

for synbio's hammer  
society needs many nails;  
what are we building?

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Three specific elements for program design came to the fore at the recent Workshop on Research Agendas in the Societal Aspects of Synthetic Biology (Workshop): remember plurality, remember social and technological context, and remember what we've learned from other technologies.

First, remember plurality: the community is talking about agendas and not any singular Agenda. Remembering plurality will help the social science community resolve the question of how to deal with retaining autonomy when embedding in natural and physical science settings. If social scientists are dependent upon the hospitality of a biological lab, some level of autonomy will likely be traded for access. If social scientists run meta-level research on the ability of different research program designs to deliver on research promises (say, advancing the public interest), a more significant level of autonomy (and in turn embedding by bioscientists and engineers) might be more appropriate. If synbio is the subject of research, such research may entail a conflict of interest if tied to synbio research funding. Societal research agendas should embrace a plurality of program designs to deftly navigate these and other possible concerns.

The question of appropriateness also extends to the second factor: remembering existing social and technological context. Conversations at the Workshop cautioned that if we focus extensively on our synbio "hammer," many societal challenges might come to resemble synbio "nails." The tendency to force problems into the paradigms of novel solutions is human, but should be guarded against at programmatic levels. Prospect theory (Kahneman and Tversky 1979) has demonstrated how individuals make choices in a context of alternatives and not absolutes; decisions about the pursuit of synbio research agendas (at least with application foci, e.g., a diabetes drug) are no exception and must be considered in the context of technological and social alternatives (e.g., existing insulin delivery technologies; health and wellness programs; food policy). A synbio research program should facilitate the creation of knowledge that can ground hype in the context of social and technological alternatives.

Third, just as the idea of brokering informed choices is not new (Pielke 2007), the community would do well to remember social science insights from the study of recently departed "emerging technologies" (nanotechnology, genetic engineering, etc.). Dan Sarewitz eloquently summarized these lessons: the deficit model is wrong (irony of running around saying that aside), the linear model is misguided, and risk is socially constructed. Whichever research agendas are pursued, programs should pair research with education and training to foster these critical societal science insights, as well as account for the implications of these insights for program design.

As with any human endeavor, a variety of environmental, behavioral, and social factors shape (reflexively) the outcomes (negotiated) of a scientific pursuit. The shapes and interrelations of these factors must be proscribed with thoughtful intention if any science is to legitimately claim a mantle of stewardship of public interest. To advance public interest, funding and other program requirements must not only align with promises about advancing public interest, but also entail structures and mechanisms for determining whether and how those promises are delivered, and feed-back results of these assessments to relevant decision-makers. Several comments at the end of the Workshop conflated social science research with science in the public interest. Social sciences are no more or less aligned with public interest than natural sciences or engineering. To forget this reality is a disservice to science and our society.

*Kahneman D, and Tversky, A (1979) Prospect Theory: An Analysis of Decision under Risk. Econometrica, Vol. 47, pp. 263-292.*

*Pielke RA, (2007) The honest broker: making sense of science in policy and politics. Cambridge University Press.*