

## **The Moral Economies of Biotechnical Facilities: A Working Paper on Venues and Responsible Innovation**

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A defining feature of the early synthetic biology manifestos, and the diffuse imaginaries that grew up around them, was the proposition that the near future of biotechnology, and the hoped-for instrumental goods connected to biotechnology, required the invention of a new style of facility for research and production. The proposition was part of the encompassing diagnostic claim that the eventual success of synthetic biology would turn less on growth in scientific knowledge, and more on the ability and willingness of biologists to comport themselves like real engineers. The *imago* of the real engineer in these manifestos is, of course, the computer engineer. The computer engineer, in turn, is portrayed alternately as the student formed by the ethos of MIT's AI lab, capable of designing programs and circuits on the logic of abstraction hierarchies; the Silicon Valley hardware designer, capable of decoupling design and construction through regimes of standardization; and the American high-tech entrepreneur whose freedom-of-operation allows for a style of life and practice characterized, simultaneously, by increases in technical capacity, wealth, social responsibility, and techno-political secession.

At the heart of all of this is the idea of facility, taken in the double sense of (i) an organization designed to provide a service or fulfill a need; and (ii) an increase in capabilities leading to the ability to do something in an effortless manner. If (in the first place), the near future of synthetic biology will only be realized when biologists comport themselves like computer engineers, then (in the second place) it is vital to create the facilities needed for that comportment to be actualized. To put it more plainly and specifically, the early manifestos proposed that biologists will not be able to comport themselves like computer engineers unless and until: (a) they have access to fabrication facilities, which will allow them to decouple the work of designing and building novel living systems; (b) they have standardized practices and materials by way of which they can organize work across time and space, allowing them to share and build on one another's work through black-boxing, abstraction, and inter-articulated composition; and (c) they have mature CAD tools that will allow them to shift from the use of databases and registries to suites of design tools for—as one player puts it—“programming matter across domains and scales.”

Ten years on from these early manifestos, it seems worth returning to the question of what facilities have actually been put into play as part of the maturing of synthetic biology—or at least the maturing of the careers and projects of the biologists and engineers who (sometimes) refer to their work as synthetic biology. The goal would not be to test the extent to which the early manifestos have provided a road-map, nor would it be to assess whether or not synthetic biologists have been able to make good on the analogies to computer engineering and the high-tech industry. The goal, rather, is to investigate and assess how it is that synthetic biologists have designed their work spaces—material, digital, and conceptual—as part of the work of increasing biotechnical capabilities. At stake in this investigation and assessment is the question of how it is that the design of new facilities for advanced bioengineering have inflected (or not) the

economies of life, power, and ethics within which synthetic biology has been imagined, talked about, and animated; how they have contributed to shifting regimes of governance (including self-governance); and the extent to which these inflections can be said to have increased capacities without also intensifying unjust power relations.