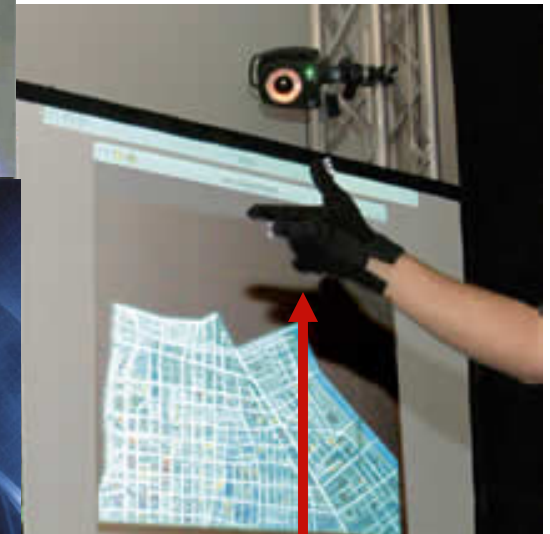
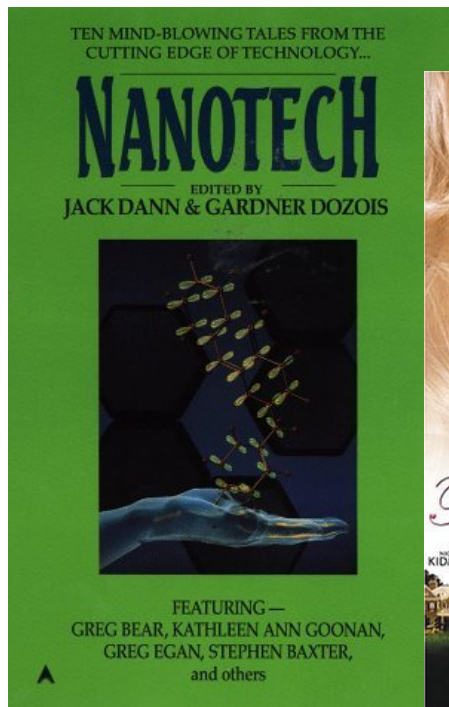


How Will Nano Affect Our World? An Introduction to Thinking about Social & Ethical Issues in Nanotechnology



Raytheon computer interface
inspired by Minority Report
15 April 2005
NewScientist.com

Deborah Bassett
Ph.D. Candidate, Communication
R.A., Center for Workforce Development
July 21, 2006

[Funny quotes]

- "I think there is a world market for maybe five computers."
--Thomas Watson, chairman of IBM,
1943

[Funny quotes]

- "This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."
--Western Union internal memo, 1876.

[Funny quotes]

- "Who in their right mind would ever need more than 640k of ram!?"
-- Bill Gates, 1981

Challenge of emergent technologies

- Difficult, if not impossible, to predict how they will develop, who will use them, and how they will be used.

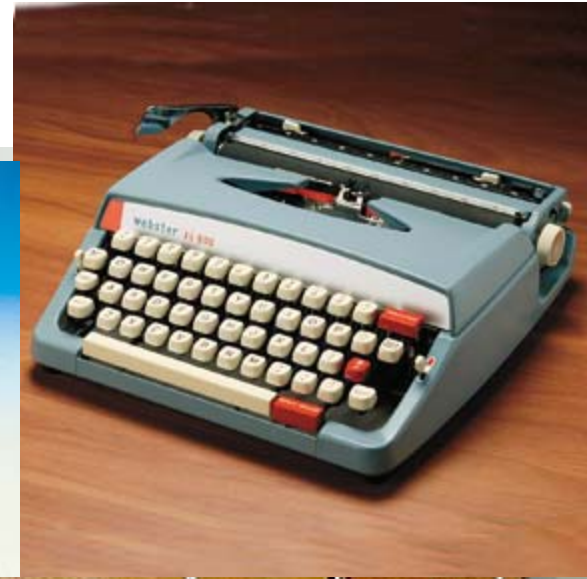
What are “social and ethical issues”?

- Science and technology are created in a social world.
- They *reflect* and *shape* society.
- How will they impact society?
- What moral questions will they raise?

“What’s so special about the ethics of nanotechnology?”

- Previous technologies addressed issues as they arose (or much later), hence:
 - Environmental damage (toxic waste sites,)
 - Health problems (asbestosis, lead poisoning)
 - Loss of public acceptance (nuclear power, GM foods)
 - Significant inadvertent societal change
- The increasing rate of change of technology means we don’t have time to “wait and see” what problems will arise.

