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Committed to a nanoblunder?

There are few more exciting scientific fields today than nanotechnology. The rush by research institutions to set up new nanocentres and nanoteams has been one of the most positive episodes in recent Australian research investment.

But is the nanobrigade about to make the same mistake as the biobrigade? Will they do magnificent science, only to see it rejected, stalled and criticised by society? Will the investment fail to deliver because nobody bothered to ask: is the community prepared to accept it?

I was somewhat shocked, in attending a conference of molecular biologists, to discover most had quit the field of gene transfer and were instead focusing on gene markers. This was clearly a market reaction by scientists (and science funders) to the market reaction by farmers who in turn were responding to the market reaction to GM food by consumers and governments.

This outcome was probably totally unnecessary. Public opinion research clearly suggests most consumers would eat GM food, provided it was safe and had an obvious benefit to them. Unfortunately, most of the early trans-genes used were to the selfish benefit of the corporate and scientific institutions, not consumers – though this is now starting to change.

By picking the wrong genes, science set back public acceptance of GM food in Australia at least 10 years, maybe an entire generation. It wasted millions of dollars and not a few scientific careers, all because of a faulty, untested assumption that people would accept it. There are signs the nanofolk are heading down the same track.

Scientists bewail the lack of scientific literacy in the community, but rarely accept the corollary: a more scientifically literate public asks harder questions. As pounded by former UK Chief Scientist, Bob May: if you teach 'em more science, they become more like scientists, i.e. sceptical. If we want a knowledge society, then listening and responding to its concerns is something science needs to get its head around.

Nanotech has several handicaps. First, it is highly complex and most people have only a dim idea what it is about. Much of the language is opaque and alienating. Second, there are unanswered questions about the safety of (quantum) nano devices and how they will interact with living tissue.

Third, there has been a lot of hype about wonderful new applications, which makes the public nervous about the inevitable downsides they are not being told about.

Fourth, major investors include defence establishments, who clearly hope nanotechnology will deliver better ways to kill people. Harmful applications are already in contemplation and the public is aware of this.

Fifth, quantum computers and nanobots/nanosensors - once invented - will have undreamed-of power to amass data on every person living in an advanced society and to observe, store, mine and analyse their words and deeds over a lifetime.

This could become the worst assault on personal liberty in history and nanotech experts have few answers for how it is to be prevented and give an impression of not caring.

As with GM, while there are benefits to industry there are, so far, few obvious consumer benefits on offer (except maybe sunscreen and self-cleaning paint!).

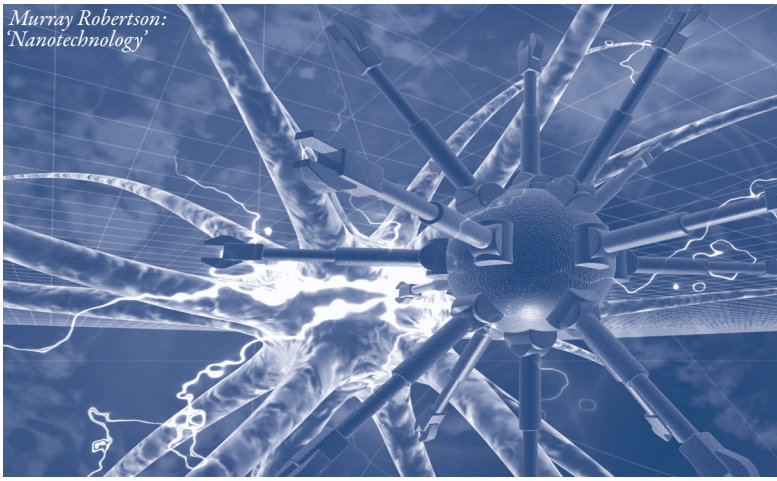
There has been almost no dialogue to determine how society wishes nanotech to be applied or regulated. This smacks of technocratic arrogance and "we know what's best for you" and begs for technology rejection. Also, most nanotech research is publicly funded, yet many outcomes are likely to be secretively privatised, irritating the taxpayers who paid for them.

These concerns add up to a perception of 'loss of control/freedom' on the part of society in determining how nanotechnologies are applied, which is likely to generate anger, concern and resistance, calls for regulation and moratoria. In some cases this may include loss of public sanction to perform research.

If Australia aspires to be a leading player in the introduction and application of nanotech then it must ensure there is:

- effective public dialogue and consultation on the technology and its application;
- much better communication on what nanotech is, what it does or can do, and what its drawbacks are;
- transparency and opportunity for public scrutiny;
- independent (not in-house) ethical oversight;
- proof that science is investigating potential risks and downsides;
- regular consultation on how the public would like to see the technology applied for their benefit;
- new human rights that protect freedoms against intrusive new technologies;
- adequate regulation and oversight.

The irony in all this is that science, which relies on data to form its views of the world, prefers to use gut instinct (usually wrong, as scientists are not typical members of society) when it comes to assessing the willingness of the public to adopt new technologies.



Murray Robertson: 'Nanotechnology'

With statistician Dr Nick Fisher, I have been working on a technique that enables scientists and scientific institutions to 'listen in' to what the public is thinking, to understand more clearly what is behind their views – and to take early action to avoid technology rejection, or to identify new market opportunities.

This technique is low cost, based on sound statistical principles and provides a "moving picture" (as opposed to a snapshot) of what the public thinks on a given topic. It is still experimental, but already promises to deliver what scientists need to know about the probable societal response to new and disruptive technologies.

At the end of the day, the future of a nation depends less on the quality of its science than on its ability to rapidly adopt high quality science and turn it into prosperity, social and environmental wellbeing. In order to do this it is essential to know what society is thinking.

An effective dialogue will put Australia at the world forefront in nanotech application and adoption. Its absence may torpedo our efforts.