

A rose by any other name: On synthetic biology, genetic engineering, and societal control of technology

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Is synthetic biology a more fashionable reincarnation of genetic engineering? Researchers from SYNENERGENE, a European Union project to study societal dimensions of synthetic biology research, were hard pressed to defend against the claim. Increased interdisciplinary depth needed to deal with large outputs of genetic data might set synthetic biology apart, but none argued that the central methods of study have changed. No change, of course, beyond revamping a moniker to circumnavigate the tortuous waters of public opinion over GMOs and genetic engineering.

This troubling position was made clear at the 2014 conference of the Society for the Study of Nanoscience and Emerging Technologies (SNET). The avowed mission of the aforementioned SYNENERGENE project is to “contribute to Responsible Research and Innovation (RRI) in synthetic biology by establishing an open dialogue between stakeholders concerning synbio’s potential benefits and risks, and by exploring possibilities for its collaborative shaping on the basis of public participation” (1). Such a mission presumes *de facto* the continued pursuit of synthetic biology.

If synbio is merely a more politically viable genetic engineering, a disturbing question follows: are science and technology (S&T) scholars complicit abetting the genetics community’s efforts to advance an agenda at odds with societal interests? Often, S&T scholars call for critical reflection on the role of science in society and the paths of technology development. If public outcry over GMOs *was* that critical reflection from society, who are S&T scholars to work with scientists to make more palatable a research agenda for synthetic biology.

Andy Stirling, in his SNET keynote, argued that the perspective of inevitability oversimplifies the complex, co-constructed process of technology development. The linear conversation of inevitability leads to token discussions about “what risks are taken, how many, and for whom?” without second-order reflection on “to what end and in what way, why, says who, and what alternatives are available?” A research agenda for societal aspects of synthetic biology should start by grappling with these latter questions—must ask: to what end is synbio research pursued, why, who decides, how, and can parts of society opt-out. Grappling with these questions must move beyond tokenism and apologetics. If the public is engaged only in a conversation of risks and benefits, of presumed development, then such engagement is simply a public promotion campaign: an effort to build public support by increasing exposure to and comfort with the ideas of synbio. Without an outlet to policy and a legitimate voice, the results of engagement will be relegated to an esoteric corner of academe and, more unconscionable, researchers and publics will burn-out, relinquishing agency to entrenched interests driving technology forward, unquestioned, under the guise of social progress.

With these points in mind, a research agenda on the societal aspects of synbio must question the very pursuit and organization of synthetic biology research. Such an agenda must allow for the structured reflection of whether, how, and to what end synbio research is conducted. The question boils down to one of societal control of technology. As Collingridge argued, society faces persistent tradeoffs in the ability to detect and correct undesirable outcomes of

technological systems (2). Where the time to detection and costs of such outcomes are low, or time to detection is high and costs are low, a technological system may be more controllable. When it takes a short time to fix an undesirable outcome and response costs are low, or when it takes a longer time to fix an outcome but response costs are low, a system may be more flexible. A combination of high controllability and high flexibility correlates with society's ability to correct mistakes in selected development pathways. What kind of sociotechnical system is synthetic biology shaping up to be? Is the landscape of the system homogenous or heterogeneous? Do governance arrangements need to treat different landscapes of synthetic biology differently to allow for alternate avenues of pursuit, or to allow for the exercise of the right not to pursue? Looking backward, looking around today, and looking forward, these and related questions offer a vital entrée to reflecting on societal control of synthetic biology.

By way of a case study, one can look to the hacker community. The idea of a hacker community refers to a polycentric arrangement of bootstrapped research venues that, more often than not, exist outside of a formal research institute. At a given hacker space, anyone with time and an interest can learn more about and practice synthetic biology research. At the SYNENERGENE panel, some argued that the hacker community presents a massive potential risk to human and environmental health. Often this fear is anchored in a centralized command and control approach to risk governance. By contrast, others at the panel viewed the hacker community as a democratically evolved mode of conducting research. A founder of one hacker space claimed that the community creates a unique venue for public engagement and the conduct of research because these spaces a) directly connect to public interests through the interests of those publics who join the community, and b) promote responsibility through a culture of transparency and self-monitoring. The experiential nature of hacker spaces and the way they tangibly render abstract ideas of synthetic biology may make such spaces ideal for hosting public dialogues on potential futures of synthetic biology. Hacker spaces represent one public voice on an alternative way to pursue a future of synthetic biology. The mainstream scientific community has no more right to deny the choice of those wishing to opt-out of synthetic biology (née genetic engineering?) than to shut down a conversation about alternative modes of pursuing synbio.

As currently constructed, the narrative of synthetic biology research seems to reinforce an amplifying feedback loop in which scientists hype the promise of economic growth from a technological pursuit; scientists benefit from greater funding to pursue said technology; scientists subsequently make calls of greater promises of economic growth, if more investment in science is made; and society is left waiting for these benefits to materialize. The scheme should sound familiar, especially since 2008: it's called a Ponzi scheme and it will benefit neither science nor society in the long-run. A research agenda on societal aspects of synbio must allow for multiple lines of inquiry into whether, why, and how to pursue synbio if such a research agenda is to meaningfully inform decisions about futures of the field. Calls to the contrary are simply a lobby for more science regardless of public interest, an untenable path forward.

References Cited

- (1) Synenergene (2014) Synenergene In Brief: What is Synenergene. Available at <http://www.synenergene.eu/brief>; Last accessed 6 October 2014.
- (2) Collingridge, D., 1980, *The social control of technology*, Pinter London, New York.