
Societal and Ethical Implications of Nanoscale Science and Engineering

A Brief Introduction

***National Nanotechnology
Infrastructure Network***

***Member Site
New User Training***

Why Are We Here Today?



- | 21st Century Nanotechnology Research & Development Act of 2003 (PL 108-153)
 - ◆ Establishes societal implications research program
 - ◆ Requires Nanoscale Science and Engineering Centers to address societal implications of their research
 - ◆ Provides for public input into nanotechnology research and development

Why Are We Here Today?

McGinn, R. *Ethics and Nanotechnology: Mapping the Views of the NNIN Community* (pending publication – please do not cite)

I Found...

- ◆ Most NNIN researchers are interested in ethical issues surrounding nano (73.1%) and believe that these ethical responsibilities go beyond the laboratory (77%)

I Yet...

- ◆ Nearly 80% did not feel that they were well informed about ethical issues relating to nanotechnology; and
- ◆ 64% of respondents had never taken a course in which ethical issues of science and technology were discussed

What Do We Mean By Social and Ethical Issues?



- I Most obviously . . .
 - ◆ **Lab safety**, e.g., consideration of the health and well-being of fellow researchers, reporting on unsafe practices
 - ◆ **Environmental consequences of research**, e.g., minimization and safe disposal of hazardous substances, fate of “nanowaste,” fair notice to potentially affected parties
 - ◆ **Academic conduct**, e.g., integrity of research results, equitable authorship recognition practices
 - ◆ **Commercial fair dealing**, e.g., respect of confidentiality and trade secrets, fair recruitment of employees
 - ◆ **Science education**, e.g., interdisciplinary studies, K-12 improvement, ethics education

What Do We Mean By Social and Ethical Issues?

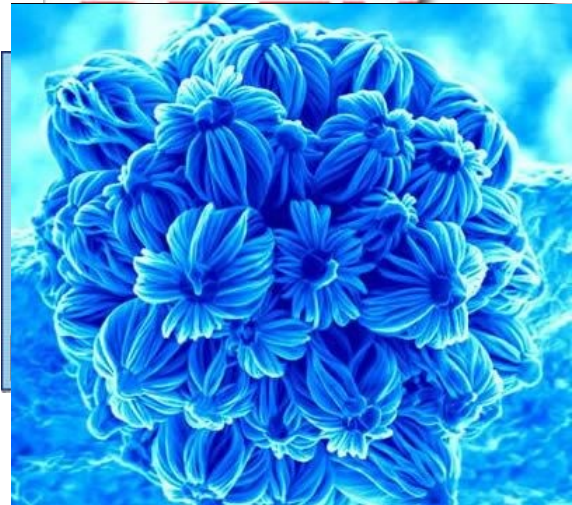
I Less obviously . . .



- ◆ **Environmental, health, and safety concerns**, e.g., ecological and toxicological effects of nanoparticles, workplace and consumer exposure
- ◆ **Economic effects**, e.g., rapid transformation and dislocation of industries, effects on wealth distribution, intellectual property issues
- ◆ **Medical technologies**, e.g., prospects for human enhancement and augmentation, improved genetic screening, advanced cures
- ◆ **Security and privacy implications**, e.g., novel weaponry and defense technologies, pervasive surveillance potential

What Do We Mean By Social and Ethical Issues?

I Less obviously . . .



- ◆ **National and international political implications**, e.g., national research funding commitments and the “nano-divide,” technology transfer
- ◆ **Media and public perceptions**, e.g., polarized reactions to nanotechnology, involvement of lay public in decision making
- ◆ **Legal and regulatory issues**, e.g., proactive versus reactive regulation, international standard-setting
- ◆ **Cultural and religious repercussions**, e.g., new media and modes of representation, new challenges in defining life

What Do We Mean By Social and Ethical Issues?



- I Even less obviously . . .
 - ◆ **People create science and technology**
 - ◆ **People also live through science and technology**
 - ◆ **Thus, science and technology are shaped by, and also shape, society.**

Why Should We Care?

- | Technologies are **social products**
- | Societies are **scientific and technical products**
- | Social and ethical issues are integral to the scientific research process; **they are not *outside of science***
- | As researchers, **we are inevitably implicated** in this process
- | We have influence . . . and **responsibility**

What Can We Do?

- I Thus, . . .
 - ◆ Our first responsibility should be to **notice** this larger picture
 - ◆ Our second responsibility should be to **think critically** about our role in it
 - ◆ Our third responsibility should be to **integrate social and ethical considerations** into our research planning, not as an afterthought or as something left for other decision makers, but as a central purpose of our actions
 - ◆ And our final responsibility should be to **engage with others** concerning these issues, within the lab, within the larger scientific community, and within the society that ultimately will both influence, and be influenced by, our efforts

Some useful resources

I Web resources

- ◆ NNIN SEI website <http://www.sei.nnin.org>
- ◆ CNS at ASU <http://cns.asu.edu>
- ◆ CNS at UCSB <http://www.cns.ucsb.edu>
- ◆ CNS at Illinois Inst. Tech. <http://www.nano-and-society.org>
- ◆ Project on Emerging Nanotechnologies <http://nanotechproject.org>
- ◆ Nano STS at USC <http://nsts.nano.sc.edu>
- ◆ International Nano & Society Network <http://www.nanoandsociety.com>

Some useful resources

I Articles and Books

- ◆ Guston, D.H. & Sarewitz, D. (2002). Real-Time Technology Assessment. *Technology in Society*, 24, 93-109.
- ◆ Lewenstein, B.V. (2005). What Counts as A 'Social and Ethical Issue' in Nanotechnology?. *International Journal for the Philosophy of Chemistry*, 11 (1): 5-18.
- ◆ C. Miller et al. (forthcoming). Nanotechnology & Society: Ideas for Education and Public Engagement.
- ◆ Roco, M.C. & Sims, W.S. (2001). Societal Implications of Nanoscience and Nanotechnology.
- ◆ Roco, M.C. & Bainbridge, W.S. (2005). Societal Implications of Nanoscience and Nanotechnology II: Maximizing Human Benefit.
- ◆ Royal Academy of Engineering and Royal Society (2004). Nanoscience and Nanotechnologies: Opportunities and Uncertainties.

Credits

- | Doug Kysar & Ana Viseu, Cornell NanoScale Facility, Cornell University
- | David Guston, Center for Nanotechnology in Society, Arizona State University