge. For centuries, the knowledge of architecture was handed down as practical and implicit knowledge. In the 19th and 20th century this knowledge becomes more and more mediated in notational systems as civil and structural engineering became on the one hand more and more scientific, on the other hand industrialization demanded for new forms transmitting information. With the beginning of the 21st century this development gets a new grade due to computer-based procedures.

Examples of architectural drawings show how the practical knowledge of architecture becomes explicitly in notational systems. It will be important to ask, which forms of knowledge are represented and mediated and which forms of knowledge cannot be successfully represented and mediated. It will also be asked how this is done. When we start to describe technical architectural drawings, they appear as an agglomeration of diverse notational systems. There are pictorial, graphical, numerical and verbal elements which mediate information only when they are interpreted jointly. Those systematic questions shall be posed considering the rapid development during the last 20 years, which are characterized by an increasing usage of computers. As a consequence, we find an acceleration of constructing processes, an increasing complexity of the working processes and a networking of the agents, related to specialization and internationalization.

Using these case studies allows learning more about the possibilities and limitations of a “rational transformation” of practice. By exploring the dynamic interface between notational forms of knowledge and praxis and action new insights can be expected concerning the traditional dichotomy of theory and praxis. Especially design processes can show that a new theoretic framework needs to be developed in order to describe these effects appropriately. Traditional epistemology not only lacks a distinct vocabulary to describe the realm of praxis, but is also unable to grasp the dynamics of interrelation and mutual dependencies. Therefore, the investigation is embedded in a discussion which cuts across persistent stereotypes such as praxis-implicit-routine and theory-explicit-exploration.
**Design in situ**

**Bamford, Greg**

Design has a new found significance in philosophy with the interest in ‘intelligent design’ on the one hand (Manson 2003) and ‘natural design’, or similar ideas in philosophy of biology, on the other (Allen and Beckoff 1995, Preston 1998, Lewens 2004). Yet there has been relatively little analysis of design as such compared with, say, traditional philosophical concerns for knowledge, perception, imagination, judgement or choice. The attention devoted to the analysis of function, for example, overwhelms that paid to design. Intelligent design and natural design both appear to rely on intuitions about design as a human practice, which intuitions are pressed into service to help make sense of a world that seemingly exhibits design features with or without, respectively, the services of a designer.

But what is design and how does it proceed? What conditions give rise to this practice; why do we design (Bamford 1991)? Under intelligent design, design seems to be elevated beyond recognition as any practice in which as designers we might engage. In natural design, on the other hand, design is short of its ordinary complexity or qualitative richness in a way that does not happen, say, with science in philosophy of science. It is one thing to attempt the reduction of a cultural practice and its products to biology, or to inform an analysis of the former with ideas derived from the latter, but it is quite another not to identify or attend to the properties or features of that practice that need to be accounted for in any such reduction or analysis. Would philosophy of design benefit if God and Nature were to resume their seats? There is some welcome evidence of considering design in situ in, for example, special issues of the journals, *Design Studies* (2002) and *Studies in History and Philosophy of Science* (2006), and elsewhere (Michl 2006).

In this paper, I begin by discussing some presuppositions or statements about intelligent design and, principally, natural design and allied notions, from the perspective of design as a cognitive activity or a human practice (Allen and Beckoff 1995, Preston 1998, 2003, Couvalis and Roux 2007). This discussion is intended to illustrate the value if not primacy of such an analysis. What, then, is it to design something? We need, I think, to distinguish: the possible (or impossible) objects designers conceive and their representations of them; the requirements such objects would satisfy; the problem solving involved in their conception for the conditions under which such objects would be realized; and the novelty of any solution candidate in design. What are the relations between requirements, functions and uses, and between designing, making and using? For example, we can distinguish requirements that are not satisfied by end use functions and functions that are not end uses in design. Artifacts have two kinds of end use function: physical and semantic (or ‘causal’ and ‘status’ agitative functions, Searle 1995). Design problems have a subjective ontology; designs can be disembodied or embodied. There are token designs and various type designs; design has a particular temporal orientation; selection is itself designed and selection occurs at various stages, in designing, making and using. Mapping this terrain is the object of this paper, and reflecting upon some implications for natural design and intelligent design.

**References**


Rational Decision-Making in Engineering Design

Birman, Fernando

I will argue that the rationality of most decisions in engineering design can be best judged with the tools of probabilistic design supplemented by theories of unreliable probabilities. Decision-making in engineering design, unlike (say) decision-making in picking a casual bedfellow or an untested ice-cream flavor, is overall a rational enterprise, which involves, at times, irrational decisions. Decision-makers, which in most real settings of engineering design amount to a group of individuals, select a design \( d_j \) among \( d_1, d_2, \ldots, d_n \) because \( d_j \) maximizes, or is stochastically expected to maximize, utility \( U \). Given designing process, product, and manufacturing attributes \( x = x_1, x_2, \ldots, x_n \) (such as designing time \( x_1 \), product reliability \( x_r \), and manufacturing cost \( x_c \)), design parameters \( y = y_1, y_2, \ldots, y_m \) (like girder elasticity \( y_e \)), use conditions \( q = q_1, q_2, \ldots, q_p \) (like statistical bridge overload \( q_o \)), external constraints \( z = z_1, z_2, \ldots, z_w \) (like moral and legal implications of a design), and what I call the Design Function \( H \), where \( H(y, q, z) = x \), a design \( d_j \)—corresponding to certain values \( y_1, y_2, \ldots, y_m \) for the design parameters and maximizing, or being stochastically expected to maximize, utility \( U \) for the design attributes \( x_1, x_2, \ldots, x_n \) under conditions \( q_1, q_2, \ldots, q_p \) and external constraints \( z_1, z_2, \ldots, z_w \)—will be the rational choice.

Now, the maximization of (expected) utility \( U \) normally requires a process of weighing conflicting values against each other, which can be achieved through the iteration of a voting lottery routine which determines the attribute scaling constants \( k_i \) (which, in turn, determine the value of \( K \)) and the utility function \( u_i(x_i) \) for each single attribute \( x_i \) in (under certainty with independent single utilities):

\[
U(x_1, x_2, \ldots, x_n) = \frac{1}{K} \left[ \prod_{i=1}^{n} (K_i u_i(x_i) + 1) \right] - 1
\]
Now, this approach has been—famously—challenged by noting that no such voting lottery routine can be, as a matter of principle, immune to Arrow’s impossibility theorem: when aggregating votes of rational agents (i.e., agents displaying transitive preference orders), the group rationality (i.e., the transitivity of global preference orders) is not guaranteed. If so, then, the rationality of this utility analysis approach to decision-making in engineering design is compromised. This does not entail, indeed, that decision-making in engineering design is itself irrational. It has been suggested that design decisions may still be rational in a social—or, perhaps, bounded—sense of this word. And it seems plausible that there is a serious case to push along these lines. After all, decision-making involved in designing bridges, computers, satellites, etc., unlike decision-making typically involved in everyday situations like those mentioned above, appears to be mostly a rational activity. But this is not what I want to squabble over here. There is another side of this question, which in my view has been completely overlooked so far, which concerns the problem of allocating a numerical value to these design attributes in the first place. It is usually acknowledged in the literature that several design attributes, like manufacturing cost $x$, are subject to great uncertainty. But there is almost no discussion regarding how to evaluate this uncertainty. Some key design attributes, therefore, are often estimated based on rough approximations or practical conventions—the accuracy of which, of course, determines the accuracy of all numerical ascriptions to $U$. Given the probability density function $f(x_i)$ for each uncertain design attribute $x_i$, the expression for overall expected utility (under risk with independent single utilities) becomes:

$$E[U(x_1, x_2, ..., x_n)] = \frac{1}{K} \left\{ \prod_{i=1}^{n} (K k_i \left[ \max_{x_{i\min}} u_i(x_i) f_i(x_i) dx_i \right] + 1) \right\} - 1$$

or practical conventions—the accuracy of which, of course, determines the accuracy of all numerical ascriptions to $U$. Given the probability density function $f(x_i)$ for each uncertain design attribute $x_i$, the expression for overall expected utility (under risk with independent single utilities) becomes:

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But, as just noted, the introduction of $U$ as a legitimate representation of the utility related to $x_1, x_2, ..., x_n$ for a design $d_j$ depends entirely on the accuracy of $f(x_i)$ as a representation of the probability distribution of attribute $x_i$, for any $x_i$. In other words, and leaving aside the cap set by Arrow’s theorem to any rational calculation of utilities in terms of multiple design attributes (for conflicting attributes not subject to any obligatory preference order), the rationality of a utility analysis approach to engineering design clearly depends on the rationalization, whatever this means exactly, of our dealings with uncertainty. One of the most significant manifestations, in my view, of our current lack of competence in dealing with uncertainty is illustrated by the classical notions of safety factors and safety margins, intended to guard us against so-called aleatory and epistemic sources of risk. I will argue, while studying these problems in detail, that a more rational approach to design is indeed that of probabilistic design—as portrayed by equation (2)—and that some critical problems that arise on this approach can be solved with Sahlin and Gärdenfors’ theory of unreliable probabilities.

References
Franssen, M., (2005), ”Arrow’s Theorem, Multi-Criteria Decision Problems and Multi-Attribute

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Franssen, M., (2005), ”Arrow’s Theorem, Multi-Criteria Decision Problems and Multi-Attribute
Malfunction in manufacturing and beyond

Del Frate, Luca

In this paper, I present new research at the Delft University of Technology, the Netherlands, on the concept of malfunction in engineering. In analyses of this concept, usually two aspects are emphasized. First, malfunction is a phenomenon that engineers aim to avoid. A suitable characterization, in this case, is the definition used by the Technical Council on Forensic Engineering of the American Society of Civil Engineers: “Failure is an unacceptable difference between expected and observed performance” (Leonards 1982). This definition is broad enough to include events spanning from annoying vibrations or excessive deformations to catastrophic collapses (Carper 2001). Second, malfunction is a phenomenon that engineers thoroughly investigate for improving design. Design methodologies like Fault-Tree Analysis, Failure Modes and Effects Analysis (FMEA) have been developed in order to assist engineers in this task. In these methodologies, malfunction is captured by the definition: “the event, or inoperable state, in which any item or part of an item does not, or would not, perform as previously specified” (Military Standard MIL-STD-721C). Moreover, as Henry Petroski has convincingly argued, failures of artifacts in general should be used to advance existent technology, as pointedly exemplified by his title Success through Failure (2006).

In these analyses of malfunction, the focus is lying primarily on the context of use, by the reference to performances, and more implicitly to the context of design, by the reference to specifications.

In this paper, I suggest that the domain of malfunction should be broadened to other contexts or stages of product development and life cycle. Drawing on the notion of life cycle as characterized by, e.g., Hubka and Eder Design Science (1996), products are not only designed and used but are also manufactured, maintained and disposed. For some kinds of artifacts such stages as prototyping, testing, installing, recycling could be present as well. Different sets of aims and requirements apply to each of these stages. In designing, engineers have to cope with all requirements that apply to the life cycle of the product that is at stake: they have to make sure that the product will meet all of them. It is from these...
requirements that are deduced the "expectations" and "specifications" mentioned in the above definitions of failure. When a product fails to meet the requirements that are proper to its functionality in the use context (according to the above definitions) it is malfunctioning in use, or it is, in that sense, unusable. In this paper, I am arguing that the same analysis could be expanded to other life cycle stages as well. I will consider a life cycle composed of just three stages: design, manufacture and use. This is a rather minimal life cycle for an engineered product, but one that is sufficient for me to illustrate my extended notion of malfunction. Drawing on my previous working experience as an engineer in production facilities, and drawing on case studies from forensic engineering, I will show how products can come to malfunction in the manufacture stage. I will explore the parallelism and the differences between products that, failing to meet use requirements, are unusable; and products that, failing to meet manufacturing requirements, are unmakeable. Different scenarios will be analyzed, from single item to product kind failures, as well as the relations between the two stages and with the design stage.

In the final part, I will consider expanding the domain of the proposed model beyond the simple three stages life cycle. Testing the model against more complex life cycles as well as in depth analysis of the relation between failure, requirements and specifications will be the next targets of future work.

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On the prospects of establishing a common framework for the modelling of functions in engineering: meaning variance and taxonomic change

Eck, Dingmar van

The topic of this paper concerns functional modelling in engineering. Erden et al. (2008) state that there currently is no encompassing paradigm for the modelling of functions in engineering, and that their research is aimed to establish one. In this paper I argue against the possibility of establishing an encompassing paradigm for functional modelling in engineering. I develop my claim in terms of Kuhn’s (1987) incommensurability thesis of taxonomic change. I proof my claim by means of a critical analysis of a conversion of functional models, proposed by Ookubo et al. (2007), between the functional basis taxonomy of Stone and Wood (2000) and the functional concept ontology taxonomy of Kitamura et al. (2005/6).

Ookubo et al.’s (2007) proposal for the conversion of functional models between the functional basis taxonomy and the functional concept ontology taxonomy is done under the hypothesis that the functional basis is a taxonomy in which solely functions of devices are described. I argue that this device-oriented perspective on the functional basis taxonomy is mistaken: functions in the functional basis may refer to functions of devices and to functions of user actions (Van Eck, 2008). I further show that the device-oriented perspective of Ookubo et al. (2007) on the functional basis leads them to re-interpret functional basis functions corresponding to user actions as functions carried out by devices (Van Eck, 2008).

I argue that the re-interpretation that occurs in the model conversion illustrates Kuhn’s (1987) incommensurability thesis of taxonomic change. In Kuhn’s (1987) view,
incommensurability as taxonomic change consists of translation failure of kind terms between the taxonomies of alternative theories, caused by meaning differences of these kind terms. These meaning differences result from differences between taxonomies in their criteria for classifying kinds in categories. Differences between taxonomies in their classification schemes for kinds lead to meaning differences between the terms describing these kinds, causing translation failure.

The application of Kuhn’s (1987) concept of taxonomic incommensurability to the model conversion, in my view, shows that the functional basis taxonomy and functional concept ontology taxonomy are partially incommensurable. By reclassifying functional basis functions that correspond to user actions as members of a device function category, a function-to-function translation that preserves the meaning of these functions is blocked. I defend this result of partial incommensurability as evidence against the prospect of establishing an encompassing paradigm for functional modelling in engineering. In order to establish an encompassing paradigm for functions one minimally needs a commonly shared conception of the meaning of a function. Erden et al. (2008) propose such a conception by viewing functions as a bridging concept between purposes and physical behaviours, and by defining functions as intended behaviours. In case of the model conversion, such a commonly shared conception is however lacking; the meaning assigned to some functional basis functions shifts between the functional basis and functional concept ontology taxonomies.

References


To Know in Order to Do – Technological Knowledge as a Guide to Technological Action

Gaycken, Sandro

Technological knowledge primarily exists in order to support technological actions, not to explain the technological world for the mere sake of understanding it. Thus the paradigmatic and central problem of any philosophical investigation in technological knowledge is not how new true, reliable and systematic knowledge is generated, formed or tested, but how an (at that particular point) already existing knowledge is put to good use in a practical, technological situation. This is a manifestly genuine outset. Yet it has rarely been acknowledged. Instead, most approaches investigated topics originating from classical
epistemology or science theory, in turn either identifying only trivial problems or succeeding to identify specific problems, but lacking conceptual ideas to get a good grip on them. My talk will thus present some ideas of what a genuine approach to technological knowledge might look like, putting the element of guiding actions to the core.

The first and main task will be to explore which basic conditions have to be met when action is to be guided by knowledge and how they are met. A model of “working thinking” has to be conceived as a genuine mode of thinking under the pressures of practical success and risk. Assuming a cognitive point of view, two main restraints appear as particularly relevant. The first is quantitative. It comes from our working memory and limits the number of facts we can be explicitly concerned with at the same time. The second is a causal restraint. Our “working thinking” is unable to process causally unconnected phenomena. The central relevance of these restraints can be seen as soon as it is acknowledged that the practical world is usually complex. It is complicated (as consisting of many potentially considerable facts) and partly emergent (as not all causal connections can be known). Thus our “working thinking” has significant shortcomings to actually cope with it in a full sense and these shortcomings have to be compensated by practically maximally optimal cognitive strategies. I will propose two. The first strategy of “hierarchization” aims at ordering our knowledge hierarchically in respect to the practically most relevant facts. The details of a situational practical success and of relevant risks thus order our conceptions and determine our causal ordering of them. The second strategy aims at a “recausalization” of causally unconnected phenomena on different systematic levels whenever they appear in some practical situation. A strange sound from my engine which I am unable to connect to some actual physical context for instance will be recausalized within the distinct system of “malfunctions” which then enables me to causally connect it again and interact practically with it. These basic findings will provide a new framework for the exploration of technological knowledge.

Finally, some advantages of the approach can be demonstrated by applying it to the case. First, a variety of specific topics which have cropped up around the discussion of technological knowledge can be developed systematically from within the new framework. “Implicitization”, “modularization”, “normalization” and “externalization” for instance can be identified as sub-strategies of hierarchization and recausalization. Second, fitting criteria for the genuine evaluation of good and successful technological knowledge can be developed. With technological knowledge conceptualized as an inherent part of technological actions, criteria of practical technical success can be applied transitively to technological knowledge, formulated as functionality, reliability and efficiency along the strategies of hierarchization and recausalization. Third, some basic concepts from traditional epistemology and science theory can be reconsidered for the technological case by placing them on the new framework. Technological causality and technological explanations for instance can be seen as complementing practically insufficient knowledge in accordance with the conditions of our working thinking and a notion of technological knowledge can be proposed as functionally reliable, efficient belief, contrasting the classical view of knowledge as justified and true belief.

Making ethically relevant design decisions in innovative technologies

Jacobs, Urjan

Innovative technologies, such as biotechnology and nanotechnology, pose special ethical difficulties for design engineers because decisions have to be made under large uncertainty and limited knowledge. Moreover, in engineering designs of innovative technologies the designer frequently goes beyond the known operational principle and/or normal configuration. The design problems in such radial designs of innovative technologies are
therefore characterized by fewer limits on the solution space, which results in a more ill-structured design problem. This in contrast to normal designs in which the solution space is more limited, because of the use of a known operational principle and/or normal configuration. Normal design thus results in a more structured design problem. A framework of legislation, regulations, codes and standards is generally available for normal designs. Under certain conditions it can be argued that design engineers just have to follow this politically sanctioned and socially accepted framework to make ethically relevant design choices. However, as a result of the very ill-structured nature of radical design problems, especially in innovative technologies, a regulative framework is missing or can be found to be inadequate.

Design engineers making radical designs thus have to rely on other tools to make ethically relevant design choices. Currently, design engineers can use various tools for decision-making in design, like multi-criteria analysis, satisficing, and quality function deployment (house of quality). However, these three tools have been strongly criticised, because of their inability to cope with uncertainty, unknowns, and value incommensurability. For example, in the multicriteria approach the best design option is selected on the basis of a score that is calculated from performance ratings on several design criteria. Because various design criteria are value laden, this approach assumes the problematic notion of value commensurability. Even though these tools have some fundamental difficulties they are still taught in engineering design curricula and routinely used in engineering design practice. The question arises whether design engineers are aware of these shortcomings and, if so, how they cope with the fundamental difficulties of these tools in making ethically relevant design choices in innovative design.

In three case studies I have explored how design engineers make ethically relevant decisions in the design of innovative technologies and how they use the three criticised tools. In the cases I have followed design teams of graduate and post-graduate students from the TU Delft attempting to design a conceptual process and/or product. The four cases I will present are: (1) a cheese whey permeate case, in which a sustainable solution is sought for waste effluent of cheese fabrication; (2) a taxol harvester case, in which a design is made that aims to improve the production of a natural anti-cancer drug; (3) bio-ethanol case that focuses on an potential production process of biofuels; (4) a terpene case in which a biological platform for terpenoid production is designed.

For each case, the use of the mentioned tools for making ethically relevant design decisions is examined. It will be shown that the design engineers are hardly aware of the criticisms on the tools they regularly apply. The design engineers nonetheless have a general notion that the result of the tools cannot be applied without further deliberation. They seem not to apply the tools to their full extent and/or even used them for a different purpose than intended. Also, it will be shown that this adapted utilisation of the design tools is the result of way engineers deal with the ill-structured nature of design problems. In this way engineers avoid the main pitfalls and make ethically more thought-out decisions, than would be expected from a direct application of these tools. However, this does not imply that the alternative application of the tools in engineering design practice lead to ethically desired decisions in all the cases. Therefore, I will argue that to make ethically desired design decisions in innovative technologies new tools are needed, which are in accordance with the used engineering design approaches.
From nutcracking to assisted driving: Stratified instrumental systems and the modeling of complexity

Jespersen, Bjorn

Traditional engineering design fails to adequately incorporate into its modeling practice the hybridity and stratification of complexes that involve not only technical artefacts but also individual people playing different roles, as well as social institutions such as laws, norms, and regulations. In this talk we propose a novel way of conceptualising this complexity.

We introduce the notion of instrumental system as the central entity of our systems analysis. In general, an instrumental system is a structured complex whose constituents are intentionally arranged in such a way as to transform a particular kind of input into a particular kind of output in a particular way.

An instrumental system is defined to exhibit these three slots in this particular order:

Instrumental system = a {Input, Instrument, User}

We are pretending that ordered n-tuples are capable of representing the sufficient degree of structure. An example of a simple instrumental system would be a nut-cracking system, whose parts are slots for a nut-cracking device, a nut, and an agent. A nut-cracking system is not a mere aggregate of elements, but one hybrid unit straddling two or more ontological spheres.

The correct execution of a well-designed nut-cracking procedure will take the system, if functioning as designed, from one state to another (from being idle to having cracked a nut), and similarly for the agent (from having a whole nut to having a cracked nut). The agent’s motive for executing the procedure is to arrive at the second state, and instrumental systems must serve to bring about such controlled manipulations of their input.

The intuitive way to approach the question of interaction between user and instrument is to ask what ‘button’ the user needs to ‘push’ in the instrument to get it to work. Sometimes there is literally a button to push, as when fetching yourself a cup of coffee from a coffee-vending machine. Oftentimes the ‘button to push’ in the case of a nut-cracking system whose instrument slot is filled by a nutcracker (and not a makeshift nut-cracking instrument like a stone) is its handle. The handle was designed to be grabbed and held by a human hand and is the point of entry of the interface between artefact and user.

A nut-cracking system is a first-order system, since each of its three slots is simple (non-complex). A higher-order instrumental system has at least one complex slot, and any or all of its slots may be complex. That a slot is complex means that the sort of entity that fills it is itself systemic, by being a structure boasting at least two parts: {α, α2, ...}. We identify stratified systems with higher-order systems. An example of a stratified system would be one whose instrument slot was complex, as in

Assisted-driving system = a {Passengers/Goods, {Vehicle, Driver}, Client}.

The client does not himself drive the vehicle serving as a cab, nor is the driver the user of an assisted-driving system. The ‘button’ that the client ‘pushes’ in order to set this system in motion is this time an abstract one: he uses (rudimentary) language to communicate his destination to the driver. Notice that the individual filling the client slot may, but need not, be the individual filling the passenger slot; for instance, a concert organizer may instruct the stretch car driver to pick an opera diva up at the airport and drive her to the venue while not riding along.
The above system counts as a second-order system, because at least one element is a first-order system (here, the instrument slot). So a first-order system is one all of whose \( a_i \) in \( \{a_1, a_2, \ldots \} \) are non-systems (i.e., primitive from the point of view of an instrumental system).

Conversely, when the systemic part of the highest order of an instrumental system is of order \( n \), the entire system is of order \( n+1 \).

Our talk offers a fairly straightforward and intuitive categorization of the complexity of various instrumental systems. This categorization underpins a taxonomy of instrumental systems, detailing the admissible forms of combination of the three kinds of slot. The talk provides an ample supply of examples of different kinds of instrumental system explicated by means of real-life examples.

**Intentions in Artefact Evolution**

Houkes, Wybo

In this paper, I argue that evolutionary approaches to technology are fruitful, despite the common objection that they ignore the role of intentions in artefact use and design. I reconstruct the seemingly deadlocked "intention-evolution controversy" as a successive refinement of both evolutionary models of artefact lineages and intentionalist descriptions of design; and I show how the current state of the art in one particular branch of evolutionary theorizing about artefacts may actually improve our understanding of the role of intentionality in designing.

Evolutionary approaches to technology have existed since Darwin’s times, but have been growing considerably more popular in the last two or three decades. General frameworks for describing the history of technology have been proposed (Basalla 1988), as well as applications of evolutionary concepts and models to particular phenomena, such as the diffusion of technological innovations (Geels 2002) and the rapid advance of technology since the Industrial Revolution (Mokyr 2002). Typically, these accounts are based on generalized or ‘Universal’ Darwinism, which extends evolutionary theory to any population of systems that shows variation, selection and retention (Lewontin 1970).

Despite their evident popularity, theories of artefact evolution continue to spawn controversy. Advocates of both the general theories and models developed for particular phenomena have responded to their critics. But both sides remain unconvinced by the other party’s arguments to such an extent that the same arguments against artefact evolution keep recurring in the literature. I focus on three such arguments: that evolutionary accounts of technology are mere “just-so” stories (Gould 1987); that such accounts run afoul of the essential role of intentions in artefact design (Témkin and Eldredge 2007); and that models of artefact evolution offer no surplus explanatory value over traditional intentionalist descriptions of artefacts (Lewens 2002), and might fail to address the proper explananda altogether (Sober 1992).

Next, I argue that the impression of eternal recurrence of the same arguments may vanish as soon as one focusses on more detailed evolutionary explanations, rather than general conceptual frameworks and narratives. To this effect, I focus on phylogenetic reconstructions of artefact lineages – a particular evolutionary line of work in archaeology (O’Brien and Lyman 2000; O’Brien et al 2001). I argue that these reconstructions offer specific, falsifiable hypotheses about the historical relations between artefacts and between their artefact designers rather than just-so stories – circumventing the storytelling objection.

Then, I consider objections against phylogenetic analyses of artefact lineages. Specifically, it has been pointed out that designing as an intentional activity differs from evolution in such a way that the 'family tree' of an artefact kind would be essentially different.
from the tree of life – and that methods used to reconstruct the latter cannot be fruitfully applied to reconstruct the former. Features of intentional design used to fuel this objection include intra-generational borrowing of solutions; revifying ‘extinct’ solutions; and independent, but quasi-incremental solutions of the same design problem. All these features are supposed to result in idiosyncrasies of the family trees of artefacts – structural oddities that phylogenetic methods are bound to misrepresent or miss altogether.

Advocates of artefact phylogenetics typically respond to these objections by pointing out structurally identical features of natural evolution (Mesoudi et al. 2004; Collard et al. 2006) and calling for more empirical work regarding these features (Gray et al. 2007). In the third part of the paper, I argue that both the intentionalist objections and the ‘business-as-in-biology’ response fail to capture what is conceptually challenging and explanatorily productive in phylogenetic analyses of artefact lineages. Recent advances in phylogenetic methods – such as maximum-likelihood techniques – allow the testing of particular evolutionary hypotheses, i.e., particular trees, rather than reconstructing such trees from scratch. Specific features of artefact designing, such as those pointed out by the critics, can be incorporated in such hypotheses, and subsequently tested. In this way, candidate explanations may draw upon sophisticated combinations of mechanisms, some of which may be mediated by human intentions. The role of intentions in explaining artefact lineages may thus find a place within an evolutionary technique, rather than be replaced by evolutionary concepts; but only after ample reflection on intentionalist mechanisms in artefact designing.

Finally, I briefly sketch two remaining sources of skepticism regarding artefact phylogenetics (the identification of artefact kinds; and the sensitivity of reconstructions to character selection and scarce historical evidence), showing the need for further conceptual and methodological analysis as well as empirical work.

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What's the difference between a 'hammer' and a 'penny':
Knowledge of technical artefacts as artificial kinds

Kerr, Eric T.

Given its ubiquity it is curious that technology has only relatively recently been recognized as a subject worthy of specific epistemological attention. In the philosophy, history, and sociology of scientific knowledge, so-called technical artefacts are typically analyzed only indirectly as tools to accomplish certain epistemic goals. This paper presents some examples of how epistemology of engineering presents specific analytical challenges. One way in which engineering knowledge may be distinguished from much scientific knowledge is by its part orientation towards the tools and artefacts of the discipline. Therefore, an analysis of engineering knowledge ought, at least in part, to be so oriented.

Consider the following uses of 'knows' (and its cognates): knowing that a tin-opener is for opening tins; a computer technician's knowledge of how to recover damaged data from a hard-disk drive; 'S knows which wire is 'earth.' Uses such as these have been categorised by Houkes as 'use know-how' and are suitable candidates for exemplars of knowledge pertaining to technical artefacts. (Houkes, 2006) This paper aims to show that such epistemological classifications cannot be accomplished before sufficient agreement is reached on the referents of these kinds of knowledge claims. Kroes and Meijers, *inter alia*, argue on behalf of a 'dual nature' conception of technical artefacts viz. that technical artefacts have both a structural (i.e. physical) and an intentional (i.e. social) component. 38

The thesis is reminiscent to many of Cartesian mind-body dualism, presumably with a concomitant promise of an extended research project therein. A more promising source of theoretical literature may be found in the Strong Programme in the sociology of scientific knowledge.

We can distinguish three 'kinds' of entity: natural, social, and artificial. First, a diagnosis is presented of the dual nature thesis and its relation to this tripartite ontology. Then, following, in particular, the work of Martin Kusch, it is argued that we should conceive of this dual nature as constituting an *artificial kind*. I demonstrate that conceptualizing artefacts in this way allows us to deal with outstanding issues of design, 'proper' function, use know-how, and normativity. Building upon Kusch's account and a Kripkean causal-historical theory of reference, it is argued that the referents of knowledge claims about technical artefacts allows us to make sense of the distinction between social and artificial kinds – between 'pennies' and 'hammers' - through collective performative referential activity. This theory holds that artificial and social kinds do have a physical structure 'holding' particular functions - pennies, for instance, are metal discs; integrated circuits are silicon 'chips', hammers are made of wood, metal or plastic - but the proper function can only be realized if there is a speech community which takes them to have such a function within a community of designers and users. It is this collective performance - the 'taking to be' - that gives physical structures their social function. I contend that this is the only way to account for normative statements about correct or proper function. An account of normativity absent of this collective performativity cannot, as famously demonstrated by Wittgenstein, make the crucial distinction between 'is right' and 'seems right'. Notions like malfunction', 'error', 'proper/improper', or even 'dispute' can only be made sense of with the inclusion of a community to sanction proper usage. (Wittgenstein, 1973: 258)

The authors of the dual nature thesis are correct to locate a distinction between social and technical artefacts between a function not dependent on physical structure - money may take many physical forms, such as metal discs, paper notes, cheques, plastic cards present accompanied by a signature, and so forth - and a function crucially dependent on physical

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38 See a special issue of Studies in History and Philosophy of Science (vol. 37, 2006), of which the aforementioned Houkes article is part.
structure. However, no physical structure can have a proper function without a sociotechnical community to performatively maintain it as a functional object by referring to it as such, by behaving towards it in a particular way, in other words, by taking it to be a functional object. What distinguishes artificial kinds from natural and social kinds is the kind of references made of them. (Kusch, 1999: 178) Artificial kinds stand between the two cases of natural and social kinds by virtue of the self-referential talk referring to them as a particular kind of thing. This ‘third way’ is beautifully captured by the dual nature thesis which, understood in the preceding manner, has the flexibility to address a range of outstanding problems in the ontology and epistemology of technical artefacts. En passant, we encounter a variety of thought experiments and counter-examples that appear to problematize both dualistic and artificial kind theory of technical artefacts.

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**Is There a Problem about Proper Functions**

Mackey, Robert

The purpose of this paper — or rather, to be philosophically precise, my purpose in writing this paper — is to defend what I will call the historical account of the functions of artifacts and to critique the theory that artifacts have some kind of a dual nature: a physical/chemical structure and functions depicted and understood as intentional properties. Artifacts have at least two kinds of functions: proper functions and accidental functions. By all accounts, if an artifact is used to do the tasks for which it was created, then
it performs its proper function. All other uses of an artifact are its accidental functions. The phenomenological experiences behind this distinction represent the difference in kind between how we perceive, say, a screwdriver is functioning when used on screws and how it is functioning when used occasionally to open a can of paint or hold up a window. The historical account elaborates on this understanding by elucidating and amplifying the multiple purposes behind the creation of artifacts: of the designers, of the producers and of those who allowed, encouraged and/or opposed their creation.

**Acting on Affordances**

Pols, Auke

In this paper I will argue that our current notion of ‘perceived affordance’ is ambiguous between ‘perceived function’ and ‘perceived use’. It is important to resolve this ambiguity, as there is psychological evidence that different brain mechanisms are involved in perceiving function and perceiving use, which would affect how perceived affordances are processed. I will propose a resolution of the ambiguity and show several benefits of it.

Talking about affordances is very popular in design. Coined by the psychologist Gibson (1979) to denote ‘opportunities for action’, their treatment in Norman’s The Design of Everyday Things (1988 [2002]), where Norman emphasizes the importance of perceived affordances in design, has consolidated their importance as a design concept.

The concept of affordances as introduced by Gibson is problematic, however. Sloman (forthcoming) argues it is too narrow, as our ability to perceive affordances is part of our ability to perceive opportunities for events (or the possibility of processes) in general. Vermaas and Houkes (2006), on the other hand, argue it is too broad. They state that perceiving an affordance according to Gibson can mean either perceiving the function of an object or perceiving how an object can be used. In some cases, these might overlap, but this is not always so straightforward. Take Norman’s example of the door that has a long vertical bar for a handle. The function of the door is clear: to let people through, yet the use is uncertain: should you push or pull?

