



NSRG

Nanotechnology and Society Research Group

Nanotechnology in the Public Interest: Questions about Capacity

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SES #0609078 (Sept. 1, 2006-Aug. 31, 2010)



Questions: Enough knowledge?

Less than 1% of the over \$1 billion in annual federal support for nanotechnology research goes to assess health and environmental effects.

- \$5 million was requested in FY2007 for EPA research on environmental and health effects, same as in FY2006.
- \$3 million was requested in FY2007 for NIOSH research on occupational health and safety, same as in FY2006; only second year of any such funding.
 - M.C. Roco, "National Nanotechnology Investment in the FY2007 Federal Budget Request." *AAAS Report XXXI: Research and Development FY2007*. American Association for the Advancement of Science: <http://www.aaas.org/spp/rd/fy07.htm>



Questions: Enough institutional resources?

- Do USPTO, EPA, FDA, and NIOSH/OSHA have the personnel to address nano-generated challenges?
 - Expected turnover in federal workforce in next decade raises concerns about institutional memory and expertise.
 - If existing agencies are already overtaxed, does this mean we need something new? Or do we just need to restructure?
- And what about state and local agencies?



Questions: Adequacy of current regulatory approaches?

- If nano-particles *are* sufficiently different, are existing federal frameworks (e.g., TSCA, FIFRA) sufficient to protect public health and safety?
 - Even if current approaches are sufficient for passive nanostructures (e.g., coatings), they are less likely to be adequate for the types of active nanostructures (e.g., biodevices) expected to emerge fairly soon.
- And what about state governments?
 - More likely to balance regulation against economic development
 - State governments vary widely in capacity
 - Problem of a patchwork regulatory system



Capacity as Defined in Different Literatures

- **Organization Theory**--reorganization, "learning orgs"; e.g., **absorptive capacity**, the ability of an organization to value, assimilate, and apply new knowledge
- **Regulation**--focus on the legal, institutional, physical, and civic **infrastructure** needed to *facilitate effective regulation*
- **Biology/ecology**--concept of **carrying capacity**, the ability of an ecosystem to *sustain* a certain population level; can also refer to the ability of an organism to sustain itself in the event of the introduction of toxins
- **Information theory**--concept of **channel capacity**, the *volume* of information that can be carried over a specific channel; also focus on ability to process and deal with *complexity*
- **Economic/Political Development**-- e.g., *Agenda 21* of the United National Development Programme; Putnam and others on 'civic capacity.'
- **Public administration**--traditional focus on service delivery



Types of Capacity

- *Lateral/Additive*
 - simple expansion
- *Instrumental/Technological*
 - improvement/efficiency
- *Dimensional*
 - new tasks, new organizational structures



Elements of Capacity

- *Quantitative*--budget; personnel; materials
- *Analytical*--expertise, learning, knowledge
- *Organizational*--infrastructural elements
- *Legal*--authority, jurisdiction
- *Political*--power; trust; reputation
- *Adaptive*--elasticity, capacity to change; impacts of culture, etc.
- *Temporal*--impacts of time, events
- *Sustainability*--long-term carrying capacity; robustness; includes "slack" resources, excess capacity



A Typology of Institutional Adaptation

Degree of Technological Novelty

High

Low

External

Technology forcing

- AEC and civilian nuclear power (1950s)

Mandated change

- GPRA (1990s)--change in instrumental capacity, effects on EPA, FDA, etc.
- AEC -> NRC (1970s)?

Source of Impetus for Change

Internal

Strategic repositioning

- NASA and space science
- EPA and TSCA

Adaptation/redirection

- FDA and drug approval
- NIH and alternative medicine



CHP: The Capacity History Project

- Identify Capacity Elements
- Identify Building Processes
- Locate and Map Agency-Environment Interactions

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