Draft Letter to the PCSBI
08/19/2010

DIYbio.org was created to help build a positive public culture around new biotechnologies and practices as the number of contributors to the life sciences extends beyond traditional academic and corporate institutions in the 21st century. While it is difficult to predict the growth of the DIYbio community or the scope of activities practiced by its contributors over the next ten years, the number of amateur biologists is likely to exceed tens of thousands based on current trends. One of our motivations for establishing DIYbio.org in advance of widespread amateur activity in the life sciences is to create a model for best practices worldwide and to initiate dialogue with other stakeholders and experts to establish a vibrant, productive and safe community.

Vibrant amateur communities formed around many other technical and scientific areas such as ham radio, astronomy, chemistry, meteorology, rocketry, and perhaps most celebrated today, personal computing. Each of these areas has been significantly improved by contributions from amateurs and enthusiasts. Today, the biological sciences are following the same path.

Citizen scientists are adopting practices like genome sequencing and biological engineering that were once accessible only to institutional investigators. The rapid decline in costs of reading and writing genetic information, the modularization and abstractions provided by synthetic biology, and the seemingly limitless number of questions and applications that can be explored using these tools is inspiring a growing community of individuals to get involved in the life sciences.

Amateur and non-institutional scientists and engineers working in the life sciences may become an engine of innovation in this century. Innovation in the United States has largely been a story of small business and individual inventors. Many household items today exist because of this phenomenon, from the common zipper to the personal computer.[1] Access to knowledge, low-cost technologies, and methods of commons-based peer production are extending this story to biotechnology. Indeed, though it is still early, a handful of small businesses have spun-out of the DIYbio community and the

[1] Cite Biology is Technology, what page?

long-term economic potential in this area has been recognized by both federal[2] and state representatives[3].

Currently, over 2,000 people from around the world contribute to the informal Do-It-Yourself Biology (DIYbio) community, working on everything from microbial fuel cells, low-cost lab equipment, environmental surveillance, kits for high school biology classes, personal bio-monitoring, to disease and treatment research. Since the founding of DIYbio.org in 2008, about a dozen regional groups have organized in the U.S. and abroad to conduct workshops, seminars, and hands-on activities. Several of these groups are in the process of establishing dedicated community labs for sharing equipment and resources among its members[4] and for conducting workshops intended to engage the public about advances in the life sciences.

In addition to the economic benefits of a decentralized innovation base in biotechnology, DIYbio.org is becoming a catalyst for science, technology, engineering and math (STEM) education. An investment today in the training of future PhD scientists may not see a return for 30 or 40 years,[5] whereas new avenues of public engagement with the scientific knowledge and technology that are shaping our world could have far more immediate impacts. We hope our efforts will inspire individuals to pursue careers in the life sciences, create new avenues for participation[6], and enable citizens to be better informed about the many opportunities and challenges posed by advancements in the life sciences[7].

We recognize that alongside the democratization of technology comes the potential democratization of risks as well. In the past two years, members of the DIYbio

---

[2] National Security Council. "Strategy for Countering Biological Threats." November, 2009. Quote: "We are experiencing an unparalleled period of advancement and innovation in the life sciences globally that continues to transform our way of life. Whether augmenting our ability to provide health care and protect the environment, or expanding our capacity for energy and agricultural production towards global sustainability, continued research and development in the life sciences is essential to a brighter future for all people. The beneficial nature of life science research is reflected in the widespread manner in which it occurs. From cutting-edge academic institutes, to industrial research centers, to private laboratories in basements and garages, progress is increasingly driven by innovation and open access to the insights and materials needed to advance individual initiatives." Available online (last accessed 08/16/2010): http://www.whitehouse.gov/the-press-office/president-obama-releases-national-strategy-countering-biological-threats

[3] Informational hearing on biotechnology innovation and academic partnerships, organized by the California Assembly Select Committee on Biotechnology, February 19th, 2010. Available online (last accessed 08/16/2010): http://democrats.assembly.ca.gov/members/a19/Biotech/default.aspx

[4] See related developments in the maker communities. Ashlee Vance. "Inventors Wanted. Cool Tools Provided." New York Times. April 10, 2010. Available online (last accessed 08/18/2010): http://www.nytimes.com/2010/04/11/business/11ping.html

[5] "the average age for first-time principal investigators on grants from the US National Institutes of Health is 42" Editorial. Do scientists really need a PhD? Nature 464, 7 (4 March 2010). Available online (last access 08/16/2010): http://www.nature.com/nature/journal/v464/n7285/full/464007a.html

[6] Novel forms of mass-collaboration and peer production are revolutionizing the way new knowledge is generated in many disciplines. Amateurs and hobbyists make important contributions. Citation needed.

[7] Could cite Stewart Brand, Whole Earth Discipline: An Ecopragmatist Manifesto.

community have participated and often led meetings with international,[8] federal,[9] and non-governmental organizations[10] on issues related biosecurity and biosafety as it pertains to the emergence of amateur and non-institutional activity in the life sciences. One example of this is the partnering of the Synthetic Biology Project at the Woodrow Wilson Center with DIYbio.org on a project to ensure safety within the rapidly expanding community of amateur biologists.[11] The project is funded by the Alfred P. Sloan Foundation and seeks to work with the community to establish a code of ethics, develop norms for safety, and create shared resources for promotion of safe practice by amateurs.

Our endeavor to establish best practices in our community and to create frameworks for future generations of citizen scientists is being conducted out in the open to encourage input and collaboration from the outset, even while capabilities of the community are modest. This has led already to a new body of academic and public policy scholarship on the phenomenon.[12]

There remains a lot of practical work to be done to build appropriate infrastructure for supporting responsible science in community laboratories and home workshops across the United States. We would like the commission to consider the role governmental agencies can serve in supporting the dissemination of educational resources and best practices for the growing community citizen scientists working in the life sciences. We look forward to working with the Presidential Commission for the Study of Bioethical Issues.

---

[8] UN-BWC, UNICRI, ESRC

[9] FBI, DHS

[10] Woodrow Wilson Center for International Scholars (may be more "quasi-governmental").

[11] http://www.prnewswire.com/news-releases/responsible-science-for-do-it-yourself-biologists-97362669.html

[12] Add citations to EMBO, Nature, and C. Kelty's article.