



NSF SES 0938099

Nanoscale Science and Engineering Center

at University of California, Santa Barbara

Project Outcomes Report

September 15, 2010 – August 31, 20

NSEC: Center for Nanotechnology in Society at University of California, Santa Barbara
PI: Barbara Herr Harthorn; Co-PIs Rich Appelbaum, Craig Hawker, W. Patrick McCray

Funded by the NSF in 2005, the Center for Nanotechnology in Society at UCSB (CNS-UCSB), along with its sister CNS at ASU, has constituted an unparalleled national commitment to upstream societal research and education to enhance responsible development of a new suite of sophisticated materials and technologies central to the nation's economic development plans. As we reach the 11-year conclusion of this effort, this enterprise provides abundant proof of concept via an unrivaled set of scholarly, educational, and societal outcomes that serve as a solid framework for future social science/science & engineering (S&E) collaborations at center scale.

Mission: CNS-UCSB has been dedicated to understanding the relationship between technological innovation and social change and to advancing a role for the social, economic, and behavioral sciences in promoting development of equitable and sustainable technological innovation. We argue that successful development of the transformative and beneficial technologies anticipated by the country's leaders depends on systematic knowledge about complex societal as well as technical factors, situated within a dynamic global system of innovation, production, and consumption, and on development of new research-based approaches to governance, democratic participation, safety, and risk.

Research: CNS-UCSB has leveraged UCSB's renowned interdisciplinary climate to integrate the work of leading nanoscale scientists and engineers with social scientists studying responsible development of nanotechnologies. The Center's research focuses on highly iterative approaches to: 1) the effects of industrial policies and international collaboration on the globalization of nanotechnology, particularly in the US, Asia and Latin America; 2) expert and public perceptions of nanotechnologies' benefits and risks, and methods to advance public participation; and 3) the historical and institutional origins of the nano-enterprise. Crosscutting initiatives target nanotech applications for solar and other renewable energies, environment, water, health, food, and the global value chain. These three research groups, along with seed grantees and strategic projects, have made over 650 scholarly presentations (432 in this award) and generated almost 600 publications (305 in this award and another 197 in the pipeline), which lay the groundwork for understanding the development of emerging technologies. Our researchers have achieved over 300 honors and awards (212 in this award), and have extended the impact of NSF's 10-year investment of \$13,099,715 (\$7,077,759 in the current award) by raising over \$26 million in leverage in this award alone with an additional \$2,272,372 in cost sharing and other institutional support in this award (total \$4,178,065 over the life of the Center).

Education & Outreach: CNS-UCSB education has fostered a diverse and highly collaborative community of cross-disciplinary scholars, while consistently producing excellent outcomes for its participants. CNS's centerpiece graduate fellowship program has trained over 137 graduate and postdoctoral scholars (94 in the renewal award) from both social sciences and S&E in societal research, while mentoring 33 community college interns from underserved communities (17 in this award). The CNS seminar has drawn participants from over 30 disciplines, while outreach activities have engaged multiple audiences in over 536 outreach presentations (316 this award), reached 1000's of diverse public audiences, and included keynote addresses and expert testimony to dozens of governmental, intergovernmental and policymaking bodies in over 25 countries, many receiving media coverage. The Center has co-founded a thriving new international scholarly organization, and CNS has convened a series of influential major international conferences and specialist workshops on East and West Coasts to address leading edge concerns about technology in society.

Outcomes: Successful development of the transformative technologies anticipated by the country's leaders depends on systematic knowledge about complex societal as well as technical factors.

To this purpose, at the sunset of the CNS at UCSB, each of the three IRGs has generated a Synthesis Report on the main cumulative scholarly results and broader impacts of their nearly 11 years of programmatic research, education and engagement. All three are available for download from the CNS website:

<http://www.cns.ucsb.edu/irg-synthesis-reports>

Each synthesis report includes a short, concise section on recommendations to policymakers, based on the research findings. The three are titled:

*Appelbaum, Richard P. (2016) CNS Synthesis Report on IRG 2: **Globalization and Nanotechnology: The Role of State Policy and International Collaboration**, (CNS-UCSB, Santa Barbara, CA), August, 2016*

*Harthorn, Barbara Herr, Nick Pidgeon and Terre Satterfield. (2016) CNS Synthesis Report on IRG 3: **Understanding Nanotechnologies' Risks and Benefits: Emergence, Expertise & Upstream Participation**, (CNS-UCSB, Santa Barbara, CA), August, 2016*

*McCray, W. Patrick, Cyrus Mody, Amy Slaton, and Brian Tyrrell. (2016) CNS Synthesis Report on IRG 1: **Exploring Nanotechnologies' Origins, Institutions, and Community: A Ten Year Experiment in Large Scale Collaborative STS Research**, (CNS-UCSB, Santa Barbara, CA), August, 2016*