How can business respond to the technical, social and commercial uncertainties of nanotechnology?

Workshop report

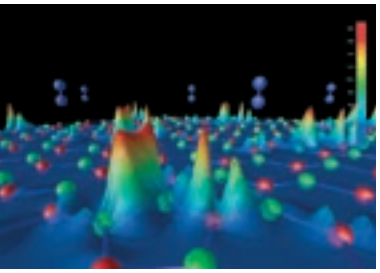
Disclaimer: This paper highlights key issues that emerged from a business workshop on nanotechnology. It is not necessarily an expression of the views of the Royal Society, Insight Investment or the Nanotechnology Industries Association.

Introduction

Commercialising innovations from nanotechnologies presents huge opportunities for business. But at the same time – while the evidence of harm is currently limited - there is real uncertainty over the potential environmental, health and safety (EHS) risks of some nanoscale materials, particularly the impact of manufactured free nanoparticles and nanotubes. The development of nanotechnologies also gives rise to a variety of social and ethical issues – both in relation to their governance and the societal impacts of specific applications.

All businesses with an interest in this area will need strategies for dealing with these uncertainties. However, it is still early days in the development of nanotechnologies, and the environment in which they are and will continue to be commercialised is not yet fixed. There are numerous societal and environmental benefits expected to be brought by nanotechnological innovation. Public opinion is positive to nanotechnologies - a Eurobarometer survey in June 2006 suggests that Europeans feel optimistic about its contribution to society - and the majority of NGOs have not made it a campaigning issue as yet.

The current debate encourages businesses, scientists, academics, NGOs and others to work together to address and reduce the various areas of uncertainty surrounding nanotechnologies; but time is running out, and the window of opportunity to secure nanotechnological innovation through a balanced stakeholder dialogue will not be open indefinitely.



Exploring business opportunity and uncertainty

On 7 November 2006, The Royal Society, Insight Investment and the Nanotechnology Industries Association (NIA) came together to explore these issues with business and stimulate companies to engage more fully with the broad spectrum of questions which affect the development of nanotechnologies.

The three organisations began this process by convening a business-focused workshop and commissioning a briefing paper: An Uncertain Business: The technical, social and commercial challenges presented by nanotechnology (available from **wwww.responsiblefutures.com**).

The workshop, hosted by the Royal Society and facilitated by Acona, brought together seventeen European companies with a commercial interest in nanotechnology – from food and chemicals manufacturers to retailers of healthcare and fashion.

The event sought to build on the work of the initial report from the Royal Society and Royal Academy of Engineering published in 2004, which was commissioned by the UK Government to consider current scientific knowledge in the field and whether nanotechnology could raise EHS, ethical or social issues which are not covered by current regulation (see **www.nanotec.org.uk/finalReport.htm**)

This event had three aims:

1. to highlight the particular technical, social and commercial issues surrounding the development of nanotechnologies

2. to stimulate discussion and interaction among companies working up and down the supply chain on these topics;

3. to explore ways in which companies individually, or business collectively, could better understand and respond to the challenges posed by the issues.

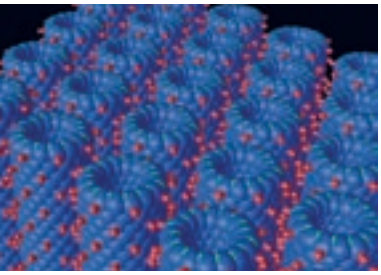
The nature of nanotechnology risks

The seminar explored the technical, social and commercial areas of uncertainty surrounding the development and commercialisation of nanotechnologies and posed related questions for businesses to consider.

• **Technical uncertainties** describe issues concerning our understanding of the technology and how it behaves; they are manifest in our ability to develop, manufacture, control and measure it and ultimately to accurately predict its behaviours.

Technical uncertainties, relating to potential EHS impacts, arise because we are at an early stage in our understanding of the behaviour and effect of (principally) free nanoparticles. Materials at the nanoscale can behave very differently from the same chemical in a bulk form. There is at this stage little data on hazard or safety: little is known, for example, about how nanomaterials enter the body, how they are metabolised, their toxicity and their impact on the environment and other species. The Royal Society has highlighted the pressing need for underpinning fundamental risk research in the area and a rigorous assessment of benefits, risks and uncertainties.

Participants were challenged to consider the commercial imperative for directed research and the role of business in controlling their exposure to risks in this area.



• **Social uncertainties** stem from society's view of the technology, based on complex factors including: the perceived benefits compared to the perceived risks; the uses to which the technologies are put, their impact on people and the environment; regulation and governance; and previous experience of new technologies.

Companies need to consider the social and perceptual uncertainties surrounding nanotechnologies as carefully as they consider the technical uncertainties. A backlash of negative opinion from consumers, governments and civil society - as happened to genetically modified crops - could prove incalculably damaging to the success of all types of nanotechnology.

