

Integration and Reflexivity in Nanoscience and Engineering

Greater reflexive capacity increases the opportunity for informed deliberation and conscious choice. CNS-ASU programs therefore strive to help nanoscale science and engineering (NSE) researchers develop a greater capacity to understand where scientific and social values come from, what they mean, and how they are related to decisions about their research. This is accomplished through a set of integrative research and educational programs that include:

- workshops
- laboratory studies;
- interviews with NSE researchers;
- functionally interdependent activities between CNS and SNE researchers

CNS-ASU has found that such integrative activities have at least modest effect on NSE researchers' knowledge, identity and practice regarding the societal aspects of their work. Mid-stream modulation of research agendas and conduct occurs at all levels of the NSE enterprise, up to and including laboratory directors. Interactions with social scientists do not hamper NSE research projects, but rather have been found to enhance them.

"Tubes in the Desert" is a large-scale research partnership between the Biodesign Institute at ASU and British Petroleum, where specially optimized photosynthetic bacterium will be used to produce biodiesel. Embedded in the project organization, CNS-ASU will mediate between research and societal outcomes through process interventions that include a "societal dimensions workshop" with project personnel. CNS will evaluate its ability to influence the project through ongoing comparison to a control project at the ASU Polytechnic campus where CNS is not involved.



"Public Value of Organic Solar Cell Research" is a CNS-ASU integration into a Biodesign Institute project that is investigating how to break through current technological hurdles of solar energy to make it a more viable energy source. "Embedded humanist" Erik Fisher will conduct real-time public value mapping and participate in the project as a team member, observer and facilitator. Fisher conducted an initial workshop that asked project members to consider how public values affect the direction of laboratory research. Workshop attendees reported that the process-oriented activities

helped them shift their paradigms of how their own innovation and decision-making are framed, and asked for additional similar activities in the future.

- Workshop Outcomes**
- 3 Faculty: "breakthrough" and "useful" ideas
 - 2 Grads: new perspectives on project
- Future Workshops**
- We should have "more meetings like this"
 - Commitment to engage "quarterly"

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