In this paper, I will argue that at least for artefacts, perceiving an artefact’s function and perceiving how an artefact can be used rely on two different neuropsychological mechanisms. I will support my argument with evidence from the psychology of perception and the psychology of tool use. The psychology of perception distinguishes between two major visual pathways in the brain: the ventral stream, which processes semantical and conceptual information (also dubbed the ‘what’ stream), and the dorsal stream, which processes location information and is strongly involved in guiding actions (also dubbed the ‘how’ stream) (Milner and Goodale, 1995). The psychology of tool use has shown that both streams are needed for accurate object recognition and use, and do interact to some degree. However, studies of patients with lesions in either stream indicate that the capacity to determine an artefact’s function and that to use an artefact may well depend on different streams, and are thus on a neuropsychological level at least partly distinct from each other (Goodale, Jakobson and Keilor, 1994; Humphreys and Riddoch, 2001).

Viewing those two capacities as partly distinct allows us to look at several aspects of tool use in a new and fruitful way. This paper will focus on two: use know-how and artefact affordances.

Use know-how has been analysed as having two components: knowledge that a sequence of actions with an artefact will lead to the realisation of a goal, and the skills needed to perform those actions (Houkes, 2006). While Houkes focuses on the first component (e.g. in Houkes and Vermaas, 2004), I will look at the second. Particularly, I will argue that the mechanisms underlying Houkes’s ‘skills’ are involved in more processes than enabling physical action, such as recognising artefacts (Humphreys, 2001).
A second possible application of the two-capacity view is for distinguishing artefact affordances from natural object affordances. Gibson talks about object affordances in general, but given that artefacts are designed to be used for certain functions, we should expect a difference in perceived affordances. Given both capacities, we can distinguish at least two ways in which designers can make artefact affordances easier to perceive, and explain how they work. First, artefact affordances can be tailored to bodily constraints on actions: a door handle is usually positioned so that it can be grasped straightforwardly for someone of average height and fits easily in the hand. This tailoring can make affordances ‘supranormal stimuli’ and thus invoke a strong reaction in the dorsal stream. Second, given the interaction between the two visual pathways, cues for how an artefact can be used can make it easier to perceive an artefact’s function and vice versa. Humphreys (2001) has found evidence that the first effect is stronger: this fits with Norman’s recommendation that if the success of a certain design depends on labels, say ‘push’ or ‘pull’ on the door with the vertical bar for a handle, the design should be improved.

References


Co-design and Pragmatism

Steen, Marc

The paper consists of four sections. In the first part it is argued that industrial design practice is changing in two significant ways. A traditional understanding of industrial design would be that one person or a small group of people design a product and that this product is produced and then used by people in ways that were anticipated by the designer(s). We are currently seeing two shifts. One shift is that industrial design is moving towards organizing processes in which designers, researchers, engineers, marketers, together with (potential) users and stakeholders engage in processes of co-design (ISO 1999; Von Hippel 2005;
The other shift is that design is moving towards facilitating change processes rather than creating finished products. Designers and others involved cannot—or choose not to—predict what people will do with the products they are working on (Oudshoorn and Pinch 2003; Rohracher 2005). Instead, they engage in joint processes of transformation design, of organizational change, resulting in new products or services or processes (Burns et al. 2006; Cottam and Leadbeater 2004; Parker and Heapy 2006). The focus of industrial design shifts from designing a product-as-finished-result to facilitating change co-design-as-a-process.

In the second section it is argued that both practising designers and design theorists need new foundations to understand and organize co-design because the foundations from science and from engineering (as they are typically understood) have become inappropriate (Nelson and Stolterman 2003; Lester and Piore 2004; Krippendorff 2006; Bartneck 2008). Science (assumedly) is concerned with understanding current situations and generating universal truths, whereas design is concerned with envisioning and realizing specific solutions for specific settings. Likewise, engineering (assumedly) focuses on creating an optimal solution for a given problem, whereas design is concerned with exploring and developing the problem and possible solutions in parallel. ‘Design thinking’ (Simon 1981; Cross et al. 1996; Cross 2006; Lawson 2006) is about dealing with ‘wicked problems’ (Buchanan 1995): the problem is not given beforehand, there is not one solution and an understanding of the problem and of possible solution are developed in parallel. Design is about two questions: ‘Where do we want to be?’ and ‘How do we get there?’ (Thackara 2006).

The third section introduces philosophical pragmatism as a way to develop new foundations for design. Especially pragmatists’ focus on practices, on processes of communication and cooperation, on people’s experiences and interests, and their orientation towards future action are relevant here (Hickman 1990; Hickman 2001; Menand 2001; Hildebrand 2008). One part of a text of pragmatist philosopher John Dewey—from Logic: The theory of inquiry (1938, pp. 101-119)—is used to understand co-design as a process of inquiry. According to Dewey, a inquiry consists of five processes, running partly in sequence and partly in parallel: 1) Perceiving a situation as ‘questionable’; 2) Exploring and formulating the problem provisionally; 3) Simultaneously exploring and further developing the problem (‘perceptual’) and possible solutions (‘conceptual’); 4) Reasoning and formulating hypotheses as a way to clarify the relations between problems (ends) and solutions (means); and 5) Conducting experiments, to try-out how solutions can help to solve the problem. Such a process of inquiry is grounded in action and in learning while acting. This perspective draws attention to the importance of communication and cooperation (Keulartz et al. 2004) in co-design and to the ethics and politics of communication and cooperation. One can encourage participants to express and discuss their personal, concrete experiences (ethics), e.g. with the problem or with possible solutions. Likewise, one can encourage participants to express and discuss their respective interests (politics), e.g. their roles in the project or perspectives.

The fourth section provides one example from design practice: a design project in which the author works—combining practice and theory, in the spirit of pragmatism. The goal of this project is to design an ICT system that supports people to engage in co-design. More specifically, the goal is to formulate requirements for a ‘mixed reality’ application—i.e., an application that combines tangible interfaces, augmented reality, augmented virtuality and virtual reality—that supports people to engage in joint urban planning—a form of co-design. In line with Dewey’s ideas, this application will include tools that people can use to express their personal, concrete experiences, e.g. via story-telling (‘user generated content’), as well as tools via which people can express their interests and negotiate with one another (‘serious gaming’). It also supports people to develop a shared understanding of the problem and of possible solutions in an iterative process of communication and cooperation. This attempt to design an ICT system illustrates the conceptualization of co-design as a process of inquiry.
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Philosophy of a silver ring: On things and design/use drivers

Storni, Cristiano

By following the way a new piece of Jewellery came into existence and enter into people’s daily life, the paper aims to theorize the design and use of technological artifacts. The paper will be divided into two parts. The first part of the discussion aims to introduce the concept of Thing. Thing is described as a twofold concept that refers to both a gathering of actors and the issues around which such actors aggregate. The thing is in fact an assembly of people that gather together in order to deliberate on some-thing (Heidegger, 1964; Latour, 2005; Pels et al., 2002). Similarly, thing is also that central something - not well defined – different actors refer to as often the use of the word in everyday language suggests (Brown, 2001, 2005). The articulation of this twofold concept will help to get rid of some of the traditional concepts (particularly those of idea and object and their platonice and Cartesian traditions) and to show what is behind (in term of design) and beyond (in term of use) any given artifact. When in-the-process of being designed or used, artifacts become things in a continuous tension between multiplicity and singularity, solidity and fluidity, possibility and necessity. Here there is always a thing as a gathering and a thing as an issued that mutually shape one another.

In the second part of the paper, I will discuss these series of opposite tendencies in terms of the underlying drivers that change the ontological status of a technological artifact being it in its design or in its use. Here I will initially elaborate on Knorr-Cetina’s concept of object of Knowledge (Knorr-Cetina, 1997, 2001). With this concept, she attempted a translation of Lacan’s notion of thing - that originally refer to the formation of subject and the definition of desire as lack - within science studies by trying to account for the way an object of knowledge (such as quarks, oncogenes ecc…) unfold and come into existence in scientific laboratories. According to her Lacanian inspiration (taken, as she underlined, by Baas, 1996), Knorr-cetina sees the object of knowledge as a structure of lacks and wants that unfold by progressively disclosing new lacks. While this perspective seems particularly accurate in rendering those tendencies toward necessity and singularity as clearly shown in some passages of the case study I provide (especially production by makers and prescriptive use by users), it displays its inadequacy to account for those tendencies toward multiplicity and possibility as many other moments of the case study I provide will show (especially those related with the early conceptualizations of the artifact by designers and with its creative appropriation by users). In order to counter balance Knorr-Cetina’s lacanian lack-driven understanding of the unfolding of scientific object in laboratories, I will introduce an oppose theory of thing and subject-formation which draws on an counter-lacanian definition of desire: desire as a creative drive that precedes both the object and subject (Deleuze and Guattari, 1976, 1983). It is indeed in Deleuze that I will find elements to elaborate on a second kind of driver that might account for different moments in the design and use of technological artifact when the unfolding of events does not seems to be driven by lacks and their progressive disclosure. While for Lacan there is nothing at the center of the thing, for Deleuze there is always a plentitude of possibilities instead. The connection of this two opposite view on the way things unfold will help us to make sense of the many directions technology unfold in its design and use.

To better summarize the two opposed tendencies that characterize the unfolding nature of things and they way their two constitutive parts (the thing as gathering and the thing as issues) relate to one another, I will introduce the metaphor of the wedding by showing that the thing as gathering and that as an issue are always together: in the bad and in the good, in time of (Deleuzian) plenty and in time of (Lacanian) wants.
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A functional analysis of biotechnology

Vermaas, Pieter E.

In this paper I present a general functional analysis of biotechnology, which, I argue, is suited for describing the reproduction and the dissemination of bio-engineered organisms, and for characterising the controllability thereof.

Biotechnology is from a conceptual point of view a challenging intermediate case between biology and technology. It is a problematic case if one wants to cling to the Aristotelian distinction between natural objects and artificial ones: biotechnological items, ranging from artificial vitamins to mules and restored ecosystems, seem to defy this distinction. Yet it is a helpful case if one wants to argue against this traditional distinction and, for instance, manoeuvre artefacts within the realm of (natural) objects that may come in (metaphysically) real kinds.

Biotechnology is a similarly challenging case for the philosophical project of understanding functional descriptions, since the functions of biotechnological items seem to be intermediates between biological and technical functions. Some authors keep away from biotechnological functional descriptions in order to focus on the ‘pure’ biological and the ‘pure’ technical ones, opening the possibility to argue against the existence of a general and uniform account of functions. Yet biotechnological functional descriptions can also be used for giving support to such a general account: the co-existence of separate accounts for biological and technical functions would lead to paradox when applied to biotechnological items.

The account of functions by Dan Sperber (in Margolis & Laurence: Creations of the Mind, Oxford UP) defines a clear position with respect to both the distinction between natural and artificial objects and the issue of whether biological and technical functions can be captured by one account. Sperber rejects the traditional Aristotelian distinction and allows for chimaeric objects like biological artefacts. Yet he keeps the distinction between biological and technical functions by categorising all functions as biological functions, cultural functions or artifactual functions. Biological and cultural functions of items are, roughly speaking, defined as capacities that contribute to the reproduction of those items (in line with the etiological theory of functions), whereas artifactual functions of items are...
defined as capacities for which agents intentionally make or use the items. Sperber's account is meant as a general one that applies to biology and technology, and to biotechnology ranging from pre-industrial breeding and domestication, to high-tech genetic engineering.

In my paper I present Sperber's account of functions and argue that it allows for analysing the creation of bioengineered organisms as proceeding along one of three main functional routes. If the relation between the human beings and the organisms involved is taken as the biological relation of symbiosis, these routes can be identified as *parasitism*, *facultative mutualism* and *obligate mutualism*. Moreover, the functional descriptions of these routes provide, by definition, information about the reproduction and dissemination of the bioengineered organisms. First functional descriptions single out those capacities for which items are reproduced. Second functional descriptions provide information about the mechanism involved in this reproduction: biological functions are capacities that are genetically reproduced, cultural functions are capacities that are socially reproduced, and artifactual functions are capacities that are intentionally reproduced. Using this information, it can be argued that specifically the functional route of facultative mutualism may lead to uncontrollable reproduction and dissemination of bioengineered organisms, since by this route the created organisms can reproduce genetically without being dependent on or locked-in by conditions set by human beings.

The upshot of this analysis is that biotechnology need not be seen as a case that forces one to give up on the distinction between biological and technical functions; by holding on to this distinction one can arrive at a useful analysis of biotechnology and the organisms it creates.

This paper is based on research with Ana Cuevas-Badallo, University of Salamanca, Spain.
The Convergence of Video Games & Military Robotics: What are the Social Implications?

Asaro, Peter Mario

In this talk, I review some recent trends in the design of visual and manual interfaces for military robotics, and their relation to video game interfaces. I argue that the strategic conception of “network centric warfare” that is being promoted by the Pentagon’s Future Combat Systems initiative is playing an active role in the convergence of robotic interfaces and video games. I will present examples of videos, TV ads, websites, and video games that seek to simultaneously recruit, train and sell to online users. The emergence of these hybrid interfaces demonstrates how the embodiment of information is reciprocally shaping new media users and interfaces. This is leading to an increased use of both visual interfaces and manual controllers originally developed for entertainment purposes. I will consider how the video game interfaces genres and technologies are influencing the latest designs of military robotics, including those with lethal capabilities. Furthermore, I will examine the motivations for these trends, including factors such as recruiting and training, as well as pressures to increase automation. The convergence of interfaces and media occurring between video games and military robotics raises serious ethical and social concerns, related to but different from earlier concerns about violent video games. I will consider some of the more significant concerns and their social implications.

Living with robots: A social-philosophical approach to robot ethics

Coeckelbergh, Mark

Scenarios about the introduction of autonomous artificially intelligent robots in our daily lives raise the issue regarding their moral status. If they were to live with us and resemble us in significant ways, then we might feel that we should take them into moral consideration. But should we? Making comparisons to debates on the moral status of animals, I show that the usual way to argue for this claim rests on the identification and proof of relevant properties of an entity such as consciousness, autonomy, adaptability, etc. (Levy, Floridi, etc.). However, I then argue that this approach gets us into trouble for several reasons. In order to avoid these difficulties, I propose a social-philosophical rather than an ontological approach to the issue. Instead of relying on properties, this approach takes social relations as the basis for moral inclusion. Finally, I show the implications of this methodological turn for our arguments concerning the moral inclusion of humans.
The (im)possibilities of re-embodiment

De Preester, Helena

Technics and technology are much more than just an artificial and superficial shell that we could lay down only if we wanted to. They are no ‘external’ phenomena, in the sense of additional and merely accidental features of human existence. In contrast, there are a number of reasons for saying that they make up the reverse side of human embodiment.

Man’s astonishing ability to deal with technical and technological items and his feeling at ease with being mediated to the world via technics and technology, all this is not just due to e.g. man’s opposable thumb that allows extreme dexterity and the manipulation of artefacts and tools. Studies into embodiment show that the bodily roots of technics and technology are also situated deeper into the body. First, in tool use, the tool has the characteristic of withdrawal into the sensorimotor body. Tools and artefacts can literally function as an extension of our sensorimotor bodies. This, of course, presupposes the extensible nature of human embodiment. Research into tool use in monkeys and humans present no general consensus about the processes underlying this. Now, the withdrawal of the tool is considered as an extension of body representations, and now, it is considered as an extension of the representation of peripersonal space. Next, there remains a confusion about whether tools are ‘incorporated’ into the body, or whether they ‘extend’ our body or bodily space. In this lecture, we present a possible clarification of the distinction between body-part and bodily extension, or, in other words, between incorporation into the body and extension of the body. We do so by comparing the processes underlying tool use with those underlying the use of prostheses. Based on a number of recent results from cognitive science, we suggest that the difference between tool use and incorporation is even more profound than expected.

This distinction has important consequences for thinking about technical and technological supplements to the body, since it allows us asking the following questions in such a way that the format of a possible answer is already visible: Is it possible that bodily extensions once become true parts of the body? Can we design tools and instruments of such a kind that the representation of the body in the brain accepts the supplement as something belonging originally to the body? Do not only replacement parts, but also bodily extensions, possibly become body parts? Is modern or future technology of a prosthetic nature? The format of the answers to these questions help us in thinking about the possibilities and impossibilities of reembodiment. Our position is, first, that the present times need a more clear view on what re-embodiment precisely means and involves, and, second, that this is only possible if there exists a sufficiently sharp distinction between ‘merely’ extending the body with artefacts and really incorporating non-corporeal entities into the body. This latter situation really is a situation of re-embodiment, and we would like to treat in more detail in what sense re-embodiment differs from extended embodiment.

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Self-operating machines and (dis)engagements in human technical actions.

Nascimento, Susana

Our general comprehension of technologies and their particular fields has come to acknowledge the crucial roles they play within the human experience, organization and interpretation of the world. Away from basic instrumental and functional views, we now regard the existences, capacities and potentialities of technical objects according to concrete social and human contexts. Furthermore, we can now relate them easily with a particular set of works and notions, recognizing overall how they constitute natural and human milieus (Gilbert Simondon), how they presuppose specific types of organization, ideas, institutions, behaviours, attitudes or actions (Jacques Ellul), how they structure explicit human experiences (Albert Borgmann), how they develop into “forms of life” (Langdon Winner), or yet how they arrange “technological intentionalities” (Don Ihde).

This paper looks for a distinctive examination of diversified epistemological and practical questions concerning the complex relationship between humans and technique, through a particular technical object classified as automaton – an artificial construct that moves by itself or possesses its own internal principle of functioning. Within a framework that includes their more recognizable anthropomorphic and zoomorphic forms, but mostly with reference to whatever aesthetical expressions, we will pursue an enlarged concept of automata, extending it to all mechanisms, machines, robots, or macro and micro systems capable of independent actions in relation to their constructors, operators and/or users.

Epistemologically, in their vitalistic appearance of inorganic independence, the conception of automata has mostly entailed scientific, technical, cultural and ontological metaphors between human and machine, natural and artificial, organic and inorganic. The many projects and histories of automata have contained distinct degrees of self-regulation, often raising questions about their similarities and differences to living beings, and for example in more recent times, pertaining to physical, biological, cybernetic, cognitive and digital interwoven models. In fact, our notions of life and technique have been mostly interdependent, as we have repeatedly used technical metaphors to define living beings, and vice-versa we have built instruments and machines following living models. Such metaphorical crossings between the organic and inorganic fields have been always present in material and symbolic histories of the automata, as showed in detail by the studies of Alfred Chapuis, Edouard Gélis, John Cohen, Philippe Breton, or Jean-Claude Beaune.

Practically, the existence of automata, as machines self-regulated and accordingly independent of human actions and decisions, involves new types of technical mediations in concrete human and social worlds, when considering simpler artefacts. Able to modify their own operations and ways of functioning, in relation to changing circumstances, automata offer us different analytical territories with reference to specific situations. We can select numerous contemporary examples – domotics of environment control, energy management machines and systems, automated equipments commanded by ICT systems, or engenderneering machines – and explore assorted questions about human-machine interface; control and autonomy; human and technical errors; differences and similarities between feminine/masculine, organic/inorganic, body/mind; responses and emotions towards machines, etc. The quite distinct self-functioning of these automata encompasses complex liaisons with possible or required human interventions in technical operations, that is, the automata engage or disengage technical human actions in diverse conditions.

Amid considerations made possible through concrete examples of automata as self-regulated machines, this paper aims ultimately at renewed understandings of human’s relation with technique and its objects, by the recovery of classic and not so classic works within philosophy of technology. As seen more explicitly in the case of automata, there is a complex intertwining between technical means, human action and social worlds. In particular, one may underlie a blurring of neutral and controlled technical action, in view of
robots, machines and systems more and more self-operating, self-sustaining and self-deciding. In general, one can discuss a paradox running through the technical domain, and instantly visible in automata: building independent technical objects and simultaneously searching for more control over technical means and their existences in human worlds. Empirically grounded and contextually sustained, these questions deserve an examination as they refer to intricate ways of technically experiencing and structuring our worlds, mainly in contemporary frameworks intensively meshed with its technical objects.

“Restless Creatures” The human body amongst technique, communication and social practises

Nicolosi, Guido

The paper shows the main limits of the hegemonic cultural framework interpreting body within scientific and technological practises. It analyses the mechanistic and top-down model built around the “myth” of the gene-information binomial and moulding life sciences today. This binomial, informed by the Cartesian dualistic paradigm (res cogitans / res extensa), provides the basis for the construction of an anthropological gaze about the definition of the Human in which human body is compared and “red” as a machine.

In the first part of the paper it is showed the core of this paradigm, that is the idea that body is a materialist machine governed by some “simple” mechanic gears. Genes are the fundamental gears of this machine. They are informational bricks governing body (like information rules computer). Everything of human life (both in biological and social sense) is linked to genes. Genotype is the most important factor, a sort of unchangeable design. In this framework a very little room for the creative action (and essence) of social man is recognised and everything is considered as potentially predestined. This is an informational and neo-Darwinist top-down model whose most important character is to be an abstract (without social and environmental roots) design, individualistically embodied in the flesh.

The paper will try to show how this model is hegemonic in the media through discourse analysis of some metaphors used in articles on scientific matters published in newspapers (not specialized press).

In the second part of the paper, this hegemonic model is criticized according to a transdisciplinary approach. This approach starts from the thought of biologists like Lewontin, philosophers like Oyama, neuro-scientists like Edelman and Damasio, social theorists like Bourdieu and Ingold. They all have an anti-deterministic perspective and they prefer to consider life as a development process. They don’t deny the role of info-genes but they reduce it to the right size.

Using all this contributions, the paper try to present life as a process in which the most important factor of development is the relationship between organism and its environment. A relation whose principal characteristic is a dialogical and unpredictable quality. Organism and its embedded nature is at the centre of this approach. Body, here, is not a machine but a vital process changing the environment (organism creates its environment) and being changed by the environment around him. But this is not only a natural system but a social one too. In fact, in this approach the theory of the radical gap between nature and culture and individual and social is refused. It becomes central the theoretical figure of ‘social practise’ as the locus where all these categories (individual, social, nature, culture) meet each other in a co-creative way. At the same time the ‘social practise’ paradigm put technique in a new very positive light. In fact, through socio-technical practises Man (but animals too) exchange and communicate with nature in a co-creative way. Nothing is definitively predetermined. World (man included) can be always modified. Nothing is in a (definitive) equilibrium state. This aspect criticizes even the radical ecologist ideology. The human agency mediated by social and technical practises (bottom up) is the central focus of this paradigm (Ingold).
In conclusion, this paper tries to propose a theoretical path based on a transdisciplinary approach. In this view, body is considered as a ‘border entity’ amongst the traditional oppositional categories of classic sociology: individual, society, nature and culture. Social practices are seen as the privileged locus on which this “borderness” finds its best “working” conditions. And human agency is considered as embedded in a socio-cultural and communicative matrix. Against both social constructivism and socio-biology, in this perspective, even technique is reconsidered beyond the “natural/artificial” opposition.

Robots and Free Will

Sehon, Scott

Could an artificially intelligent robot have free will and moral responsibility? Even as a hypothetical question, this provides an interesting test for accounts of freedom and agency. But as robots become technologically more sophisticated, this question will become one that society needs to face as an eminently practical matter. Building on my previous work concerning the nature of action explanation and free will, I will argue for a view on which freedom comes in degrees and on which increasingly rational and competent robots will have correspondingly higher degrees of genuine freedom and moral responsibility.

I begin the paper by summarizing an account of action explanation that I have defended in my book, Teleological Realism: Mind, Agency, and Explanation. I argue for a non-causal account of action explanation, according to which common sense psychological explanations of human behavior are irreducibly teleological: we explain behavior by citing the state of affairs towards which the agent was directing her behavior, i.e., by citing the purpose or goal of the behavior. Epistemologically, we arrive at teleological explanations as part of an overall attempt to construct a theory of an agent, and part of our aim is to produce a theory according to which the agent is as rational as possible. Rationality can be judged in different ways, but two are particularly relevant to judging a candidate teleological explanation: the degree to which the explanation makes the behavior appropriate for achieving the goal, and the degree to which the goal is of value. Since these are matters of degree, then goal directedness itself comes in degrees. Turning to free will, I propose that free actions are those that are done for reasons, i.e., those that are genuinely goal directed. Thus, freedom and agency come in degrees and are tied to the extent to which an agent’s behavior can be rationalized.

When applied to robots, this account of freedom and agency has two principal implications. First, if (or, rather, when) robots become such that their behavior is sufficiently intelligent and flexible in a complex array of circumstances, then we will be able to construct interpretive theories of the robots such that they are rationalizable. It will make sense to attribute to them genuine goal directedness, and thus genuine agency and freedom. Second, the freedom of robots will not be an on/off matter. Different robots will have different degrees of freedom, from the negligible degree appropriate to most contemporary robots to the full-blooded agency of androids which have so far only existed in science fiction, but which will inevitably become a reality.

It is often noted that one philosopher’s modus ponens is another’s modus tollens, and that might be thought applicable here. I will have argued that from my account of agency and freedom, we can infer that robotic freedom will ultimately exist, though it will come in degrees. For philosophers who are highly inclined to deny that robots can be free or that their freedom could be a matter of degree, the argument might be turned on its head and seen as an argument against my view of freedom and agency. To answer this charge, I will consider a thought experiment in which we imagine a spectrum of robots from the extremely crude to robots who are indistinguishable from sophisticated and intelligent adult human beings. I will then argue that competing conceptions of freedom (e.g., agent-causationists,
indeterminists, and traditional compatibilists) have to say quite unintuitive things about this spectrum of cases, whereas my account makes much more intuitive sense of the sequence.

Ultimately, I will argue that we are engaged in something like the search for Rawlsian reflective equilibrium. On the highest, most abstract, level, we have theory of free will and the arguments made for it. At the lower, more concrete, level, we have our considered judgments or intuitions about particular cases, like the spectrum of robots. By going back and forth between these levels, we hope to come up with a theory that both seems plausible in the abstract but also accounts for our informed intuitions about cases, from thought experiments or otherwise. And I will suggest that my account achieves a balanced equilibrium, both informing our judgments about cases that are likely not to be hypothetical for long, and in making sense of strongly held intuitive judgments.

Do Posthumanists Dream of Pixilated Sheep? Sandberg’s & Bostrom’s Brain-Emulation Examined and Critiqued

Shores, Corry

In their report “Whole Brain Emulation: A Roadmap,” Anders Sandberg & Nick Bostrom outline the path to developing technology that can simulate brain activity on computers. In their ultimate form, these simulations may allow us to survive our body’s death by allowing us to “mentally upload” our minds. Yet, it is possible this technology cannot fully be realized. Nevertheless, by examining the reasons why the development falls short, we can obtain data that may settle certain philosophical debates regarding human thought and selfhood. In fact, Sandberg & Bostrom defend their plan against possible objections to some of its basic philosophical assumptions. Their purpose is to argue for the feasibility of the technology. At the same time they indicate the sorts of philosophical debates this technology may help decide. To further develop the philosophical issues involved in this technology, we examine some basic presuppositions of their approach: 1) that consciousness is an emergent phenomenon that can emerge also from software programs, 2) even if human brain functioning involves analog computation, we still may produce an emergent consciousness primarily by means of digital computation, and 3) we may use computers to simulate the sort of randomness that is essential to the ways our brains develop. Our examination suggests that there are still problems and alternate considerations that need to be addressed for the Roadmap to have more solid footing: a) their defenses of the digital simulatability of consciousness define analog as being quantitatively different from digital. However, we need to address theories that information-signals from the sense-organs are continuously variable and that they are stored in our memory in this analog form. Thus it could be that the brain receives signals producing uniquely analogical qualia that are not digitally simulatable, b) their explanation for the way that randomness may be used to simulate neurogenesis suggests also that the brains of both the emulation and the original person will develop traits that distinguish them from one another. Yet, the aim is to produce a 1-to-1 copy that is either numerically the same or a continuation of the original person. But it seems that the copy will not even be qualitatively the same, and also it will inevitably be a part of its own unique continuum of divergent development, c) in fact, their criterion for successful emulation is that the simulation bears all ‘relevant properties’ of the original. But if the original person is truly a unique self who is subjected to her own unique random variables, then a successful emulation should be expected to develop into a mind that the original person would slowly come less to identify-with. The question then is, what are the “relevant properties” of our selfhood such that we may continue our own unique existence in a computer simulation? d) it is still not yet clear if human creative thinking can be emulated using digital computation. Moreover, it seems in states of puzzlement our brains experience a failure to ‘compute,’ which forces them to find new ways to process information. Yet it is not clear which computational state is equivalent to human perplexity, and if random variations can
simulate the ways that human minds invent new concepts. Thus our analysis concludes that the development of this technology can provide data for the following philosophical debates: 1) whether consciousness is an emergent phenomenon, 2) if our brains use analog or digital computation, 3) if personal identity is too unique to be simulated, 4) the role and nature of randomness in human cognition, and if 'free will' can be simulated by incorporating random variables, and 5) whether computers can emulate human creative cognition.

Social robots: how to bridge the gap between fantasies and practices?

Smits, Martijn & Daemen, Floortje

In the past, manufacturing prices of robots and their limited capacities made them mainly suitable for factory work. Today however a new generation of robots is brewing, especially in the US and in Japan, due to falling prices and technological developments enlarging their capacities. These new 'social' robots (as distinguished from 'industrial' robots) will occupy social domains outside the factory: they will be used for cleaning, caring, entertainment, education and surveillance, in the household, in hospitals, in restaurants and in war-zones. Imagine: your grandmother taking care of a little robot dog, children learning from a robot-teacher, military robots supervising dangerous areas, being serviced at a desk by a robot receptionist. Expectations are mountain-high, with visions like the 'ubiquitous robot society' and the 'Neo Mechatronic Society'. Bill Gates recently heralded homes with smart mobile devices in 2025. And the South-Korean Ministry of Information and Communication expects that before 2020 every South Korean home will have a robot. Japan expects robots to solve the problems of an ageing society, with its expected lack of workers.

In science and technology studies, few attention has yet been paid to the rise of this second generation of 'social' robots and the new social and ethical issues they raise. This omission might be caused by the limited social skepticism so far on robot developments, few exceptions aside. On the contrary, most recent newspaper articles on the newest types strike a tone of enthusiasm and fascination. The silence on social issues seems to be an omission the more because these developments have been mainly driven by technology so far. Expectations about their future impacts are almost exclusively voiced by robot experts and policy makers and not by the actors in social practices they are designed for. Potential users have not yet been actively involved. At this moment however, few prototypes resemble well-functioning and ready-to-buy machines. Since robots are highly 'autistic' automatons, presupposing very structured environments to work properly, they cannot easily be used as substitutes for nurses and teachers. Social environments need severe adaptations before robots can function properly. Thus, multiple misfits between expectations and the intended social practices can be foreseen. For example, many European citizens abhor the idea of being cared after by a robot nurse. We further expect unintended winners and losers, new risks, new normative questions, new needs, changing responsibilities and new forms of dependence. In our paper, we serve two goals:

- Firstly we describe the potential gaps between the vision of developers and the (future) needs of potential users in six fields of application. We will formulate an agenda of social and ethical issues on social robots that need to be addressed by STS researchers, innovators and policy makers. This agenda aims at opening a broad anticipation and reflection on the meaning of robots in future social practices.

- Secondly we suggest a method aiming at diminishing the gap between expert visions and the needs of practices, called 'vision assessment'. In the autumn following the SPT conference, we will undertake such a vision assessment for some types of robots intended to function in hospital contexts.
Ethical, Legal and Societal Issues in the Strategic Research Agenda of the Coordination Action for Robotics in Europe

Veruggio, Gianmarco & Operto, Fiorella

This paper refers to the activity about Ethical, Legal and Social (ELS) issues developed by School of Robotics in the frame of the Strategic Research Agenda of the Concerted Action for Robotics in Europe (CARE Project).

Europe has a globally successful industrial robotics industry. Building on this is the next logical step for Europe to ensure that its industrial robotics market share is maintained and enlarged in the newly emerging fields of robotics (domestic service, professional service, security and space robotics). Following the Lisbon 2000 recommendations, it has been recommended that the goals of development in science & technology can be achieved more easily if all the stakeholders interested in robotics and in the robotics European market join forces and focus on the converging robotics technologies that are common to many different types of robotic components, products and applications. At the same time, those same directions indicate that stakeholders in the field of ethical, sociological, and cultural fields should be interested in, and partake responsibilities about, the ethical and societal implications which an increased use of robots is going to pose. Essential, for example, are the qualification of European workforces (a target compatible with the Lisbon Strategy), and the management of societal acceptability and change and the adjustment of standards and regulations.

Issues of liability, privacy, employment law, insurance, rights of access, quality of care, and the assignment of responsibility in legal actions involving the use of robots will cut across the robotics applications, from “care of the elderly” to the use of military and security robots. It is certain that these issues will come to dominate the design of more advanced robotic systems and it is important that a dialogue between nontechnical domain experts and robot designers is established so that robot designers can be made aware of their ethical and legal responsibilities to the people that will use and depend on their products. Particular emphasis should be placed on analyzing the impact these issues may have on the design of Advanced Robots and on the infrastructure required for their deployment.

Legal issues surrounding the close interaction between humans and robots both at home, in the workplace, in the entertainment and leisure sectors, and in security; Societal opportunities and challenges arising from the introduction of Advanced Robotics, particularly in healthcare and care for the elderly and for the work-life balance; Societal challenges in work displacement caused by Advanced Robotics; Ethical issues surrounding the introduction of Advanced Robotics; all this wide cultural chapters are to be addressed by all the components of European society.

The primary objective of a Strategic Research Agenda (SRA) for robotics in Europe is to establish a coherent and integrated European robotics research and development strategy, which attracts the commitment of all stakeholders.

The Coordination Action for Robotics in Europe, CARE, is a project funded by the European Commission (Directorate Information Society and Media), under the 6th Framework Programme (1/11/2006-31/10/2009), leaded by KUKA Roboter GmbH and with
15 partners. The objective of CARE is to coordinate the actions and initiatives in the field of robotics in Europe for the first three years of the Framework Programme 7 (FP7). One of CARE main task (and of the Authors, as responsible for these tasks) is to address the broader impact of Advanced Robotics on society assessing the ethical, legal and social surrounding the introduction of Advanced Robots that directly interact with their users in everyday human environments.

