

Beyond the Lab and Far Away: Engagement with the DIYbio Community

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Todd Kuiken, Ph.D. – Woodrow Wilson Center

In the 1970 film *Tora! Tora! Tora!*, Admiral Isoroku Yamamoto exclaims, "I fear all we have done is to awaken a sleeping giant and fill him with a terrible resolve." This was in response to the successful 1941 attack on Pearl Harbor by forces of Imperial Japan. In spring 2013, a small project listed on Kickstarter that was part of the larger DIYbio movement awoke the U.S. regulatory system with a dimly lit glowing plant. On May 7, 2013, *The New York Times* published "[A Dream of Trees Aglow at Night](#)"ⁱⁱ, which exposed those not paying attention to the power of crowd funding and the possibilities, albeit with a novelty product, of biotechnology and the DIYbio movement. As I opened the door to my office that morning, my phone was already blinking, the first message from a U.S. Senator's office wanting to know how this type of product could escape regulatory oversight. As I hopped in a cab on my way up to Capitol Hill to brief the Senator's staff, all I could think about was the quote from Admiral Yamamoto. Glowing Plant's ability to raise half a million dollars in such a short period of time and the perception that there was no oversight of the first release of a genetically engineered seed produced by "amateurs" caught the government off guard. The swift and immediate reaction from the Hill gave me the sense that the "sleeping giant" had been awoken.

Our conversation was based on how a project like Glowing Plant was perceived to have escaped regulatory oversight and whether the [Coordinated Framework](#)ⁱⁱⁱ, a regulation written in the mid-1980s, was capable of dealing with applications that could come out of the DIYbio movement. Established as a formal policy in 1986, the Coordinated Framework for Regulation of Biotechnology describes the federal system for evaluating products developed using modern biotechnology. It established which federal agencies would have jurisdiction over a particular application in order to streamline the process for companies that could potentially fall under the jurisdiction of at least three federal agencies and no less than four federal laws: the Plant Protection Act; the Federal Insecticide, Fungicide, and Rodenticide Act; the Federal Food, Drug, and Cosmetic Act; and the Toxic Substance Control Act. The three main federal agencies responsible for regulating the safe use of genetically engineered organisms are the U.S. Department of Agriculture, the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Health and Human Services' Food and Drug Administration (FDA).

As the ability to manipulate and design new organisms rapidly evolves, debates on whether the coordinated framework is suitable to regulate the changing face of biotechnology should continue. However, the issue around Glowing Plant is not whether the process it is going to use is [regulated or not](#)^{iv}, but whether the government and general public are comfortable with "amateurs" being able to use these techniques. Glowing Plant challenges the status quo in a number of ways. First, it showed how a research project could be funded outside the traditional funding methods, how democratized access to biotechnology techniques could spur a new company with thousands of supporters, and how a project/product could be marketed and sold as an open source application. At the same time, it is challenging whether our governance structures

can deal with fast-paced technologies, particularly when it comes to environmental release from products produced outside the traditional biotechnology industry.

The recent exposure in the popular press and those in academia around DIYbio can be both good and bad, depending on your perspective. It could potentially open the doors to federal funding, increase the ability to acquire surplus or retired laboratory equipment, and enhance access to user facilities and government expertise. However, it also shines a brighter light on the community, which could increase scrutiny from regulatory agencies and exacerbate the [myths](#)^v that surround the DIYbio community. The Woodrow Wilson Center has been actively engaged with the DIYbio community for several years and surveyed the community in order to challenge seven widely held beliefs about DIYbio practitioners, particularly about their labs, capabilities and goals. The survey found that the science they practice is far more benign than described in the popular press. In fact, the report suggests that the DIYbio community offers national education and entrepreneurship opportunities, rather than over-inflated risks. In addition the report documents how the DIYbio community has been actively engaged in addressing the biosafety risks associated with their community by developing codes of conduct and, with the help of the Woodrow Wilson Center, launched the Ask a Biosafety Officer program which gives amateur scientists direct access to professional biosafety officers.

Anyone tinkering with and experimenting with biology raises legitimate biosecurity, biosafety, and environmental concerns. As the movement becomes more sophisticated in its scientific abilities, these concerns will continue to grow and the community should continue to address and adapt to these apprehensions. The movement is going to have to engage with those in the federal government, academia and the general public if it wants to avoid knee-jerk regulatory actions based on misinformation and conjecture from those that believe placing biology in the hands of the public is too dangerous and that the movement has nothing to contribute beyond becoming the next biosecurity threat.

The DIYbio movement, and the larger citizen science movement, presents an interesting dichotomy for the U.S. government. On the one hand, it wants to [support the movement](#)^{vi} in order to promote innovation; on the other hand, there are legitimate biosecurity, biosafety, and environmental concerns that raise public policy and public perception issues. Like it or not, the community has a spotlight on it, and while the movement has its supporters within the government, there are those who are looking for ways to limit its ability to flourish and, in some instances, shut it down completely. By engaging directly with the government and the communities in which they operate, the community can build supporters, adapt to their concerns early, and control the narrative around DIYbio.

ⁱ <http://chimera.labs.oreilly.com/books/1234000002013/index.html>

ⁱⁱ http://www.nytimes.com/2013/05/08/business/energy-environment/a-dream-of-glowing-trees-is-assailed-for-gene-tinkering.html?_r=3&

ⁱⁱⁱ http://www.aphis.usda.gov/brs/fedregister/coordinated_framework.pdf

^{iv} <http://www.nature.com/news/2011/110720/full/475274a.html>

^v http://www.synbioproject.org/site/assets/files/1278/7_myths_final.pdf

^{vi} <http://www.whitehouse.gov/blog/2014/02/03/announcing-first-white-house-maker-faire>