

# The Popularisation of Emerging Technologies through Ethics

## From Nanotechnology to Synthetic Biology

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### *Introduction*

We are used to considering engineering ethics largely a critical enterprise. By pointing out ethical issues and by raising concerns about a technology, ethicists usually criticise rather than promote the technology in question. Of course, from a utilitarianist perspective, an ethicist might come to the conclusion that a certain technology is better than another one or than doing without. However, such conclusions are rare in philosophy and would not be considered uncritical promotion. In this essay I argue that engineering ethics, almost unavoidably, turns into the promotion and popularisation of a technology if that technology does not exist yet but is considered to be emerging in the near future. In other words, ethics of emerging technologies is not only prone to but almost destined to play a propaganda role in the public sphere. As engineering ethics moves from established to emerging technologies ethicists need to be aware that they become useful instruments in the struggle for public attention and funding.

After pointing out three popularisation traps that ethicists of emerging technologies tend to walk in, I briefly discuss nanotechnology and synthetic biology as two recent cases. In conclusion, I suggest two strategies that avoid the popularisation traps and other related dilemmas and which, by reorienting the working focus of ethicists, allow the making of useful ethical contributions.

### *Three Popularisation Traps*

Imagine a research field that has no prospective societal and ethical implications whatsoever. Would anyone outside the field be interested in that research? Would anyone be willing to fund such research? A research field that has no societal and ethical implications is equivalent to the increasingly discredited ivory-tower science. In contrast, research that is promised to lead to useful technological products and processes and thereby meet societal needs is mostly favoured by funding agencies. In addition, the more directly the technology addresses individual consumer needs and concerns, the easier it is for a broader public to understand what the research is about and the more it is

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covered by the mass media. Since science policy in democratic countries to some extent seeks to legitimize its funding policy to a broader public, the media attractiveness or media suitability of research reinforces science policy preferences and vice versa. In the struggle for public attention and funding, researchers increasingly depend on PR activities that point out the societal implications of their research. Here ethicists can be useful in three indirect ways.

It would seem that PR works well only if it exclusively emphasizes the positive societal implications, and that any negative aspects of the envisioned technology are undesirable. However, the idea that a technology has only positive societal implications is as naive as the idea that the public is a homogeneous mass with clear preferences. Even if the majority embraces certain societal implications, there will certainly be minority groups who oppose the same implications and who thus raise ethical concerns. Therefore, any new technology with societal implications is likely to stir ethical debates. Since public debates increase public attention more than almost anything else, PR managers need to find and control the right dose of ethical concerns to manage the debate. Academic ethicists can do an excellent job here, because they can raise moderate concerns by avoiding exaggerated claims and extreme positions.

Moreover, the ambivalence of technology, which philosophers have discussed since antiquity, is also deeply rooted in our common sense understanding of technology, at least in a relative sense: the more powerful a technology is, the more it can be used for both welcome and unwelcome effects. (A big hammer can handle bigger nails than a smaller one, but also causes greater damage if used without care or destructively.) By inversion of the argument, the more severe possible adverse effects are, the more powerful is the technology to generate also welcome effects. Thus, raising ethical concerns about adverse effects is a forceful argument for the power of a technology and, thus, also for possible welcome effects. If the technology does not exist yet but is only emerging, any ethical reasoning about possible drastic issues is a powerful tool to propagate the future importance of that technology. Since such reasoning is only hypothetical, there is no strict limit to the severity of the issues from a PR perspective. Even if the technology is said to have the potential to destroy the whole earth, which nowadays goes as “disaster ethics”, it might be very useful to attract public attention (and money) by stirring fears and hopes of an omnipotent technology. This is why philosophical ethicists, with their usually more moderate reasoning, are somewhat disadvantaged compared to less scrupulous visionaries and science fiction authors.

