A Spoonful of Trust Helps the Nanotech Go Down

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Introduction

Utopian and dystopian visions of nanotechnology are prominent in both the public press and academic literature. Proponents argue that nanotechnologies will help clean the environment, produce cheap energy and eliminate poverty,[1] while opponents respond that nanotechnologies will undermine local economies, raise serious health and safety issues, and possibly even destroy the environment.[2] It would be easy to reject out of hand these visions as extreme and irrelevant, because they do not represent the current or likely future states of the technology. However, this move sidesteps the question of why these extreme visions arise, and more importantly, the problems that such polarized discussions create for public trust in government and science. As should be clear from recent experiences in Europe with genetically modified (GM) foods, it is no longer sufficient for governments, scientists and industry to deploy a technology that "experts" have deemed safe and effective – the general public must also "buy into" the new technology if it is to be adopted. But this buy-in and public trust can be significantly undermined by the hyping of new technologies. In this paper, I argue that if governments, academic scientists and industry wish to effectively develop the potential of nanoscience and nanotechnologies, they must be cognizant of the dangers of over-hyping research and losing public trust.

Hype

Hype is arguably an important part of the opening phases in the development of a new technology, because it facilitates the creation of new networks of relations, helps in the acquisition of necessary resources (human, financial, technical), and permits the development of a popular consciousness about how the new technology will replace old, less effective ways of doing things.[3] By projecting an image of where a technology will lead, developers create a possible future that is "fundamental to producing the incentives and obligations that will be necessary to mobilise the necessary resources for a particular aspiration to be realised."[4] To project the desired future image (and attract public or private research funding), scientists and universities will often, alongside more objective academic articles, make press releases and conduct media interviews that highlight the benefits and novelty of their research. The media in turn respond to broad public interest in science and technology by reporting on new discoveries. But while this reporting is usually factually accurate, it tends to be uncritical of scientific claims, focusing on the positive or novel aspects of the products of research while neglecting the limitations.[5]

Although hype can be a very effective means of achieving these near term objectives, it can also be counterproductive in the long run. If we look at the case of GM crops and foods, for example, we see a set of technologies that were promised to be revolutionary (but safe), and that would quickly lead to enormous social, economic and environmental benefits. Governments (and industry) in the United States, Argentina, Canada and China have invested significant public monies in GM technologies (and implemented supportive agricultural and intellectual property rules) in the hope that these technologies will provide a competitive advantage for their large and heavily subsidized agricultural sectors. However, as with many other biotechnologies, such as gene therapy or pharmacogenetics, the promises have largely proven premature, the hype unsubstantiated, and for the most part the general public has yet to see any tangible benefits.[6] It should not then be surprising that many people are becoming sceptical

of (and militant about challenging) the positive claims made by governments and industry about the safety and utility of GM foods and other biotechnologies.

A culture of hype can also lead to weaker market conditions and skittish investors. As we saw in the late 1990s, the inability of most small biotechnology companies to make good on promises and translate intellectual property into marketable products led many venture capitalists to back away from this sector.[7] The current climate is one of feast or famine – substantial funding can be leveraged for supporting demonstrated functional products, but it is very difficult to acquire the long-term stable funding needed for companies to move through the development pipeline (10-15 years) and translate discoveries into marketable products.[8] The danger with this situation is that it is often very difficult to accurately predict which particular technologies will succeed. Investors may overestimate the scale of potential applications that in reality are only niche items or have indirect utility, while missing other important applications that could be very powerful agents of technological change. By focusing on the short-to medium-term potentials, hype may obscure the long-term potential of a new field of innovation.[9]

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But hype is not the only danger. The top-down technological determinism present in much of government and industry visions of the future (technology is good, and more is better) presupposes a passive consumer and ignores the inevitable uncertainty of technological development. The reality, however, is one of complex social, technical, political, and economic "actors" involved in the success or failure of technologies.[10] Thus while new technologies will continue to be developed and implemented by their designers, "they will also be adapted and translated by users for their own purposes; if unable to meet these ends, the technology may be rejected."[11]

Science Regulation and Public Trust

Assessments of the accuracy, effectiveness and usefulness of new technologies will likely continue to be relatively technocratic – it is largely scientists and professional policy analysts who gather relevant information and determine which services or technologies are safe and useful. For example, the application of nanotechnology in the molecular electronics industry raises public health and worker safety concerns related to the inhalation of carbon nanotubes. It is appropriate that research be conducted to determine toxicity and risk of these materials[12] so that safety measures can be implemented. In general, society benefits from having scientific and medical professionals evaluate and decide whether a given technology is safe and effective, and from regulatory structures that control access to technologies which could be hazardous if used inappropriately. However, this "expert-driven" model of technology assessment tends to occur in a "backroom" or "black box" manner, with only the results and not the processes or rationales being made available for public inspection.