[Circa 1990



TELE
746



How might nano affect society?

- Environment
- Culture
- Economy
- Health

Nanoparticles - Health, Safety and the Environment

■ **The Benefits**

- Detecting and removing contaminants
- Medicine
- Development of benign industrial processes and materials

■ **The Hazards**

- What are the effects of nanomaterials on public health?
- High reactivity, ability to cross cell membranes
- Small is different - new behaviors at the nanoscale

■ **Regulatory issues**

- Regulation in the face of uncertainty
- No FDA approval needed for cosmetics
- Parallels to asbestos



'Butterfly Wings on Every Eyelid' -

L'Oreal

Sep, 13, 2005



L'Oreal says that shop shelves will soon see the world's first cosmetics products to incorporate stunning new color effects that rely on light refraction and not pigments

- Researcher Pete Vukusic, Exeter U. Varied thickness of nano-scale layers of material like mica, liquid crystals or silica, to reflect light to produce color.
- The FDA doesn't regulate cosmetics like it does drugs. These products will .. hit the market with the same safety testing behind them as any other cosmetic.
- Watchdog groups worry that nano-scale particles could pose a health hazard

Consumer, Health, and Environmental Groups Launch First-Ever Legal Challenge on Risks of Nanotechnology

May 16, 2006

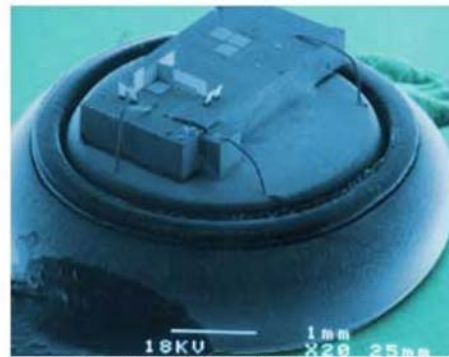
WASHINGTON, DC - The International Center for Technology Assessment (CTA) and a coalition of consumer, health, and environmental groups today filed a formal legal petition with the Food and Drug Administration (FDA), calling on the agency to address the human health and environmental risks of untested and unlabeled nanomaterials in consumer products. The petition is the first U.S. legal action filed to address the potential human health and environmental risks of nanotechnology.

(Retrieved July 10, 2006 from http://www.icta.org/press/release.cfm?news_id=19)

Privacy Issues

Boyco t Gillette
http://www.boycottgillette.com/
SEND GILLETTE A MESSAGE:
DON'T BUY PRODUCTS WITH
TRACKING DEVICES!
I would rather grow a beard.
GILLETTE SPY CHIPS
ABOUT RFID
BOYCOTT GILLETTE

RFID "Foiling" Kit
PROTECT your privacy
Instructions for use:
1. Remove aluminum foil from plastic bag.
2. Fold foil around RFID-encoded document.
3. Drop document in your purse or wallet and go!
PERSONAL RFID SHIELD
Sponsored by **epic.org**
ELECTRONIC PRIVACY INFORMATION CENTER



Dr. K. Pister, Small Times Aug. 16, 2001

RFID & Smart Dust

- Surveillance
- Highly efficient marketing
- Can they be read at a distance?
- Could they be read by 'unfriendlies'?
- Do they enable identity theft?
- **Balance between convenience, economic benefit, and privacy**

Genetic Information

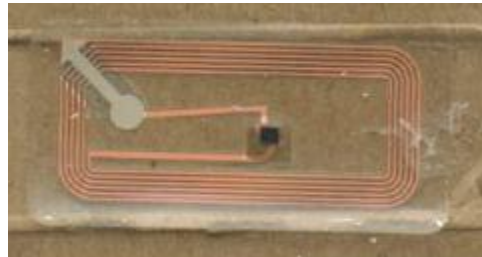
- Insurers may use this to deny, limit, or cancel insurance policies
- Employers may use genetic information against existing workers or to screen potential employees.
- **The economic incentive to discriminate based on genetic information is likely to increase as genetic research advances and the costs of genetic testing decrease.**

[“Spy Chips”]

Smaller than a grain of sand

Unique ID

“Beams” back information to a “reader”



(Photo: © Liz McIntyre 2003)

Above: Magnified image of actual tag found in Gillette Mach3 razor blades.