Thirdly, if ethicists discuss an emerging, i.e. still non-existent, technology, their work appears useless if they do not, at the same time, point out the future feasibility and importance of that technology. That is because the importance of ethical work directly depends on the importance of the subject matter of the ethical reflection. Thus, in order to have their own ethical work acknowledged

by both peers and a broader public, ethicists of emerging technologies are forced to make claims about the feasibility and future importance of the technology for which they usually, as ethicists, have no particular expertise. Whatever the subtlety of their actual ethical reasoning is, the main public message is that the technology is important because professional ethicists take it seriously – which is exactly the message that PR managers want to spread in order to obtain funding and public attention.

Can ethicists avoid walking into these three popularisation traps? Of course, they can point out the uncertain feasibility and importance of the technology in question, but that goes at the expense of devaluing their own work for both peers and a broader public. They can also avoid any catastrophic attitude and discuss subtle ethical issues rather than dramatic and unlikely scenarios. However, compared to “disaster ethics”, which transhumanist propagators of nanotechnology try hard to establish, such subtle issues appear as innocent as infantile concerns, at least to a broader public. And if they nonetheless do so, they exactly match the expectations of PR managers in that they, with their academic authority and moderate concerns, induce a public debate that is easier to control. There may be ethicists who feel comfortable with that role. However, they should be aware that they are no longer playing the game of academic ethics and that moderating a public discourse requires different responsibilities and skills than moderating a seminar.

#### *Case 1: Nanotechnology, or How Ethics Establishes Identity and Novelty*

Nowadays the term “nanotechnology” comprises a huge variety of research projects; from materials to catalysis, electronics, pharmacy, diagnostics, and so on, almost any classical science and engineering discipline is involved. Not only is it difficult to find a meaningful scientific definition to cover the variety, also none of the individual research projects is really new (Schummer 2009a). Indeed many have been explored at least since the mid-20th century, mostly outside the public attention, which does not exclude that they have continuously produced novel and important discoveries and inventions, as any good research is expected to do. When fresh public money became available, through national research budgets labelled “nanotechnology”, a mass movement of relabelling research “nano” began that still grows. Because the vast majority of research in modern science and engineering has long worked on better understanding and control of their systems at the atomic or molecular scale, as standard definitions of nanotechnology require, the ubiquitous relabelling is perfectly legitimate and impresses only the scientifically illiterate.

Since nanotechnology lacks identity and novelty, it would seem difficult to propagate it as “the next big thing”. That is where ethics entered to establish both the identity and novelty of nanotechnology (Schummer 2004). Much of today’s “nanoethics” derives from Eric Drexler’s utopian and dystopian visions of molecular robotics that he in 1987 called “nanotechnology” and which numerous visionaries, science fiction authors, and transhumanist organisations have copied

and further elaborated on in public best-sellers. Unrelated as these visions are to the current research labelled nanotechnology, they provide public identity such that, in the public view, nanotechnology is tantamount to molecular robotics and its derivatives (Schummer 2005). And because Drexler and his followers have forecasted radical novelty, by envisioning radical social changes through nanotechnology that would urgently require ethical reasoning, nanotechnology has assumed the aura of novelty. In particular the quasi-religious transhumanist movement that seeks salvation in the fulfilment of Drexler's visions has established numerous centres, foundations, and institutes for "ethics", because ethics is the best means to sell their visionary ideas.

From a professional ethicist point of view, Drexler's visions might appear more interesting than, say, nanostructured materials, catalysis, or any other research that is currently labelled nanotechnology. It is also easier to deal with, since professional writers have already explored all kinds of imaginative scenarios; and it is easier to communicate, since it has long been part of the public imagination and requires no scientific background. All that might have tempted some academic ethicists to focus on visions of unlikely feasibility rather than on current research from which, of course, the development and marketing of forthcoming technologies derive. In so doing, they provided little service to the public discourse that visionaries could not have done better. However they lent their academic credibility to the notion that nanotechnology is specific and novel and thus helped popularize the actual nanotechnology movement in science.

