

COMMENTARY

Too small to overlook

Voluntary reporting of nanomaterials by industry has failed. Mandatory measures are a step in the right direction, but the field needs more data sharing and oversight, say **Andrew Maynard** and **David Rejeski**.

Global investment in nanotechnology research and development by public and private sectors has risen to more than US\$18 billion annually and nanotechnology has passed from a scientific curiosity to a market reality, with hundreds of substances and nanotech-based products now commercially available. Despite the need for evidence-driven oversight of the products of nanotechnology, very little is known about the use of nanotechnology in industry, and relevant oversight remains in its infancy. Even basic information on what nanomaterials are being produced, in what quantities and how they are being handled and used, remains largely undocumented.

Voluntary efforts to gather information on the production of nanomaterials have been largely unsuccessful. A UK reporting scheme initiated in 2006 received just 13 submissions in two years. A similar US Environmental Protection Agency (EPA) programme did not fare much better. It had received only 29 submissions by the end of 2008, covering 123 different nanoscale materials. The agency's own assessment concluded "it appears that approximately 90% of the different nanoscale materials that are likely to be commercially available were not reported"¹. Low reporting levels are probably accounted for by the requirements for businesses to expend considerable resources in gathering information, with little direct benefit to themselves.

Against this backdrop, in January, Canada announced that it would initiate a one-off mandatory data collection from industry on the production and importation of engineered nanomaterials in quantities of greater than 1 kilogram, to help inform future regulatory decision-making. France is also in the process of introducing mandatory reporting — a move that could put it at odds with its European neighbours by creating a different regulatory environment.

Instituting mandatory reporting is a welcome move towards effective oversight, but it is only one of many steps that are needed if the promise of this technology is to be realized.

In principle, such data calls and any resulting evidence-based regulations will benefit industry by reducing uncertainty and by clarifying operational guidelines. Solid data on what

nanomaterials are being produced and used (and in what quantities), what the potential risks are and how adverse effects can be minimized or avoided, will enable effective risk management. The dearth of information on human health and environmental effects is being noticed by insurance companies — for example, Lloyd's of London has placed nanotechnology in its top tier of emerging risks — raising concerns that a



The risks posed by products made with nanotechnology need to be quantified.

continued lack of data could increase the cost of company insurance.

Effective oversight will depend on effective data sharing and on targeted research. Five research challenges that would help support evidence-based decisions on using nanotechnology safely were suggested in *Nature* in 2006 and they are still valid today². These include exposure monitoring, toxicity testing, predicting and avoiding harmful behaviour and evaluating risks for the lifespan of the material. Several countries are addressing these challenges, but research is about 2–5 years behind the proposed timetable, and information gaps still exist in how to generate, use and dispose of engineered nanomaterials safely³.

Increase the flow

For research and regulation to work, more needs to be done to facilitate the flow of information between organizations. New government and industry partnerships are needed to ensure access to relevant and trusted data on nanomaterial risks. Small firms and start-up companies need help from government and industry associations to address potential risks and meet regulatory requirements.

Mechanisms also need to be established to enable industry and researchers to share data with regulators, consumers and other businesses.

Already, non-governmental initiatives such as the GoodNanoGuide⁴ and the Responsible NanoCode⁵ are helping businesses work together to address nanomaterial safety. National and international standards organizations are developing guidance on how to work safely with nanomaterials. Additionally, the Organisation for Economic Co-operation and Development is coordinating efforts to generate toxicity data on 14 commercially relevant nanomaterials that will be publicly available.

Regulators are also acting, even in the absence of data. On 29 June, the EPA tightened its regulatory oversight on specific types of carbon nanotubes. Later this year, European rules governing the use of nanomaterials in cosmetics will come into effect, and the application to nanomaterials of European regulations on chemicals continues to be explored.

Yet progress remains patchy, and developers and regulators are a long way from understanding how to predict and manage the potential risks associated with existing nanomaterials, let alone those in the pipeline. Moves towards mandatory data collection are welcome, and we hope other nations will follow suit. But it must be accompanied by more effective and timely data sharing and oversight at the local, national and international level. Get this right, and consumers and industry stand to gain from the development of safe, sustainable new technologies. But get it wrong, and everyone is likely to lose out. ■

Andrew Maynard and **David Rejeski** are at the Project on Emerging Nanotechnologies at the Woodrow Wilson International Center for Scholars, 1300 Pennsylvania Avenue, Washington DC 20004-3027, USA.
e-mail: andrew.maynard@wilsoncenter.org

1. *Nanoscale Materials Stewardship Program. Interim Report* (US Environmental Protection Agency, 2009).
2. Maynard, A. D. *et al. Nature* **444**, 267–269 (2006).
3. *Risk Assessment of Products of Nanotechnologies* (Scientific Committee on Emerging and Newly Identified Health Risks, 2009).
4. www.goodnanoguide.org
5. www.responsiblenanocode.org