Nanotechnology and Environmental Governance

The Problem(s) of Uncertainty

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The “Problem” of Nanotechnology – The AOL View


- Nanoparticles can cause disease and death. Regulators are doing little to respond.
- Nanofoods coming to a store near you! [Remember GMOs?]
- NNI’s obsession with tech innovation and economic growth over safety
- No U.S. agency leads on nanotech EHS; companies can stonewall reform efforts.
- Not enough being spent on environmental, health, and safety research
- Nanomaterials haven't yet sparked the backlash GMOs did -- *but that may change.*

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The “Problem” of Nanotechnology – NNI Response

Official NNCO Response (Clayton Teague)

• No evidence of harm by engineered nano product

• Series wrongly presumes that nanotechnology is inherently dangerous until proven safe

• The U.S. leads the way in nano EHS research: Federal nano EHS research has grown $34.8 million in FY 2005 to $74.5 million in FY 2009 and ~ $91.6 million in FY 2010.

• “Risk must be balanced against benefits, and the essentially theoretical risk that has so far been identified should be balanced against the benefits in terms of sophisticated products and economic growth and jobs created by this expanding industry.” [emphases supplied]
On Uncertainty – “Framing Nano”

Andrew Maynard (2010) -- nano as a "wicked" problem (Klijn 2008)

• The drivers of nanotechnology ≠ the drivers of oversight

• Inability of multiple stakeholders to agree on the nature of the problem

So what is the “problem” of nanotechnology?

• Fixation on how “new” is “new”
  • How “revolutionary” is it?

Maybe we’re asking the wrong questions ...

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A Taxonomy of Challenges*

- **Ultimate and Unfamiliar** -- Challenges that we have not encountered before and can only dimly understand
- **Intermediate and vaguely familiar** -- Challenges that have arisen in the past in the context of other revolutionary technologies and that we have *some* experience (and resources) for addressing
- **Immediate and familiar** -- Challenges that commonly arise in the development and application of new technologies and that we have experience (and resources) for addressing

* Courtesy of Ron Sandler (2007)

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Ultimate and Unfamiliar

- Self-replicating nanobots and nanoassemblers
  - Famously, in Michael Crichton, *Prey*.
- Strong Artificial Intelligence
- Everlasting (or really, really, really long) Life
- Independence from Nature
- Redesigning Nature
- Redesigning Ourselves
- Merging Human and Machine Intelligence
- Merging Virtual and Non-virtual reality
  - Ray Kurzweil, *The Singularity Is Near: When Humans Transcend Biology*

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Intermediate and Vaguely Familiar

- Human Flourishing
  - Health
  - Longevity (lifespan)

- Social Relationships
  - Familial institutions
  - Support systems
  - New forms of sociability

- Human-Nature Relationship
  - Artificial alternatives
  - Alienation from Nature

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Immediate and Familiar

- **Human Health**
  - Toxic and chronic impacts
  - Consumer safety
- **Environmental**
  - Immediate and long-term
- **Economic**
  - Labor market effects
  - Patents/Intellectual property
- **Justice**
  - Distributive justice (equity)
  - Participatory justice (democracy)
- **Responsibility**
  - Control
  - Oversight
  - Accountability
- **Destructive Technologies**
  - Military or state controlled
  - Criminal or illegal
- **Civil Liberties and Rights**
  - Personal privacy
  - Individual choice

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Which Challenge do we Choose?

• The immediate and familiar?
  • We know the issues, and we have experience
  • Addressing the most likely impacts and plausible risks now

• The intermediate and vaguely familiar?
  • Historical analogies
  • Develop principles for risks that raise highest concerns
  • Focus on building institutional capacity

• The ultimate and unfamiliar?
  • Focus on workable, responsive, and legitimate governance regimes that can adapt to conditions of acute uncertainty
  • Conditions where citizen trust is most critical
The “Problem” of Nano Revisited

- Nanotechnology – even in its most basic sense -- exacerbates even the immediate and familiar challenge

- Nano as a “focusing” technology and as a challenge to governance
  - Uncertainties and lack of information about risk make it difficult to set priorities, design appropriate responses, and evaluate performance
  - It uncertainties may require granting flexibility to companies even as such discretion is not in political favor
  - Its promises and its uncertainties force promoters and critics off their accustomed stances – potential for a “grand bargain” on risk?
  - Even if not “revolutionary,” the broad range of nanomaterials to hit the marketplace will stress regulatory regimes and institutions
• *New social context* – end of three decade dominance of free market / deregulation narrative?

• Citizen demands for more vigilant government in general will shape responses to emerging technologies – and existing materials/chemicals.

• Impacts of overarching concerns about cancer – President’s Cancer Panel Report

• *New political realities* – Government in office less reflexively opposed to regulation
  
  • Voluntary efforts have not panned out despite efforts by industry associations to bolster participation – businesses not inclined to volunteer.

  • An era of more assertive government action
• **Connected citizens** – Less trusting, more networked citizenry poses new types of challenges to the fundamental relationship between regulators and the regulated.

• **Constraints on industry discretion** – Even as conditions of uncertainty may require some discretion (e.g., limited self-regulation), demands for *accountability* will require greater transparency and stakeholder involvement.
  
  • Likelihood of greater demand for information transparency – including “trade secrets” – in return for more nuanced view on risk?
  
  • “No data, no market” thrust on TSCA reauthorization.

• Challenges posed by nano- and other emerging technologies (e.g., synthetic biology) is forcing a rethinking of regulatory approaches
• Multi-agency roles in regulating nanotechnology will necessitate a type of governance that defies conventional, hierarchical patterns.

• “Networked” approaches to governance – need to secure collaboration among diverse stakeholders, whether it involves disclosure, regulation, or other forms.

• “The question is really how to move beyond simplistic notions, such as self-regulation, to building systems of accountability and governance that are conducive to appropriate expansion of both science and democracy.”
  -- International Risk Governance Council (2005, 119)

• Why it is important – and yet will be so hard – to “get this right.”
Governing Uncertainty

Environmental Regulation in the Age of Nanotechnology
Edited by Christopher J. Bosso

This book makes a significant contribution to the issues it sets out to address, namely how government confronts conditions of acute uncertainty about environmental and health risks, and how, given such uncertainty, government structures its regulatory policy. Students and scholars of science and technology policy will find the work interesting and relevant, particularly in its treatment of the EPA and the federal scene.'

Albert H. Teich, Director, Science and Policy Programs, American Association for the Advancement of Science

Foreword by J. Clarence Davies
1. Policy Consequences of the 'Next Industrial Revolution' Christopher Bosso
2. A World of its Own? Nanotechnology's Promise -- and its Challenges Sean T. O'Donnell and Jacqueline A. Isaacs
3. Institutional Evolution or Intelligent Design? Constructing a Regulatory Regime for Nanotechnology Marc Allen Fisher
4. Engaging Business in the Regulation of Nanotechnology Cary Coglianese
5. EPA and Nanotechnology: The Need for a Grand Bargain? Marc Landy
6. Nanotechnology and the Evolving Role of State Governance Barry G. Rabe
7. Nanotechnology and 21st Century Governance Christopher Bosso and W. D. Key

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