The public perception of risks is dynamic and while currently people are broadly well disposed towards nanotechnologies this cannot be counted on indefinitely. The behaviour of companies, governments and others in society can shift perceptions one way or another. These perceptual risks depend on the ability of companies and governments to minimise unintended consequences, develop beneficial technologies and adequately govern the exploitation of the technologies.

Participants were challenged to consider what steps they were taking to understand the social and perceptual risks they face and what methods they were using to mitigate these.

• **Commercial uncertainties** focus on the specialised questions raised as companies commercialise nanotechnology-based products. For example they need to consider the risks arising from the shape of future standards and regulation, and whether minimum regulation is necessarily the best approach; the potential for litigation (there are many lessons which may be learned from the business approach to asbestos for example) and the impact of complex intellectual property regimes on the development of less commercial but highly beneficial applications.

These issues are also critical for investors who will be affected by the impact on company valuation if these risks are handled badly, especially if the products form a large part of the company's current or future business, or if it has a valuable public brand. Similarly, lenders and insurers will be scrutinising the technical, social and commercial risks posted by nanotechnologies to allow them to assess risk, while the costs of capital and insurance policies may rise if these uncertainties are not adequately addressed.

Participants were challenged to consider the effectiveness of their approach to research, risk assessment, regulation and other commercial aspects of nanotechnology development.

The importance of interconnections

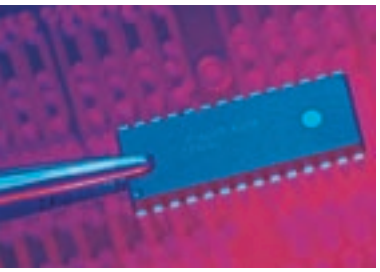
None of these risks and uncertainties can be considered in isolation. The commercial uncertainties for businesses working with nanotechnologies arise out of the technical and social risks associated with them. Regulatory uncertainty, for example, may leave companies potentially liable for damages in the event that products are discovered to present EHS problems, which in turn may affect a company's ability to get adequate insurance coverage; or large scale brand owners and retailers may find themselves exposed to widespread public criticism if uncertainties further down the value chain affect public perception of nanotechnologies as a whole.

Business response to nanotechnology uncertainties

The participants at the workshop began to shape priorities for a business response to these issues. The important questions were distilled to three key areas:

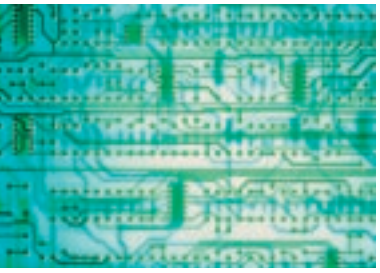
1. A new approach to responding to technical, social and commercial risk is needed: Participants stressed the importance of a new approach to understanding and responding to the three types of risk. Lessons from asbestos and genetically modified crops must be learned and incorporated into businesses response to the development of nanotechnologies. This may involve new partnerships, a coordinated approach to responsible nanotechnology research and development and clarity about where responsibilities lie.

2. Business should be more active in the shaping the debates on regulatory systems, standards & definitions: There was concern about how the existing systems of regulation and risk assessment can cope with nano-risk and what role business should play in their development. A number of initiatives were currently underway in this area internationally, but progress was slow and business needs were often not taken into account. Participants felt that business should be fully involved in the processes of agreeing common definitions, standards and regulatory approaches. In light of current uncertainties, the development of a business focused 'code of conduct' on the responsible development of nanotechnology was welcomed.



3. The importance of coordinated engagement and communication: Participants stressed the importance of effective and balanced communication about nanotechnologies. A starting point would be communication up and down the value chain between consumer focused companies, manufacturers and researchers. Dialogue between business and ngos, consumers, government and the public was also considered an essential part of the process of responsible development - to understand and respond to aspirations for and concerns about nanotechnology.

Next steps identified at the workshop



Responsible nanotechnology code

The development of a voluntary code of conduct for businesses engaged in nanotechnology was widely agreed to be an important next step. It was felt the code should be principles based rather than standards based and would be developed through a process of engagement between a group of European businesses and a wide range of stakeholders, including ngos, government and consumer groups.

Responsible nanotech forum

The coordination of an effective response to the technical, social and commercial issues surrounding nanotechnologies was considered essential. The participants discussed whether a new 'Forum' or 'Centre' may be an appropriate vehicle for this. It could be convened by an 'honest broker', an independent group who would be at arms length from all the stakeholders, yet have the respect and authority required to engage widely and coordinate a range of activities. Most importantly participants stressed that it should focus on actions to address uncertainties, rather than simply being a talking shop.

A strategic approach to communication and engagement

The group felt that there was a need for strategic coordination on communication and engagement activities on nanotechnology. This could enable business to understand and address social risks more effectively. It would also provide a clear means to demonstrate to stakeholders, including investors and regulators, a responsible business approach to nanotechnology development.

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