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Out to break biotech's IP stranglehold

Cormac Sheridan

The Open Source software movement has broken the stranglehold of expensive, proprietary products. Could the same thing happen in biotechnology?



Whether you regard patents as a hindrance or a spur to innovation probably depends on how many you hold. The biotechnology industry, possibly more than any other sector, is tightly wedded to current concepts of intellectual property (IP) protection, because of both the long timelines associated with product development and the high cost of commercialising product ideas.

The promoters of an ambitious initiative to develop and apply to the process of biological innovation the ideas and working practices of the software industry's open source movement want to change all that. Spearheaded by Richard Jefferson, a plant biotechnologist with a sharp appreciation of the political economy of technology adoption, the Biological Open Source (BiOS) initiative aims to build a "protected commons" of biological IP.

In an interview with ScienceBusiness, Jefferson said this would enable both commercial and non-profit entities to pool ideas and apply innovations more broadly, and more cheaply, than current IP-centric mechanisms allow at present.

The BiOS initiative is being developed by Cambia, a non-profit institute based in Canberra, Australia, and affiliated to the Charles Sturt University in New South Wales, with support from diverse funders, including the New York based Rockefeller Foundation. BiOS is developing a set of internet-based information tools to promote collaborative working among researchers and to critically analyse existing patent 'landscapes'.

Practising what he preaches

Jefferson is advancing the BiOS concept directly through making his own IP in the area of plant transformation available under a BiOS license. American-born Jefferson developed the GUS reporter gene system and, more recently, the so-called "transbacter" system for introducing DNA into plant cells via several species of Rhizobium. The latter bypasses the standard and heavily patented

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technology based on Agrobacterium (*Nature* 433; 629-633 [2005]).

He identifies BASF Plant Science among its first 50 licensees. As a latecomer to plant biotechnology, he says it has a more limited portfolio of technologies than its rivals and therefore has less room for manoeuvre in cross-licensing agreements." They represent a very extreme example of why this is needed," he says.

Jefferson is critical of the licensing tactics that large firms with extensive IP assets deploy in order to shut out competitors, particularly small and medium-sized enterprises (SMEs) and non-profit organisations, from the innovation process. Under the biological commons system he advocates, for-profit companies would readily obtain access to particular technologies but would be required to share whatever enhancements they developed with the wider community. No single entity would be able to hijack the whole.

The aim, he says, is to disaggregate the tools of innovation from the products of innovation, so that companies would compete at the level of products and services, not on their ability to get to the starting gate. "Everyone benefits when there is an open innovation stack," he says. The cost of innovation should fall, while access to its benefits should be more equitable than it is at present.

Threats for smaller firms

The concept holds threats for smaller firms, however, as well as for large multinationals. Many life sciences SMEs have developed business models based on proprietary tools or methods. "If methods were public domain, big companies would crush us," says Martin Welschof, CEO of Oslo, Norway, based Affitech, which has developed a proprietary, cell-based system for rapid identification of antibodies.

Moreover, he says the patenting system can stimulate innovation, as companies can be forced to seek new ways to circumvent existing patent estates. For example, in the antibody space, Affitech and other firms, such as IsoGenica, of Cambridge, UK, and Haptogen, of Aberdeen, UK, developed alternatives to phage display patents controlled by Cambridge Antibody Technology, also of Cambridge, and other firms. "Those kinds of technologies would never have developed if there had been easy access to phagemid display," Welschof says.

Alexander von Gabain, co-founder and chief scientific officer at Vienna, Austria-based vaccine developer Intercell, differentiates between the legitimacy of broadly based patent claims and more specific, product-based IP protection. "Predictive patents, for example, on genomic sequences of organisms, that protect all hypothetical targets one may derive from the sequence, are indeed an impediment for the development of new drugs and vaccines," he says.

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"However, the closer IP is to the product or technology that will hit the market, the more it needs our present patent system in order to promote company formation, development and investments."

Would investors bite?

Attracting biotechnology investors to an open source model would also be difficult, according to Nick Gostick, incubation manager at BioCity Nottingham, an incubator for biotechnology start-ups. "Venture Capital investors in this sector are wedded to the protection of their investment afforded by a solid patent. I just don't see them having any appetite to invest in a company based on open source IP - worse still invest in a company that is committed to making its IP available through open source," he says.

The use of patents is "expected, contemplated and accommodated in the BiOS model", Jefferson says. But SMEs that develop generic tools for their own exclusive use may find themselves competing against the BiOS community. The whole thrust of the initiative is to ensure that companies have access to the technologies that

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enable them to get competitive priced innovation to market, he says, while also ensuring that society benefits by allowing competitors to operate as well.

The altruistic hurdle

The whole initiative faces a major hurdle in inculcating the kind of cooperative, altruistic culture that has made the open source software movement such a success. Unlike software coders, hard-working molecular biologists and protein chemists do not tend to sign up for additional lab work in their spare time, at least not within the institutional contexts in which they operate at present.

Finding ways of motivating researchers, assigning credibility to open source research work and aligning it with their overall career ambitions is a challenge, says Jefferson. "It's a real issue, it's important, and it's not going to go away." Dealing with it could require top-down approaches as well as bottom-up initiatives.

"There are institutions that have real top-down clout and that are burning to see their mandates better implemented," says Jefferson. He identifies the US National Institutes of Health and several of its constituent institutes among the organisations BiOS is talking with.

Whatever about the implementation difficulties, the basic ideas and working methods developed in the open source software movement are readily applicable to biotechnology, according to Eric S. Raymond, a key participant in that movement and author of *The Cathedral and The Bazaar*, which documents its development.

"Open-source methods are applicable anywhere that the fundamental bottleneck of production is not capital goods – such as computers or gene sequencers – but rather human attention and creativity," Raymond says. "Open source is a re-discovery of the power and necessity of decentralised peer review. That's the basis of science, and it's going to tend to recur anywhere that the culture of science intersects with industry."

For next-generation biotechnology entrepreneurs, loosening your grip on your patent portfolio might just open up a new business model.

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