**From Tools to Actors: The Emancipation of Robots in Science Fiction**

Weber, Karsten

If one understands the term “Science Fiction” in a broad sense then it would be necessary to take into account literature of the 19th century, for instance Mary Shelley’s *Frankenstein* or E. T. A. Hoffmann’s *Der Sandmann*. Actually, it would be possible even to go back to ancient times and to mention Hephaestus and his artificial maidservants, and in the Middle Ages, one can find the saga of the Jewish Golem. At the beginning of the 20th century Karel Čapek wrote his novel *R.U.R.* (*Rossumovi Universální Roboti*, 1920) and coined the term “robot”. Then, in the 1940s, a vast number of Science Fiction stories dealing with robots was published; particularly Isaac Asimov’s short stories and books have to be taken into account. In all these texts, robots are conceived as servants or slaves, they are fully dependant on their human masters. But even in these early stories, those robots and artificial beings try to escape from subordination and slavery. If one follows the development of Science Fiction during the time of the 1940s until now one will recognizes a common topic of this development: Robots and artificial beings actively try to emancipate themselves from the mastery of humans. This can be understood as the fictional version of theories in STS, in which artefacts are conceived as actors.

Then, beginning in the late 1960s and continuing until now, a new aspect got prominent in Science Fiction: The rebellion and insurrection of machines. The intelligent computer HAL 9000 in Stanley Kubrick’s hallmark motion picture *2001: A Space Odyssey* is one of the first and most striking examples of this issue in Science Fiction. Other examples, among many others, are the robots in the *Terminator* trilogy, in the motion picture *I, Robot*, and in the second trilogy of *Star Wars*. Both, *I, Robot* as well as *Star Wars*, raise a new issue in blockbuster motion pictures that is virulent in Science Fiction and scholarly debates concerning technology for much a longer time: Cyborgs. Now, the technization of humans and the humanization of technology is at stake, the borders between nature and technology are blurring.

Understanding Science Fiction as a medium to reflect attitudes of society towards social challenges helps to realize that most of those questions which are raised in the Call for Papers for Track 10: Robots, cyborgs and artificial life has only one possible answer: It depends. For example: How should we live with robots? That depends on our assumptions on personhood and human rights. If one argues that human rights are preserved for humans, it is very likely that we treat robots like other machines, namely as tools. Given that they will have something like consciousness they probably will see themselves as servants and slaves. But if we are willing to grant human rights to every entity that shows up certain characteristics like consciousness, self-consciousness, and the like then we would have no other option as to treat robots as persons. Therefore, one can argue that our treatment of future robots and artificial beings is dependent on or relative to our conception of a person and our basic moral intuitions concerning persons. In fact, I shall not argue for a moral relativism but rather for a more comprehensive moral universalism that is prepared to grant human rights to non-human persons.

The aim of my proposed talk is to show the development of Science Fiction concerning robots and artificial beings from the early 1950s until now. Furthermore, I will try to show...
that the view on robots and artificial beings in Science Fiction is strongly dependent on the state of technology and on scientific knowledge about human beings and particularly about the mechanisms of mind and brain. Finally, I shall argue that scholarly debates in bioethics concerning heavily handicapped newborns as well as concerning assisted suicide can inform our thinking about robots, cyborgs, and artificial beings.

What do Carebots say about Care?

Wynsberghe, Aimee van

This paper presents insight for policy makers concerning carebots – service robots for the care of persons at home - by making explicit the hidden assumptions presupposed through their design and implementation in care contexts.

The International Federation for Robots reported the use of 6.5 million robots worldwide in 2007, of which 5.5 million were service robots in the home, among other places. The current widespread use of robots in the home invokes a fear for potential misuse in light of the lack of international legislature and/or policy guidelines. Leading roboticist Noel Sharkey has urged the creation of such guidelines for the 'protection of the vulnerable', most notably the elders for which these robots are targeted. The assessment of robots for safe and ethical implementation is flogged with the same difficulties as the assessment of any new technology – a tension between assessing efficiency and assessing quality of life. Current ethical assessments of carebots investigate ethical appropriateness in terms of economic and legal aspects (Decker, 2008); ethical impact in terms of appropriate human-machine relationships (Turkle, 2006); and ethical appropriateness in terms of the needs of elderly persons and the capabilities of robots (Sparrow and Sparrow, 2006). What these studies fail to address is the moral impact of this technology (carebots) on the tradition of care. Specifically, what carebots say about: the value of care, the way the care-receiver and the care-giver perceive themselves, and their relation to each other. To address these concerns we need a deeper understanding of what carebots say about care.

Care ethicists like Joan Tronto and Nel Noddings argue for an espousing of care ethics in politics. Noddings points out the tension between moral obligation and moral support, in terms of home-care and technology, and insists that policy must be developed to encourage and support home care-giving. By revealing the underlying assumptions made by carebots about care we may design a framework within which the use of carebots is morally acceptable and supports the practice of home care-giving as Noddings suggests. To include robots in the care process, various assumptions must be made by both designers and policy developers about the care process and the elements involved in the care process. The aim of this paper is to make explicit the hidden assumptions carebots perpetuate through their design and initiation about the various elements of the care process – the care-giver, the care-receiver, the relationship between the two, and the needs of the care-receiver.

By making explicit the silent traditions found in care, we have shown how the use of robots to fulfill caring tasks: undermines the female and her unique attributes as care-giver; reduces the care-receiver to an object for which technological care is sufficient, commodifies the needs of the care-receiver fragmenting the process of care and fails to recognize the significance of human relationships in care. Designing robots with a particular emphasis on the care-giver as opposed to the care-receiver helps facilitate this goal and may also halt many of the inherent threats faced with the addition of robots into care contexts.
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The Difference of Professional Responsibilities in Engineering: Asbestos Issues and Space Shuttle Challenger Disaster

Atsushi, Fujiki

In this study, I would like to discuss the relation between knowledges that individual engineers have and responsibilities which engineers shall accept for their professional activities by examining the difference of two contrastive cases, the Asbestos Issues and Space Shuttle Challenger Disaster. Here I will describe that engineers are responsible for a certain issue only when they have specific types of knowledge concerning it.

In general, engineering is considered a profession[1, 2, 3]. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity[4]. Engineers have the knowledge about risks or danger in engineering, which most non-professionals cannot have. Therefore, engineers are usually the professionals best qualified to foresee and assess the risks in their field[5]. So they are required to warn the public of technological risks.

However, engineers are not criticized severely in the case of Asbestos Issue. Asbestos is the name given to a number of natural mineral fibers. It possesses useful properties such as high tensile strength, flexibility, resistance to chemical and thermal degradation, and electrical insulation. Asbestos is commonly used as an acoustic insulator, and in thermal insulation, fireproofing and other building materials as well as many products in use today. But asbestos has not only useful properties, but also undesirable ones. When these fibers get into the air they may be inhaled into the lungs, where they can cause significant health problems such as lung disease including asbestosis, lung cancer, or mesothelioma[6]. There were some early warnings on the health risks of asbestos mainly from the 1960s[7]. In spite of their early warnings, global use of asbestos has been continued for several decades. In addition, a lot of countries in Asia, the Far East and Latin America become a new consumer of asbestos, so we can guess that the number of asbestos victims, including potential one, is now increasing. To put it in an extreme way, we may regard the Asbestos Issue as the case that engineers would have failed to warn public of technological risks. However, people commonly do not think that the engineers should take personal or collective responsibilities for Asbestos Issue. They generally think that their nation or some enterprises rather than engineers are responsible for the Asbestos Issues. Because they did not take sufficient prohibitive measures, in spite of that they had a strong authority and enough evidences to restrict the asbestos abuse. The most of engineers have had the expertise which only engineers can obtain, but they did not have enough authority to restrict.

On the other hands, people do not take a similar view in Space Shuttle Challenger Disaster, which is frequently referred to as a typical case in engineering ethics. In this case, Roger Boisjoly, the engineer who found various data of erosion and blow-by of O-rings in the booster, acted as professional to tell his boss that launching the shuttle in extraordinary condition is very risky, and his advices are taken by people as responsible act. In contrast, Robert Lund, vice-president for engineering at Morton Thiokol, took the blame for reversing his decision that we should not launch the shuttle, and his unethical decision are not taken as responsible one. People think that the engineers should take personal or collective responsibilities for this case. These two examples clearly show that there are cases that differ in how to have their responsibilities as profession, although both cases are related to engineering.
Why does such a difference occur? Engineers take professional responsibilities only when they have a specific knowledge and skills which are crucial to avoid these cases. Engineers also had such knowledge in both cases, however, the knowledge was actually widely shared by many other professionals as well as ordinary people in the case of Asbestos Issues.

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Undermining Authenticity or Increasing Autonomy? How Technologies of Self-Transformation Challenge Theories of Responsibility

Christoph Bublitz, Jan

In the discussion on the prospects and perils of neuro-technologies to enhance cognitive and emotional capacities, the notion of authenticity plays a key role. Critics of neuroenhancements suspect that personality traits formed by the help of neuroenhancements are inauthentic as they make persons alienate from their “true self”. Contrarily, proponents appreciate neuroenhancements as tools for self-creation that enable persons to become the way they want to be – authentic. However, authenticity remains a blurred notion as the underlying (metaphysical) views on the “self” and human nature diverge irreconcilably.

At least in one aspect authenticity seems to lie at the heart of normative considerations. There is an alleged relation between authenticity and personal autonomy. Most contemporary accounts of personal autonomy are at least implicitly based on a notion of authenticity: Persons are autonomous – govern themselves – only if they are authentic – true to themselves. Accordingly, major (compatibilist) autonomy accounts stipulate some sense of authenticity as a (necessary) condition for autonomy (G. Dworkin, H. Frankfurt, A. Mele, I. Haji, J. Fischer & M. Ravizza).

If neuroenhancements threaten authenticity, and authenticity is a condition for autonomy, neuroenhancements may undermine personal autonomy. If someone consumes i.e. SSRIs for enhancement purposes, elevates his mood and acts in accordance with his enhanced mind set, he may be deemed inauthentic. And if agents are autonomous only in respect to authentic actions, he is not autonomous. If this line of reasoning can be sustained, it is a strong argument against the use of neuroenhancements. Particularly compatibilist autonomy accounts need to introduce an authenticity criterion, as to them persons can be responsible even if they do not have a “possibility to act otherwise”. Compatibilists have to explain the relevant difference between an agent being compelled to act and being caused to
act (in a deterministic world). Their answer is that persons are responsible because they act from their own mechanisms (Fischer & Ravizza) or according to their own set of preferences. Whether someone's preference structure or mechanism-in-action is his own, is a question of its authenticity. Some accounts stipulate rather strong conditions for authenticity requiring every personality transformation to be under an agent's full control and not being caused by direct brain interventions. Then, most technology-assisted personality transformations render the agent inauthentic and hence nonautonomous.

I will argue to the contrary, claiming that strong authenticity conditions are normatively unconvincing. If someone's personality has undergone a profound and lasting transformation, it does not make sense to consider his former personality authentic and to ascribe to it normative priority. This is true regardless of the means of transformation. A person is and acts in the world with his current personality, and we can neither exempt him from responsibility for his actions because his former personality was different, nor can we – paternalistically – urge (or even compel) him to resort to his former personality as long as he identifies with his present personality. This freedom from paternalism comes at the price of accountability. Furthermore, it is hard to deny that at least some brain interventions that bypass agential control can restore autonomy, i.e. psycho-pharmaceutical treatment of mental illness.

This leaves us with weak authenticity conditions, such as an agent identifying with his personality. These are not – in principle – undermined by the use of neuroenhancements. However, some cases shall be discussed in which weak authenticity has counter-intuitive consequences, highlighting a problem that classical conceptions of praise and punishment, based upon the idea of persons possessing a rather stable and durable personality, have with technologies for rapid and thorough personality transformations.

**Human Values at the Intersection of Technoscientific and Democratic Values**

Crombie, James

What are the points of convergence and symbiosis – or alternatively the points of tension and incompatibility – between technoscience, on the one hand, and democratic and human values, on the other? In one strand of reflexion, technological progress and the advance of scientific knowledge are represented as essential factors in the increasing liberation of the human spirit and the increasing realization of human potential. This is the optimistic reading of the Baconian aphorism according to which knowledge is power. Another tradition reads the same aphorism in a darker light and sees science and technology as hostile to the spontaneous creativity of the human spirit and conducive to the rise of a technocratic tyranny, reminiscent of Lewis Mumford’s “megamachine.” As Gilbert Simondon puts it: “It is difficult to liberate oneself by transferring slavery onto other beings, be they men, animals or machines; to reign over a people of machines enslaving the whole world is still to reign [...].”

One particular point on which technocratic rationality seems to come into conflict with basic democratic values is in the area of popular sovereignty and social policy. What is the place and the use of expert advice and testimony? “The [sovereign] people,” as Isabelle Stengers puts it, in her characterization of the view she is about to question, “must listen to the experts, accept to be realistic, which is to say grown-up and rational, and then decide, in all lucidity [en conscience].” Should certain pharmaceutical products be available on prescription only? Should the possession, use and traffic of other such products be ruled to be a criminal offence? Should a given project to dam a river to regulate flow and produce energy be given the go-ahead? Should the use of fossil fuels be drastically curtailed in order
to stave off apprehended catastrophic climatic change? What is the weight and what is the authority of scientific and technological expertise in decisions such as these?

The spectacle of a democratically elected president who expressed disbelief in the efficacy of antiretroviral drugs in slowing the development of the disease known as AIDS – because he didn’t believe that the virus identified as HIV was the cause of that disease – is a grotesque example of democratic sovereignty gone awry to the detriment of the overall welfare of a population. In an ideal view of historical progress, we may go so far as to wonder whether ignorant politicians and gullible electorates should not turn over such important decisions to those who have a more objective view of things! Can technocratic reason replace the democratic process? Should it?

Isabelle Stengers does not think so. The present paper includes a critical examination of Stengers' account of what makes scientific answers to scientific and technological questions "reliable." It also includes an evaluation of her position that the "submission" which makes laboratory-entities so unique "and the fact that they answer the questions which are asked of them in such a reliable way [should] not become the general model around which all power coalesces."3 It may be true that we can legitimately ask whether and how a whole society can be brought around to recognize the merits of, say, a process like pasteurization. On the other hand, however, we can also ask whether and how engineers can be (legitimately?) forced, by social movements, to "see" certain dangers which they otherwise might have been unwilling to recognize – as western nuclear engineers have, on Stengers' view, contrary to those of the former Eastern Block?4

Stengers' view, confirmed by Simondon’s, is that modern techno-scientific rationality arose in opposition to structures of authority and legitimation which were dominant at the beginning of the modern era. Modern science and technology began as a "puissance de contestation et de transformation des rapports d’autorité."5 The situation has perhaps changed, now that the main institutions of techno-scientific rationality have become the allies of the dominant power structures and the categories of thought associated with them – subject, as in Galileo’s day, to being questioned.

Notes
5. Ibid., p. 89.

Forward-looking responsibilities in R&D networks

Doorn, Neelke

In the last decades increasing attention is paid to the topic of responsibility in technology development and engineering. The topic is most often raised in the context of disasters due to technological failure, such as the Bhopal disaster (Bisarya and Puri 2005; Castileman and Purkavastha 1985; 1991), the explosion of the Challenger (Davis 1998; Harris, Pritchard and Rabins 2005; Vaughan 1996), and the sinking of the Herald of Free Enterprise (Berry 2006; Richardson and Curwen 1995). The discussion of responsibility then typically focuses on questions related to liability and blameworthiness. Asking these questions might suggest that there is one, unambiguous definition of responsibility. This is far from true, however. In moral philosophy, few concepts are more slippery than that of responsibility (Miller 2001: 455). What the questions of liability and blameworthiness share,
is that they both start from a backward-looking sense of responsibility. The question of responsibility is asked, after some undesirable event has occurred. An obvious disadvantage of such an approach is that it does not directly contribute to the prevention of disasters. Only indirectly, if people know that they will be held liable and that they have to repair certain costs, will they be encouraged to prevent bad events from happening. The fundamental problem of backward-looking responsibility in collective settings is that it is prone to the occurrence of the problem of many hands, which is the difficulty, even in principle, to identify the person responsible for a certain outcome (Thompson 1980). Hence, either no-one can be fairly held responsible, or moral responsibility is reduced to causal responsibility which results in an unfair ascription of responsibility.

However, the ascription of responsibility can also refer to something that ought to happen in the future: being responsible then means that an agent has been assigned a certain task or set of obligations to see to it that a certain state of affairs is brought about. In that case we speak of forward-looking responsibilities. In the case of technological development forward-looking responsibilities may, e.g., refer to the task to take certain risks into account during design by taking preventive measures.

In the present paper it is argued that the scholarly literature in engineering ethics seems to be biased towards backward-looking responsibilities, hereby overlooking the opportunities for incorporating ethical reflection during technology development. I will show how different types of responsibilities have different implications for engineering practice in general, and R&D or technological design in particular. I will do so by discussing new trends in the field of engineering ethics, viz. ethical parallel research (van der Burg forthcoming; Zwart et al. 2006). Conceptually this new trend is linked to the notion of ‘midstream modulation’, as first introduced by Macnaughten et al. (2005), and further elaborated by Fisher, Mahajan and Mitcham (2006). Midstream modulation denotes the alteration of R&D activities from within, i.e. during the phase of R&D and not after implementation (downstream) or before start of R&D (upstream). It therewith provides the opportunity for more reflexive participation by scientists and engineers in the internal governance of technology development. Using the example of the development of a new sewage water treatment plant I will show how a focus on forward-looking responsibility may improve technological design.

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Scientific Isolationism: Is it wrong to perform research likely to be used in wrongful ways?

Douglas, Tom

Much past and present scientific research could be used in wrongful ways. Research in nuclear physics is the obvious example, but more recently the major developments with obvious wrongful applications have come from the biomedical sciences (in particular, molecular biology, microbiology, synthetic genomics and behavioural neuroscience). There is a long tradition within the sciences of maintaining that the ethics of engaging in various types of research can be assessed independently of the likely or possible wrongful uses of that research. Call this view scientific isolationism.

Scientific isolationism is often put in terms of moral responsibility; the claim is then that scientists are not morally responsible for the wrongful uses of their research. Alternatively, it may be captured by drawing a sharp distinction between the ethics of research and the ethics of technology. In many cases, however, scientific isolationism is simply assumed without being explicitly stated. For example, in recent decades, many ethicists have added their (implicit) support to scientific isolationism by Democrat solely on the means by which research is conducted when discussing research ethics.

In this paper, I argue that scientific isolationism is mistaken. I first argue that there should be a presumption against scientific isolationism by noting that, outside of science, the ethics of pursuing a course of action is normatively thought to depend at least in part on the wrongful conduct that following the course of action may foreseeably enable. I then assess various positive arguments for scientific isolationism. These appeal to

- The intrinsic value of scientific knowledge
- The doctrine of double effect
- The doctrine of doing and allowing
- The view that the intervention of other moral agents breaks moral significant causal chains (so that if A causes B, but in a way that requires the intervention of another moral agent C, then A is not morally responsible for C)
- The view that individual scientists can have no significant effect on the rate of scientific progress
- The view that it is too difficult to determine how science will be used to make the ethical assessment of science dependent on such predictions

I argue that all of these arguments fail and that we ought therefore to reject scientific isolationism. The ethics of research does, I claim, depend on whether and to what extent that research is likely to be used in wrongful ways. I end by briefly assessing two competing answers to the question ‘when is it wrong to pursue research that is likely to be used in wrongful ways?’ According to the first answer, such research is wrong whenever its expected disvalue of its wrongful uses the expected value of its permissible uses. According to the second answer, it is wrong whenever the expected wrongful uses exceed some threshold of wrongness or likelihood. I tentatively defend the first answer.

Responsibility and the Grounding of Morals: Hans Jonas on Nihilism and the Possibility of a New Ethics

Heikkerö, Topi

This paper focuses on the relationship between technology and ethics and begins by succinctly describing this relationship. It then introduces Hans Jonas’s (1903–1993) thinking on the ethics of technology: his account of nihilism inherent in the modern world view and his attempt to construct a new ethics appropriate for humanity living in a technological era. The paper concludes with a critical assessment of the relevance of Jonas’s thinking.

The question of ethics in a technological culture takes three different forms. First, technological advance can be seen as posing new challenges to ethics, but as isolated issues that can adequately be dealt with piecemeal in such applied ethics fields as bioethics or computer ethics. Second, technology can be argued to be radically transforming the human condition, so that the enormously increased human powers require a kind of ethical thinking, with an associated questioning of the adequacy of traditional ethics. Third, it has been suggested—both triumphantly and with laments—that the very meaning of ethics has been undermined by the modernization process, that ethics as a whole is irrelevant. Hans Jonas, in fact, addressed all three facets of the question. His work in bioethics exemplifies addressing new moral challenges. This paper, however, focuses on his contributions to the second and third part of the question. Jonas perceived that the intellectual justification of moral norms had come to a crisis due to developments in the modern worldview. Jonas argued that at the heart of most, if not all, modern thinking is an assumption of bare being, that being in itself is devoid of good. According to Jonas, forms of dualism analogous to the Cartesian form underlie modern understanding of the world: the human being as consciousness posits "values" and meanings on a world that in itself is empty of value. From this it follows that the relationship between being and good needs to be established with philosophical argument. These arguments often fail and always are open for questioning. In people’s lives this lack of grounding in ethics results in disorientation, arbitrariness of judgment, and lowering of moral standards. Jonas thought that this same state of affairs exists both within value-free science and Heidegger’s ontological thinking—two very different modern approaches to reality.

Based on his analysis of the predicament of modernity, Jonas attempted to think about being in a manner that would not separate being and good from each other. This led him to inquiries about organic being. In The Phenomenon of Life: Toward a Philosophical Biology (1966), he argued for a unique philosophical understanding of biology. According to Jonas, even the simplest forms of life are based on freedom and inwardness. Furthermore, freedom, transcendence, goal-oriented behavior, and value inherent in life increase the more developed the forms of life become, from a simple plant to a human being. Accordingly, Jonas argued that humankind is the highest manifestation of this natural progress toward greater freedom and self-transcendence.

Jonas’s analysis of organic being enabled him to find a twofold solution for the problem of nihilism. First, in organic being, good, obtainable as goals, appears to be inseparable from
being. Second, highlighting the organic life in human beings creates an integral, less dualistic, account of human existence.

The second position in this paper is to briefly describe Jonas’s suggestion for a novel ethics appropriate for the technologized human condition. He outlined this proposal in The Imperative of Responsibility: In Search of an Ethics for the Technological Age (German 1979, English 1984), which became his most read book. In it he attempted to establish a philosophical grounding for a new kind of categorical imperative, the moral duty of present generations to preserve life for future generations.

The paper concludes with a few critical reflections. On the one hand, the paper sides with Jonas in his analysis of the predicament of modernity and argues for the necessity to think about being in ways that do not exclude good. On the other, the paper finds Jonas’s constructive and more particular arguments in many ways problematic but worth further consideration.

The Reflexive Designer: A method for sustainable technology development

Lindblad-Gidlund, Katarina

The often considered most evasive part of the frequently used trinity of sustainability (economical, environmental and social), social sustainability, is also the one we tend to leave behind. It might be justified theoretically due to its complexity in order to operationalise and analyse it (which is put forward by Marshall & Toffel, 2005, among others), but is that reason enough and what are the dangers in doing so? In this article the opposite action strategy is chosen i.e. to actually focus on the concept of social sustainability by Democratization of the relation between social sustainability and development of technology. In doing so, a suggestion is put forward, that design theory could work as framework for further understanding, and that the notion of ‘reflexive design’ (proposed by among others Grin et al. 2004, resting on ‘reflexive Democratization’ by Beck, Giddens & Lash 1994 and ‘the reflective practitioner’ by Schön, 1983) could actually work as a design method to enhance social sustainable technology development. To be more precise, the suggestion here is that what is often forgotten in traditional design methods are (a) the position held by the designer her/himself before even meeting the stake-holders and the claim that technology designers almost act as neutral and (b) therefore could put the major responsibility on the purchaser.

Credibility, legitimacy and growth of social science has for many years been based on a close connection with the idea of Democratization as the important objective in social transformation (Becker et al 1997). And, more importantly, Democratization defined as economic growth and achieved through a western view on rational behaviour (ibid.). This normative foundation for social transformation has also, almost as a hostage, used technology as its crown jewel to illustrate, explain and Democratize its inner logic.

And even if there do exist criticism, as for example the Marxist criticism of Democratization theories, it is not shown in policies and guidelines for societal development. There still exists a traditional development paradigm where new theoretical and conceptual challenges are not taken into account.

One possible explanation for such failures could be found in the perception of these issues as too complex and out of reach, which is claimed here, is happening to the issue of social sustainability in relation to technological development.

The possible impact of such a standpoint is multifaceted, (a) it could delimit the notion of technological development to only include solutions related to economic growth, (b) which in its turn could delimit the possibility to get support for other kinds of technological development paths and (c) which, in the next turn, might hinder us from actually understand the social transformation we are part of and create ways of participating in it.
By using design theory as a foundation for understanding the processes of technology development several options are disclosed. The basic assumption is that development processes are design actions (Löwgren & Stolterman). They are as such co-created in multi diverse contexts and often non-linear and complex. But still, they are design actions i.e. actions stemming from perceptions, notions and ideas of a possible future and the result of the actions are closely connected to these perceptions.

However, these perceptions are not always deliberative, conscious, and elaborated on. They might hide underneath formal and socially accepted norms on development and future. But they will nevertheless unveil themselves in the creations.

In technology related development processes, for example in the creation of an information system, highlighting, elaborating and Democratizing these conscious and unconscious notions and ideas i.e. positions, creates a platform and structure to take social sustainability into account. Not as a traditional view on method (as possible to illustrate and describe as a generic process), but even so, both as a point of departure and line of thought to return to. Reflective design “requires more than the usual involvement of stakeholders and co-producers in design: additionally, such ‘discursive will formation’ requires that institutionally embedded assumptions, knowledge claims, distinctions, roles and identities which are normally taken for granted, must now be critically Democratiza” (Grin et al. 2004:128)

By such an analytical design process, the elusive character of social sustainability is dealt with and focused on without defining it in a too narrow representation. The nonlinear, complex and qualitative dimensions of social sustainability also reveal themselves. And a reflective design process holds potential to turn “a technically good idea into a ‘socially robust’ one by redesigning it, turning side effects into design criteria” (Grin et al, 2004:128, se also Gibbons et al., 1994).

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A Balancing Act: Responsible Technological Development

Melendez, Carlos

Choices over the adoption of certain available technologies are often based on considerations and expectations of using a particular technology in line with some conception of the good life. These choices are often made without regard for the resultant changes in activities that come with the adoption of a new technology. The activities that technology users carry out before and after adoption are often perceived as one (from a plurality or as the singular) way that something is done. That is, some desirable end is attained by the employ of a particular technology. Along with widespread adoption, users come to rely upon that technological application in order to attain the desired good. The desire over that good is informed by needs in accordance with some conception of the good life held by technology adopters.

Actual uses of technological devices and applications often deviate from those uses intended by the developers. That is, the designed-for, expected, uses often fall short of the wide range of use that devices and applications find in “the wild,” or, when widely adopted. This deviation from the intended-for uses and applications results in our having to contend with undesirable or nearly unpredictable outcomes.

As a result, technological development, adoption, and application has implications for social practices and relations. The attainment of the desired end of the user by means of a particular technological application is often at odds with the desired ends of a society because, while conceptions of the good life within a society often overlap, social groups often have very disparate conceptions of the good life. We can examine this relation between socially desirable ends and individually desirable ends if we look to the effects that follow the introduction of certain technologies into developing countries.

In this paper I argue that if we look to the debate surrounding the introduction of genetically modified food and commodity crops into African countries as food aid in 2002, we can see how the responsible adoption and development of technologies involves balance between producers and adopters; and further, a balance among socially desirable ends and individually desirable ends. Responsibility, as regards technological development and adoption, cannot be ascribed solely to the producers, or the adopters.

The case of the 2002 food aid debate shows us how the decisions to accept or refuse food aid that contained genetically modified maize was informed by, on the one hand, the individual needs and individually desirable ends of potential adopters, and, on the other, socially desirable ends (as expressed by policymakers of the various countries involved). While some individuals were loath to consume genetically modified maize because of fear due to an identification genetically modified seed as hazardous, other individuals were eager to acquire genetically modified seed, which was identified as a technological application which would fulfill some individually desirable end: higher crop yield. The actions of the governments involved indicate how expectations over the consequences that would result from the introduction of genetically modified crops to the recipient countries influenced the decisions and actions taken during the debate. In the cases where the recipient countries refused unmilled grain, the expected consequences were perceived to be in conflict with socially desirable ends.
Technological Devices and Responsibility Distributions

Nihlén Fahlquist, Jessica & van de Poel, Ibo

Technological devices sometimes appear to redistribute responsibility. Some devices take over tasks which were previously performed by human beings and examples of this can be found e.g. in aviation. As a consequence, questions on whether and how this reallocation of tasks affects the distribution of responsibility. Some technologies re-distribute responsibility by making it more difficult for the individual to behave irresponsibly, for instance alcohol interlocks in cars. We focus on the V-chip technology to explore the topic of whether and how technological devices affect distributions of responsibility. The V-chip is a television receiver that blocks violent content and it is intended for parents to use in order to manage their child’s television viewing (Wikipedia, http://en.wikipedia.org/wiki/V-chip).

Since 2000, all 13-inch/33 centimetres and larger televisions manufactured in the United States are required to have this technology, but it is up to the parents to decide whether to use it. The blocking of programs is done in accordance with a rating system. The National Association of Broadcasters, the National Cable Television Association and the Motion Picture Association of America established the rating system called "TV Parental Guidelines". The ratings are displayed on the screen for the first 15 seconds of rated programming and the rating together with the V-Chip permit parents to block programs.


The case-relevant question in this paper is the following. Does the V-chip affect responsibility distributions and if so, how? Whereas some argue that the V-chip diminishes parental responsibility, others argue that it is a tool for parents to exercise their responsibility. The more general question is: Does technological devices affect responsibility distributions and if so, how? Moreover, what are the ethical implications of this? If new technologies are likely to re-distribute responsibility it is important to address the question of how responsibility is re-distributed and whether the technology in question affects the distribution of responsibility in a justifiable way. Such insights could also be fed back to the design of new technologies, so contributing to the approach of Value-Sensitive Design.

This paper proceeds as follows. First, we briefly explain what the V-chip is. Second, the arguments for and against the V-chip are presented. Third, the notion of parental responsibility is detangled and discussed and we examine whether the V-chip enhances or diminishes parental responsibility. Fourth, we discuss what the responsibilities of other actors, for example government and TV stations, should be and how it is affected by the introduction of the V-chip. We conclude by discussing what lessons we learn from this case concerning technology and distributions of responsibility.

‘…And lead us (not into) persuasion?’ Ethical issues of Persuasive Technology

Spahn, Andreas

In my presentation, I would like to analyze the challenges that persuasive technologies pose for the autonomy of the user (I). I will then critically evaluate a suggestion that has been made in literature to derive at a fundamental ethical principle of persuasion (Berdichevsky and Neunschwander 1999) that is meant (at least in part) to answer these challenges (II). Finally I will investigate several objections against this attempt and suggest improving the justificatory power of this principle by using a different ethical framework (III).

Often enough, social values can be in conflict with the interests or preferences of individual persons. The change towards a sustainable society, for example, is widely viewed
as crucial for our future. At the same time it is recognized that technology alone cannot bring about a sustainable society. Individual agents need to change their behavior as well. How do we motivate agents such that they realize our social values, even when these values conflict with their own private interests? This is one of the possible fields where persuasive technology comes into the picture. It aims at persuading human agents to behave in socially-valued ways, by giving information, providing feedback, and taking over actions. At the same time, these very technologies raise various ethical questions, many of which have to do with a conflict between the individual values of human agents and the social values that these technologies aim to promote.

It has often been argued that it is difficult to draw the line between strategies of persuasion, manipulation or propaganda (Marlin 2002), making it important to find ethical criteria to distinguish ethical from unethical persuasion. First attempts in the literature to develop an ethical framework for persuasive technologies (Berdichevsky, 1999; Baker, 2001; Fogg, 2003, 211-239; Verbeek 2009) suggest that the role of the ‘autonomy’ of the user is a crucial ethical field of investigation. Classical ethical theory has always emphasized the role of autonomous decisions, especially in the context of neo-Kantian approaches (e.g. Habermas 1995), but also in research done on ‘informed consent’. Persuasive Technology seems to give up this ideal of autonomy, by potentially parternalizing or even manipulation the user.

In coping with the issue of autonomy Berdichevsky and Neuenschwander suggest a ‘golden rule’ of persuasion (Berdichevsky 1999) that could be used as a prima facie guideline for the employment of persuasive technologies. The authors admit however, that this guideline is still in need of further elaboration and justification. They initially follow Rawls’ line of thought in his Theory of Justice (1988), in which he tries to balance individual autonomy and freedom of choice on the one hand with an attempt to justify social inequalities (to a certain extent) on the other hand. Since ‘Persuasion’ also suggests an asymmetrical relation between the persuader and the persuaded, they suggest that a principle in the line of a Rawlsian ‘veil of ignorance’ could be used to cope with the most important ethical issues of persuasive technology.

