

NSEC: Nanotechnology in Society Project
Imaging, Scientific Change and Public Understanding of Emerging
Nanotechnologies

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I. Introduction: This grant supports four different sub-projects, all of which concern themselves with the societal interactions of nanotechnology. It also provides a hub of activity around which the broader activities of the University of South Carolina's ^{nano}Science and Technology Studies community revolve.

2. Imaging Nanospace: Images are crucial to popular and scientific thinking. But nanoscale images can be interpreted in a variety of ways. Many such images exist, ranging from schematics and faithful documentation to fantasy and fine art. Moreover, these images play different roles in different contexts, with color, shape and texture having different significance. Unless this multitude of images is studied and identified, we will be saddled with misunderstandings that stifle productive discussion. These images and messages are complex, and may be seen as informative and empowering or as misleading. Varying cultural, ethical, religious and aesthetic perspectives frame public responses. Fostering social trust and developing effective, transparent communication strategies depends on understanding the dynamics that underlie such interpretations.

Building on USC's "From Laboratory to Society" NIRT, Chris Robinson (Art, USC) is analyzing nanoscale images in an effort to develop recommendations that will minimize misunderstanding. Davis Baird (Philosophy, NanoCenter and Honors College, USC), is working with practitioners to examine the uses of moving images of the nanoscale for communicating about the nanoscale. Baird, Robinson and Otávio Bueno (Philosophy, University of Miami) are currently organizing a workshop for October 2007 on visual images of the nanoscale, inviting stakeholders and scholars for whom nanoscale images matter. Participants will include most especially probe microscopists and instrument developers who have been leading the way in establishing current imaging practice in probe microscopy. In addition to scientists and engineers, participants will include social and behavioral scientists and communication researchers, historians and philosophers, artists, policy makers and members of the lay public. Issues of form, meaning, interpretation, and standardization of nanoscale images will be the primary focus of exploration.

3. Changes in Scientific Practices: A richer understanding of scientific practices will illuminate and potentially improve the development of scientific and engineering knowledge in nanotechnology. Following the plan laid out in *Vision 2020, the Chemical Industry's R&D Roadmap for Nanomaterials by Design: From Fundamental to Function* this project, led by Ann Johnson (History, USC), creates space for discussions about the interaction of nanotechnology R&D practices with policies designed to make those practices more efficacious. This discussion space is explicitly multidisciplinary and invites and engages practitioners, policy-makers and science studies scholars. We are beginning by looking at the historical development of roadmaps and the present-day effects of roadmaps in general and the Chemical Industry's Vision2020 for

Nanomaterials in particular, but interviewing scientists and engineers as well as policy makers about it. In addition, we are investigating the first element of the Nanomaterials roadmap, “Fundamental Understanding and Synthesis.” This area is concerned with the development of new theoretical understandings of both physical and chemical properties of the nanoscale. For example, how will theories which explain quantum phenomena intersect with understandings and explanations of classical phenomena which dominate engineering and materials research? Will new theory need to be created for this mesoscale range? How will theories which are philosophically incommensurate be bridged in the interest of solving crucial scientific problems in engineering nanostructured materials? For 2007, we are planning a small workshop on the role of theory in the development of nanotechnology, inviting a small group of scientists, engineers and science studies scholars to discuss questions of what sorts of mesoscale phenomena existing scientific theories can and cannot explain, and the directions that future theoretical developments may take.

4. Lay Understandings of Nanotechnology: This project is led by Susanna Priest (College of Mass Communication and Information Science, USC) whose new work will involve a mental modeling and concept mapping project designed to create a more nuanced understanding of how both experts and ordinary people (“lay public”) think about nanotechnology. The protocol for an initial set of expert interviews is complete. Priest, working with William Hallman (Food Biotechnology Program, Rutgers), is developing baseline information about public perceptions of nanotechnology using a technique called mental modeling, a qualitative research technique based on in-depth, semi-structured, face-to-face interviews designed to elucidate individuals’ understandings and to provide cognitive maps of their associations. Interviews will be conducted with “average” Americans and with those having particular knowledge of nanotechnology (about 15-20 individuals in each group over the two years). The current plan is for the lay public interviews to form a foundation for a panel study that will track the way that lay perceptions evolve over time.

5. South Carolina Citizens School of Nanotechnology: Chris Toumey (Nanocenter, USC) organizes the South Carolina Citizens’ School of Nanotechnology (SCCSN), an outreach program which brings experts and nonexperts together in dialogue on scientific and societal issues in nanotech. As of December 2006, there have been six rounds of the SCCSN. The SCCSN is *not* a mere transfer of information in the spirit of “civic scientific literacy” or “public understanding of science.” On the contrary, it is justified by the ideas of stakeholder democracy and participatory democracy: people identify themselves as stakeholders in nanotechnology; nonexperts acquire, comprehend and deploy scientific knowledge when they want to or have to; and nonexperts can have active and constructive roles in decisions about science policy. The SCCSN is intended to serve those who see themselves as stakeholders in nanotech policy, by helping them develop the background and confidence to claim a role in processes of nanotech policy.

The SCCSN model has five elements:

- a) The speakers are faculty experts who are adept and comfortable in speaking with nonexperts;
- b) A package of readable articles gives the participants background and confidence to express their concerns and to pose questions to the speakers;

- c) There are numerous opportunities, both formal and informal, for the participants to express their concerns and to pose questions, and for the speakers to respond to them;
- d)** To ensure a friendly, intimate atmosphere for questions and discussions, enrollment for each round is limited to under fifty.
- e) The program is open to revisions and improvements that are suggested by the participants.

Compared to other forms of outreach, The SCCSN is more intimate than a mini medical school, more formal than a science café, and, with its background readings, it provides more depth of content than the other two forms.