

In 2012 CNS-ASU faculty Jameson Wetmore and Ira Bennett were invited to develop a “Societal and Ethical Implications” component of a Next Generation National Nanotechnology Infrastructure Network (NG-NNIN) proposal with an annual budget of \$525,000. NSF decided to cancel that funding stream at the last moment, but the network within a network that was designed might be a useful tool for thinking about social science research and engagement in synthetic biology. The basic framework was as follows:

NG-NNIN Societal & Ethical Implications Program Proposal
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Recent scholarship has demonstrated that one of the most effective ways to both research the societal and ethical aspects of nanotechnology and feed the insights gained in this process into decision making at many levels is to bring together social scientists, natural scientists, engineers, and the public to work collaboratively. The NG-NNIN, with its broad national coverage and thousands of users, is in a unique position to facilitate this type of work by serving as a nationwide convener of these activities at its 17 universities. The NG-NNIN Societal & Ethical Implications (SEI) Program will create an infrastructure for developing new programs, facilitating collaborations, promoting research, and disseminating content and best practices that address the relationship between nanotechnology and society. The NG-NNIN SEI program will be administered at Arizona State University (ASU) and will focus on three major areas:

1. **Professional Development.** The NG-NNIN will aim to increase science and engineering undergraduate, graduate student, and postdoc’s understanding of the social, political, and ethical implications of their work:

a) *New methods for professional development.* The NG-NNIN will develop new programming and pilot such programs at ASU, which will then be distributed more broadly through the mechanisms that follow.

b) *Science Outside the Lab.* Each year four graduate students affiliated with the NG-NNIN will be selected to attend CSPO’s flagship educational program: “Science Outside the Lab” a two week program in Washington, DC that introduces students to how government agencies, corporations, and NGOs make decisions about science and engineering.

c) *Mini Grants for Engagement Development.* The SEI program at ASU will coordinate the distribution of \$3,000-\$10,000 grants to facilitate activities at NG-NNIN universities for things like paying for an assistant to develop course material, travel for program participants, or providing extra salary for a professor with an existing full teaching load to co-teach a course with a scientist.

2. **Interdisciplinary Research and Programs.** While it is important to offer graduate students professional training to develop individuals with interdisciplinary skills, much of the future of science and technology will be developed by groups of people, often in laboratories. Thus a major component of the SEI Program will focus on fostering interdisciplinary collaborations.

a) *Anticipatory Workshops.* These two day workshops will bring together the wide expertise of social scientists, natural scientists, museum professionals, and others from within and outside the NG-NNIN nodes to brainstorm future technological possibilities and implications of specific nano-enabled fields.

b) *Mini Grants*. Grants between \$3,000 and \$15,000 will be made available to groups wishing to do interdisciplinary work on the societal and ethical implications of research.

3. **Museum Collaborations**. In order for social scientists, natural scientists and engineers to truly understand the links between nanotechnology and society we must work with and learn from the public.

a) *Partnerships between nodes and local science centers*. The NG-NNIN SEI Program will identify and facilitate partnerships between scientists, engineers, and museum professionals with complimentary expertise and common goals. These partnerships will help the public understand our work and, more importantly, help our researchers understand the public.

b) *Annual network wide museum collaborations*. The SEI Program will pilot a different interdisciplinary program each year, drawing from multiple museums and NG-NNIN nodes. These could include a workshop for graduate students and PIs on how to present research to a broad audience or a competition for graduate students and lab groups to develop tabletop demonstrations that help the public to understand the technical and social aspects of their work

c) *Mini Grants for Science Museum Development and Collaboration*. The SEI program will offer partner science centers grants of \$3000 to facilitate their collaboration with NG-NNIN researchers.

Building an SEI Network

While much of the NG-NNIN's SEI work will be facilitated through the ASU node, a number of strategies will be employed to capitalize on the strength of the entire network.

1) *Congress on Collaboration in the Social and Ethical Implications of Research*. In years two and four the SEI Program will host a Congress that brings together representatives from every node to work with and learn from professionals from across the country and other large networks and centers.

2) *Development Charettes*. In conjunction with the Congresses, the SEI Program will sponsor one day workshops that give scholars from NG-NNIN nodes a collaborative space for developing new professional development programming.

3) *SEI Fellows*. In the first generation NG-NNIN it was difficult to find reliable SEI coordinators at every site, but a handful of scholars stood out, doing very good work. These fellowships will recognize SEI leaders at NG-NNIN nodes, give them funds to continue the SEI work they do and strengthen their relationship to the NG-NNIN, and provide incentive for NG-NNIN nodes to recruit faculty at their universities to do SEI work.

4) *Travel funding for Collaborative work*. The SEI Program will sponsor trips for scholars looking to pick up new skills and approaches by spending time embedded at an aspirational peer site for up to a week. Money will also be set aside to make sure that the director and associate director are able to engage in site visits at various nodes.

5) *Clearinghouse Website*. To further disseminate established programs and prevent continued reinvention of engagement programs, the SEI Program will collaborate with Purdue University's NanoHub to develop a website dedicated to providing syllabi, tips, and pitfalls to avoid.

6) *Evaluation*. In an effort to continually improve these programs and develop data for publishing and promoting them, we will hire an outside consultant for evaluation. They will provide an overall analysis of activities and an analysis of at least one targeted program each year.