In my presentation I will consider various objections against this principle, including objections that Berdichevsky and Neuenschwander raise themselves. I will show that most of the objections are, however, based on a factual interpretation of this principle, that suggests taking the interests and values that people actually have as a starting point. The principle could however be made stronger, if it were based on an understanding about which interests and values people should hold, that is which interests could rationally be defended. I will then investigate how communication ethics deals with this very issue: how can we construct ethical norms, that are rational, by starting from factual interests of individuals that are (often) irrational. If I succeed, I will argue, how the same solution found in this context, could be applied also to the debate about ethical principles for persuasive technologies. Finally I will argue, that communication ethics, such as discourse ethics, might generally be an interesting ethical framework for persuasive technologies: after all these technologies obtained their name from a distinguished communicative intersubjective activity: namely “persuasion”. An ethical theory, which also focuses on the intersubjective domain of communication, might thus be a valuable resource when dealing with persuasive technologies.

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A qualitative investigation of scientists’ moral attitudes to science, technology and society

Small, Bruce

Technology provides many morally good outcomes for humans; improved health, life expectancy, living standards, and magnificent democratization. However, as a result of our use of technology, society also faces negative moral outcomes associated with global environmental and social crises. These include: global warming, species extinction, resource depletion, pollution, wealth/resource inequity, and weapons of mass destruction. Science and technology play a causal role in these human induced crises.

Increasingly, public and scientific attention is focusing on social and ethical issues regarding the application of scientific knowledge. Much of the recent attention to ethics and social responsibility in scientific research stems from advances in biotechnology and the debate that has surrounded our enhanced ability to manipulate the genomes of plants and animals (Polkinghorne, 2000). Other developing ‘Promethean’ technologies (Small & Jollands, 2006) such as nuclear, nanotechnology, ICTs, virtual reality, artificial intelligence, robotics, cyborgism, and cognitive and neural technologies also warrant particular ethical and social consideration. Convergence of these technologies will exponentially increase human power over nature, making ethical and social analysis even more imperative.

However, the social role of science has been under scrutiny by both the public and the scientific community since the Second World War and the development of nuclear technology (Nicholas 1999). Public and scientific concern regarding the environmental impacts of the applications of modern science and technology has continued to grow since the publication of Rachel Carson’s (1962) *Silent Spring*.

Lenk (1983) argued that as science penetrates deeper into the mysteries of nature, technologies become correspondingly more powerful in their reach and effects throughout the natural and social environments. He contended that our increased technological power warrants an extended ethic concerned with the future of humankind, other creatures dependent upon human power, and the dignity of nature. Similarly, Petrinovich (1999) argues that the increasing power and ubiquity of modern science and technology necessitates an increased deliberation of social responsibility and justice associated with new technologies and their potential applications.

Ziman (1998 p.1813) observed that the products of science have “become more tightly woven into the social fabric” necessitating scientists “having to perform new roles in which ethical considerations can no longer be swept aside.” Ziman suggested that individual scientists must become more sensitive to the impacts of science on society and the resulting social and ethical issues.

Scientists, as the developers of new knowledge and technology, clearly have an important role to play regarding the social and moral impacts of technology on society. This paper presents results from a piece of qualitative empirical ethics research investigating New Zealand scientists’ attitudes to the moral responsibilities of science and scientists in society.

Unstructured interviews of New Zealand scientists (n=22), working in fields related to gene technology, were conducted to investigate their attitudes towards social responsibility...
in scientific research. The data corpus (interview transcripts) were analysed using the method of thematic analyses as described by Braun and Clarke (2006). Relevant text segments were coded and, based on conceptual similarities, grouped into manifest themes and sub-themes. Next, thematic maps of the data were developed in order to interpret the meanings and relationships between themes. Three main themes were developed and described. These themes are 1) Doing Good, 2) Engagement, and 3) Compliance.

Doing Good describes participants’ beliefs about the responsibility of science and scientists to ‘do good’. It covers a range of attitudes from ‘do no harm’ and ‘there is no imperative for science and scientists to do good’ through to ‘science should be done for the public good’. Sub-themes of Doing Good are: knowledge (moral and ethical status), technology (moral and ethical status) and foresighting (a moral responsibility).

Engagement describes participants’ beliefs about scientists’ and the science community’s responsibility to engage and communicate with society. The sub-themes of engagement are: informing society (about science, technology and potential societal impacts), becoming informed (about society’s beliefs and attitudes regarding science and technology), and democratization (public participation in science and the setting of the science agenda).

Compliance describes participants’ beliefs about scientists’ responsibility to comply with various social and moral norms, regulations and laws. Sub-themes identified under Compliance include: societal mores, personal values, laws and regulations, and scientific norms.

A wide range of attitudes were expressed by study participants demonstrating that scientists are struggling to come to terms with new moral responsibilities arising from the development of Promethean technologies.

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Between Personal Acceptance and Public Acceptability: The Bioethics of Fashioning Flesh – not just Designer Vaginas and Penis Enhancements

Tomasini, Floris & O’Neill, Fiona K.

Where do we locate the responsibility for fashioning flesh? For example in the juxtaposition between plastic and cosmetic surgeries, there is a distinction between what is necessary and what is possible; between clinical need and cosmetic desire.

We can locate responsibility within ourselves and, or with others. There are a spectrum of possibilities between these extremes where taking responsibility, for both cosmetic and plastic surgery, rests with how the individual perceives themselves and their embodied needs with respect to society.

We will discuss the psycho-social motivations that underpin different kinds of decision-making in the fashioning of flesh; from informed patient choice to consumer options. Here we examine the tensions between self acceptance and public acceptability, ontological (in)security and its effect upon our sense of responsibility in contemplating different forms of fashion flesh. We argue that the ontologically secure, self-accepting individual is more likely to make authentic (existential) choices; because basic trust in the self is necessary for an agency that chooses itself and its embodiment, over social norms or pressures. Here responsibility is about making personal choices that fit within the care of the self. In contrast, we argue that the ontologically insecure are more concerned with public acceptability in their desire, need, or even addiction to fashioning flesh, where care of the self becomes a public commodity open to the judgment of others. Here responsibility is about making prudential options, to fit with a publicly acceptable image of what and how one should be in the eyes of others. In thinking through these issues we must not ignore the political power of fashioning. That is the conundrum and paradox that lies between the connotations of the fashion and to fashion; and the ramifications these have within the market for innovative treatments and enhancements. Remembering, that bespoke items have always been the height of fashion, whereas mass consumption has become the goal of fashion, even for flesh.

There is no simple either/or here: responsibility for fashioning flesh may be motivated more or less by personal acceptance and public acceptability. We democrati three main psychological tensions along a shifting scale, where the nature, agency and location of responsibility can change:

A) When public acceptability is paramount and personal acceptance is unsupported and even eclipsed, then responsibility focuses on the opinion of others. This is illustrated by responsibility that is located externally, in the service that surgeons or others offer. In which case, responsibility becomes a matter of prudence and/or carelessness within plastic and cosmetic surgery options.

B) When public acceptability is understood with reference to personal acceptance then responsibility is brought within the realm of authentic personal choice. This can be sensitive to the opinion of others, but in no way needs to be totally dominated by them. For example, surgery may be less a decision about ‘fashion’ per se and a more a decision about what we can pragmatically live with in relation to the opinion of others.

C) When personal acceptance is paramount and public acceptability is inconsequential, responsibility for treatment or enhancement becomes a completely authentic choice which can be both personal and, or political – some times playfully so. For example, surgery may be both trend setting and/or deemed unnecessary by an individual, quite often provoking, the aversion of others.
We shall discuss these issues through the following examples:
- Breast surgeries across genders, necessary and elective choices – reconstruction, enhancement, reduction and transsexual surgery.
- Personal and social motivations for designer vaginas and penis enhancements.
- Future-present technologies and the market for somatechnic enhancements.

**Material role responsibility**

Waelbers, Katinka

In high-technological societies, the complex questions concerning technologies and responsibility are increasingly pressing. After two centuries of experiencing both the blessings and troubles of ongoing technological revolutions, many people shall accept a need for increased responsibility in the development, management and use of technologies. To be able to deal with the many problems we are facing and to work towards more desirable outcomes, we need to take more forward looking responsibility.

However, due to the problem of the many hands and due to the difficulty of foreseeing the consequences, distributing responsibility is complex. While so many people are involved in the development, use and management of technology, each fulfilling their own limited tasks, it is hard to get a grip on whose actions will lead to which outcomes. Every human actor becomes just a cog in the machine, and asking someone in particular to take a more proactive stance quickly becomes arbitrary. Also the understanding that it is hard, if not impossible to foresee the consequences does not provide an inviting basis for being more proactive. To fairly ask for more forward looking responsibility, we should have a clearer understanding of the mechanisms of technological impacts.

The mainly sociological Science Technology and Society (STS) studies and philosophy of technology work—often together—to develop a broader understanding of the complexity of the impacts of technologies and their steerability. One of the most influential schools within STS and philosophy of technology is based on Bruno Latour’s work, which argues theoretically and empirically that the impacts of technologies can often not be sufficiently described in terms of risks or side effects, since just focusing on the side effects ignores the way in which technologies affect or co-shape our actions. This theory of co-shaping or “mediation” can lead to an explanation of the mechanisms behind substantial, unintended influences that are hard to explain otherwise.

But mediation theory is also problematic for it adopts solely an output oriented view on agency, and ignores the reasons for actions. For good reasons, Latour claims that both humans and technologies are exerting power within a network. In the networks, humans cannot be seen as individuals, free and autonomous actors, and neither should technologies be understood as passive or neutral regarding to the interaction with humans. But if we only focus on the outcomes of the interaction within networks, we do not have a starting point for becoming more responsible, since reflection about our reasons for action is what can make us responsible agents.

To work on this problem, it is important to 1) reformulate mediation theory so that it incorporates reasons for actions, and 2) to find an understanding of human agency that does not make the modernist mistake to assume an atomist agent, but that still empowers us to take more responsibility. For this, we need a moral philosophy that is receptive to the idea that people act and live in a social context that provides them with reasons for actions. This paper argues that such a moral philosophy can be found in the practice oriented ethics of Alasdair MacIntyre. MacIntyre elaborates extensively on what it means to be a dependent human agent: biological vulnerabilities and social interdependence provide us with reasons for actions. But he also explains how people can work to become more responsible while being socially interdependent and biologically vulnerable by using the capacity of practical reasoning. Therefore MacIntyre's understanding of human agency can enrich technology.
However, MacIntyre has not written much on the social role of technology. So, the question is whether we can still be autonomous in the MacIntyrean sense of the word if we accept that technologies also play an important role in shaping our actions. By showing that technological mediation of human actions often actually means that technologies alter the reasons for human actions (just like changes in the biological and social sphere do), but not the human capacity of reasoning (e.g., reflecting), we can argue that we are still able to take more proactive responsibility, even though the consequences of the interactions between the practices within the networks are hard to foresee.

41 At least as long as we are not talking about deep brain stimulation, psycho-pharmaceuticals, brain implants and other technologies that alter our capacities to reflect.
3 perspectives of cultural variations of values for aid assisted ICT Governance projects

Aleem Ahmed, Malik

Technology Alteration (Design and Management) Framework proposes that the content design and management modalities of Information and Communication technology transferring projects e.g. for aid assisted ICT Governance projects should be customized, modified and if needed altered according to the cultural variations of values of the specific developing country for the successful implementation and sustainable operations (ABC 2008). In our previous work, we suggested that “cultural variations of values” can be seen from three different perspectives i.e. cultural variations of values with respect to 1) Concept, 2) Emphasis, and 3) Practice (e.g. see ABC and XYZ 2008).

Firstly, same value might have varied conceptual meanings in different cultural and moral systems e.g. people in a Western society and that of Eastern society may put emphasis on privacy. But privacy might be perceived differently in different countries (Milberg et al. 1995). Similarly, collectivism in Pakistan may mean collectivism in terms of more emphasis on family whereas collectivism in Japan may mean collectivism in terms of more emphasis on community. “Different religions and cultural traditions might agree that freedom, justice and peace are moral ideals, but their perspective upon, and understandings of, those moral ideals will differ” (Grenholm 2007). This means that variations with respect to concept of the values exist in different cultures and societies. We refer it to as “cultural variations of values with respect to concept”.

Secondly, in different cultures and moral systems, people put different emphasis on same values i.e. cultural variations of values exist between the people of different countries with respect to the emphasis they put on a value e.g. Collectivism is a value. Hofstede (1991) work shows that people in Pakistan put more emphasis on Collectivism than people in United States of America. We may say that people in United States of America put more emphasis on Individualism or we may say that people in United States put lower emphasis on collectivism meaning “cultural variations of value (collectivism) with respect to emphasis” exist between both societies. Similarly people in The Netherlands put more emphasis on self-expression whereas people in Pakistan put less emphasis on the same value (e.g. see Inglehart n.d.). We refer it to as “cultural variations of values with respect to emphasis”.

Thirdly, the term cultural variations of values also implies that people may put emphasis on the value but “cultural variations with respect to practice” might exist i.e. in one society people acknowledge and practice according to the value but in another society people acknowledge but don’t practice fully according to the value. For an example, people in two countries may acknowledge the importance of Trust; but in one country, people trust each other but in the other because of corruption and poverty, people might not trust others to the extent they should be. “Cultural variations of values with respect to practice” might be the consequence of “cultural variations of values with respect to concept” or “cultural variations of values with respect to emphasis”. In this paper we would explore these perspectives in details.

We would also propose a “cultural variations of values matrix” which can be used to elaborate the cultural variations of identified values with respect to concept, emphasis and practice. To illustrate an example we would use the data from the 4th wave of World Values Survey of a developed & technology producing country and a developing & technology
consuming country. In the end we would argue that in case of cultural variation of a value with any of the 3 perspectives exist between the technology producing (developed) country and technology consuming (developing or under developed country) then stakeholders have to take into account that variation while conceiving and implementing ICT Governance projects for a developing country.

References

1. ABC
2. ABC & XYZ
socio-economical and infrastructural situation of countries may be different. One needs to be mindful that technology transfer from one environment to the other is not the answer particularly in cases where the environmental set up is different. The impact of the western values in use will be assessed as well.

The commonality of the challenges in the health sector across developing countries will give a good basis to generalise the Malawi situation although the magnitude is different. Although globalized innovations are believed to both facilitate new forms of experience and engender dilemmas that call for critical philosophical inquiry, the later is more common in developing countries. This poses the question of the reality of virtual reality in developing countries.

**Questioning the Cultural and the Technological Realm through the Conservation of ‘Global’ (?) Cultural Heritage**

Kokkinos, Charalampos

Modern science and technology (as crucial outcomes of Modernity) continuously supply everyday life with even more sophisticated practical applications, while at the same time degrading its theoretical compound on all the levels of social milieu. Moreover, and despite the addiction, one could say, of modern societies to a kind of ‘technological way of life’, there is actually a lack of a critical study of the technological phenomenon, especially in its relationship with cultural heritage.

The product of technics, the technological object, presents itself in the modern era as the result of a ‘normal’ procedure, and thus the social nexus that supports its production, and, mostly, ‘justifies’ it, is never completely revealed. There are many cases where the production of a ready-to-be-consumed product has utilized unlawful means of exploiting human power. The reign of the ‘civilized’ world over the majority of the modern society is already a well-known function that tends to become ‘rationalized’ and thus to appear as the only solution for the accumulating impasses of the West. It is this rationale that leads to the degradation of certain crucial issues at the hierarchy of social action.

In this paper, I attempt to describe the impact of technology on civilization, as it has mainly been shaped by the changes that have been observed in the ways material evidence is received in modern society. The manmade heritage of material objects influences the shaping of the collective experience to a great degree, registering events and situations in the social memory. The components of the outer world are the physical presence and the ‘imprinted experience’ of the members of each community. I follow the idea that reality is never given to us in a ‘pure’, ‘naked’ form. There is no dualism between reality and mind: Reality in itself does not stand on the one side as an object, independent, pure, given, neutral and indifferent and accordingly, the human mind is not self-contained and self-reliant, as an acting subject, which is always ready to take advantage of the nakedness of reality in order to penetrate it. Reality and mind, phenomena and perception are always socially shaped.

Exploring the concept of the ‘artifact’, we can see the ‘socialization’ of the objects that gives them a unique ‘nature’. On the other hand, the wind of globalization that blows fiercely, and not only in the economic and political fields, has influenced decisively the concepts of culture and of technological civilization. In this way, it provides concrete arguments to all those who argue for the perpetuation of the status quo concerning the residence of important monuments far away from the place in which they were initially found.

My aim is to grasp certain critical points that bring to the fore, on the one hand, the widening of the cultural condition and, on the other hand, the intrusion of technological thought in our mental activities.
I claim that the vision of a culture, which will be common possession of all humanity, presupposes the respect of every country’s right to possess and take care of its own cultural heritage. In this context, a philosophy of technology must focus on a theory of interpretation of technological civilization, placing in the epicentre of its interest the social dimension of artifacts.

References


The Reality of Virtual Reality in Developing Countries

Lake, Brain

This paper questions how ‘open source’ has influenced thinking about and development of public policy in the European Union. The emergence of open source software represents a comparatively recent approach to the development and distribution of information technologies, coinciding with the rapid growth of the Internet and the growing perception of an ‘information society’ as emblematic of a new social reality – a new way of doing things.

Leading software companies have engaged with open source through selective adoption of the multiple licensing and operating strategies available to them. The use of open source products and methods has become less controversial as software, hardware, and service providers have embraced their use and implicitly acceded to the conventions that characterise open-source development.

Such conventions did not simply emerge ready-made for unconditional application by interested parties. The influence of charismatic individuals including Richard Stallman, Eric
Raymond, and Linus Torvalds has in many cases defined the core philosophy and norms of the open source movement. In other cases, development communities work towards a common goal, often with the leadership or encouragement of ‘champions’. (Alexy and Henkel 2008; Barcellini, Détenne et al. 2008)

The impact of open-source and its influence as a social phenomenon have not gone unnoticed outside the software development community. The idea of ‘openness’ is described using such key terms as, ‘communal management and open access to the informational resources for production, openness to contributors from a diverse range of users/producers, flat hierarchies, and a fluid organisational structure’. (Lovink, Anderson et al. 2006) These terms are used to describe software development and increasingly, cultural and political groupings. The “…self-evident’ realisation of a ‘voluntary global community empowered and explicitly authorised to reverse engineer, learn from, improve and use-validate its own tools and products seems to indicate that it has to be taken seriously as a potential source of organising for other realms of endeavour”. (Lovink, Anderson et al. 2006)

Douglas Rushkoff argues that the open source development model can be usefully applied to democratic processes, advocating it as a template for the rise of an open-ended participatory process within what he describes as a ‘networked democracy’. (Rushkoff 2003) Biella Coleman attributes the popularity of open source beyond the software realm to a ‘transpolitical appeal’, in which traditional notions of the left, right, and centre no longer apply. (Lovink, Anderson et al. 2006) This “…has enabled FLOSS to explode from a niche and academic endeavour into a creative sphere of socio-political and technical influence bolstered by the Internet”. (Lovink, Anderson et al. 2006)

These socio-political conceptions of open source are problematic in two ways. First, they are applied retrospectively, asking how open source practices can be applied to existing political processes. No attempt is made to account for the underlying mechanics of the open source ‘social group’ or to determine if it exists as a coherent and describable social entity. Secondly, it fails to note that many of the constituencies making use of open source see themselves as fundamentally opposed.

Open source use and development has generated a coherent political entity with identifiable norms and interests that are operationalised though political advocacy. This paper proposes a theoretical framework for the analysis of the impact of open source on what can be called the European Union’s institutional discourse – its process of crafting public policy. In doing so we encounter “…a high degree of intertextual and interdiscursive complexity. Discursive acts/symbolic practices are embedded in other discursive acts/symbolic practices and so forth”. (Wodak and Chilton 2005) In essence, open source represents a single strand of discourse amongst many thousands. This discourse may be part of an older discussion, it may overlap with others, or it may be interconnected. Within the field of discourse theory, this is referred to as interdiscursivity. (Wetherell, Taylor et al. 2001; Wodak and Chilton 2005)

The challenge in operationalising a constructed social theory about open source lies in clarifying the basic theoretical assumptions under which to proceed, and developing conceptual tools capable of connecting the analysis of texts and other types of discourse with political theories on institutions, actions and social structures.

This paper constructs a new-institutionalist theory of the politics of open source using critical discourse analysis to study an illustrative case – that of the EU’s proposed directive on software patentability. It seeks to provide insight into how open source as a politically influential institution has impacted a policy process of direct interest to the software industry. It further seeks to provide an indication as to how future interactions between open source and policy processes may unfold.
References


The Conflict between Growth and Goodness in International Development Policy

Moore, Erin Christine

The "Age of Development" – roughly the last half of the twentieth century – was initiated and defended on the grounds that certain areas of the world (underdeveloped nations, or regions within nations) suffer unnecessarily, and it is the responsibility of those who have climbed out of poverty, disease, and superstition (developed nations) to help them out of their abject but reversible situation. The leading nations of the West thus promulgated their own philosophy of history: all societies worldwide, unless arrested by one or another force, were seen as passing through a set of stages culminating in a state of 'maturity' where they would eventually meet the glorious condition exemplified by, among others, post-war America. As I will demonstrate, in development policy the goal of global development is most often phrased in the language of moral responsibility, where leaders act to fulfill the imperative of a consumer-oriented Lebensphilosophie. Characteristic of this philosophy is the use of technical, quantitative evidence to adjudicate so-called questions of value – the quality of a human life, for instance. This is not an accidental characteristic of international development. Rather, this theme, that the good life can be quantified, has deep roots in philosophical modernity, where issues concerning value or 'goodness' can only be expressed in terms of scientific or material rationality.

This attempt to manage political uncertainty through technocratic, quantitative, and 'transparent' measures evokes one of the founding episodes of the modern era. The Thirty Years War in Europe (1618-1648) was a period of horrific chaos and tragedy resulting from a clash of religious values and ideologies. In its aftermath political thinkers such as Locke concluded that it was futile to debate matters of religion and human values in the public sphere. Questions of value could not be rationally adjudicated, it seemed, so the safest approach was to relegate such questions to the realm of private allegiance and individual taste.

As much as possible, society would be structured in order to avoid deliberation on these types of questions. Instead, political governance would be classically liberal, where each individual had the right to define the good as he or she deemed appropriate. Thus evolved a classic Cartesian dualism: values were to be treated as subjective, while matters that could be quantified (i.e., via science) were objective in nature. And under the impetus of figures like Adam Smith, political economy (later, economics) became a way to obtain an objective
expression of subjective values – the pursuit of economic, that is, consumerist self-interest was promoted as both uncontroversial and universal.

A parallel can be drawn from the birth of the modern era to the aftermath of WWII, when the clash of political ideologies reached a stalemate during the Cold War. Truman’s development program sought to avoid political ideology by promoting what it saw as an ‘obvious’ and universal standard of progress. In so doing he could simultaneously spread the ideals of capitalism (and prevent the spread of communism) while avoiding getting enmeshed by the political debate. But in this masterful bait-and-switch the development agenda relinquishes its moral force. By constraining the debate over the good life to quantifiable measures, the question that should be at the center of development theory—that is, what truly constitutes a better life?—becomes impoverished. Substituting data for dialogue begs the fundamental question that has vexed thinkers at least since Socrates. In the modern world, however, metaphysics gives way to physics, and the result is a society severely limited in its ability to conceive of, discuss, and pursue the good, even as its current dogma on this point breeds distraction, anomic, and ecological collapse. A development philosophy worthy of its name must embrace the old time metaphysical questions, now placed within a post-modern (that is, global and ecological) framework.

In this paper I examine modernity’s substitution of materiality for metaphysics and morality. Section One explores the conflation of the two meanings of development - human improvement and material growth - by examining several important texts of international development policy. Section Two discusses the theme of unlimited growth and places it in a historical and philosophical context. I argue that this is a philosophical phenomenon that is tied to the fundamental tenets of modernity, specifically an emphasis on unlimited progress achievable through science, technology, and rationality.

Section Three considers some alternatives to this perspective, both in philosophical rhetoric and in recent development theory. Here I also consider the limitations of the academic domain of development ethics and discuss the need for a field-based philosophy of development.

**Tradition as a Modern Strategy: Indigenous Knowledge as Local Response to Globalization in Nigeria**

*Nwaka, Geoffrey I.*

Globalization is now perceived by many in Africa as a new version of earlier forms of external domination and exploitation. Its economic and welfare benefits and opportunities are unevenly shared, and appear to bypass or adversely affect many countries of the developing world. But Marshall Sahlins has rightly emphasized the need for developing countries “to indigenize the forces of global modernity, and turn them to their own ends”, since the real impact of globalization depends largely on the responses developed at the local level. The challenge for Africa is, therefore, how to engage and cope with globalization in a way that is compatible with local values and priorities; how to strike the right balance between global and local cultures in national governance and development – as in Japan and East Asia.

For a long time African customs and traditions were misperceived as irrational and incompatible with the conventional strategies of development. But the economic crisis and policy failures of the 1980s and ‘90s, and the current threat of global recession have exposed flaws in the Western, neo-liberal, ‘external agency’ model of development imposed from the top by national governments and international development agencies. Because of growing concern about widespread poverty, widening inequalities and environmental deterioration, there is renewed interest in an alternative approach to development which emphasizes the cultural dimension of development, and the often overlooked potential of indigenous knowledge as “the single largest knowledge resource not yet mobilized in the development
enterprise”. This paper considers how indigenous knowledge and practice can be put to good use in support of local governance and development in Nigeria; how development policies and programmes can be made to reflect local priorities, and build upon and strengthen local knowledge, capacity and organization, especially in such vital areas as agriculture and natural resource management, law review and conflict resolution, education, health care and poverty alleviation. The World Bank has recently published an impressive collection of essays aptly titled Indigenous Knowledge: Local Pathways to Global Development. It is in that sense that this paper sees indigenous knowledge as a model for rethinking and redirecting the development process, and as a way to involve, enable and empower local actors to take part in their own development.

The paper concludes with some general reflections on the indigenous knowledge movement as an appropriate local response to globalization and Western knowledge dominance, and as a way to promote cultural identity and inter-cultural dialogue on African development. A fair and more inclusive globalization should be based on respect for cultural diversity, and should provide a new context and opportunity to overcome inequality between and within nations, and to strengthen global solidarity.

Solidarity and Technology: When and Where do the Problems Meet?

Pfeiffer, Jonathan

The ways in which people understand one another, especially across lines of cultural difference, are important to both peace and violence. For instance, Appadurai (2006) suggested a link between a particular form of economic globalization that became dominant in the 1980s and new forms of violence and political tension. Appadurai has called it the “anxiety of incompleteness.” Other scholars have called attention to the technological constitutions of global social struggles. Carrico (2007) highlighted those having to do with health, media, weapons, and natural resources. Carrico believes that each of these issues illustrates the challenge of fairly distributing costs, risks, and benefits of technological development and change. How, when, where, why, and for whom do the problems of inter- and cross-cultural understanding and technological change meet? Concentrating especially on the challenge of peace in the context of difference, this paper suggests a way of thinking about relationships between cultural difference and technological change. First, working definitions of “technology” are drawn from Aristotle, Heidegger, and Arendt. Second, expressions of technologies as motivations for violence and instruments of violence are distinguished, while acknowledging that such a distinction is not always recognizable. Third, the paper highlights several meeting points of culture and technology. For instance, the question is raised: Will the so-called (Roco and Bainbridge, 2002) converging technologies of human performance (nanoscale, biological, information, and cognitive technologies), while possibly expanding human capabilities, enable yet additional forms of difference, and thus exacerbate anxieties of incompleteness? What about other social problems, like the vulnerability of the individual body and the collective nation (Butler, 2004)? Because of the vastness of their (often hyperbolized) implications, these technologies offer an extreme case for practicing the way of thinking about technology suggested in this paper: as a simultaneous enabler and inhibitor of building new communities on the basis of difference.
Globalization and the Innovation University

Selinger, Evan

When administrators and educators justify why innovation should play a central role in structuring contemporary academic culture, they appeal to the global advantage premise.

While businesses have always valued innovation, the current global competition over intellectual property enhances the commercial importance of rapid technological development. By training students to be “knowledge workers” universities can increase the likelihood that their graduates will not be stuck in mid-level industry positions. Knowledge workers have advantages in the global market because: (i) they are effective multi-disciplinary collaborators; (ii) they possess virtues associated with innovation—especially creativity, originality, and spontaneity; and (iii) they have cutting-edge technical skills and a sophisticated understanding of how to conduct sponsored research on projects that revolve around time-sensitive and often hurried deadlines.

In my SPT presentation, I will advance the extant discussion on the global advantage premise by making applied philosophical claims about: (1) technologically mediated subjectivity and (2) the normative ambitions of higher education. These claims draw from the traditions of postphenomenology and critical theory.

With regard to (1), I will discuss “Design and Research,” an honors class that I recently co-taught at Rochester Institute of Technology. To further RIT’s transition to becoming an “innovation university,” the class aimed to empower students to develop creative solutions to the following challenge—design an innovation center that can inspire collaboration across disciplines and effectively enhance the university’s capacity to train innovative knowledge workers who possess global leadership potential. Students found postphenomenological insights about technology conveyed by Don Ihde, Albert Borgmann, and Peter-Paul Verbeek especially useful, and they drew thoughtful connections between those insights and behavioral economic conceptions of “choice architecture” and “default settings.”

With regard to (2), I will discuss Christopher Newfield’s skeptical arguments about innovation and knowledge workers. In Newfield’s Unmaking the Public University: the Forty-Year Assault on the Middle Class he insists that despite the bold claims made about knowledge workers “creating their own destiny” in “postcapitalist” environments, during the 1990s U.S. companies extended traditional capitalist ambitions. They “subordinated” the innovative ideals of “team work,” “communities of practice,” and the “authority of flexible and democratic expertise” to profit-making practices that dramatically limited intellectual freedom and minimized long-term financial investment through commitments to codifying knowledge and outsourcing employees. Newfield demythologizes the hype surrounding knowledge workers in order to make deeper points about the social and economic consequences that follow from universities following the trail of innovation and failing to make needed contributions to helping middle class students address fundamental issues of cultural history and human development.

Ultimately, the juxtaposition between critical theory and postphenomenology helps us better appreciate the extent to which postphenomenology is a normatively relevant form of inquiry. While postphenomenology can be applied to deflationary ends, while it can clarify the material conditions of transformation that any robust ethical or political theory needs to

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42 On President William Destler’s official online summary of the “mission and vision” of Rochester Institute of Technology we are informed that: “RIT will lead higher education in preparing students for successful careers in a global society.” To further this vision, Destler has been working hard to make RIT an “innovation university”. He contends by that focusing on innovation, the university can provide a positive answer to the following question: “Does America still possess any significant competitive advantages that we can exploit to both sustain and advance the quality of life here?”
take account of, and while its emphasis on multi-stability is congruent to a cosmopolitan view of globalization, applications of postphenomenology are not internally constrained by any substantive normative theory. Lacking such constraints, postphenomenological insights can be applied to a variety of ends, including instrumental goals that earlier generations of phenomenologists and critical theorists would find objectionable. To avoid postphenomenological insights into creativity and cooperation being co-opted by an overly-narrow market driven conception of innovation, it is necessary to appeal to critical theory arguments about why a normative ideal of "human development" should be central to contemporary university culture, even though the global advantage premise is persuasive.

References


*Dao and Phronesis: Comparing Approaches to Ethics and Technology*

Wang, Qian & Zhu, Qin

In contemporary European and North American approaches to ethics and technology, renewed attention has been given to Aristotle’s notion of *phronesis* by some neo-Aristotelisms such as Alastair MacIntyre and Martha Nussbaum. This has been done as an alternative to more rule-based ethical theories, and in some extent as an effort to deal with the complexities of the moral life in the contemporary world. In the world today rapid developments in technology have appeared in many instances to undermine received ethical views and presented people with new moral situations. Under such circumstances, *phronesis* may offer a way to deal with problems by pursuing a middle or mean between the overdone and undone. *Phronesis* attempts to approach technological practices that are full of unpredictable risks in ways that avoid either over commitment or under commitment, that is, that pursues moderation. One of the important recent book-length contributions along this line is Anne Loeber’s *Practical Wisdom in the Risk Society* (2003), which explores a “phronetic” approach to technology assessment.

Such a turning in European and North American studies shows certain similarities to a traditional Chinese ethics of technology that is worth comparative study. The idea of *guiding technics by dao* was advocated in a traditional Chinese ethics of technology.
Although it is necessary to distinguish premodern craft technics (the primary concern of traditional dao insofar as it is concerned with the making and using of artifacts) from modern technology, nevertheless it seems reasonable to try to extend some of the ideas about how dao can be used to guide technics to issues related to technology. Specifically, dao should be seen as providing an ideal toward which technics or technology should aim, and which can thus be used to guide or regulate the social functions of technological development.

Dao is a unique category in Chinese philosophy. It is very difficult to translate this term into English. It can be related to but is quite distinct from what is called logos in classical Greek philosophy. Dao indicates the most reasonable and optimal state, which is determined objectively by all aspects of human practices and their relations. As an ideal state, it can only be perceived and understood gradually by intuition. Within technological activities, dao is embodied internally in harmonies among operators, instruments and objects, and externally in harmonies between technology and nature, and technology and society. The former is usually known as small dao, which refers to utilitarian value and efficiency of technological activities, whereas the latter is referred to as big dao and involves the social function of technological activities. As the intelligent signpost for the development of Chinese traditional technics, the guidance and regulations for technological activities by dao emphasizes the holistic relations among all elements, and therefore avoids some of the limitations of, for instance, a utilitarian ethics of technology. As with Aristotle’s notion of phronesis, the making and using of artifacts guided by the dao calls attention to a wisdom that purses a middle or mean course, one that stands between too much or too little making and using.