Not surprisingly, when launching its National Nanotechnology Initiative in January 2000, the US government already designated ethicists to play a crucial propaganda role in their initiative. As the White House press release on that occasion states,

Ethical, Legal, Societal Implications and Workforce Education and Training efforts will be undertaken to promote a new generation of skilled workers in the multidisciplinary perspectives necessary for rapid progress in nanotechnology. [White House 2000, for a discussion see also Schummer 2004)

### *Case 2: Synthetic Biology, or How Ethics Generates Research Goals*

In synthetic biology, with its ambitious goal of creating living beings de novo, the relationship between ethics and technology is different and more deeply rooted in cultural history. Indeed, one can argue that moral concerns first created the ambitious goal of synthetic biology and then fostered it up to the present day.

It has largely fallen in oblivion that the creation of "primitive" living beings from inanimate matter was considered a triviality since antiquity in

almost any culture, including the Greek and Judeo-Christian traditions, up to the 19th century. (For more details on the following, see Schummer 2009b.) Both common people and scholars were convinced, and could point to their Textures like the Bible or to authors like Aristotle or Thomas Aquinas, that from worms to vermin, to amphibians and even some birds, many animals generate spontaneously from dirt and dung on a regular basis. There was even an industry to create optimised bees, called *bugonia*, and ambitious research programs like in Francis Bacon's *Novum Atlantis* (§ 62) to produce animals *de novo* that best serve human needs. No ethicist or Christian theologian ever raised any concerns about that, because it was perfectly in accordance with the Bible that tells us, for instance, about magicians doing exactly that (*Exodus* 8).

It was not before the 19th century, when Lamarck's and Darwin's evolution theories linked the generation of humans to the generation of simple organisms, that the accusation of "playing God" was first applied to the idea of creating simple living beings. Exotic as that creationist position is in the history of Christian theology, it upgraded a former triviality to a divine act, simply by raising quasi-moral concerns. Whenever a Christian fundamentalist raises the concern of "playing God", he or she stirs the fascination in some equally Christian fundamentalist scientist to do exactly that and, at the same time, provides religious and societal relevance to such research. Since the *de novo* synthesis of living beings struggles to find convincing scientific and utilitarian legitimisation, compared to the genetic modification of existing living beings, its divinification is a powerful tool to attract public attention and funding in Christian countries. Thus, any quasi-moral concern of "playing God", or its secular counterpart of "acting against Nature", is the best way to popularize the enterprise of people like Craig Venter.

#### *Conclusion: Two Strategies for Ethics of Emerging Technologies*

As professional ethicists we are facing a two-fold dilemma. On the one hand, it is important that we explore ethical issues of emerging technologies at an early stage, before the technological development creates its own facts and even before the rhetoric of technological determinism blocks public deliberation, which includes dealing with technologies of still unclear feasibility. On the other hand, any ethical treatment of such emerging technologies runs the double risk of, first, popularising the technology against the author's intention and, second, dealing with unfeasible visions in competition with lurid visionaries. Given the necessity of ethical work on emerging technologies, I suggest two independent strategies to avoid the dilemmas, both of which require broadening the traditional working focus of ethics.

First, ethicists need to be aware of the social dynamics of public discourses including their own role therein. This may not only help avoid walking into one of the popularisation traps; it might also guide their ethical research towards a better cultural understanding of moral debates on technologies, including the cultural history of visions and the hopes and fears they stir, as well

as the role of science policy in democratic societies. Reflecting on the rhetorical and popularisation role of ethical issues does not only increase our understanding of descriptive ethics, it may also help formulate normative ethics and act as ethical advisor in a more appropriate manner.

Second, ethics of emerging technologies need not articulate itself in public comments, competing with lurid visionaries. If the goal is ethical guidance of the technological development, this can also be achieved in teamwork with scientists and engineers who are actually developing emerging technologies. That would, of course, require more background and understanding of science than dealing with visions; better communication skills than writing scholarly books; and, last but not least, the willingness of scientists and engineers to engage with ethicists in a mutually constructive manner. From Constructive Technology Assessment to Interdisciplinary Trading Zones, there are already many tested models for the active involvement of ethicists in the technological development.

In sum, cultural reflection and active involvement in technological development are two options for professional ethicists to provide useful contributions that escape the popularisation traps and dilemmas. As many societies move towards a “stakeholder” culture that has no place designated for genuine ethicists in political decisions, these options might also help define the future role of applied ethicists in society in general.

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