Coinciding with (if not resulting from) the environmental movement in the 1970s, there has been growing public scepticism of government and scientific assurances about the safety and effective oversight of new technologies.[13] Widespread media coverage of very public disasters (nuclear meltdowns at Three Mile Island and Chernobyl, tainted blood supplies, foot and mouth and BSE "mad cow") tie into concerns about corporate corruption scandals (Enron, Arthur Anderson, ImClone) and the increasing influence of pro-industry and economic agendas on public policy.[14] This distrust has been manifest in the formation of numerous public advocacy and activist groups (*e.g.*, Greenpeace, Friends of the Earth), and a willingness on the part of consumers to challenge governments and industry, and for example, to engage in public boycotts.

The GM food example is particularly illustrative. In the 1980s, international agriculture-biotechnology companies such as Monsanto focused on convincing farmers and governments that their products were safe and cost-effective – "the consumer" they were interested in was the farmer who would purchase and plant their GM seeds and technologies. The end-consumer in the food store, *i.e.*, the general public, was seen as a passive participant who would accept, unquestioningly and without complaint, the fabulous new GM foods that they were being offered. But this view was clearly mistaken. End-consumers were anything but passive; nor

were they willing to accept at face value the claims of industry (or government scientists) about the benefits and lack of risk associated with GM technologies. With the introduction in Europe in the late 1990s of laws requiring the mandatory labelling of GM foods, consumers voted with their wallets and pressured retailers (with significant upstream effects on suppliers and producers) to sell only non-GM products, effectively wiping out the European GM food market:

> European consumers collectively undermined, perhaps for the first time, a major wave of industrial investment and innovation and learnt that they had powers which they had not previously appreciated...Their appetites for exerting such influences have been whetted, and consumers are now more likely to try to exert their newly discovered influence than they could previously have been.[15]

However, the GM food story should not be seen as evidence of a Luddite, technology-phobic population. Indeed, there tends to be widespread positive public regard for technologies that appear to have a clear benefit and minimal or at least well understood risks (*e.g.*, biotechnologies that improve health care, such as genetic diagnostics or bio-pharmaceuticals). But when the benefits are dubious and the risks are potentially very serious and not well understood, as in the case of GM foods, then the public as consumer of new technologies may be very wary.[16] The lesson for a nascent field such as nanotechnology – in which there are as yet few applications, but which is receiving billions of dollars of public monies – is that there must be broad and genuine public engagement in determining the scope and possible futures for this field. Public involvement must, however, be more than just "marketing" – as has been argued above, hype that does not "pay-off" in the near to medium term will significantly undermine public trust. If real long-term commitment and enthusiasm is to be enlisted, then genuine public engagement is essential.

Conclusion

Hyping a new technology may be necessary for researchers and companies to attract sufficient government funding and venture capital to develop research into a marketable product; but too much hype can over-inflate public expectations and worries, and when combined with a perceived lack of oversight and limited transparency and accountability in decision-making, can lead to a dangerous loss of public trust: "The most obvious lesson of the recent traumas for the biotechnology companies is that their products will only become acceptable once they are able to persuade consumers that their products will provide benefits to consumers which outweigh the perceived risks."[17] Nascent nanotech firms should learn from this lesson.

We need to do better at educating and engaging the general public on issues related to the implications of new technologies. How to do this is, of course, not an easy question, and the need for dialogue should not be allowed to be mistaken for a need for persuasion.[18] We must be wary of seeing the public as merely deficient in scientific education (the deficit model of public understanding of science).[19] If the public is to be engaged, what we should be striving for is s*ufficient* public understanding in pursuit of *meaningful* public participation.[20] Some attempts are beginning to be made to engage the general public in explorations of the social, economic, ethical and political issues associated with nanotechnology. For example, in the UK, reports have been prepared to evaluate the social and economic effects of nanotechnology,[21] and The Royal Society is conducting a broad public consultation.[22] In parallel (and often in opposition) to government sponsored reviews, public advocacy groups such as the ETC Group[23] and Greenpeace[24] have also laid out their concerns as part of the wider public discourse.

All the best intentions on the part of governments and public advocacy groups will, however, come to nothing if academic and industry scientists continue to feel pressured to unrealistically hype their research: "Scientists making exaggerated claims about their research and in research proposals can do considerable damage. These claims fuel public perceptions that nanotechnology is either 'science fiction,' or dramatic and radical, and therefore risky."[25] Evidence presented to consumers about the safety and benefit of new technologies will have to be much stronger and more transparent, and be made available in a manner that is more accountable to public concerns than has previously been the case.[26]

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25 *Supra* note 22 at 13.

26 *Supra* note 14.