However, phronesis is perhaps as difficult a concept to translate into contemporary English as is dao. As one of the four “cardinal virtues (the others being courage, temperance, and justice), it would seem to deserve one word in English. But the only common one-word translation, “prudence” (via the Latin prudencia), is clearly inadequate, and the common two-word “practical wisdom” makes it sound like phronesis is a kind of applied wisdom when in reality it would seem to have its own special character. Nevertheless, about phronesis it would seem possible to say the following: It is experienced and learned in a thinking framework strongly influenced by logic analysis. Philosophers emphasize its ethical value, and argue that phronesis is an intellectual virtue; the right means to achieve rational goals, and a procedure that places them within a rational worldview. Yet NEW FROM HERE since it cannot be determined by logical analysis alone, identifying the middle or mean “rests with perception” (Aristotle, Nicomachean Ethics II, 9; 1109b24). But because of Aristotle’s bias toward logic, his admission of a dependence on perception is something of an apology or admission that phronesis is not what he wishes it could be. In addition, because of this dependence on context and perception, phronesis is difficult to practice in contemporary technological society where the norm is to seek logical decision-making procedures. In this sense, traditional Chinese dao exhibits similarities to phronesis, but because dao is understood as part of a system of thought that is less logic oriented and more intuition-oriented and is also part of a less logic-dominated culture, the daoist approach may have some strengths in comparison with phronesis.

The dao is experienced and constantly deepened through intuition and exercise, during which a set of distinctive cognitive categories are constructed. These categories include knowing (zhì) and doing (xìng), mind (xīn) and thing (wù), and instrument (qì) and craft (shù), leading to the guiding of technics by dao across the whole spectrum of technical behaviors, including social applications and ethical reflection. The Chinese idea of guiding technics by dao is a thoroughly practical philosophy. Daoism has the definite prospect of being able to function in ways that Aristotelian phronesis cannot. However, it must be admitted that the idea of guiding technics by dao was originally put forward in the context of traditional agricultural and handcraft technics, so applications to modern technology with its characteristics of accuracy, complexity and high-efficiency will not be easy. Adaptations to the developments of modern technology will be necessary. Only by adapting the old and
eliminating historical limitations to bring forth the new can its due value for ethics and technology be fully realized.

As a step in this direction, this paper will argue that with regard to technology, which is the contemporary form of technics, daoism has the potential to present a reasonable ideal for the guidance of technological activities. But this ideal is not something that can be grasped by the intuitional experiences of individual operators. Instead, it will involve a kind of modern *phronesis* of technological communities and the whole society. Within technological activities, some embodiments of the *dao* can be already found. For instance, industrial ecological system design and recycling economics are attempts to harmonize relations between technological activities and nature, while forecasts and assessments of technology aim to harmonize relations between technological activities and social life, and human engineering or ergonomics emphasizes harmony between operators and machines. However, the *dao* is not any of these attempts or the integration of them, but the perfect harmony among all the technological elements being pursued by all of these attempts at harmony.

In modern technological activities, it is difficult to find the “*dao*-technics” relations in the way they are present in the story of “A Cook Dissects His Oxen” in *Zhuangzi*, where the *dao* is fully realized by an individual. Nevertheless, there exists an inclination in contemporary philosophy to appreciate the ideal of the *dao*. Examples can be found in the work, for example, of Joseph Needham, Martin Heidegger, and Fritiof Capra. It may thus be possible to experience and grasp the idea of guiding technics (technology) by *dao* in the modern context. Consider information technology as a case in point. If all relations in an information technology system fit together harmoniously, so that the system not only produces rational, high-efficiency and accurate communication but also does not overburden operators or cause information pollution or internet addiction nor undermine social order, but improves rather than weakens the harmonies of human lives, this is a state which approaches *dao*.

The contrast between *dao* and *phronesis* can thus constitute an important contribution to comparative studies in Chinese versus European and North America perspectives on ethics and technology. That efforts have been made to revive *phronesis* as a philosophical concept has demonstrated the importance of such a comparison and its potential usefulness to the problems of dealing with the problems associated with developments in modern technology. Along with looking back to Aristotle for philosophical resources, we should also pay attention to Chinese Daoism and what it might be able to contribute to dealing with the problems of ethics and technology, and consider the modern significance of another intellectual resource that has exerted a great influence in the history of culture.
Ambient Assisted Living (AAL) as a promoter of the good life – some conditions/aspects from a technology assessment perspective

Bechtold, Ulrike & Sotoudeh, Mahshid

Ambient Assisted Living as referred to in the AAL Joint Programme or national technological R&D Programmes aim to provide (assistive) technologies (ATs) and services which raise the wellbeing of older adults. The aim is to improve their autonomy, security, health and social participation and allow them to stay at their homes as long as possible. Another goal is to develop the EU-wide and national “silver-markets”.

ATs are home-based electronic systems and included devices to facilitate ICT use for older adults in general which may be mechanical or electronic, fixed or portable and they may be visible to fully integrated, manual to fully automated (Doughty et al. 2007).

Based on the project “Participative approaches for technology and autonomous living” (Bechtold and Sotoudeh, 2008) this contribution shall critically examine some crucial aspects in the context of AAL as AT can be a help to older adults as well as an impediment. To do so we want to go beyond a merely technological perspective and show that successful use of AT depends on more than good technology and requires what Blythe et al. (2005) coined as “Socially dependable Design”. Moreover this contribution aims to shed light to the somehow antagonist goals of AAL that ATs shall be a real contribution to a diverse groups’ wellbeing and an economic success in terms of a market exploration. We will show that needs should be identified by participation of a broad spectrum of relevant actors including older adults themselves, family members, social and health care providers, etc.

1 Observations on the AAL programme level

The assumptions of the programme in terms of “Quality of Life” and the target group are examined. The concept of the “wellbeing person” as used in the respective programme terminology shall be discussed against the literature (e.g. Kahneman & Krueger, 2006) and ethical TA (after Palm & Hansson, 2005). To do so it is also inevitable to specify the primary target group of AAL – “the elderly” – and critically examine terminological and/or functional concepts and their meanings which are used to refer to that fairly heterogeneous group. The everyday life of older adults, their needs and problems have to be considered as well as personal behaviour patterns as a relevant context for autonomous living and the willingness to use ATs.

2 Contribution of participatory approaches to the R&D process:

The results of the project suggest a mode of research that implies technology developers and technicians to attend supervised trainings and thereby spending a certain amount of time with the people in need. They were referred to as participatory observations at institutions or internships spent in institutions, or simply accompanying the health and

43 http://www.aal-europe.eu/
44 http://www.aal-deutschland.de/ or http://www.ffg.at/content.php?cid=939
social care personnel. Generally, it was considered of high value to participate in the real lives of people in need, and the value of this approach was ascertained on two levels:

Concerning the human dimension, it signals respect for the people and fosters understanding of problems and needs. On the level of AAL technology development the chance of bringing together different rationalities in the same situation of facing problems might enable a creative potential that would otherwise be left untouched.

Most prominent limiting factors for such activities (e.g. supervised trainings of engineering students in caring organisations) are time and skills. They have to be addressed for both the attending and providing party. Moreover ethical aspects have to be considered.

Finally we conclude that if the user of AT is not an object but an active subject of interest who is given the power to influence the research process or is included in conducting it as Barnes and Taylor (2007) ATs may well serve the quality of life of older adults. Three different levels (of limitation) seem to be important here:

1. Framework support (e.g. funding)
2. Education (e.g. technicians interdisciplinary skills)
3. Research & Development (e.g. researchers’ valuation of different actors involved)

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Technology, the Good Life, and Liberalism: Some Reflections on Two Principles of Neutrality

Briggle, Adam

One of the principle findings of the philosophy of technology is that technology is not value neutral. Yet more work can be done to relate this finding to the debate in political philosophy about the supposed neutrality of modern liberal democracies. The purpose of this essay is to further the conversation between these two communities of scholarship and their contested understandings of neutrality. It first justifies the importance of this topic in terms of the “progress paradox” and globalization, which both put the question of the good life squarely on the agenda for high-tech liberal democracies. The paper then offers a background discussion and working definitions of liberal neutrality of effect and of justification as well as technological neutrality and non-neutrality. Part of this discussion involves distinguishing between technology writ small (e.g., consumer goods) and...
technology writ large (e.g., government projects in defense, communication, or transportation). However, the paper argues that both senses of the term “technology” have significant impact on individual well-being both in terms of how it is conceived and the opportunities for achieving it.

The paper then considers in turn the relationship between technology and (a) liberal neutrality of effect and (b) liberal neutrality of justification. The first relationship raises radical philosophical issues about self and society. In so doing it highlights an important disagreement in the liberal theory literature about how and to what extent the liberal state is non-neutral. A parallel disagreement exists within the philosophy of technology. The second relationship highlights two further challenges to the ideal of liberal neutrality, now understood in terms of justification. The first has to do with the question of what counts as a rights claim and what counts as causing harm and thus what counts as an activity that can be legitimately regulated by the state. The second ties into the unavoidability of supposedly “unintended” technological consequences.

These reflections suggest a need for liberal societies to match their technological powers with greater thoughtfulness. The challenge is devising ways to make explicit the substantive goods that are always already there and cannot be avoided with recourse to “neutrality,” either technological or liberal. Thus, the paper concludes by attempting to formulate a normative principle of thoughtfulness, that is, a theory and practice of raising questions of the good life to a level of explicit reflection and debate. In making this argument, the paper turns to deliberative democracy as a normative theory and as a set of practices already at work in technology policy making.

**Technology & Listening to Music: From the Concert Hall to the mp3**

*Cressman, Darryl*

One of the more subtle dimensions of technological determinism appears when we speak of technological revolutions. In these narratives technology appears autonomously, the result of a “eureka” moment which marks a definitive break with the past. The invention of recorded music is one example of this type of historical narrative – a history that can be neatly divided between pre-phonographic musical culture and musical culture after Edison. Despite the popularity of employing this technological divide, taking the invention of recorded music as the starting point for a sociotechnical history of musical culture is problematic. It implies that prior to recordings musical culture neither influenced nor was influenced by technology; that only after Edison is musical culture sociotechnical in nature. Thus, by de-contextualizing recorded music from the complex history of cultural assumptions, expectations and practices into which it was introduced the deterministic notion of a technological revolution comes to be the only explanation for recorded music.

I argue that these problems can be corrected if we change the way in which we understand the role that technology plays within musical culture. The cultural significance of recorded music is largely explained by focusing on the things that people do with these technologies. It is not surprising, then, that recorded music constitutes an abrupt break with past. An alternative history can be discovered if we move beyond describing what people do and instead examine how technology mediates listening. I argue that the technical pre-history of the phonograph can be discovered if we examine, first, how the practice of listening changed in the 19th century and, second, how these changes came to shape the technological mediation of listening prior to the phonograph.

Learning how to listen to music as a cultural practice became associated with a notion of the good life around 1800. It was here, as many historians and musicologists point out, that listening became more concentrated, silent and potentially transcendent (Attali 1985; Goehr 1992; Johnson 1995). Prior to the 19th century musical performances were usually the
backdrop for socializing and chatting. So what happened? Aesthetically, music was now understood to be more expressive and transcendent than the other arts. Economically and socially, this change corresponded with the cultural ascendancy of the bourgeoisie and a new seriousness in regards to aesthetic reception. In short then, beginning in about 1800 a type of listening behaviour emerged in Europe that coincided with the idea that music is an almost divine achievement of Western culture.

These cultural changes, in turn, began to shape the buildings that were to both mediate and symbolize this new musical culture. The purpose built concert halls that were built in Europe in the 19th century embodied the ideals that had shaped musical culture during that century. Not only were these buildings meant to invoke the notion of a “music temple”, they were also designed to pre-suppose an expectation of listening experience.

Interpreting the concert hall as sociotechnical in nature opens up a pre-history of the phonograph that identifies the social and cultural contexts into which it was introduced. The ideals of autonomous art and a transcendent listening experience that shaped 19th century musical culture were realized first in the concert hall and later in the quest for fidelity that shaped the design and intent of recorded music. This quest for fidelity was evident in the original marketing of the phonograph and was later presupposed in the design of the LP and the CD.

The cultural context that gave shape to both the concert hall and recorded music was, for nearly 200 years, intertwined with a distinctly bourgeois concept of the good life. However, in the past decade, the mp3, the Internet and mobile listening devices have become the predominant technology in relation to musical culture. I conclude my paper by raising questions concerning how we conceive of technology and the good life in 21st century musical culture. Does the 19th century romantic conception of music, listening and the good life still shape technology and musical culture today? Or have we come to associate new practices, mainly distribution, storage and portability, in our evaluation of technology, the good life and musical culture?

References


Ferrari, Arianna

Although technologies have always been attached to promises of raising living standards and solving basic problems, the current way in which nanotechnologies are increasingly presented goes in the direction of promises of a better world in every aspect. Due to their enabling and ubiquitous character, nanotechnologies are expected to contribute to wealth creation, sustainable development and other benefits for producers, consumers and society at large (cf. for example NSTC 1999, National Science Foundation 2001, BMBF 2004, Nanoforum 2005, National Nanotechnology Initiative 2007). Furthermore, nanotechnologies are attached to a particular vision of nature as something mechanic, reducible in its fundamental building blocks (atoms and molecules) with a strong capacity for regeneration and re-assembly, therefore as an engineer, as well as something plastic permanently capable of reconstructing itself (see Ferrari 2009). The vision of nature as a plastic engineer seems to reconcile the two different approaches defined by Bensaude-
Vincent (2004) as the two different cultures of nanotechnologies, that is, the ones of the engineer’s and of the chemist’, culminating in a strategy that combines reductionism with the acknowledgement of unpredictability.

If nature is a plastic engineer and if through nanotechnologies we as human beings are now capable of grasping the building blocks and to reshape and rebuild it, the possibility of entirely recreating the world seems to clearly follow from these premises. The vision of a better world, better not only in its normative sense but also fundamentally different in its physical terms, is a potent one in nanotechnologies. In other words, in the nanoworld nature will be reconstructed a doc, warranting abundance to everyone and ultimately peace (granted by the abundance of resources for example). In many discourses, also at the institutional level, it is very often presupposed that nanotechnologies will bring benefits, that they will contribute to create a better world, and that currently the question is only about the means through which we can fully realize this potential.

These optimistic visions stand in strong contrast with the questions and the problems raised by critics of nanotechnologies. Besides the authors who express apocalyptic fears, expecting that nanotechnologies will materially destroy the world (cf. Joy 2000), many others contest the approach based on taking the benefits of nano for granted. This approach will lead to considering the question of (nano)technology per se, detached from the concrete social, political and economic context in which these technologies are developed. When, for example, the big trade union association IUF calls for a moratorium on nanotechnologies in food and agriculture (2007), it does not only do that in the name of risks, but also asks for a breakpoint until the socio-economic impact of these technologies have not been assessed with the participation of all stakeholders, including the possible impact on the workers in these areas (cf. Foladori and Invernizzi 2007). Whereas supporters in many cases tend to consider technologies per se as a means of development, some critics highlight the central role of the conditions under which the design of these technologies happen for assessing the potential of technologies (cf. ETC Group 2003). Therefore, the critical stance toward nano does not only refer to the possible dangers and side-effects, but also contests world and nature’s visions embedded in technologies as well as presupposed ideas of a good life. In this paper, both the optimistic visions of a nanoworld which improves the quality of life as well as the arguments of the critics contesting the fact that nano will assure a good life will be carefully analyzed.

It will be shown that the clash of visions around the future nanoworld depends, at least in part, on different methods of analysis of the causes of the major problems of our time as well as on different visions of what the role of technology can be in our society and, in addition, to its contribution for a good life. Furthermore, it will also be shown how this line of analysis can be very fruitful for reconstructing the ELSI-debate on nanotechnologies which in many cases appears either too much focused on issues of risks or it remains blocked on an individualistic level, concentrating on issues of autonomy and privacy.

References

Mennonites in the United States are generally indistinguishable from their neighbors politically, socially, and technologically. Far from separating themselves symbolically from broader society, Mennonites participate to varying degrees in their local communities, and exhibit the same traits that modern American life in general exhibits—insularity, a fast pace, and an awareness of scarcity (of time, money, sleep, status, meaning). A technological culture exacerbates these traits by substituting commodities for the good, so that human activity becomes dedicated to maintaining and acquiring the devices that can produce “the good life” with as little effort as possible. Technology is no longer (if ever it was) simply a set of tools; technology is a way of life.

Yet most Mennonites would agree that community is central to the good life because the community reminds the believer that the Christian’s primary citizenship is in the Kingdom of God, that sometimes the Christian life is incompatible with the American Way, and that those who constantly pursue goods cannot serve God. Community, in Mennonite understanding, cannot be purchased or attained through technical means. Rather, authentic Christian community is formed and preserved by practices of hospitality, of accountability, of fellowship and worship, and of bearing one another’s burdens.

Associated Mennonite Biblical Seminary, a seminary owned and operated by the Mennonite Church (USA and Canada), stands at the point where Mennonite thought encounters Mennonite life. Its mission to “serve[e] the church as a learning community with an Anabaptist vision, educating followers of Jesus Christ to be leaders for God’s reconciling mission in the world,” reflects clearly the centrality of community and the interpretation of the good life toward whose realization that community is inclined. But for all the grandeur of its mission, the seminary inadequately resists the dominant culture in which it finds itself. This failure is perhaps nowhere more evident than in the realm of information technology, especially as that relates to the community the seminary desires to become—an authentic Christian community characterized by joyful and caring engagement with others; by the moral, ethical, spiritual, social, and intellectual growth of its members; and by its intentional identification with the Reign of God.

Information technology, or rather, uncritical use of it, can subvert the seminary’s attempt to create such a community. This subversion happens when information technology advances a lesser good (for example, the speed of electronic communication) to simulate a greater good (the immediacy of face-to-face communication), while simultaneously receding into the background, with the result that the lesser good becomes a substitute for the greater.
In this presentation I will argue that, given Mennonites’ own worldview, the role of a director of information technology at a Mennonite seminary (a position I currently hold) should be to advocate for a “good enough life,” in which technology intrudes into our consciousness precisely through not being the newest, fastest, most transparent, or most efficient. This intrusion can remind the community that bearing one another’s burdens requires more than obtaining the latest gadget, that fellowship is not reducible to collegiality, that accountability is not mere transparency, and that hospitality is inefficient. A good enough life is, in fact, a good life as Mennonites would recognize it.

**Modernity, the Good Life and Technology**

*Hang Wong, Pak*

Different kinds of technology are often said to have contributed (or, detracted) individuals from the good life. Yet, what is considered to be good is not independent to the worldview which the individuals subscribe to. According to Charles Taylor (1989), modernity generates specific concepts of the good that are unique to modernity. To understand the relation between the good life and technology, particularly their relation in modernity, the concepts of the good (and, of good life) in modernity must first be articulated. The aim of this paper, therefore, is to (i) provide a descriptive analysis of the concepts of the good (and of the good life) in modernity, to (ii) give philosophical, sociological and historical explanations of how these concepts have become legitimate concepts of the good and to (iii) sketch, briefly, how to understand the relation between the good life and technology.

Various theories of modernity have been developed by philosophers, sociologists and social theorists; following Brey (2003), I distinguish theories of modernity into cultural and epistemological theories and institutional theories, the former ‘focus on the distinction between pre-modern and modern cultural forms and modes of knowledge’ and the latter ‘focus on the social and institutional structure of modern societies’. A study of cultural and epistemological theories such as Taylor’s (1989) will provide the philosophical basis for discussing concepts of the good in modernity, and to provide grounds for explaining how some characteristics of modernity made possible specific modern concepts of the good. On the other hand, institutional theories of modernity such as Giddens’s (1990) which focuses on institutional and organizational settings of modernity, will give us a broader view of the characteristics of modernity that includes various social, economic, political conditions as well. By examining representatives of these two types of theories, I will develop an account of modernity, which highlights those characteristics of modernity that are relevant to the formation and/or development of the modern concepts of the good. Yet, the question remains: what is ‘the good’ and ‘the good life’ in modernity? My answer to this question will be both philosophical-theoretical and empirical. Here, I will elaborate Taylor’s account of the good(s) in modernity, as Taylor explicitly links the characteristics of modernity and the formation of modern identity with the modern concepts of the good(s). In particular, I will illustrate how the characteristics of modernity identified provide supports for the modern concepts of the good. Then, I will supplement Taylor’s philosophical-theoretical analysis with empirical research, which draws on empirical data to discuss what is actually being valued, such as those by Inglehart (1990, 1997).

Whether a technology is considered to be beneficial or harmful to individuals depends ultimately on what is considered to be good. Modernity, as I argue, has its own understandings of the good. As such, the relation between the good life and technology in modernity can only be understood through articulating the good in modernity. In other words, the relation should be understood against a background of specific worldview. This approach to the understanding of the relation between the good life and technology has several advantages, an obvious one is that: it opens up the space for comparing the relation
between the good life and technology in different cultures. I shall end my discussion by explaining various advantages of such approach to the understanding of the relation between the good life and technology.

References

Virtually Good – What Can We Learn from the Argument from False Pleasures?

Hartz Søraker, Johnny

Virtual worlds seemingly offer the opportunity to fulfill desires that might be otherwise unattainable, be it for ethical reasons or due to physical shortcomings and obstacles. As such, the increasing use and pervasiveness of virtual worlds could be regarded as good news, since it allows more people to pursue their conception of happiness, be it by way of more easily fulfilling their desires (desire-fulfillment theory), experiencing pleasure (hedonism) or to more easily attain the kinds of intrinsically valuable things that philosophers have proposed since ancient times (objective list theories), such as friendship, love, knowledge, aesthetic beauty and so forth. Of course, this conclusion does not follow if the virtual “surrogates” are somehow inferior to the real thing. Thus, virtual worlds have, in many ways, become a test bed of our intuitions regarding the kinds of things that makes our lives fare better. Indeed, a number of philosophers, journalists, policy makers and others have argued that virtual worlds pose a threat to well-being, because we might come to settle for less valuable virtual surrogates. For instance, Albert Borgmann makes a distinction between instrumental, commodified and final communities and argues that virtual communities can at best be instrumental or commodified, because they do not contain “the fullness of reality, the bodily presence of persons and the commanding presence of things” (Borgmann, 2004, p. 63). In a similar fashion Barney (2004) sees virtual communities as inferior due to their lack of physical practices and Dreyfus is critical of what he describes as the nihilist, irresponsible and often uninformed nature of virtual communities (Dreyfus, 2004). Winner has also characterized what he refers to as the cyberliberterians’ conception of community as hollow and banal, primarily because they ignore the importance of “obligations, responsibilities, constraints, and mounds of sheer work that real communities involve” (Winner, 1997, p. 17).

A general line of argument in this vein is what Fred Feldman (2004) has dubbed ‘the argument from false pleasures’, exemplified by e.g. Robert Nozick’s ‘experience machine’ (Nozick, 1993, pp. 42-45) and Shelly Kagan’s ‘deceived business man’ (Kagan, 1998, pp. 34-36). In short, these arguments entail that some entities and experiences are false or inauthentic, and therefore should not be taken as conducive to well-being, at least not to the same degree as actual or authentic entities and experiences. Although the arguments suffer from some serious flaws, many of which will be addresses, a proper scrutiny of the strengths and weaknesses of the arguments can yield important insights into the nature of virtual worlds and their potential impact on the quality of our lives. In particular, I will focus on four important implications. First, I will argue that some virtual states of affairs are just as true or authentic as actual states of affairs – that sometimes there is no significant epistemological difference between actual and virtual. Second, I will argue that virtual states of affairs are often connected to what Nozick refers to as “deeper reality” – that sometimes there is no significant ontological difference between actual and virtual. Third, I will discuss whether epistemological and ontological differences are ‘axiologically relevant’, i.e. whether these differences in themselves are of any importance when evaluating the value of virtual worlds and entities. Finally, I will argue that claims about the inferiority of virtual states of affairs should not be constructed as universal truths, and that we need to maintain a strict distinction between theories of well-being (or self-interest) and theories of ethics (or other-interest).
References

Technology and Social Progress - The case of John Gray’s Conservative Theory and Henryk Skolimowski’s Ecological Theory
Itay, Anat

Technology seems to be a key element in most theories of progress. It is seldom disputed that technology generates progress in various areas of the human life. Nonetheless, each theory regards the role of technology for social progress in a different light. The role technology plays in social progress is especially important (and becomes controversial) once major technological developments such as genetic engineering and artificial intelligence are considered, and therefore the debate on whether or not technology should be limited becomes a vibrant one.

The question addressed in this paper is whether society should lead and restrict technology in accordance to society’s ideas of the good. Restricting technology might prevent society from crossing a line that is not included in its idea of the good, or it might be counter productive and in fact harm social progress. I analyze two theories that strongly oppose the use of technology for achieving social progress, therefore prima facie one would expect them to argue for limiting and restricting technology. John Gray’s Conservative theory, and Henryk Skolimowski’s Ecological theory. The paper explores how is it that while expressing disenchantment with technology, and while being highly concerned with technology as a source for social progress, both Gray and Skolimowski reach the conclusion that technology need not be restricted or limited.

45 “Thus the notion of “social progress”...is intimately related to the upsurge of science and technology since the sixteenth century... Everything, is seems, involved in a higher standard of living, has come within the reach of industrial society, provided only that technology is enabled to increase productivity by harnessing new sources of power, and by devising new machines and processes” (Buchanan, Robert A. Technology and Social Progress. Oxford: Pergamon Press: 1965, pp 7-8).
After a short introduction to the debate on technology and social progress, the paper continues with exploring Gray and Skolimowski’s ideals of progress, examining both their understanding of progress to date, and their normative approach towards it. This account reveals that while Gray and Skolimowski regard technology and its role to social progress in current times as harmful at best, they in fact refrain from advocating limiting it. In order to find an explanation to this dissonance, several theoretical assumptions of the two philosophers are examined: their approach to social progress, to technology, and to nature. It is found that while all other theoretical assumptions indicate a need for limiting technology, it is the philosophers’ approach to nature and the human role in it that allows and perhaps determines a stance against limiting technology.

The paper concludes with a discussion whether there is at all a theoretical possibility to consider limiting technology once an assumption of a powerful nature is held. In that, this research offers to contribute to the debate on whether technology should be guided or limited according to society’s ideas of the good.

**The needs of technology**

Lente, Harro van

According to the old wisdom, need is the mother of invention. And, indeed, one of the building blocks of our understanding of technological change is the concept of ‘need’. When a technology is successful, the argument goes, there must have been a need for this, albeit ‘latent’. On the other hand, it is also a well-known that technological change will incite new needs (Graber, 2007). Firms invest in the development of ‘new markets’, and societies are confronted with ‘changed needs’. Invention, in its turn, is the mother of need as well.

This paper addresses the question how the production of need is related to the production of novelty. Traditionally, in the philosophy of technology and in engineering rationales, the fulfilling of needs is an important driver and legitimation of technological activity. Cultural critics as Ivan Illich and Jacques Ellul, on the other hand, emphasize that the production of needs is at odds with a pursuit of the good life. Here the idea is that a distinction can/should be made between ‘real’ or ‘genuine’ needs and artificial needs. In the sociology of science and technology another, contrasting account of technological change is given (Borup e.a. 2006). On the basis of circulating and shared expectations researchers, technologists and firms decide what options to take and routes to follow. It is not a matter of pre-defined problems or articulated needs, but a matter of ongoing technical change driven by promises in which actors cannot afford to miss the next generation of technologies.

A basic discussion addresses the distinction between ‘basic needs’ and ‘non-basic needs’. A recurrent theme is the idea that what is conceived of as needs depends on the historical period and the locality (Soper, 2006). This is contested by Doyal and Gough (1991) in their influential *Theory of Human Needs*. In spite of all the relativistic differences, they seek to establish principles to define universal needs. The ground from which they start is the idea of participation in social life. Here two notions follow: physical health and autonomy; both are a starting point for a minimum of participation in social life. The stress on objectivity of needs not only leads away from (cultural) relativism but also from the idea that needs are individual expressions. Here the distinction is made between ‘wants’ and ‘needs’.

In this paper I will continue this argument in an exploration of the relationship between the dynamics of technology and the dynamics of needs. The paper is structured into three

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47 “The world view, the implicit beliefs, values and assumptions about the nature of reality, is interrelated with the form of technology that a society maintains…The world view of a culture reflects its relationship to the natural environment.” (Das, Mitra and Shirley Kolack, Technology, Values and Society. New York: Peter Lang, 1993, 149).
First, the various uses of the concept of 'need' in technical change are studied and categorized. Here we explore various strands of innovation literature as well as technology and cultural critics. Second, a reconstruction is made how needs are part of the co-evolutionary process of technical change. The mechanism in which promising options are converted into requirements appears to be accompanied by a mechanism in which needs as outcome are converted into needs as cause. In this second line I can draw from case studies in the Netherlands on hydrogen research, on renewable energies and on energy transitions.

The third part discusses how the ongoing production of needs also challenges the notion and practice of Technology Assessment, which seeks to enrich and broaden technological development by reflection and participation of stakeholders. While this is very useful and wise, the various TA approaches seem to suffer from a lack of attention to the ongoing production of needs. The paper studies the possibility to start TA from notions of the good life, and investigate how (old and new) technologies may support these. The question whether needs are real or artificial is not very helpful: the relevant and sensible question is which needs can be afforded.

References


Social technologies in the making of the good life

Menéndez Viso, Armando

The good life has always been one of the philosophical topics par excellence. From Plato and Aristotle to Rawls and Sen, the definition of the constituents and determinants of a happy, human existence have had a place at the core of moral reflection. However, during the last few decades, a number of disciplines have joined, if not replaced, ethics in the search for the quid of the good life. Economics, statistics, psychology, sociology, epidemiology, demography, anthropology, and even nutriology have now their say about what is a good standard of living. Indeed the good life is not just a matter of subjective perception anymore, but also an object that can be measured. Thus, indices have been developed to measure quality of life, the best known of which is probably the United Nations’ Human Development Index (last version in Watkins 2007). This index provides with a set of numerical figures allegedly representative of how good the life of the individuals of a given population can be. Well-being indices have been thoroughly refined, extended and perfected since their inception and now the many variables included cover an impressively wide range of aspects of life; e.g. GDP per capita, literacy rate, life expectancy, enrolment in primary, secondary and tertiary education, HIV prevalence, or long-term unemployment, to name just a few. The Human Development Index has proven to be a useful tool. In fact measurement of good life has turned to be so successful that public administrations, companies, and private citizens adjust their goals to climb higher in the rankings. The makers of the index have become powerful choice architects, to use Thaler’s and Sunstein’s expression (Thaler & Sunstein 2008). It could be said that figures have come to be identified with the good life itself. But what exactly are such figures?
The answer given in this paper is that those figures, and the indices they compound, are but technological (social) devices. This is not a merely ontological statement, but a categorisation with many theoretical and practical implications:

1) Good life is tightly linked to the abovementioned social sciences (economics, psychology, etc.); i.e., it is a science–dependent concept and, therefore, an institutional, social product.

2) Good life indices are devices, and therefore subject to the same kind of technical, sociological, and historical analysis that science and technology studies have produced about different kinds of artefacts. This also means that good life is not only a political issue, but a technical one as well, and therefore cannot be tackled in the political arena alone.

3) As technological devices, well-being indices do not portray reality, but transform it – in MacKenzie’s words (MacKenzie 2006), they act as engines, rather than as cameras.

4) If there are reasons to promote public participation in ‘common’ technologies, there are even more for the public control of social technologies, such as the indices measuring the good life. Mechanisms should be implemented similar to those proposed to govern ‘non-social’ technologies; e.g., public information, citizens’ panels, consensus conferences, and the like.

Michel Callon, Karin Knorr Cetina, Donald MacKenzie, Yuval Millo, Fabian Muniesa, Alex Preda, and Lucia Siu (Knorr Cetina & Preda 2005; MacKenzie 2006; Callon, Millo & Muniesa 2007; MacKenzie, Muniesa & Siu 2007), among others, have very recently begun to interpret financial markets as technological (social) devices, stressing their performativity, and applying to them the methods of economic sociology and science and technology studies. This paper intends to extrapolate their analysis to the realm of good life measuring, thus outlining an alternative, participative way of elaborating well-being indices.

References


‘Love-Hate’ Relations and Somatechnics: Assessing the actual and potential impact of convergent treatment / enhancement technologies in our bodies and our lives?

O’Neill, Fiona K.

As numerous and various technologies converge on the ‘raw material’ of the human body it seems pertinent to ask how standard present and future-present treatments and enhancements belong in our bodies and our lives. How do individuals actually experience human-technology relations, when one’s body is intimately supported or enhanced, and
when one's life is dependent upon the efficiency of that technology? What might the adults of
the near future imagine they would like and will actually accept? This paper draws on two
empirical studies to discuss the intimate nature of our medical somatechnical relations, on
the one hand, and the way in which young people presently perceive treatments and
enhancements and envisage the future they will inherit.

"My hearing technology is not something I would have chosen, but it is my constant
companion and it (...) will be my companion and part of me for the rest of my life" (Adult
female hearing aid user); some users of therapeutic tools experience a ‘love-hate’
relationship with the intimacy of their somatechnology. Users seek numerous ways in which
to accommodate to and, or distance themselves from their dependence upon their particular
technology. There is an ongoing negotiation of how these technologies belong in an
individual’s life.

"I would like to upgrade, hair, legs, eyes, hands – I want them because it will help
and make me feel better" (10yr old male); most, but not all young people, are happy to
imagine themselves enhanced with superpowers or some form of bodily enhancement. But
when they are faced with the realities of present and future-present possibilities they
demonstrate how they already appreciate the majority of arguments we see in the academic
debates. Much of their discussion focuses on issues of fairness; balancing the needs of
society against those of individuals.

Common issues, for both the users of standard present medical technologies and the
young people considering present and future-present enhancements, were the integrity of
the human body as a lived social and personal experience; the significance of an individual’s
dependence upon technology and society; the experience of pain. And how those who are
intimately embodied with/in a somatechnical relationship belong: where one’s relationality
with others is not only through the object of technology but with the otherness of the subject
of technology itself; as in the companionship quoted earlier.