Retrieved 7/19/06 from <http://www.boycottgillette.com/aboutrfid.html>

Case Study:



“Protest against Eddie Bauer's Nanotech”

Monday, May 9, 2005

*“On Saturday in Chicago, activists protested topless outside of the Eddie Bauer store on Michigan avenue. They're concerned that the Nano-Tex coating the company uses to make stain- and wrinkle-resistant clothing could cause health problems. Howard Lovy's NanoBot has posted exclusive photos of the protest and the press release from the activists, representing a Chicago group called **THONG (Topless Humans Organized for Natural Genetics)**: “We’re out here naked so people can SEE THE PROBLEM, nanotech is such a radical and unpredictable new technology, like biotech, that it takes something highly visible, like a naked body, to get people to focus on the need to stop corporations from using humans as guinea pigs for new, untested, and unstable new technologies!” said Kiki Walters of THONG.”*

http://www.boingboing.net/2005/05/09/protest_against_eddi.html

Questions....

- Techniques not tied to specific goals -
- Ethical Concerns:
 - What we might choose to do to ourselves
 - Human desires to 'excel'
 - Coercion - peer pressure
 - What some might choose to do to others
 - Coercion - some governments?
 - Pre-emptive choice - parents choosing for unborn children
 - Expensive techniques - leading to the economically and physically rich vs the economically and physically poor?
- Choices are based on our concepts of 'improvement' which can be
 - Impermanent
 - Cultural
 - Flawed (Q: Would a 'perfect' human be....human?)
- What does it mean to be 'human'? Or 'normal'? **And who decides?**



Black smiles, deliberately done, used to be considered beautiful in Asia. In Japan, 'Ohagura' enhanced sex appeal and was thought to keep teeth healthy

SEI questions for nano researchers

- For whom and what purposes are you developing your product?
- What problem is your "product" trying to solve?
- Who will benefit from it? And, conversely, who won't?
- Who will have access to it? Who will be excluded?
- Who will own it? And, how can you assure access to it?
- How will it affect and reconfigure social, economical and political relationships?
- Are there dangers involved with its development? (e.g. safety, health, pollution)? How can you minimize them?

(Retrieved July 10, 2006 from <http://www.sei.nnin.org/intro.html>)

A Taxi-Driver's

Case Study

Dilemma

Patent issued for nanotechnology bone biomaterial

Medical Patent News
Published: Monday, 1-Nov-2004

 [Printer Friendly](#)  [Email to a Friend](#)

Competitive Technologies announced today that patent number 6,808,561 has been issued by the US Patent Office for Dr. Brian R. Genge's nanotechnology bone biomaterial developed at the University of South Carolina (USC).

CTT has an exclusive agreement with the University of South Carolina Research Foundation to license and commercialize the nanotechnology, an injectible calcium phosphate-based biomaterial. Dr. Genge is a research professor in the Department of Chemistry and Biochemistry at USC.

"The granting of this patent recognizes the unique qualities of Dr. Genge's innovative nanoparticle biomaterial technology," said Suzanne N. B. Alent, CTT's VP Marketing and Business Development. "CTT has an agreement with a major dental products company to research the manufacture and use of this nanotechnology for dental applications. We will continue to aggressively market this superior technology for all aspects of its capabilities."

In addition to its use in the dental field, the patented nanotechnology can also be applied to a variety of human orthopedic procedures, especially related to the spine and craniofacial reconstruction, as well as veterinary uses. The bone biomaterial technology is an easily flowable, moldable paste that conforms to and interdigitates with the host bone. It rapidly hardens itself in vivo, forming a solid bone-like structure capable of stabilizing fractured bone within 15 minutes and supports the growth of cartilage and bone cells. The technology has superior compressive strength making it suitable for weight and non-weight bearing bones, and is both machinable and drillable.

You are in New York for a day. You take a taxi to go to Central Park. Your driver is Chinese, and seems to be in his early sixties. A conversation begins, and he tells you that his grandson in China is showing great potential as a gymnast. Furthermore, the grandson is being encouraged to have bone implants to make him stronger, and better able to withstand high impact routines. The family is worried. The team leader says these implants are safe, but they're not sure. They are poor farmers, and if the boy succeeds it could mean a great deal, both for him, and for his family. In particular, his three cousins might get the opportunity to go to a good school and achieve a professional job. If the boy is seen as uncooperative, he may be dropped from the team, and face a future working in the fields.

What do you tell your taxi-driver?

Acknowledgement and disclaimer

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