Open Source Research Overview

Background

Open source research is a concept that envisions a collaborative, open process that results in the creation of a product. Not a new concept, open source has long been used in the computer community. The UNIX and later Linux operating systems, as well as the software that operates on those platforms, are created using open source research. The process functions by a sum of individual contributions. One person may have an idea for a useful software program, but may lack the programming skills necessary to make the software function. In open source, this is not a problem because one person's end product is another person's beginning product.

This system functions well because rather than standing alone on the knowledge of one person or development team, the source code is a constantly evolving product of global knowledge. Anyone who is willing and able to contribute to the process can. The result is a product that is non-proprietary but attributable to the contributions of many individuals. The development is an intellectual commons that functions economically based on technical support.

Current Open Source Uses for Biomedical R&D

Countries such as India and China have been quick to take advantage of the prospects that a "science commons" creates. Both countries are developing nascent biotechnology and pharmaceutical industries through weak intellectual property protections, and open source science creates a new opportunity they could seize. China already selected Linux as the country's operating system and scientists in India have gathered for workshops on open source.

This kind of collaborative effort can also be seen as accelerating from the human genome project, where many individual laboratories work together and the results are released in the public domain. Those involved with the human genome project investigated the possibility of making the project truly open source by using an open-source licensing agreement. Then the SNP Consortium brought together private and public resources with a commitment to creating a rich public domain of new knowledge. Another successor project, the International HapMap Project, which is mapping the common patterns of variations in the genome, also places the completed data in the public domain and allows subsequent patterns on discoveries derived from that data. Most recently the Biological Innovation for Open Society (BIOS) announced they will launch an open source platform for DNA sequences.

The attempt to unravel the mysteries of the proteome have also made open source science approaches more evident. The Human Proteome Organization (HUPO) is a collaborative group of the leading proteome researchers. Also, the open source ideal has been combined with grid computing to help researchers simulate protein folding. The World Community Grid and Folding@home use the computers of volunteers to simulate protein folding. After the Human Proteome Folding Project, the World Community Grid will move onto other research projects.

Expectations for Open Source R&D

"New ideas need new organizational structures." Leroy Hood argues. The possibility that networks of scientists working across disciplines could speed discovery leads some close observers to anticipate that large corporations may outsource research to biotech companies, and perhaps networks of scientists. Some think that the financial incentive conferred by intellectual property rules means that it will take companies, small and large to harness science to healthcare products. Others disagree, and would rewrite intellectual property laws.

Developing countries, like China or India, have a vested interest in a weak intellectual property regime since they have less intellectual property to protect and need new technology for development. Since their intellectual property regimes are still developing, they could take the lead in open source research without attracting institutional resistance from inside the country. A successful open source system in either of those countries would create a new model that could attract multinational companies.

Under current conditions, open-source research is most likely to play a role in non-patentable compounds, drugs whose patents have expired and diseases that affect small numbers of people or are found mainly in poor countries. A lack of market incentive make it less attractive for large pharmaceutical firms to develop these areas, but an open-source framework that brings in non-profits, universities, and individual researchers could make a significant contribution. Success in these smaller markets might open the pathway for open source research in larger markets.

Looking beyond current conditions a growing number of educated scientists are coming from different countries and they are using the WWW to link up and exchange ideas across all boundaries--intellectual as well as geographic. Their ability to discover new findings and disseminate them rapidly, so that others can work on the ideas, is likely to grow. The economics of scientific research could shift if the velocity of scientific discovery accelerates and the body of knowledge available in the global science commons accumulates. Whether it shifts from West to East, from companies to networks or from industry to sector is unknown, but open source science could make all of these possible.

Questions about Open Source

Can open source science outperform the current organization of scientific discovery?

Could open source collaboration be used to develop drugs for neglected diseases?

Can an open source framework democratize drug research by creating a basis for non-profits, universities, and individual researchers to collaborate?

Can a developing country create an open source intellectual property regime and use it to develop a pharmaceutical or biotechnology industry?

Could a viable business model based on open source research be developed?

Sources

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