How might we understand the belongingness of technologies within our bodies and our
lives; how might we appreciate the kind of love-hate relations that such embodiment can
engender. Does the mode of integration make not only a difference to the experience of
integrity, but to our appreciation of human-being-cyborg? By considering the nature of what
it is to belong and to have belongings we can begin to appreciate the experience narratives of
somatechnics; by considering issues (including an Aristotelian appreciation) of philia and
xenia.

Co-Production of Good Life

Rota, Andrea

Technologies, technological artifacts and technical processes can be designed, used or
performed with the aim of improving human capabilities towards a good life, and they can
have complex positive (or negative) influences on the good life way beyond the expectations
of their designers and users.

Analytically, the complex and multifarious links between technology and good life are
explored in several domains - ICT4D, user-led design, user participation in the design and
management of aspects of public life, management studies, e-government and learning
technologies studies, just to mention some highly popular fields of research.

More recently, the increasing focus on ethnographic studies of uses and interpretations
of technologies in everyday life, alongside the development of research methods for such
kinds of analysis (Miller and Slater, 2000; Bakardjieva, 2005), has helped to shed more light
on the intimate relationships between individuals and technologies.

Most of the current research, design practices and public policies assume that
technologies can support (or hinder) the good life of individuals or of groups (as small as
families or as large as nations). In this article, I make the case for a wider scope of good life
which does not restrict individuals’ and groups’ freedom to self-determine their own meaning of a smaller-scale “good life”) and I show how this can lead to a different basic understanding of technology as co-production of good life itself by human beings.

Although there can obviously not be (neither should it be wished) any general agreement about what a good life means abstracting from the specific conditions, wishes and needs of individuals, recent developments of public discourse seem to suggest that we are gaining a better understanding of what does not constitute a good life in a broader sense: environmentalism and the increased widespread awareness of environmental sustainability of everyday choices, the work of Yunus (2008) and other economists and political theorists showing how poverty is nowadays mainly a consequence of bad (and often ill-conceived) allocation rather than of scarcity of resources, alongside a better understanding of how the human brain connects emotions and rational choice, are some of the driving forces behind this better understanding of how the “do no harm” principle could be applied to policy choices and through technologies in a broad sense more successfully than only a few decades ago.

In this article, I present a philosophical interpretation of these phenomena within the framework of critical theory of technology. Some of Marcuse’s writings suggest (Marcuse, 1972) that nature is currently undervalued as a source of human sensibility, and as such it becomes more of a material on which technologies operate rather than a guiding foundation of what a good human life in balance with other living beings and with the planet’s resources could mean; more recently Feenberg (2008) articulated an updated vision of Marcuse’s suggestions, hinting at the “far richer experience of technical politics than was available to [Heidegger and Marcuse]”, and from a different perspective Damasio (2003) offers a compelling narrative of how human beings translate basic emotions and feelings towards a higher-level quest for a good life.

Starting from these premises and building on the preliminary findings of my ethnographic research on Internet users aimed at understanding “what the Internet comes to be in their everyday life” [1], I present an interpretive framework that explores consequences and implications of a basic understanding of technology as essentially co-production of good life by human beings at the broadest level of the “human enterprise” as development of human life and how this ethical “do no harm” vision could be embedded in the smaller scale (but nevertheless fundamental) “good lives” that specific technologies and technical processes aim to achieve.

I also propose some methods for the development of this level of analysis, grounded in ethnographic practices and mediated through current developments of the scientific understanding of the human mind and of technical politics.

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Technologies that Make Us Happy? Psychological Implications of ICT for the Pleasant Life, the Engaged Life, and the Meaningful Life

Rosas, Omar

The advent of computer technology certainly symbolized an important landmark in the history of modern human tool making and use. Unlike tools like looms, tractors, washing machines, and electric toothbrushes, the function of which can be regarded as augmenting human practical crafts, computers appeared in human history as technological artifacts that extend or enhance human cognitive functionings. Part of this cognitive enhancement has to do with the ways in which computer-based applications like ICT reconfigure our mental models, social interactions, and communicational practices. In this sense, we cannot but recognize that the ongoing development of ICT has brought about significant changes in the way we interact with each other and live up to our individual aspirations and collective expectations in an increasingly digitally transformed lifeworld.

ICT has also introduced refinements in our conception of human needs, preferences, desires, prosperity, continuous development, in a word, our idea of the good life roughly conceived. In a lifeworld in which basic processes of human agency are constantly intertwined with technological artifacts, ICT delivers the image of human beings as well informed, technologically competent, rapidly satisfied, and accurately served. Yet beyond the aforementioned potential benefits, the digital transformation of the lifeworld also raises a legitimate question: Does ICT, along with its implicit promises, make us happy? Put in other words, does ICT contribute, in a substantive way, to our living a good life?

In order to answer this question, some preliminary considerations are in order. Scholars interested in studying the good life have proposed several conceptions intended to capture what they consider to be the essence of a well-lived life. In this sense, philosophers have underscored critical elements like pleasure (Bentham, 1978), preferences (Brandt, 1989), desires (Griffin, 1986), and human flourishing (Nussbaum, 1992). On the other hand, psychologists, often inspired by philosophers’ conceptions, have implemented models of the good life in terms of subjective well-being (Diener et al., 2003), social well-being (Keyes, 1988), and self-determination (Ryan et al., 2006) among others. In the same way, and from a positive psychology perspective, psychologist Martin Seligman (2002) has recently argued that living a good life or, in his own terms, having authentic happiness is to be understood on the grounds of three traditional—philosophical—theories, namely hedonism (the pleasant life), desire theory (the engaged life) and objective list theory (the meaningful life).

According to Seligman, authentic happiness synthesizes all three traditions and provides a view of the good life as a “full life”, a well-balanced life that satisfies all three criteria of happiness. Instead of choosing among competing views, Seligman’s strategy is to define the good life as a multidimensional phenomenon and consider each traditional view as a necessary but not sufficient condition for living a full life.

With this in mind, my aim in this paper is twofold. First, I’ll argue that ICT reconfigures our basic informational niches and thus implies reframing crucial questions about our values, preferences, desires, functionings, and achievements in life. Second, and by drawing on Seligman’s work, I’ll argue that ICT has considerable psychological implications for our conception of the good life to the extent that ICT-based activities can provide benefits in one domain (e.g., the pleasant life) to the detriment of other equally important domains (e.g., the meaningful life). After analyzing a few particular applications of ICT such as Internet use, virtual therapies, and video games, I’ll draw some conclusions about the ways Seligman’s work help articulate philosophical and psychological methods to study the impact of ICT on the good life and set the agenda for future research.
Is Technology Good for Us? A Eudemonic Meta-Model for Evaluating the Contributive Competence of Technological Products and Processes for the Good Life

Spence, Edward H.

The title refers to the question addressed in this paper, namely, to what degree if any technology, in the form of products and processes, is competent in contributing to the good life. To answer that question, the paper will develop a meta-normative-model whose primary purpose is to determine the essential conditions that any normative theory of the Good Life and Technology (T-GLAT) must adequately address in order to be able to account for, explain and evaluate the Contributive Competence of Technology for the Good Life (CCOT-GL). By CCOT-GL understand the competence of any technological product or process in its design and/or its use to contribute in some way, if any, to the Good Life of society. Henceforth I will use the all embracing term “technology” to refer to both the products and processes of technology.

There are at least two necessary methodological meta-conditions that any T-GLAT must meet. I will refer to those conditions in this paper as the formal condition and the material condition.

The Formal Meta-Condition

The formal condition characterizes the necessary structural form of the theoretical framework of any T-GLAT and comprises at least three general normative categories that any T-GLAT must of rational necessity include within its theoretical framework, so as to be both theoretically and practically adequate. Those formal normative categories are motivation, justification and compliance. For if it lacks sufficient motivation, agents will not be pre-disposed to act in accordance with its prescriptions and if it lacks justification rational agents will have no reason to be convinced of its rational authority and thus will have no reason to offer their rational allegiance to any T-GLAT that lacks rational cogency. Finally, compliance is practically necessary if the prescriptions of a T-GLAT are to be capable of leading to social and political action resulting from T-GLAT informed policies.
The Material Meta-Condition
The material condition characterizes the necessary content that any T-GLAT must address and include both in its conceptual explanation and practical application. It comprises at least ten essential minimal conditions that any T-GLAT that seeks to evaluate the Contributive Competence of any Technology to the Good Life (CCOT-GL) must adequately address:

1. Desires
2. Pleasures
3. Needs
4. Means-ends-satisfaction
5. Value-ends-appraisal
6. Love-worth-appraisal
7. Respect-preserving-appraisal
8. Sustainability
9. Moral Rights
10. Eudemonia
11. As aspiration-fulfillment
12. As capacity-fulfillment

The Two Theses of the Paper in Summary
Using this meta-model the paper will argue for and support in detail two inter-related theses: (a) any Theory of the Good Life and Technology (T-GLAT), whether desire-satisfaction theory, objectivist theory or capability theory, amongst many others, must be capable of at least addressing and accounting for the two formal and material meta-conditions outlined above. Insofar as any T-GLAT fails to do so, then it is not an adequate theory; and (b) one such adequate Theory of the Good Life and Technology is my Neo-Gewirthian Theory of the Unity of the Right and the Good (Spence 2006, Chapter 10). The paper will provide arguments to demonstrate and support the case for such a theory but without excluding the possibility that other theories that meet the necessary formal and material conditions as outlined above might also prove successful. As such, the paper takes a pluralistic methodological approach to the research question addressed therein.

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11. The paper will also be informed and where necessary refer to some of the as yet unpublished papers presented at the International Conference on The Good Life in a Technological Age (GLITA) held at the University of Twente, June 2008.
From extended cognition to socio-technical agency

Blomberg, Olle

Edwin Hutchins’ theory of distributed cognition (DCog), while originally formulated as a theory about the nature of human cognition (in 1995) is now a widely used framework for ethnographic “user studies” in Human-Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW) (see Ackerman & Halverson 1998, Wright et al. 2000, Hollan et al. 2000). In philosophy, Hutchins’ research has also become well known, primarily as one of the main empirical touchstones for the “extended cognition movement”, associated with philosophers such as Andy Clark (2008), Robert Wilson (2004), and Susan Hurley (1998). According to the extended cognition view, bits of the environment, including representational artifacts (notebooks, PDAs, maps etc), can become proper parts of an agent’s cognitive processes. In this presentation, I will try to make the relation between DCog and the extended cognition view clear, and review and assess some objections that have been raised against DCog. I will conclude that DCog can be fruitfully applied to some kinds of socio-technical systems, highly rationalized organizations that are working toward a clear systemic goal, but not to others.

While the extended cognition claim seems to be a component in DCog, the theory also incorporates two related claims, which proponents of extended cognition might not want to take on board. First, DCog partially implies a shift away from an “organism-centered” extended cognition view (see Clark 2008) to a focus on larger socio-technical-cum-cognitive systems. At the core of DCog is the claim that (some) socio-technical systems (a) are computational systems and (b) should be taken as a proper unit of analysis by cognitive scientists (in other words, they are cognitive systems). Computation should here be understood broadly, as the “creation, propagation, and transformation of representational states”. Secondly, in arguing for (b), proponents of DCog seem to accept that socio-technical systems have some form of agency apart from the agencies of the individual human agents that are parts of the system.

With regard to (a): While philosophers have criticised DCog and extended cognition mainly for distorting the nature of cognition (Adams & Aizawa 2001, Rupert 2004), DCog have been criticised in HCI and CSCW for other reasons: for “cognitivising” both technology and the social world in a distortive way (Button 1997, 2008), and for focusing on ‘cognition’ conceived in an overly broad, and therefore redundant way (Latour 1996, p. 63n12, Hollnagel & Woods 2005, p. 58). I will argue that these critiques highlight what kinds of socio-technical systems that DCog can be fruitfully applied to.

With regard to (b) and the claim about socio-technical system agency: Those who argue that such agency makes sense usually appeal to the explanatory benefits of treating socio-technical systems as agents (see Rupert 2005). However, as critics are quick to point out, it seems that the behaviour of groups or socio-cultural systems can be reductively explained by reference to the agency of the people that participate in the system. Rupert argues that in order for what he calls a “group cognitive system” to be an agent, it must minimally be argued that the public representations that are propagated in such a system are mental representations. However, he shows that this is not possibly according to any acceptable view of mental representations. I will propose that DCog suggests a way in which to meet this criticism, by appealing to what I will call ”subsystemic” representations (in analogy with...
subpersonal representations). However, this appeal again shows that DCog is a suitable theoretical framework only for a limited range of socio-technical systems.

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An Intentionalist Design Stance and its Objects

Borgo, S., Carrara, M., Garbacz, P. & Vermaas, P.E.

In this paper we argue that the design stance in Dennett’s approach presupposes his intentional stance: application of the design stance for describing the behaviour of designed systems presupposes the application of the intentional stance to a (hypothetical) designer and sometimes also to the users of the system.

In our arguments we use Dennett’s descriptions of the design stance, an analysis of the engineering concept of function used in a formalisation (Borgo et al. 2009) of this concept, and a recent critique of Dennett’s design stance by Vaessen and Van Amerongen (2008).

When introducing his three stances towards describing the behaviour of systems, Dennett describes first the physical stance, then the design stance and finally the intentional stance (Dennett 1987, pp.16-17). This ordering seems reasonable given that the stances seem to introduce assumptions about systems that are increasingly controversial. When applying the physical stance, one assumes (uncontroversially) that a system’s behaviour can be described by its physical structure and the laws of physics. The design stance adds a teleological perspective that tells what behaviour the system is designed for. And in the
intentional stance one assumes that the system is a rational agent, with beliefs, purposes and desires. It can however be argued that the design stance presupposes the intentional stance. The 'controversiality ordering' is thus rather one in which the physical stance comes first, then the intentional stance and finally the design stance: the design stance introduces all assumptions that come with the intentional stance and adds that systems can be considered from a teleological perspective.

Dennett identifies two types of systems to which the design stance can be applied: artefacts and biological systems. In principle design may merely mean here that a teleological perspective is added to the system. Yet, Dennett seems to take designing as a process in which a (hypothetical) designer adds this teleological perspective to the system. In the case of artefacts Dennett illustrates, for instance, application of the design stance by means of the procedure of reverse engineering, in which it is assumed that the features of an artefact are for a reason added by a designer (Vaesen and Van Amerongen 2008, pp. 781-782). Our analysis of the engineering concept of function shows the extent to which intentional choices are part of those descriptions (Borgo et al. 2009). In, for instance, the Functional Representation approach to engineering (Chandrasekaran and Josephson 2000) two kinds of functions are distinguished. A device-centric function is in turn an effect of this behaviour on the artefact’s environment, that is selected and intended by an agent, who may be the designer but also an user. Hence, in order to capture with the design stance the behaviour for which an artefact is designed, these selecting and intending agents should be considered, which implies applying the intentional stance to those agents. Dennett’s writing provides reason to draw the same conclusion when the design stance is applied to biological systems. This application is for Dennett “adopting the intentional stance towards the process of natural selection and looking for the somewhat covert design rationales of the features we discover.” (Dennett 1990, p.187).

The critique by Vaesen and Van Amerongen (2008) shows that in the case of artefacts the design stance presupposes the intentional stance in another way: people may determine the functions of artefacts with the design stance by taking into account the intentions of agents (users) that interact with that system. These arguments lead to the conclusion that application of the design stance to a system S implies the assumption that there is an intentional agent A who designed S for a certain behaviour. This agent A is a designer if S is an artefact, and “Mother Nature” (Dennett 1990, p.187) if S is a biological system. Application of the design stance may moreover imply the assumption that there are intentional agents B who interact with S with specific beliefs, desires and purposes. The system S is then typically an artefact, A is the designer of the system and B are for instance its users.

We end our paper with an exploration of how with these more detailed descriptions of the design stance, artefacts can be distinguished from mere instruments in the cases that the agents B are human beings or animals.

References


Human Values at the Intersection of Technoscience and Democracy

Crombie, James

What are the points of convergence and symbiosis – or alternatively the points of tension and incompatibility – between technoscience, on the one hand, and democratic and human values, on the other? In one strand of reflexion, technological progress and the advance of scientific knowledge are represented as essential factors in the increasing liberation of the human spirit and the increasing realization of human potential. This is the optimistic reading of the Baconian aphorism according to which knowledge is power. Another tradition reads the same aphorism in a darker light and sees science and technology as hostile to the spontaneous creativity of the human spirit and conducive to the rise of a technocratic tyranny, reminiscent of Lewis Mumford’s “megamachine.” As Gilbert Simondon puts it: “It is difficult to liberate oneself by transferring slavery onto other beings, be they men, animals or machines; to reign over a people of machines enslaving the whole world is still to reign [...]”

One particular point on which technocratic rationality seems to come into conflict with basic democratic values is in the area of popular sovereignty and social policy. What is the place and the use of expert advice and testimony? “The [sovereign] people,” as Isabelle Stengers puts it, in her characterization of the view she is about to question, “must listen to the experts, agree to be realistic, which is to say grown-up and rational, and then decide, in all lucidity [en conscience].” Should the possession, use and traffic of certain substances be ruled to be a criminal offence? Should a given project to dam a river to regulate flow and produce energy be given the go-ahead? Should the use of fossil fuels be drastically curtailed in order to stave off apprehended catastrophic climatic change? What is the weight and what is the authority of scientific and technological expertise in decisions such as these?

The spectacle of a democratically elected president who expressed disbelief in the efficacy of antiretroviral drugs in slowing the development of the disease known as AIDS – because he didn’t believe that the virus identified as HIV was the cause of that disease – is a grotesque example of democratic sovereignty gone awry to the detriment of the overall welfare of a population. In an ideal view of historical progress, we may go so far as to wonder whether ignorant politicians and gullible electorates should not turn over such important decisions to those who have a more objective view of things! Can technocratic reason replace the democratic process? Should it?

Isabelle Stengers does not think so. The present paper includes a critical examination of Stengers’ account of what makes scientific answers to scientific and technological questions “reliable.” This is because of the special nature of the “laboratory-entities” in terms of which the questions are asked. On Stengers’ view, ”the fact that [these special objects] answer the questions which are asked of them in such a reliable way [should] not become the general model [of "submission"] around which all power coalesces.” Answers to questions about laboratory-entities can have varying degrees of relevance to factors of social and human concern while, on the other hand, factors of social and human concern can feed back into our choice of the laboratory-entities we ask questions about. This is not relativism. Social acceptation of pasteurization and antibiotics is not an arbitrary whim. But Stengers also rejects technocratic scientism, arguing that we can legitimately ask whether and how engineers can be forced, by social movements, to “see” certain dangers which they otherwise might have been unwilling to recognize – as western nuclear engineers have, on Stengers’ view, contrary to those of the former Eastern Block?

Stengers’ view, confirmed by Simondon’s, is that modern techno-scientific rationality arose in opposition to structures of authority and legitimation which were dominant at the beginning of the modern era. The situation has perhaps changed, now that the main institutions of techno-scientific rationality have become the allies of the dominant power
structures and the categories of thought associated with them – subject, as in Galileo’s day, to being questioned.

Notes

5. As Stengers puts it, modern science and technology began as a “puissance de contestation et de transformation des rapports d’autorité” (ibid., p. 89).

Genealogies of technology: Foucault, Feenberg and critical historiography

Hamilton, Edward

Constructivist approaches in technology studies have been credited with the innovation methodological terms for the analysis of technological development as a social process (Bijker, 1993; Bijker & Law, 1992; Callon, 1987, 1986; Pinch, et al., 1987). However, such approaches, at least as they were articulated in the 1980s, were critiqued for the lack of a normative foundation on the basis of which evaluations of the outcomes of technological change could be made (Brey, 1997; Radder, 1992; Winner, 1991). Such a critical dimension may have been implicit in the links constructivism made between technical development and the interests of social groups, but without elaboration, it seemed difficult to link its unique approach to a political theory of sociotechnical practice.

Andrew Feenberg’s critical theory of technology responds to this lacuna by reintroducing themes from the Frankfurt School’s critique of instrumental rationality (Horkheimer & Adorno, 1972; Marcuse, 1978, 1964), and Foucault’s theorisation of power/knowledge (Foucault, 1994, 1991, 1990, 1980), to produce a critical constructivist philosophy of technology (Feenberg, 2002, 1999, 1995). Feenberg re-crafts concepts like “interpretative flexibility” (ambivalence), “relevant social groups” (participant interests), “closure” (strategic encoding), and “technological frames” (technical codes) and arrives at a theory of technology that can ground a critical constructivist approach. At the same time, he adapts constructivist understandings of human agency in the technical sphere and arrives at a theory of the democratic transformation of technology, thus answering to the problems identified in his own philosophical sources (Baert, 1998; Merquior, 1985; Poster, 1980).

What critical theory of technology lacks, however, is a methodological framework that can actualise its terms in empirical studies of the historical development of sociotechnical systems. It is my argument that a return to the work of Michel Foucault can aid in the construction of a critical historical method for critical theory of technology.

In this paper, I attempt to recast Foucauldian genealogy in the language of Feenberg’s critical theory of technology in an attempt to provide methodological terms for critical constructivist history of technology. I argue that, when separated from the substantive arguments that form the basis of Foucault’s theory of power/knowledge, the “methodological prescriptions” comprising genealogy enable the articulation of a framework for applying Feenberg’s critical theory to cases in the history of technology. At the same time, I attempt to demonstrate that Feenberg’s re-conceptualisation of power/knowledge in the theory of the technical code provides a more viable conceptual framework within which to re-articulate the genealogical project of a “recovery of subjugated knowledges” – the location and
actualisation of alternative modes of organising sociotechnical practices for the benefit of subordinate groups. The first part of the paper returns to the roots of Foucauldian genealogy and critical theory of technology in the work of Nietzsche and Marx. It attempts to draw out formal similarities between these two thinkers that ground a rapprochement between Foucault and Feenberg. I then outline Foucauldian genealogy as a historical method before turning to the substantive terms of critical theory of technology in the rearticulation of that method. I conclude by outlining, with reference to cases in the development of educational technologies, a method for critical history of technology grounded in a synthesis of genealogy and critical theory.

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Hybrid Cognitive Systems and Etiological Theories of Function

Van Holland, Marijke & Vaesen, Krist

In this paper we examine how etiological theories of function fare with respect to hybrid systems – i.e., systems that contain both biological and artifactual components.

Etiological theories of function are meant to be theories on the nature of functions generally – alternatively, on what it means for some entity \( x \) to have a certain function \( \phi \). (Wright 1973) As such, etiological theories have been proposed to apply to different types of entities that may be said to have functions: in particular, to both biological entities and man-made artifacts (technology). Etiological theories thus abstract from the specific nature of the phenomenon under investigation. However, particular (causal) mechanisms remain important for determining the actual function of a particular type of entity, so that determining the function of a biological item may draw on different kinds of events than determining the function of an artifactual item. In the case of biological items natural selection is the important causal mechanism (Millikan 1984, Neander 1991), whereas in the case of artifacts we typically appeal to design and intentional selection (Vermaas & Houkes 2003).

This seems to provide a problem especially for hybrid systems that contain both (a) biological and (an) artifactual component(s). It is unclear whether in order to explain the functions of such systems from an etiological viewpoint we need to appeal to natural selection, designer’s intentions or a combination of both.

To explore this problem we focus on one specific type of hybrid system: extended cognitive systems involving a human brain and a cognitive technological artifact. Such systems have been studied by, among others, Clark & Chalmers (1998), who have shown that human cognition depends crucially on the bonds created between internal cognitive resources and external resources; and that these bonds can result in integrated and more or less permanent brain-artifact systems. In such cases, brain and artifact together are treated as one functional unit. Clark and Chalmers offer the example of Otto, an Alzheimer’s patient who uses a notebook as a substitute for his failing memory. Otto relies on his notebook in the same way as healthy people rely on their internal memory; it is constantly and directly available, and Otto trusts it implicitly as a typical believer would her internal memory. In other words, Clark and Chalmers argue convincingly, Otto’s brain and his notebook together constitute a single belief system with a clear function, i.e. the same function as a biological belief system; and insofar as the latter can be attributed a proper function, the same holds true for Otto’s hybrid belief system. This contention is further supported by the fact that it is possible for malfunction to occur at the system’s level. If the notebook is lost or destroyed, it is not only the artifact that is affected; the entire brain-notebook system will no longer be able to fulfill its action-guiding role.

Now, if hybrid systems have a proper function, as the above example suggests, then it should be possible to formulate an etiological account of that function. In this paper we explore what such a theory would have to look like; in particular, we assess whether to explain the function of a hybrid system it suffices to invoke an evolutionary or intentionalistic causal story alone; or that hybrid systems by their very nature should be explained in terms of a combination of these histories. As a starting point, we use the classificatory system for etiological theories of function introduced by Vermaas & Houkes

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See also e.g. Clark (1996, 2001, 2003), Sterelny (2003), Wheeler (2005).
(2003), which divides etiological theories into reproduction versus non-reproduction and intentionalist versus non-intentionalist types. We spell out the prospects of each combination of these types (reproduction-intentionalist, non-reproduction-intentionalist, reproduction-intentionalist, and reproduction-nonintentionalist). If we find a likely candidate among these possibilities, we have the beginning of a viable theory of proper functions for hybrid (i.e., biotechnical) systems.

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“Technical operation and 'individuation' of nature in Gilbert Simondon’s”

Lefebvre, Anna

Converging applications of the NBIC technologies give rise to a new relation between technical operations and the triple dimension of life: biological, psychical and social. Life seems to be questioned in its very nature, as such it appears no more relevant to make any nature as a norm in order to evaluate these processes. Keeping a substantialist ethics might lead us astray.

The purpose of this communication is to show that Gilbert Simondon provides conceptual tools to an appropriate analysis of these processes, as well as the emergence of concrete axiological criteria, because he accepts to question first and foremost the opposition between technology and substantial nature, inherited from Aristotle. Precisely, the French philosopher does not reduce the terms of this opposition either – he does not stand for a technological reductionism that would bring back each living being to a technical reality. While he criticizes more radically than ever any substantialist understanding of nature, the genetic approach of the technical object, he develops mainly in: Du mode d'existence des

49 The works of Gilbert Simondon is only getting rediscovered. An English translation is just to be established. In the meantime, I decided to keep in quotes his French phrases.
invites us to grasp its own reality in the very articulation it creates – and in which it consists – within a nature, which, thus, pursues its own “devenir d’individuation” 51. I aim to underline that the technical object eventually appears at the point of convergence of the three different “régimes d’individuation” (physical, vital and psychosocial) of nature, without belonging to none of them, and that, therefore, constitutes a focal point for the philosophical reflection.

After a brief presentation of Simondon’s understanding of nature, I shall refer to four distinctions Simondon himself suggests, in order to clarify the technical object’s position within nature.

The first distinction between an abstract object and a concrete object introduces a polarity in the field of production. Sole the process of “concrétisation”, which fulfills the necessity to increase the functional convergence of a technical system, allows to conceive the emergence of the technical “individu”, which is to be no more considered as a mere artefact but is a system recruiting for its own functioning, some virtual effects of nature as a “milieu associé”. This concept might be a precious tool to precise the relation between technical operations and matter.

Further on, I shall consider the comparison between a laboratory object and a plant grown in a greenhouse. Whereas the technical object is getting involved in a naturalization process, the plant might be left to an artificialization process. The natural/artificial conceptual couple, thus, makes sense almost in an axiological way. Nevertheless, this comparison is not at all to be confused living beings and technical realities, but enables to get deeper into the different modes of relations that each individual have with its “milieu”, and to reconsider the concept of autonomy, which does not mean independence.

The third distinction is between the robot, whose perfection is, according to Simondon, a product of science fiction, and the machine, which exists thanks to its capacity to receive information as well as to be an instrument of information. While Simondon criticizes fake analogies produced by cybernetics, he notices that the invention act produces a correct analogy between the mental operation and the functioning of the object. I shall clarify the meaning of the concept of “information” and the relation between technical activity and thought in Simondon’s.

There remains the fourth distinction between prostheses and technical objects, which keep their own meaning safe, whereas they are separated from the living being’s body. To get the very issue of this insight, our attention will be drawn to the cyclical genesis of the image 52, which technical objects belong to. Invention, which occurs when the system of the images is to be resolved according to a new scale, gives to created objects a significant status, as for they are exteriorized images of invention. If some really extreme parts of developed living being organisms, which are not yet separated from the body have already a symbolical function in magic thought, only invented objects are symbols and supports of “transindividuelle” psychosocial “individuation”.

Instead to edict some abstract norms to evaluate what we use to consider as mere applications, philosophy is responsible for extract conceptual tools from a concrete analysis of those phenomena. Indeed, the real task of philosophy seems to be a phenomenological one. Philosophy, as a culture, must reflect technical objects to preserve the possibility of an inventive psychosocial “individuation”, that is to say: guarantee the production of actual values and significations.

51 Nature must be considered as a ‘devenir d’individuation’ being developed according three different “régimes” which cannot be reduced to each other: physical, vital and « psychosocial ». Cf. L’individuation à la lumière des notions de forme et d’information, coll. Krisis, Ed. Million, Paris, 2005.
52 Cf. Imagination et invention, Ed. La Transparence, Paris, 2008
The practical orientation of technology between efficiency and good action

Mandolini, Clara

The paper’s aim is to consider the problem of the moral responsibility connected to the transcendental orientations of technology. Technology, in fact, in spite of the extremely different uses that can be done of it, contains an implicit practical orientation, that is efficiency for productive actions of the man. To affirm this implies to deny the interpretation of the ontological essence of technology according to which technology is intrinsically “empty” of any orientation and ethical dimension for human praxis, since it simply lacks a specific intrinsic power to orient human action in a sense or in another. On the contrary, technology – in its specific transcendental essence of “device for”, of instrument of mediation from the intention to the purpose, is defined just by its instrumental nature. In this aspect, that at a first glance seems rather banal, we can find a deeper affirmation: technology is defined by its instrumentality, that is the same as to say that its practical definition – its real nature – consists in its capacity to lead to a certain result, to mediate to the purpose of action in the most efficacious way. This is what we assume to be the transcendental quality of technology: efficacy. Then, the first part of the paper will put into light this “essence” of technology by recalling and discussing critically some philosophical positions by Aristotle, Roger Bacon, Descartes, Marx, Heidegger.

Assumed that, at an ontological level, there is no other way to think the essence of technology than by analysing its constitutive orientation to efficacy, we can pose another question, which leads directly to the moral problem connected to the possible “bad” use of technology. The question then is: is this intrinsic orientation to efficacy in itself morally “neutral”, or does it contain a certain vision of praxis? The second part of the paper will consider this hypothesis, by discussing some theoretical hypotheses, mostly elaborated by Max Weber, Max Horkheimer and Theodor Adorno. These can be resumed in two essential positions: the first one assumes the practical total neutrality of the “essence” of efficacy; the second one assumes that this ontological characteristic silently contains a precise practical “direction” for human praxis. Then, the third part of the paper will consist in presenting the consequences of that on the formulation of some criteria of moral orientation for technology itself, as included in a broader structure of human praxis and in an ideal of “good life” and human flourishing through action. In this last part we will recall the conceptions by Maurice Blondel and Max Scheler about the essence of human work and action.

In their conception, work and technology are transcendental forms of human praxis: this does not mean that technology is a separated domain of action and research, but that it is originally included in the dynamics of effectuation of any human action, in as much as action requires and creates the devices to progress “efficaciously” in the world and with other co-subjects. But, being radicated in the same dynamics of general action, technology (as well as work) become part of the general movement of praxis to the human research of wholeness and flourishing. In this light, as the final part of the paper will show, technology finds a moral sense, which connects its efficacious ontological structure in a moral, more comprehensive, praxis.
A Phenomenological Analysis of Facebook: A laying out of the constituent aspects of the phenomenon of the social networking site Facebook including the framework, the self, and the other

Melendez, Carlos & Valadas, Alexandra

Social networking sites like facebook are increasingly becoming popular as means by which we interact with each other. This interaction is not limited to friends and acquaintances, but is also spilling over into the work environment, including co-workers and employers. As a framework, it provides an arena within which we encounter our “selves” and the other by means of various mechanisms. These mechanisms include the “publication” of different items such as images or photographs, written statements, the status update, and commentary. On one hand, this allows the user to exert control over the representation of himself or herself in explicit ways. On the other, this presents the user with the possibility that the representation of the other that is encountered may or may not represent the other accurately. As a communication technology, facebook changes social interaction, creating not only a new social space but changing the nature of the encounter with the ‘Other’ as well.

Levinas conceptualizes the ‘face to face’ as an account of intersubjectivity which maintains the absolute difference of the Other; that is, through the interpersonal relation, the transcendence of the other person is transformed into immanence. This is the moment of the ethical encounter, a moment of recognition and difference. The self is then faced with a continuous awakening through the presence of the other; the self as a being, always troubled by the other.

The creation of a hyperrealist public sphere where the mediation of the social encounter allows for the possibility of ‘being social’ without true ‘social’ interaction sets up Facebook as a technological device that encourages the reification of ‘the face’ of the other, mediating the referential relationship between the ‘real’ other and the ‘copy’ that the other chooses to show on Facebook. Therefore, due to the nature of the technological device itself (in accordance with the different ‘applications’ or modes of communication that convey a limited subset of information about the subject) and the decision of the ‘other’ to make visible only certain aspects of itself, the constructed representation is unable to faithfully represent the other. As Baudrillard argues, representation has been replaced by the process of simulation, which places the copy – the simulacrum – as the actual truth. However, since the simulacrum often precedes the real as a mode of presentation it cannot be an actual copy, and it becomes instead the real itself, i.e. the hyperreal.

Facebook becomes, then, a vehicle for the transformation of real and traditional social interactions in which the real ‘face to face’ is abolished at the expense of the hyperreal commentaries, messages, and other modes of communication found in the Facebook platform.

