

New User Orientation

*Societal and Ethical Dimensions of
Nanoscale Science and Engineering*

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
 - Requires integration of societal concerns into nano R&D for benefit of all Americans
 - Provides for public input into nano R&D

Background

Some historical examples

- Worker safety (mining, logging, factories, asbestos)
- Environment (resource extraction, pollution)
- Globalization (colonization, exploitation, politics without justice)
- Economics (sweatshops, offshoring)
- Science & Technology (nuclear power, mad cow disease, genetically modified organisms/food, human genome project)

Background

- # Survey conducted by R. McGinn within NNIN, focus on ethical issues
- # Found...
 - Most NNIN researchers are interested in ethical issues surrounding nano (73.1%), and that these ethical responsibilities go beyond the laboratory (77%)
- # Yet...
 - Most people are ill-informed about what to do, or how to do it
 - Only half of respondents believe that there are significant ethical issues relating to nano

What Do We Mean By Social and Ethical Issues?

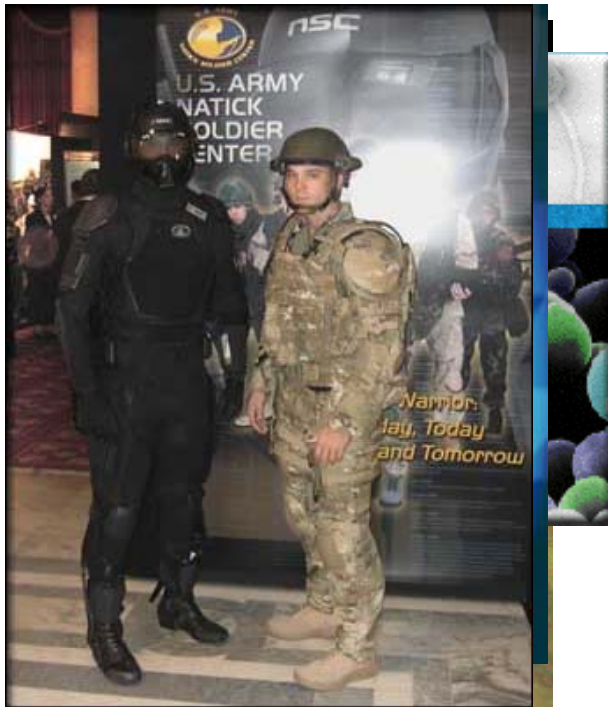


Most obviously . . .

- **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?

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?

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?



- # 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?

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

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

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

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