We will explore how Facebook, therefore, mediates a new form of intersubjective relation, one that will imply that the modification of the subjective experience no longer conforms to its traditional forms of the ‘face to face’ with the other. The face is no longer the canvas of constitution and reconstitution of subjectivity, and the types of content imposed by Facebook along with the ability of the other to employ certain filters to construct a self, is leading to a new subjective experience.
Instruments and Scientific Change

Pitt, Joseph C.

This paper will begin an examination of the impact of technological innovation on scientific change. Specifically, the paper will consider the role of new and improved scientific instruments on scientific theorizing. More specifically, I will be looking at developments of microscopes and telescopes and their impact on astronomical and biological theories. For too long the role of the technologies involved in science has been ignored when it comes to understanding scientific change. Yet when we turn to the actual doing of science, not some philosophical abstract reconstruction, we instruments and other technologies everywhere.

The argument is both straightforward and novel: traditional theories of scientific change ala Kuhn, Lakatos, and Laudan ignore the most important players in scientific change: instruments. These types of theories has been ignored by scientists since they seem to have nothing to do with the way science is actually conducted. The standard philosophical view concentrates on the apriori reasons scientists ought to employ in their selection of new theories to replace discredited theories. Little attention is given to the means by which these theories were discredited and what that entailed when it came to devising replacement theories. I will argue that the technologies that contributed to the demise of old theories are important contributing factors to the development of new theories. That is, the instruments that supplied the new data used to discredit the old theories are now to be employed in the development and confirmation of new theories. These new or improved instruments are seen as the means to the end of understanding nature better and must be factored into the kinds of things the new theories say and predict.

New instruments, or improvements on old one, (e.g., adding a micrometer to Galileo’s telescope) are the primary source of the new information that causes revisions in current theories or even their rejection. This is not to say that there is some kind of priority to the technologies involved, but rather that there is a radical symbiosis among instruments, social technologies like funding agencies, and scientific theories. The specific case that helps establish that point concerns the development of the microscope. Created at the same time as the early telescopes in the 17th century, microscopes initially failed to generate scientific interest. The reason seems to be that while they appeared to yield new data, there was no theory of the very small that helped to make sense of that data. When cell theory was invented in the 1830s, there came an explanation and a call for better telescopes to yield better access to the microscopic world. In turn, the data these microscopes produced caused revisions in the theories and so the race was on to see more and explain better what we saw and what its significance was.

The same situation can be found when we look at the interaction between telescopes and theories of the heavens. Galileo’s telescopic findings shattered the Aristotelian/Ptolemeic view and while it took roughly 150 years to put a more coherent theory together, producing that theory was intimately involved with the increasing sophistication in telescopic technology.

The general theme of the paper is that we cannot understand the mechanisms of scientific change without understanding the contributions of the various technologies that make science possible, what I have called elsewhere the technological infrastructure of science. To ground this general claim I begin the discussion here with a, necessarily, short look at the roles of telescopes and microscopes.
Have we just moved into the age of technoscience?

Radder, Hans

Some philosophers strongly demarcate the natural from the engineering sciences and, more generally, science from technology. Others agree that the natural and the engineering sciences and science and technology may overlap in certain respects, but still claim that they can and should be empirically and/or conceptually distinguished. Recently, however, both the more radical and the more moderate claims about the distinctions between technology, the engineering sciences and the natural sciences have been challenged by several authors.

In an extensive historical paper, Paul Forman argues that since about the 1980s there has been an ‘epochal change’ in our views of the relationship between science and technology (Forman 2007). Since that time, science has come to be seen as subordinated to technology, both as regards its role in actual practices and as regards its rank in socio-cultural evaluations. In a similar vein, Alfred Nordmann proposes the claim that, roughly in the same period, there has been an ‘epochal break’ in the historical development of science, from a scientific to a technoscientific enterprise (Nordmann 2009). Related, but somewhat broader, are the views that there has been a fundamental change from a Mode 1 to a Mode 2 approach to the production of scientific knowledge (Gibbons et al. 1994) or from an academic to a post-academic or industrial science (Ziman 2000). These views deny, or strongly question, any basic distinction between present-day natural and engineering science or between science and technology.

In this paper (see Radder 2009), I discuss and evaluate these views, with a focus on the ‘epochal break thesis’ put forward primarily by Nordmann and Forman. The epochal break thesis constitutes a bold claim with historical, philosophical, social and moral dimensions. The paper addresses some aspects of each of these dimensions.

First, I argue that the idea of a single ‘great divide’ between a scientific and a technoscientific enterprise is questionable on both historical and philosophical grounds. Yet, this does not imply that there are no important distinctions at all between recent and past science. In section II, I point to two novel nonlocal patterns, both related to an increased significance of engineering science and technology: first, a strong focus on the issue of the external validity of scientific methods and claims and, second, a substantial commodification of academic research. In section III, I conclude that a conception of scientific development in terms of the emergence of novel nonlocal patterns is preferable to an account in terms of an epochal break. Furthermore, I elucidate how nonlocal patterns may be identified and explained and what is implied, and what not, in postulating the existence of such patterns. Using Max Weber’s notion of ideal-typical explanation, the paper closes with an argument for making explicit the normative issues involved in advocating philosophical claims, be they about epochal breaks or about novel nonlocal patterns. In my case, this implies to highlight, scrutinize, explain and assess the implications of the commodification of academic research.

References


Did Ellul and Heidegger Reify Technology?

Son, Wha-Chul

Ellul, along with Heidegger, is often criticized to have reified technology. According to this view, Ellul and Heidegger treat modern technology as if it is an independent entity that has its own nature or essence. Many complain that Ellul and Heidegger do not pay enough attention to individual technologies. Feenberg calls them “essentialists.”

In this paper, I will claim that this wide-spread idea concerning Ellul’s and Heidegger’s philosophies of technology stems from unfair and incorrect reading of their works. While Ellul and Heidegger took quite different paths in their investigations of modern technology, their approaches are far from being essentialist.

Even when this accusation is proven to be wrong, several questions concerning the hidden implications of this debate still remain unresolved. Why did Ellul and Heidegger refuse to deal with individual technologies, in the first place? Were they so ignorant not to see the immense variety of modern technological development? Which aspects of their theories are so irritating for contemporary philosophers of technology? What did philosophy of technology gain by the accusation of Ellul and Heidegger and what were lost on the way?

The first section will be devoted to examine the charge of essentialism against Ellul and Heidegger critically. Detailed research on Ellul’s and Heidegger’s main texts and on the works of their critics will be conducted. In the second section, I will analyze the context of reification debate in philosophy of technology. It will be argued that the main issue is the pessimism of Ellul and Heidegger rather than their understanding of technology. In the third section, an effort to synthesize the positions of both parties will be made. On the one hand, I will claim that the agenda behind the critique of Ellul and is understandable and justifiable in some respects. On the other hand, it will be argued that Ellul’s and Heidegger’s ideas are not incompatible with active intervention of human beings in the process of technological development. The conclusion is simple: the accusation of reifying technology is not only incorrect, but also unnecessary.
Ove Arup: the reflections of a philosopher-engineer

Chilvers, Andrew

Trained in philosophy and engineering Ove Arup established the Arup firm in the UK in 1946 and it has since grown into a global and world leading firm of designers, engineers, planners and business consultants. Their successful contribution to some of the most significant engineering designs of the late 20th century and more recent years is undeniable from the Sydney Opera House in Australia to the Channel Tunnel Rail Link in the UK. Undeniable also is the origins of the firm in the philosophical reflections of its founder.

Throughout his lifetime Ove Arup held to two core positions. Firstly, that our grasp on things is always incomplete and can often be shown to be mistaken at some later date (Jones, 2006). Secondly, he was staunchly opposed to rigid ideologies or mantras. He held that every case is unique and that all things change over time and with context including values, beliefs and meanings (Jones, 2006). Through rigorous reflection on his experiences as an engineer Ove Arup grappled with some of engineering’s core issues; the appropriateness of design to context and definitions of quality therein and the role of engineering knowledge both on projects and in society. The results of these reflections are identifiable within the present day firm in two lasting forms; ‘Total Design’ and ‘The Key Speech’.

Originally developed as ‘Total Architecture’, the main feature of Total Design is the involvement of all professional design and engineering disciplines from the outset of a project. Given the limitations of any one perspective this aims to ensure maximum consideration of design aspects throughout the design process.

The Key Speech was made by Arup in 1970 and results directly from his reflections on the role of the engineer within society and on how to ensure the appropriateness of the engineering designs of his firm to changing contexts especially in light of its fast growth both in terms of employee numbers and geographical coverage. The Key Speech can be viewed as a moral framework around which the firm arranges and conducts itself. Arup’s assertion however was that it must be viewed only as a framework of ‘container concepts’ open to enrichment and that it was the continuing duty of the firm’s members to ensure relevancy through continuous and rigorous reflection (Jones, 2006).

The present-day Arup firm forms the basis of research into Engineering Engagement or the active reflection on the role of personal, organisational, social and political values within engineering practice. This research is both an undertaking in Engineering Engagement and a critique of the levels and form of Engineering Engagement present in practice. Thus, this research looks to critically assess the role of values in shaping the Arup firm’s practice and the level to which its current members reflect upon this.

This paper further explores the philosophical reflections of Ove Arup as shaped by his humanist values and stimulated by his experiences as an engineer but also as the founder of one of the largest and most influential firms of engineers in the world. His views are compared to those of contributors to the field of Philosophy of Technology. This paper thus contextualizes the philosophy of one of the most reflective engineers of modern times, views which still pervade the culture and practice of a successful modern day engineering firm even since Ove Arup’s death some 20 years ago.

220
Engineering a framework for the analysis of favourable and unfavourable user-artefact interactions: a nanobiosensor case study

Evers, Johan

This paper proposes a framework for the systematic analysis of user-artefact interaction outcomes, using nanobiosensors (i.e. sensor devices for in vivo and real time diagnosis and monitoring) as a case study. Nanobiosensors are understood as technoscience research artefacts that are developed for use in health care, which is a highly sensitive public and policy domain. The author argues that in addition to knowledge about ‘societal’ parameters such as the meaning of health, illness and just health care systems, knowledge about ‘technoscientific’ parameters are relevant for the design engineering in a technoscientific context. The latter parameters are identified as the intentionality of the user-artefact interaction, the artefact mediation, and the awareness of artefact mediation.

Engineers in a technoscientific context have to deal with the complex entanglement of research practices and socio-economic expectations. Not only are science practices (which gravitate around the acquisition, accumulation and sharing of theoretical knowledge) and technology practices (which are oriented more towards knowledge application) becoming more interdependent, but they are also subject to societal scrutiny and economic feasibility. Artefacts at the interface of info-, bio- and nanotechnoscience, for instance, are expected to change the experiences and actions of affected (non) users in virtually every domain (including human health care) in the coming decades. Artefacts for advanced health surveillance such as nanobiosensors belong to Europe’s research priorities for the coming five to ten years. But if affected (non) users are confronted with these developments, they simultaneously express hope, fear and uncertainty, and thus ambivalence. Hence, given the expected significance of these evolutions and the present uncertainty about their precise impact, design engineers in a technoscientific context can benefit from tools that provide insights in favourable and unfavourable user-artefact interactions.

The proposed framework in this paper is inspired by a multilayered scheme of Berdichevsky & Neuenschwander concerning persuasive technologies (i.e. technologies that direct users into specific, often more responsible, actions). The authors have linked the designer’s responsibility with key concerns in the designer’s social responsibility. Analogously to this scheme, the present author identifies societal and technoscientific aspects that together determine whether the user-artefact outcome is favourable or unfavourable. On the one hand, societal parameters refer to how an individual (or society) defines what is good or right, what is bad or wrong in the area of health care. On the other hand, the author argues that three ‘technoscientific’ parameters or mechanisms influence the decision making process towards a favourable or unfavourable outcome. The first mechanism is the intentionality of artefact-user interactions, which takes into account whether the engineer intended the outcome or not. It has a direct link with the design context. The second mechanism is the ‘artefact mediation’, which refers to how much the artefact steers the user’s experience and action. The usefulness of the typologies ‘force’, ‘persuade’ and ‘seduce’ are examined. The third mechanism is the ‘awareness of mediation’, which considers whether the affected user was aware of the behaviour steering character of the artefact. The author concludes with an evaluation of the appropriateness of these parameters by means of the nanobiosensor case study.
Using Scenario Planning to Develop “Judgment” for Dealing with Engineering Systems

Farber, Darryl & Pietrucha, Martin

The size and scope of engineering systems problems, such as developing a globally sustainable transportation system, present an interesting challenge to engineering thinking. Abstractly, at the heart of engineering thinking, is the aim to create a “thing” that functions as one intends. More intrinsically though, the engineer creates the thing with the intention of planning, commanding, and controlling (PCC) how that thing works. Here we take the thing to be a system defined as “a set of interacting components having a well-defined (although possibility poorly understood) behavior or purpose; the concept is subjective in that what is a system to one person may not appear to be a system to another.” With complex engineering systems there is good reason to believe that there are limits to the PCC approach. Why? Because engineering systems are intrinsically coupled with social systems, such as an economic system, and it is known that the PCC approach, as in command economies, does not work. Recognizing this fact has implications for the design of engineering systems as well as for the education of professionals who deal with engineering systems.

The purpose of an economic system is to allocate scarce resources among competing ends. In market oriented economies, the actions of decentralized market participants, acting in their own self-interest given well-developed social institutions; property rights for instance, achieve this purpose. The entire system is decentralized yet it coordinates exchange and production activities, such as engineering activities, to achieve a generally satisfactory allocation of goods and services. There are, of course, market failures that create a need for government action, such as regulation, to correct these failures. Since engineering systems “have a management and social dimension as well as a technical one,” one could think there is a theoretical limit to how much it is possible to plan, command, and control an engineering system. This suggests that to create effective engineering systems one must

References


See note 1.
embrace an approach to engineering systems that functions more like a market system, which has engineering activities embedded in it. This means that engineering systems professionals need to think in a slightly different way when they engineer. Scenario planning may be the tool to facilitate this transition to a different style of thinking – a reflective style distinct from simply a task-focused, strictly analytic style – which would enable engineers to develop an intuition about how an engineering system may evolve. 

Planning using scenarios is a way to think through how different factors, such as politics, economics, and culture, although sometimes poorly defined, can have an effect on how an engineering system performs. Because these factors are poorly understood, there is a difficulty modeling them such that these factors may be frequently dismissed in the name of model tractability. Scenarios, in the form of a narrative as distinct from a mathematical model, are a way to make intelligible complex situations by distilling the many factors that can influence a situation to a few key elements some of which are inherently not predictable. Working through a scenario planning analysis may generate for the user(s) a sense of the different ways in which the world works. Organizing one’s thoughts as narratives of possible futures may enable one to better understand how diverse groups of stakeholders interpret the same facts about the world differently. These different interpretations may give rise to different ways those stakeholders act, which may have consequences for how an engineering system evolves. For example, the capacity of the global transportation system to evolve to one that is sustainable will require the interaction of hundreds if not thousands of stakeholder groups involving differing aspects of technology, politics, economics, and the environment. Many of the interactions could revolve around an attempt “to determine” what sustainability is and whether engineering system XYZ is sustainable.

Engineers typically depend upon quantitative analyses to understand engineering systems, but because of the scope and complexity of these systems, one may also risk losing the forest for the trees. Through the scenario planning process one may begin to comprehend the whole and develop an intuition or instinct for an engineering system. Paul Krugman in comments at Princeton University after winning the 2008 Nobel Memorial Prize in Economic Science states the case well for the role of instinct in investment, which is relevant to the role of instinct in understanding engineering systems since, after all, many systems are trillion dollar investments. “I can explain to you very carefully why I do what I do and have only a so so [investment] track record. Whereas the really great investors are completely incapable of explaining what they do, but somehow do know what to do and I’m not one of them. Instinct beats analysis . . . every time.”

This paper will explore how scenario planning may be a useful tool for engineers to learn to identify and synthesize information relevant to the performance of an engineering system, using the evolution of a globally sustainable transport system as an example. We also suggest how scenario planning could move closer to the core of engineering systems education.

Reflective Engineering Philosophy

Gedge, Dennis

This paper comments on the seeming role of Engineering being restricted only to the mathematical aspects of construction projects, and also questions the stance of the Engineering profession vis-à-vis politics. Mathematical results have to be interpreted and applied. The application of these results is inevitably concerned with politics.

Can Engineering even exist without philosophy?
All Science, if it is applied, becomes Technology, and some of it becomes Engineering. Known science is sifted in order to apply it by Engineers. That sifting process is a philosophical one, and in some ways it is an instinctive heuristic approach. Philosophy is not formally recognised as being part of the practice of Engineering, although now this is not so in the academic world. If it is accepted that a philosophical process is essential to know when not to use sledgehammers to crack walnuts, the question then arises, why are we cracking nuts anyway?

Two strands of Engineering Philosophy
Modern Philosophy is strongly rooted in logic and is almost mathematical. This type of philosophical approach is useful in deciding how to apply theories, and it may be applied to academic work. Another branch of philosophy is one which is more related to morality. Philosophy, then, has a great bearing on the work of the Engineer. An awareness of the need for a philosophical approach to Engineering practice is, perhaps, a pointer in the search to find the difference between technology and Engineering.

Out of fashion – Engineering Judgment
Any project design only exists in an immaterial way, it is a set of ideas and it has to be translated into something physical. It is impossible to construct a Civil Engineering project precisely as it was conceived in the designers mind’s eye. Putting it bluntly, Engineers just have to make the best of it as the job goes along. This is entirely different to discounting the negligible effects of known science, and Civil Engineers should be prepared for major design changes. Civil Engineering projects have to be interpreted, they may well seem to consist entirely of fixed mathematical definitions with little room for doubt, let alone interpretation. Engineering has to serve humanity, and when construction problems arise, in that transformation from the intangible to the concrete, the problems usually are the ones associated with resolving differences of opinion between all the parties involved with the project, engineers are called in to bring an analytical approach to getting things working again. These analyses have to be summarised, reduced to essentials and then communicated. Communication is an essential but often overlooked part of an engineers job. In crises ideas have to be transmitted quickly and accurately, it is necessary to revert to fundamental ways. Verbal reasoning will always be resorted to. The phrasing of thoughts in situations like this can have a dramatic effect on the outcome. Precise, unambiguous, and even poetic use of language is itself philosophical.

Politics and the Professions
From the early days of Civil Engineering, those responsible for defining which projects to undertake inevitably became embroiled with politics not only because of the huge financial risks and investments involved, but also because these projects affected the ways in which the people could trade and live their lives generally. Politics continues to dominate funding for current Civil Engineering projects, as much of it has to come ultimately from taxation. The Engineering profession is not alone in this, in that their work is financed in this way. So how should any of the modern professions react.
As the world becomes increasingly reliant on technologies which are becoming more complex, this question itself becomes more relevant. There may well be no immediate solution, but there should be an increase in awareness of the question.

Engineering Rigor and Its Discontents Philosophical Reflection as Curative to Math-Physics Envy

Goldberg, David E.

Engineers, particularly the academic variety, are fond of using the term “rigor.” Rigor is generally considered a good thing and it is used to construct phrases of approbation. “That’s a rigorous analysis” or “He had a rigorous education.” Its absence is considered to be a bad thing, and then the term can be used to construct phrases of derision: “Those leadership and teamwork classes are not sufficiently rigorous to be taught in the College of Engineering.” With some frequency the term “soft” is used as synonymous with “not rigorous” as in “We’ll accept those soft courses in a rigorous engineering curriculum over my dead body.”

This paper considers the different ways in which the terms “rigorous” and “soft” are used in engineering circles with an eye to understanding the biases reflected in such usage. The paper starts historically and traces the beginnings of this way of thinking to the importance of Maxwell’s equation to early electrical engineers at the end of the 19th century and considers the engineering education’s wide adoption of more math and science following World War 2 as the most recent contributory event to this trend.

Thereafter the paper shifts to consider two senses of the term “rigorous.” The first sense is the mathematical one, and the idea is that one is rigorous in derivation or in the giving of a formal proof. In other words, one is being rigorous in this sense if one starts from a well defined set of premises, moves step by step using the laws of symbolic logic, coming to a correct and formally true conclusion at the end. Here, we pause and reflect that although aficionados of rigor in derivation take pride that formal proofs result in conclusions that can be traced back to the original premises with nothing added, that argumentation theorists criticize formality on exactly the same ground. Toulmin’s argument (Toulmin, 1958) is often used along these lines, and there the notion of modus ponens is augmented with the addition of a warrant in which other inputs can be used from outside the premises to support or bolster the conclusion.

The second sense of rigor is the scientific one, and the idea is that one is rigorous in application of established scientific laws. In other words, one is being rigorous in this sense if one starts from a set of scientific laws and moves to an answer using the rigor in derivation discussed in the previous paragraph. Seen in this light, an aficionado of the first type of rigor might object to the use of mere constant conjunction (to use Hume’s term) of certain causal patterns to rely on the inductive speculations of science. It is also interesting to note that the term “rigorous” is not usually applied in this sense when the principles of science are not represented as mathematical laws. For example, the notion of plate tectonics in geology is not usually expressed in law-like form, and it would be difficult to find a geologist anywhere who would diminish the importance of that discovery in explaining so much about the world around us. Yet it would also be difficult to find an engineer who would use the term “rigorous” in the context of plate tectonics or any theory expressed in largely conceptual terms.

This last observation gives us a clue as to the problem, and it is one recognized and elegantly attacked by Toulmin (2001) and Schon (1983). The problem stems from an overemphasis in representing knowledge in the style of physics since Newton. The paper explores Toulmin’s historical tracing as well as his argument for reasonableness. It also considers Schon’s argument for more reflective practitioners who put math and science in their proper place as one set of tools among many. The paper finds these two perspectives to
be simpatico and palliative, but it also recognizes that those who live by equations and numbers are unlikely to be persuaded by mere arguments and words.

The paper continues by summarizing an economic theory of models presented elsewhere (Goldberg, 2002). Starting from the assumption that engineers often work in economic settings, the paper reviews a theory of modeling that looks at the tradeoff of modeling prediction error and cost. It then examines the circumstances under which an engineer is being economic in his or her modeling, arguing that many times, the use of rigorous models (in the two senses above) is uneconomic. This conclusion leaves a “rigorous” engineer in a precarious position. Either he or she isn’t much of an engineer (in the economic sense) or the restriction to the two modes of rigor discussed at the outset is too limiting.

The paper takes the second way, and the economic analysis together with the arguments of Toulmin and Schon pave the way to a reconsideration of the usual notions of engineering rigor. The paper concludes by suggesting that philosophy has a number of important roles to play in sorting out these longstanding conceptual errors, not the least of which is offering alternative forms of rigorous analysis to those who may soon discover the limitations of their earlier mistaken beliefs.

References

Is Engineering Philosophically Weak? A Linguistic and Institutional Analysis
Goldberg, David E.

A recent paper (Mitcham, 2008) argues that there are certain occupations such as medicine and law that aspire to good-in-themselves values such as health and justice and calls these philosophically strong. Mitcham distinguishes these philosophically strong occupations from others such as engineering, the military, and business that lack such ideals and calls them philosophically weak. Moreover, after this descriptive start, Mitcham moves toward the normative and suggests that engineers as individuals and engineering as an occupation might benefit by aspiring more valiantly to good-in-themselves values.

The present paper takes Mitcham’s terminology, key distinction, and subsequent ethical urgings as interesting and deserving of further scrutiny. The initial approach is linguistic. The paper takes the terms “philosophically weak” and “philosophically strong” at face value, looking for differences among the Mitcham 5 in so doing. An analysis of both individual practitioner and occupational awareness of the five core elements of philosophy—metaphysics, epistemology, ethics, politics & aesthetics—results in a division between philosophically strong and weak occupations, but along different lines than those of Mitcham’s analysis. This analysis results in the conclusion that engineering is philosophically weak, but in a sense different from that of Mitcham.

Trying to recover Mitcham’s distinction, the paper then explores the distinction of end-in-themselves and instrumental occupations. This distinction seems to capture the division

59 Mitcham uses the term “profession,” but we use the weaker term “occupation” to avoid any debate over whether the five may all be considered professions in some conventional sense.
at the level of the whole occupation, but at the level of individual practitioners, even this analysis has difficulties. The juxtaposition of occupational and individual disparity is a clue that perhaps institutional (North, 1993) difficulties must be probed to obtain an alternative formulation.

The paper continues by examining the institutional arrangements in which the various occupations practice and finds them to be substantially different among the Mitcham 5, with institutional similarities aligning along the boundaries of Mitcham’s distinction. This insight gives a second interesting clue to an alternative model of what may be separating Mitcham’s strong and weak occupations.

In particular, Mitcham’s strong occupations are often set in institutional arrangements where two conditions combine: (1) the practitioner is assumed to promote the client’s interest and (2) working for the client is presumed to result in a larger societal good through the workings of the larger institutional setting and constraints placed on the occupation by that setting. The paper calls the first condition local ethical alignment and the second the presumption of global ethical alignment. The institutions of law and medicine are examined in this light, and, while they differ in the way the satisfy condition (2), they both satisfy conditions (1) and (2). The paper calls such occupations ethically simple, because doing good as a practitioner usually only requires practicing one’s art well in harmony with one’s client’s interests.

By contrast, Mitcham’s “weak” occupations share the characteristic that following the “client’s” wishes is little guarantee of a good global outcome. This can occur because (1) the client may seek an outcome that is malevolent or otherwise not aligned with a larger interest, and (2) even if the client’s goals are aligned the outcomes are uncertain or unpredictable in important ways and locally aligned action may result in some unintended consequence that is judged as unsatisfactory after the fact. Even if we ignore the social difficulty of summoning the courage to reject performance in cases such as case (1), case (2) suggests that the “weak” professions share the characteristic that local alignment is no guarantee of global alignment. In this way, what Mitcham calls “weak” might be better termed ethically complex, and this suggests that simple urgings to loftier ideals might have a rough go of it for reasons that are difficult to lay at the individual practitioner’s door step.

The paper concludes by considering the interrelation of institutional complexity and ethical complexity using examples drawn from engineering history. Layton’s study of the development of engineering professional societies in the 19th and early 20th century (Layton, 1971) is particularly useful. This past is also used to reflect on growing calls for professionalism in the reform of engineering education (Sheppard, et al., 2008). Although the lessons are difficult to draw, it does seem clear that overly simplistic, universal approaches to the design of transformation efforts are likely to be counterproductive or, at least, incomplete and not broadly applicable.

References


Reflective engineering in Animal Husbandry: applying a structured engineering design approach in a contested area

Miedema, Hanneke & Bos, Bram

In the recent past a number of attempts have been made to design new systems for animal production that fulfill a range of needs from different actors, like the animal, the farmer, and the consumer. The guiding idea of these attempts is to try to synthesize these needs into design, thereby resolving conflicts of interests rather than weighing them against each other. The possibilities for synthesis or are thought to increase, if a structured engineering design approach is chosen. However, structured engineering design methods like Structured Design (Van den Kroonenberg and Siers, 1998) are tailored to the design of hardware that performs functions to fulfill the needs of one or only a few users, based on a very clear brief of requirements. If applied to the design of complex systems, like animal husbandry systems, which comprise of human and non-human living organisms, matter and technological artefacts, these methods are stretched beyond their original area of application in at least three (possibly fundamental) ways. Firstly: the introduction of biological systems (like animals) both as functional parts as well as ends in themselves complicates the structured, rationalized approach since non-human living organisms have varying needs that should not become reduced to something similar to matter; Secondly: the introduction of requirements like social values and perspectives that are impossible to quantify, considerably increase the interpretive flexibility of these requirements. And thirdly: the structured approach may implicitly choose sides in unresolved conflicts of interest between actors (like the farmer, the animal and the consumer) in the system to be designed.

In this paper we analyze the basic structure of Structured Design, and its application in a project aimed at the design of new husbandry systems for pigs. The analysis is based upon participant observation in a course on Structured Design and a series of design meetings of the project. We will show and explain the limits of the original Structured Design approach, but we will also argue that rationalized, structured design approaches to design complex biosystems in areas filled with value conflicts, like animal production, might still be very fruitful to resolve value conflicts in the design phase. Yet, a number of conditions have to be met and a number of adaptations to the methodology have to be made. Amongst these are process conditions (iteration, reflection with stakeholders and postponement of judgment), and a reformulation of functions. But also adjustment of the method to a mere biosystem design, for example by taking into account not only the requirements of actors when using a system, but also the requirements of the system when being used by actors, which facilitates a construction of relationships between the different elements within the system.

Finally, we relate this approach to Instrumentalization Theory of Andrew Feenberg (1999). We conclude that Structured Design can be perceived as an explication of primary instrumentalization, and that this explication enables us in principle to actively introduce and promote processes of secondary instrumentalization into the design phase, provided the conditions and adaptations we suggest.

References

Bolted on or systemic? How engineering ethics differs from philosophical and medical ethics.

Ocone, Raffaella & McCarthy, Natasha

Why teach engineering ethics?
The engineering curriculum has to develop the technical capabilities of engineering students but it also has to prepare them for the broader challenges of professional practice, including the ethical decisions that they will have to make. In this paper, I will focus on teaching ethics within my own area of expertise, chemical engineering. This area of engineering in particular presents a lot of challenges that require a grounding in ethics – chemical engineering involves dealing with significant hazards, environmental threats and high capital. However, the lessons are applicable to all areas of engineering.

How to teach engineering ethics
One can think of a number of ways to teach ethics in engineering (Davis, 1999, reports eight different ways). These methods reduce to two main broad routes: one consists in devising and giving a specific module on ethics, the other consists in integrating ethics into the curriculum. The second option, which I describe as “integrated” teaching of ethics, presents a number of advantages: it gives the students the opportunity to see “ethics in action”; it shows that ethics is intrinsic in the discipline; it demonstrates that engineering is an ethical profession in its essence.

Why integrate ethics? Engineering ‘versus’ philosophy and medicine
Why is the integrated approach the best method for engineering ethics teaching? This can be shown by contrasting it with other disciplines. When teaching ethics to philosophy students, individual modules are appropriate, which go ever deeper into ethical issues and ethical theory. This is because in philosophy, ethics is about analysis – it is about understanding an ethical problem or an ethical theory, and dispassionately comparing the application of different theoretical approaches to an ethical problem. Ethics for engineers in contrast is about synthesis. The engineer has to find ‘solutions’ to ethical problems (best courses of action) in a way that the philosopher does not. Therefore, learning skills of analysis is not necessarily useful for engineers. And unlike a philosopher the engineer is embedded in the process rather than standing outside of it – they are being prepared for dealing with specific kinds of ethical problems that will arise in real practical situations. Hence, engineering ethics should be taught in the contexts in which ethical problems arise, with a focus on making ethical decisions rather than analysing ethical theories.

This suggests a similarity between engineering and medical ethics, which is also about making decisions rather than analysing problems. However, there is a difference between medical professionals and engineers in that the former are more likely to have a responsibility to an individual patient or client. The ethical issues for a doctor, from keeping information confidential to taking life-saving decisions, are immediate and easy to grasp (even if they are not easy to ‘solve’). However, the human relationships for engineers are less direct and immediate. In engineering the decisions have a more long term and distributed impact. This makes ethical problems harder to detect and the best course of action more difficult to identify. This means that in teaching engineering ethics there is the challenge of stimulating ethical concerns, and encouraging students to see the less obvious ethical
dimension to practical engineering problems. This is best addressed by raising ethical issues alongside the technical and practical topics that engineering students learn about.

**Tools for teaching engineering ethics**

The paper will conclude with a presentation of a method for integrating ethics into the engineering degree. The Engineering Ethics Curriculum Map, produced by The Royal Academy of Engineering Teaching Engineering Ethics Group, proposes a framework (location, content, learning outcome, process) for the teaching of Ethics in Engineering. It is a dynamic and continually evolving framework intended to be flexible to different degree courses and for different student groups, so ethics teaching is always well matched to engineering teaching. I will show how the map can work for chemical engineering and how it can be implemented in a chemical engineering degree.

**Reference**


**Systems Intelligence in Engineering Ethics**

Saarinen, E., Häimaläinen, R.P., Martela, M. & Luoma, J.

Recent global phenomena related to climate change and corporate scandals have led to increased interest in engineering ethics both among the academics as well as the practitioners of engineering. The standard approach to engineering ethics is to take an existing ethical theory and apply it to the engineering context (e.g. Martin & Schinzinger 2005). As a result, certain engineering practices might be subjected to critique stemming from the utilitarian tradition, for example. In such a standard approach, engineering is viewed as a social activity that doesn’t have inherent norms and ethics of its own as opposed to health care, for instance, where there exists a wide consensus concerning the purpose and governing values of the profession. Against this standard view where ethics is viewed as something external to the engineering activity itself we argue that today engineering is inherently value-laden with complex interconnections in the socio-economic environment. Thus engineering ethics must be approached from a systems perspective. Therefore we propose systems intelligence as an approach to modern ethical thinking.

The core of engineering is in a particular orientation to the world, and this orientation does involve an ethical stance. As we see it, an engineer is an improver who seeks to cause “the best change in a poorly understood situation within the available resources” (Koen 2003). In other words, engineers aim to improve a given state of affairs or object-system. But this ethics of improvement itself presupposes a stance that should be recognized as ethical. The “practice must itself be responsible for its purposes and measures of improvement” (Ulrich, 2001) but this alone is enough to introduce values to the core of engineering activity because some values to be maximized is assumed at the start. Therefore it is misguided to view engineering in terms of ethics that operates as an external framework setting norms for the engineer’s value-neutral primary actions. Likewise, an attempt to reduce the ethicality of an engineer’s activity to a single value-base or norm set does not do justice to the engineering condition. This is because the engineer’s drive for improvement will always take place in the context of a larger frame of change. The actions of an engineer have an impact in multiple different systems with different values. Concentrating in only one of them oversimplifies the ethical responsibility of an engineer. Ethical codes simply cannot be used “in cookbook fashion to resolve complex problems” (Unger 1994: 106).

Technology created by engineers has a “pervasive and profound effect on the contemporary world” (Martin & Schinzinger 2005). During the last century the outcomes of
the engineering profession have changed significantly our lives, our societies and our planet (Johnson 1991), and some of the effects that have emerged project a highly disturbing picture of the nature of the overall macro-level change. Even good willing engineering attempts can lead to unethical consequences if a larger systems perspective is omitted. This is demonstrated by the promotion of biofuel as an ethical alternative without taking into account the negative systemic effects biofuel production has when land is averted from rainforests and food production to fuel production. Therefore there is an urgent need of tremendous gravity to investigate such phenomenon with a systemic perspective (Senge et al. 2008), and to be reflective about them (Mitcham 1994). Yet that reflection cannot remain on a level of descriptive inquiry only, but must approach its subject matter from the point of view of improvement on the level of the practical. This is nothing but the ethics of improvement of the engineer at work.

To be an engineer is to be an agent for improvement. Our view of engineering as an essentially value-laden profession emphasizes the responsibility of an engineer and the contextual nature of the parameters that define improvement in a given setting. To be ethical in contemporary world an engineer must have an understanding of the larger systems effects of her actions. To succeed in her task for improvement in a socially responsible way, the engineer needs systems intelligence, the capacity to act intelligently in the “context of complex systems involving interaction, dynamics and feedback” (Saarinen & Hämäläinen 2004). The view of engineers as value-free agents presupposes wrongly that engineers operate outside the systems they manipulate. Instead engineers must be seen as operating within the systems, influencing the system at the same time as the system is influencing the engineer. Systems intelligence highlights this dynamic nature of the engineers’ condition. For a systems intelligent engineer, ethics is inbuilt to their everyday actions and decision-making, and will form a constant point of reflection for the engineer as a manifestation of the ethics of improvement.

References

Future Reflective Practitioners: The Contribution of Philosophy

Schiaffonati, Viola

Reflection in engineering practice and how this reflection is essential for the development of engineering cannot leave aside an analysis of engineers’ education, its potentialities and its limits. This talk addresses some issues of engineering education, with particular attention on how philosophy might be useful to create future practitioners able to be reflective in their professional practice. The analysis is based on my personal experience in teaching two philosophy of science courses to senior engineering students at Politecnico di Milano, one of the leading academic institutions in Italy. To evidence how philosophy might help, rather than considering the failures of engineering education (Goldberg 2008), I start by considering how philosophy can contribute to engineers’ curriculum, which at Politecnico di Milano is still strongly based on applied science and mathematics (Vincenti 1990).

Despite a more than 100 years history, it is just few years that Politecnico di Milano has introduced a small number of philosophy classes. The idea at the roots of this project has been to offer, besides the traditional topics already taught, some conceptual tools useful for a reflective practice. Accordingly, the main tenet in introducing these courses has been to articulate them on the basis of engineering students’ needs. What everybody in the faculty wanted to avoid was to import standard philosophy classes, without the effort to rethink them for engineering education. For this reason a great effort has been devoted to analyze how philosophy can be taught to engineering students and how it can help in enhancing their capabilities by its integration with more scientific and technological notions. More specifically, the goal of these courses is to gain the capability of engineering students in reflecting on some concepts used thorough all their formation, but usually not critically analyzed from a foundational point of view. The idea behind is that a better articulation of the foundations of engineering disciplines can improve conceptual clarity and help in diagnosing errors. A good example is the following: it is typical of computer science engineering students trained in Artificial Intelligence to give for granted the analogy between brain and computer, without considering the meaning and the truth conditions of this analogy. However, the question “Is the brain a computer?” requires a careful analysis of its meaning conditions and, in case, of its truth conditions. Such preliminary analysis can be very useful to teach students how to avoid starting from bad questions or ill-posed problems. Moreover, this analysis exemplifies how high standards of rigor may be achieved also in qualitative domains, such as philosophy, and not just quantitatively in science and mathematics (Goldberg 2008). Finally, it shows how conceptual clarity is the first step also for the future challenges emerging in practice. The objective, hence, is not to teach philosophy and its history, but to apply philosophical analysis to engineering problems. On the basis of the reported experience, one way to enhance the critical capability of engineering students is to analyze the growth and dynamics of scientific knowledge. Therefore, I argue that a historically informed philosophy of science is very useful to know the evolution of ideas and, thus, to gain a deeper understanding of them. In conclusion I dwell that the teaching of philosophy, and philosophy of science in particular, can have a deep impact on forming future generations of reflective engineers, but to do that it needs to be integrated along two different dimensions. The first is a historical dimension, showing that current concepts and ideas used in engineering have not always been the same, but have evolved along different directions, thus promoting a more pluralistic view of science and technology. The second is a pragmatic dimension, connecting philosophy to the needs of engineering students and showing how conceptual clarity is essential in practice and can be achieved also in qualitative terms.
References


Parallel Panels

Towards Sustainable ICT?

Chair: Aviram, Roni

Participants: Puech, M., Ihde, D., Winner, L. & Aviram, R.

The belief in progress through science and technology (with a conception of science as the foundation of technology) has been, to a large extent, the core belief of modernity. Bacon’s “knowledge is power” (i.e., deciphering nature’s secrets so we can control it to our benefit) and Descartes’ image of the “tree of knowledge” which will grow the fruits of technology for solving all of humanity’s problems are two examples of the myriad manifestations of this modern generative conception of the linear link from science to technology to progress.

The success of this project has exceeded the wildest dreams of its founding fathers. Humans have used technology to penetrate the realm of God: his “dwelling” (space), his “occupation” (creation of organisms), and the expression of his “rage” (Hiroshima). One of the explanations for this success is tightly related to methods of rational management and enhancement of efficiency, and to the main power behind them – the free market economic competition and urge to maximize gains.

It has brought forth hubris: man (as opposed to God) as the master of the universe, pushing forward an immense economic power – the engine of Western development in modernity. It has also raised growing anxieties, including of a “Babylonian” catastrophe stemming from this hubris (from Rousseau, through Luddism, Heidegger, and today the green movements).

While until recently the hubris approach has been dominant, with critics serving as the barking dogs while the caravan passes, during the last few decades warning voices have gained public, and even more so political audience and consideration. The global effort to move toward sustainable and green technology; the partial control of stem cell research and other biological technologies; or the partial control of genetically engineered food (or at lest the debate on this issue) testify to a new approach which often tries to rationally optimize the balance between hubris and anxiety. While these optimization attempts, on the national or international levels, have some negative effects and are still rudimentary, they bring hope that such an approach is in principle possible and can lead to concrete consequences.

But it seems that this optimization approach has yet to be dominant in the area of ICT. Here too we have a hubris which is forcefully pushed by economic interests. This push led to an almost automatic equation of the “computer”, the internet, Google and Web 2.0 with progress and the beginning of a new dawn of creativity, production, communication, democratization, learning, knowledge and the “global mind”. At the same time there are critics who are dissatisfied with various phenomena, including child exposure to potential harm, the disintegration of the self, the disappearance of individual identity and the development of the “one-dimensional man”. But these critics can’t even slow the caravan.

The panel discussants share the view that technology has both negative and positive aspects; that this distinction should be made in light of ethical/social values; and that it should serve as the basis for a blueprint for political action on the micro level consisting of voluntary activities of individuals, or on a more macro level with organized social activity.
Thus, the panel will focus on what these suppositions mean in the context of specific technologies. All of the presentations will be guided by the following template:

Analysis of the impact of a specific technology:
1. What is your conception of the Good Life? What are the ethical/social values on which the analysis should be based – as stemming from this conception?
2. Are there generic methodologies/guidelines that can assist in analyzing the impact of this (or any other) technology in light of the given values? If not, how are we to proceed given the desire to rationally structure knowledge?
3. Using the chosen methodology/guidelines (or if they do not exist – commonsense), what is the impact of the technology at hand on its users and society at large?

Suggestions for action:
4. Do philosophers of technology need to come up with a blueprint for social or political activity? If so, on what level? Or how operational should this blueprint be?
5. If such a blueprint is desired, what suggestions for action should we draw from our answers to A) above?

**Synthetic Biology: Historical roots and future implications**

*Chair: Stemerding, D.*

*Participants: Campos, L., Belt, H. van den., Koepsell, D. & Est, R. van*

As a new and emerging science and technology synthetic biology has recently gained prominence on the agenda of national governments and a variety of scientific and advisory organizations. Synthetic biology is defined as the engineering of biological components and systems that do not exist in nature. It is determined on the intentional design of artificial biological systems, and on redesigning existing organisms, with the aim to acquire useful functions. Synthetic biology may be seen as a typical example of a converging technology, rooted in molecular biology and involving a wide range of scientific disciplines and technologies, including systems biology, computational simulation and nanobiotechnology.

According to some accounts, the rise of this new field suggests a fundamental paradigm shift: biology is no longer considered ‘nature at work’, but becomes an engineering discipline. In this context synthetic biology is also raising shining promises and expectations about new pharmaceutical products, ‘living’ therapeutics, biosensors, and sustainable production of biofuels and biobased materials.

In this session we will discuss the rise of synthetic biology from various perspectives, including its historical roots, its present emergence as a new field, and its future societal and normative implications. From a historical perspective Luis Campos (Drew University, Madison, New Jersey) will consider earlier visions of a synthetic engineering-based approach to biology, showing that these visions have been a pertinent and recurring theme in the history of biology of the twentieth century. Henk van den Belt (Wageningen University, The Netherlands) will discuss the way in which these visions have taken shape in the ambitions and activities of contemporary synthetic biology, focussing in particular on the continuing ‘informatization’ of life and its consequences for the relation between knowing and making, the natural and the artificial in biology. David Koepsell (University of Delft, The Netherlands) will take up the distinction between naturally-occurring and artificially created genes in a critical discussion of the way in which this ontological distinction serves as a justification in granting patents for artificial life forms. Dirk Stemerding and Rinie van Est (Rathenau Institute, The Hague, The Netherlands) will explore the more general cultural
and moral understandings – in terms of both fascination and distaste – that may be raised by synthetic, engineering-based approaches aiming at the creation of new artificial life forms.

**Thinking About Innovation**

*Chair: Pitt, J.*

*Participants: Taylor, E., Shew, A., and Butera, M.*

Considering the significance of innovation in popular and political discourse on technological change, it’s surprising that the concept has received relatively little attention in the philosophical literature. While technological innovations play an important role in the writings of many thinkers, there is no agreement on how the term should be used, or what, precisely, it means. This panel will outline a variety of considerations for developing a philosophical account of innovation, and will debate the pros and cons of several potential definitions.

The research to be presented in this panel discussion represents some of the results of a semester-long seminar led by Joseph C. Pitt on the social and ethical consequences of innovation. Questions to be addressed will include, but are not limited to: What are the conditions for labeling a technology innovative? What criteria should be used for separating innovations from those technological changes that are merely refinements of or improvements on existing technologies? Do technological innovations exist independent of their uses in a given society? That is, are there innovative technologies or only innovative uses of technology? Is the phrase "technological innovation with significant social consequences" redundant? Are innovations historically contingent? How should we differentiate innovation from invention? Are innovations restricted to new inventions, or can old technologies become innovative over time? Can technologies cease to be innovative? Is “innovative” a subjective category?
**Future Scenarios of Medical Genomics and Health Care: tracing the innovation journey of medical genomics and asthma**

*Bitsch, Lise*

Promises and expectations to future outcomes of medical genomics are not modest, and genomics is presented as laying the groundwork for personalized medicine and a revolution in health care. Debate has accompanied these promising visions of the future. Ethical, legal, social and policy implications of a future genomics-based shift to a more risk and prevention oriented health care system are special concerns, and particularly controversial is the consequences implementation of personalized medicine could have on the balance between a national, governmental public health model, and what can be called an international, boundless market and consumer-driven model. The overall aim of my project is to map the dynamics of the development of medical genomics and develop a method to use knowledge of this dynamic to develop scenarios which can be used as tools aiding in processes of policy making and steering of emerging technology.

The poster will present the first stage of my project, including research question, challenges and method. I take the concept of ‘innovation journey’ as a starting point for a retrospective mapping of the innovation journey of medical genomics and asthma. Major forces driving this innovation journey are promises and expectations to and visions of prevention, diagnosis and treatment, which will be tailored to the individual for maximal effectiveness. Asthma is used as the first case and central questions presented on the poster include: What is the retrospective pattern of the journey of medical genomics in asthma? When, how and who created a link between genomics and asthma? What promises and expectations are connected to the innovation journey of genomics in asthma? What importance and strength does promises and expectations have in terms of driving the innovation journey of genomics in asthma? How can analysis of a retrospective innovation journey provide structure for imagination and development of scenarios of the future?

**Minding the other gap: A case for taxonomy of nanotechnologies in nanoethics**

*Casteleijn, Jasper*

The focus of existing nanoethical reflection seems to be on either devices which have nanotechnologies embedded in them, or on the general effects of the production, use and disposal of nanotechnologies. In former type of assessment the devices are assessed, not the effects of using nanotechnologies in said devices. And in the latter type of assessment the effect of nanotechnology in general is assessed and not specific nanotechnologies.

Due to these two types of assessments there are three problems occurring. Firstly there is the non-specificity problem. When assessing a device, the results could have little to do with the embedded nanotechnologies, and thus only assesses a specific embedment of nanotechnologies. Secondly there is the generalization problem. When looking at general issues, reflection is focused on the use of nanotechnologies in general instead of the effects of different nanotechnologies. This could result in generalizing the effects of certain
nanotechnologies so that they seem applicable to all nanotechnologies. And third there is the speculation problem. There has been a lot of focus on uncertain foresights, which deflects attention from current pressing issues.

In my thesis I propose distinguishing between different nanotechnologies in nanoethical reflection, and herewith close the gap between the two types of assessment. I apply two distinctions – one distinction based on the method of production and one based on functionality – to the privacy and nanotoxicology case. This showed that certain issues (currently) only apply to one type of nanotechnology, and that the three problems can be solved to some extent.

**Human enhancement: socio-cultural and transcendence dimensions. NomoTop approach**

Chokletsov, Vadim V.

Historical process has shown to us, that degradation of spiritual institutions, moral and ethical values based on transcendence dimension, general desacralisation of the World are open a way to the «person, as instrument». The situation of the Subject accepting Improving Human Performance ideas in frameworks only of the physicalism approach contains a similar threat.

At the same time, «...Technologically created second nature serves as a habitat for human action in work and leisure. It is sandwiched between original “first” nature with its geographical, meteorological, agricultural conditions, and evolved culture with its local history, traditions, values, ways of living. Since each society or each region finds itself in a specific first nature and has developed its own culture, it will tend to produce a culturally specific artificial environment or second nature. While CTs might serve to homogenize and globalize the world, the CTEKS approach accepts European diversity as a challenge and the basis of economic opportunity. It therefore incorporates cultural and intercultural studies in the structuring of and translation between artificial environments.»

Thus, to form a truly adequate and safe development of NBIC61-powered transformative anthropology we need to expand and to deepen the concept of trading zones62. According to the authors, trading zones should be not only a space of specialists communication to put into practice the Nano - Bio - Info - and Cogno - projects, but a broader Institute- Subjects of New Societies self-realization and self-representation Space using the full potential of converging technologies and Humanity Culture.63

In questions of trading zones social designing author focus the attention on following aspects:

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61 So probably «NBIC-convergence» is not «already a fact», but it is a convenient political and economic tool («the radical constructivism»). See for example: Joachim Schummer, «From Nano-Convergence to NBIC-Convergence: “The best way to predict the future is to create it”» Deliberating Future Technologies: Identity, Ethics, and Governance of Nanotechnology, Heidelberg et al.: Springer, 2008.
62 The term of Peter Galison for US NNI
63 Like a certain modern form of Hermann Hesse The Glass Bead Game in Castalia
- Inclusion of integral approach of Vseedinstvo 64 («Integral Knowledge», «All-unity», «True, Good, Beauty» or «Sciences, Religions, Arts» Unity) to the «NBICS...»-convergence projects. Vseedinstvo is convergence too; it is a convergence of Humanity cultural, pragmatic and transcendence spheres.

- Stimulation of new forms of economic relations in various forms of innovative societies for the best environmentalisation and personification of manufacturing, change of «a consumption cult» on the system of values based on spiritual and creative qualities of the Person in a context of transition to «postinformation society».

- Game concept for NBIC-projects realization in research and business spheres both in respect of support of completeness of personal self-realization, and in the light of preservation and development of a cultural variety.

Apologists of Human enhancement anthropotechnological trend in overwhelming majority oppose religions or completely bypass transcendence dimension of existence. Religious faiths also negatively perceive Improving Human Performance idea. Nevertheless, already there are separate works on synthesis of Christian position with posthuman concept. The author of the report also considers synthesis (instead of opposition mystical and secular outlooks) as a necessary condition of formation of a harmonious image of the future.

Integral synergy approach to the socio-cultural, transcendence and economic dimensions of NBIC-convergence, according to the author of the report, can be provided by new NomoTop concept. NomoTop is a Smart Landscape, a genius loci like an extrapolation of Person Topology to a real interactive autopoetic Environment Space for Other. NomoTop is a version of postanthropological Body, Posthuman Being self-representation and self-actualization.

64 See for example: http://www.utm.edu/research/iep/s/solovyov.htm


67 for example: the Catholic and Orthodox Churches

68 See for example: The triangle of new and emerging technologies, disabled people and the World Council of Churches; Able-ism: A prerequisite for transhumanism By Dr. Gregor Wolbring http://www.bioethicsanddisability.org/

69 See for example: An integral theory of consciousness, Ken Wilber, Journal of Consciousness Studies, 4 (1), 1997, 71-92; Russian cosmism, Neoteilhardism also tend to this point of view.
About converging technologies and human enhancement – a vision

dos Santos, Dalci Maria & Cavalheiro, Esper Abrão

The converging technologies phenomenon (also called NBICS Technologies) dwells in the synergic effect of nanotechnology combined with other highly complementary disciplines, such as biotechnology, information technology, neuroscience/cognitive science and synthetic biology. Many experts, reports and publications [1,2,3,4,5,6,7] back up this definition as well as state that converging technologies will modify the understanding of mankind and life itself.

Among the expected breakthroughs are revolutionary changes in health care, the emergence of highly effective communication techniques such as brain-to-brain interaction and the enhancement of human capabilities by human–machine interfaces which ameliorate the physical cognitive decline that is common to the aging mind [7]. In addition, the development of brain-computer interfaces could reconceptualize the notion of what it means to be human. Given such a context, it is clear that the role of neuroscience and the various cognitive science fields will be gigantic and crucial.

In this poster we present the results and findings of an exploratory survey on converging technologies, neuroscience and cognitive sciences. Neuroscientists and researchers from all over Latin America were invited to answer a questionnaire in three steps on converging technologies, neuroscience & cognitive science. Our reflections on possible future applications include themes such as therapy, enhancement and the visions of science and society. We have also included in our reflections the different perceptions of converging technologies, thus presenting challenges to both science and society as a whole.

References

**A possible explanation on cloningman**

*Fan, Chen & Huiduan, Ma*

The paper elaborates the rationality of cloningman with the premise of technical availability through analyzing theoretically human’s nature, origins, bearing and ethics and its forthcoming trend. It proposes that human’s concepts of ethics are developed in a specialized period, and will evolve gradually along with the development of society. The formation and development of society is a self-organizing phenomenon and is a process of a nature history. Human being has the natural character of seeking after goodness. Then in the question of cloningman, we should think carefully the relations between technology development and tradition ethics, and keep certain tension between technology and ethics.

**Achieving the good life through electrical stimulation? Deep brain stimulation and depression - means, ends and ethics**

*Johansson, Veronica*

Within bioethics there has in recent years been an increasing interest in the ethical implications of deep brain stimulation (DBS), and lately the first articles on DBS and depression have appeared. DBS, commonly referred to as a brain pacemaker or a neurostimulator, is a surgical treatment where invasive electrodes stimulate brain structures deep within the brain such as the thalamus or the basal ganglia. Initially DBS was used as a last resort treatment for movement disorders such as Parkinson's disease and essential tremor as well as relieving chronic pain. Today its use is extended. Beside attempts to treat migraine, epilepsy and balance disorders, studies have been conducted to evaluate DBS as a treatment of for instance Tourette's syndrome, obsessive compulsive disorder and major depression. Further, the technique is considered as a possible treatment for anorexia, obesity, cocaine addiction and aggression, which is likely to spur the ethical discussion even further. Though, as for now much of the discussion on ethics and DBS evolves around questions regarding clinical practices. Another approach is to discuss the ethics of DBS in relation to one of the oldest questions in philosophy: what constitutes a good human life? This poster presents an account of the ethical implications of DBS and depression, based on the classical theories on the human good.

**The Functional Morality of Robots**

*Johansson, Linda*

When robots become more advanced, the problem of ascribing responsibility becomes more difficult. Some argue that there might, even today, be so called responsibility gaps\(^7\), where no responsibility can be ascribed, neither to the manufacturer, the programmer, the user nor the robot. In order to provide a base for such discussions it is necessary to scrutinize the notion of moral agency and whether or not a robot might be a moral agent.

The notion of a moral community as something that is invented by humans is a useful metaphor when deciding matters regarding the potential moral responsibility of robots. Members of the moral community might be moral agents, moral receivers, and possibly

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other moral entities. Defining these notions will help clarify whether or not robots can be part of the moral community and in what capacity.

Note that “morally responsible” will be understood in a pragmatic sense, the way we hold humans morally responsible if they are not forced or restrained, etc. The question in this paper is: are there any requirements for being morally responsible in addition to that of being autonomous—requirements that might exclude robots from being moral agents? Certain mental states, such as a proper understanding of moral situations, are probably necessary.

When discussing the potential moral agency of robots, a so called Moral Turing Test is useful. If a human interrogator, asking questions regarding moral matters, cannot decide whether the respondent is a human or a robot, then the robot has passed the test. I argue that if a robot passes such a test, he is a moral agent—in terms of displaying mental states such as understanding. That is, if robots can behave as if they have the proper mental states—make a moral judgment and provide reasons for that judgment—then they should be accepted as moral agents.

The argument for this suggestion is based on the idea of the moral community as something that is invented by humans, and the way we accept other humans as moral agents. We do this based on their behaviour. Why should we treat new—artificial—potential agents any differently than human agents? We may not accept that robots have mental states, but we should accept this sort of functionalism in morality—a functionalist morality of robots.

The Convergence of Structure and Agency

Lewin, David

A classic polarisation exists between our capacity as agents, and the social, cultural and technical structures in which we find ourselves. On the one hand, we regard ourselves as free agents with rational capacities to make choices and decisions. Such a broadly Kantian anthropology posits a radical freedom at the heart of human nature. Opposed to this notion of the free agent, stands the evidence of critical theories of sociology, psychology, philosophy, and technology, which regards human nature as fundamentally conditioned. As such, these conditions are regarded as a threat to freedom.

Within philosophy of technology the threat to human freedom is felt as in terms of technological determinism. Such determinism has been explored since Heidegger’s infamous suggestion that we are within the movement of a technological destiny, but generally the debate has polarised into a caricature of technological essentialists, who are seen as threatening freedom, and those anti-essentialists, for whom the category of technology is

Some might argue that such an investigation, regarding mental states, might be uninteresting since a robot can never have the relevant autonomy for responsibility: there is always a human programming the robot, meaning that it is deterministic. But the size of artificial intelligence projects will likely make their code impossible to fully analyze and dissect for possible dangers. With hundreds of programmers working on millions of lines of code for a single war robot, for instance, no one has a clear understanding of what is going on, at a small scale, across the entire code base. “There is a common misconception that robots will only do what we have programmed them to do. Unfortunately, such a belief is sorely outdated, harking back to a time when programs could be written and understood by one single person”. (Patrick Lin, chief compiler of a new U.S. Navy-funded report).

Functionalism regarding mental states is the idea that what makes something a mental state of a particular type does not depend on its internal constitution, but rather on the way it functions, or the role it plays, in the system of which it is a part.
itself highly suspect and thus any substantive threat dissolves into the specific empirical problems raised by individual technologies.

The poster will be largely concerned with representing this polarisation of technical structure and human agency visually by way of a possible convergence. I would use the visual medium to represent some ideas towards a new mediation that converges upon the middle voice – between activity and passivity. Paul Ricoeur offers an approach towards such a mediation (especially through the work of Don Ihde and David Kaplan) but I would also like to display Anthony Giddens’ ‘Structuration Theory’ as a motif of convergence.

**Systems of Change and the Problem of Technological Singularity**

Melnychenko, Oleksandr M. & Mokhovykova, Kateryna S.

Today’s modern civilization is plunging into accelerating changes which are gradually affected by scientific, and especially technological progress. These changes - which touch essential sides of the human nature such as genome, intellectual facilities etc. - threaten the humanity with technological singularity i.e. by reaching such an unprecedented level of changes that the humanity will not be able to remain itself. At the present time it becomes especially urgent to the progress in philosophical understanding of world changes as a whole, as well as the part of science and technology as the most essential factors which cause the intensification of man’s life changes.

Taking into consideration the need of philosophical understanding of science’s, technique’s and technology’s role in engaging the humanity in an unknown before escalation of world’s changes - we should unite the results received in systems philosophy with the results received in philosophical researches of problem of change, and try to describe the science, technique and technology as such systems initially oriented at explore an essential relation between these phenomena and change, and their contribution into the processes inexorably leading the humanity to singularity. Hereafter, we will identify such systems as systems of changes, and conceptual models of science, technique and technology - submitted as specific systems of changes – respectively as systems of scientific, technical and technological change.

**Reciprocity and technology. The case of the Dutch Electronic Health Record**

Mensink, Wouter

This paper starts off from the premise that a technology such as the Electronic Health Record (EHR) operates at micro-, meso and macro-level and, as such, plays a role in a multiplicity of power relations, either as a mediator or as an enabler. The notion that all these levels are intertwined, however, makes reciprocity in these power relations problematic.

The main conceptual contribution of the paper is a critical discussion of reciprocity as a concept for understanding the ambivalent mediating role of technologies in society. Foucault conceptualises reciprocity in power relations by arguing that there is always the possibility of refusal. The question is how refusal operates in a multi-level set-up.

Based on an in-depth study of Foucault’s understanding of power as a relation, the paper re-interprets his work on neoliberal governmentality through this lens of reciprocity. In line with the notion that governmentality deals with thinking about government, the
framework that results from this is applied to a longitudinal case study of the political thinking about the governance of the Electronic Health Record (EHR), a technological artefact with major implications for Dutch society.

The empirical material discusses the developments of this discussion up to a letter that all Dutch citizens received in February 2009, in which they were given the option to refuse the use of their data in the EHR. Thereby, they also denounce the benefits that the system might offer.

This study contributes to the “empirical turn” in the philosophy of technology, but strives to go beyond micro-level discussions.

**Ethical Issues of Emerging ICT Applications in Europe: A Framework**

*Stahl, B.C., Rogerson, S. & Wakunuma, K.J.*

A central problem of the ethics of technology is that it tends to arrive too late. In many cases ethical issues are only recognised when the technology is already on the market and problems arise during its wide-spread use. Ethics can then become a tool to clean up a mess that might have been avoidable. It is probably not contentious to say that it would be desirable to have ethical input at the earlier stages of technology design and development. Indeed, there are ethical theories and approaches that explicitly aim at an early integration in the technology life cycle (van den Hoven, 2008). One central problem of this type of approach is that the future is unknown. By definition we do not know with certainty what will happen in the future and an ethics that relies on future development needs to be able to answer the question of how it decides which technological developments to pursue.

The poster aims to contribute to the discussion of this question. Its approach is to identify likely scenarios of future ICT developments that are grounded in empirical facts, particularly within the European Union. It aims to give a high level overview of the European landscape of emerging ICTs. Its purpose is to come to an understanding of the ICTs that are likely to develop in the next 10 to 15 years with a view to understanding which ethical issues we can expect and how we may best prepare to meet them.

**References**

Rethinking User-Interfaces: The Link between Information Technology, Philosophy and Cognitive Science

Steinert, Steffen

Often enough the discussion about human-machine-interfaces (or user interfaces) is blind on one eye. Mostly the focus lies on the material side of interfaces like displays or buttons. This side can be summed up in what I coin “physical interface”. But a crucial aspect is left out, if the cognitive side of the userinterface isn’t taken into consideration: the “cognitive interface”. With cognitive interface I mean the mental or conceptual model, which is presented to the user through the physical interfaces. The user needs a mental model of the machine, in order to handle it effectively. He needs an understanding of the activities that have to be done for accomplishing certain tasks. The users’ model also contains the knowledge to foresee the systems’ performance, if a certain command is given. This model is arranged and influenced by the physical interface. And since computers have only a fixed amount of physical interfaces but an enormous amount of applications, the cognitive aspect has gained more importance. But cognitive and physical interfaces can’t be separated, as phenomenology shows the human mind is always an embodied mind. Hence there is a demand to explore the various interrelations between body, mind and machine. This interplay is precisely where design, phenomenology and cognitive science can learn from each other. From what has been said the user-interface is not just linking humans to their machines, but also cognitive science, information technology and phenomenology. We have to use the outcomes of all those disciplines to get a full grasp of what it means to handle a device.
INDEX

Agich, George J., 96
Aleem Ahmed, Malik, 176
Ammon, Sabine, 127
Arnautu, Robert, 11
Asad Zaman, M., 123
Asaro, Peter Mario, 148
Aspers, P., 9
Atsushi, Fujiki, 159
Aviram, R., 234
Aviram, Roni, 234
Aydin, Ciano, 12
Bamford, Greg, 128
Bechtold, Ulrike, 188
Belt, H. van den, 225
Birman, Fernando, 129
Bitsch, Lise, 237
Blad, Sylvia, 13
Blank, B., 9
Blomberg, Olle, 206
Bluemel, Clemens, 65
Boenink, Marianne, 97
Boon, Mieke, 44
Borso, S., 207
Bos, Bram, 228
Bostrom, N., 9
Bostrom, Nick, 8
Bräutigam, K., 47
Brey, Philip, 9; 66
Brüggel, A. 9
Brüggel, Adam, 189
Brom, F., 10
Büscher, Christian, 67
Butera, M, 236
Calleja López, Antonio, 79
Campos, L., 235
Carlsen, H., 50
Carrara, M., 207
Carusi, Annamaria, 15
Casteleijn, Jasper, 237
Cavalcante, Esper Alvaro, 240
Chekletsov, Vadim V., 238
Chivers, Andrew, 220
Christoph Bublitz, Jan, 160
Cockelbergh, Mark, 17; 148
Collins, Louise, 101
Cressman, Darryl, 190
Crist, B., 69
Crombie, James, 80; 161; 209
D’Silva, J., 97
Damen, Floortje, 154
de Cózar-Escalante, José M, 81
del Muto-Martin, Immaculada, 18
De Preester, Helena, 149
De Tavernier, J., 97
Deblonde, Marian, 70
Dekker, Cornelia, 112
Del Prato, Luca, 131
Devolder, Katrien, 19
Dijkstra, Fokko Jan, 45
Donovan, S., 69
Doorn, Neelie, 162
Dorrestijn, Steven, 20
dos Santos, Dalci Maria, 240
Douglas, Thomas, 19
Douglas, Tom, 164
Driessen, Clemens, 84
Dupuy, Jean Pierre, 8
Durbin, Paul, 114
Eck, Dingmar van, 132
Est, R. van, 10; 235
Evers, J., 97
Evers, Johan, 221
Fan, Chen, 241
Farber, Darryl, 222
Feenberg, Andrew, 8
Ferrari, Arianna, 191
Fiedeler, Ulrich, 51
Fisher, Erik, 79
Fleischer, T., 47
Fritsch, Matthias, 21
Fritzsche, Albrecht, 71
Frohdenm, Robert, 9
Garbaaz, P., 207
Gayeken, Sandro, 133
Gedge, Dennis, 224
Goldberg, D., 10
Goldberg, David E., 225; 226
Gorokhov, Vitaly, 73
Grabber, Brent M., 193
Grauer, Asaf, 75
Hämäläinen, R.P., 230
Hamilton, Edward, 210
Hang Wong, Pak, 194
Hannah, Bill, 32
Hansson, S. O., 10
Hartz Søraker, Johnny, 196
Haas, Sean, 85
Heersmink, Richard, 22
Heesen, Jessica, 102
Heikkerö, Topi, 165
Heil, Reinhard, 23
Henschke, Adam, 86
Shores, Corry, 153
Small, Bruce, 171
Smits, Martijntje, 39; 154
Son, Wha-Chul, 219
Sotoudeh, Mahshid, 188
Spahn, Andreas, 169
Spence, Edward H, 204
Stahl, B.C., 244
Steen, Marc, 142
Steinert, Steffen, 245
Stemerdinger, D., 235
Stevens, Christopher, 119
Storni, Cristiano, 145
Subramaniam, V., 9
Swierstra, Tsjalling, 92
Taebi, Behnam, 121
Taylor, E, 236
Thompson, Paul B., 93
Tommasini, Floris, 173
Torgersen, Helge, 75
Ullah Khan, S., 123
Vaesen, Krist, 110; 212
Valadas, Alexandra, 62; 216
Valadas, M. Alexandra, 94
Vallor, Shannon, 40
Van Calster, G., 97
Van de Poel, Ibo, 169
van Est, Rinie, 63
Van Holland, Marieke, 212
Varner, Gary, 125
Verbeek, Peter-Paul, 41
Vermaas, P.E., 207
Vermaas, Pieter E., 146
Veruggio, Gianmarco, 155
Vries, Rob de, 99
Waelsers, Karinka, 174
Wakumuna, K.J., 244
Walhout, Bart, 63
Wang, Qian, 185
Weber, Karsten, 156
Weiss, Dennis, 42
Wensing, E.J., 123
Wiksman-Suhrn, P., 50
Winter, L, 234
Winter, Jan de, 48
Wulfhorst, J.D., 69
Wynsberghe, Aimee van, 157
Yoshimachi, Akihiko, 53
Zhu, Qin, 185
Zwart, S., 10