

## Open source innovation

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*CSIR's Open Source Drug Discovery program will harness the collective minds of Indian scientists to be a part of discovery of therapeutics for infectious diseases.*

Indian drug discovery firms might be attracting a lot of attention for their NCE pipelines and though they might have enjoyed the monopoly in this field, that is soon going to change with the country's foremost research institution, CSIR's new Open Source Drug Discovery project. The project, that is all set to revolutionize the way drugs are discovered, is still at a nascent stage. It aims to throw open the challenges in drug discovery to scientists, researchers and even students in the country's premier educational institutes and research institutions to harness their collective intellectual capital to bring about the country's first drug for tuberculosis as a part of its first phase. This would be followed by other infectious diseases such as malaria and others once the first project has attained success. The project is the brainchild of Dr Samir Brahmachari, director general, CSIR, and has been sanctioned \$38 million by the planning commission.

### Drug discovery, a lengthy process

Traditionally drug discovery takes place behind closed doors, veiled and shrouded in secrecy, thus terminating any participation from the academia. Not only is it time-consuming and expensive, but also a high-risk proposition. It begins with basic research, which expands the fundamental understanding of disease pathways and identifies and characterizes new drug candidates. This is followed by developmental research, where researchers test the safety and efficacy of a new drug

candidate and determine its metabolism and interaction with the body and with other drugs. Only a fraction of drug candidates proceed beyond basic research and preclinical development to clinical trials - a process that takes many years. Roughly out of 10,000 compounds in basic research, on an average only five enter clinical testing and just one makes it to the market.

### **The open source model**

Wikipedia defines open source as a development methodology which offers practical accessibility to a product's source (goods and knowledge). The open source model of operation and decision-making allows concurrent input of different agendas, approaches and priorities, and differs from the more closed, centralized models of development. The principles and practices are commonly applied to the development of source code for software that is made available for public collaboration, and it is usually released as open-source software. The human genome project and Linux are other examples where the open source model has found its application.

What the Open Source Drug Discovery project is aiming at is more free sharing of information. Optimizing on the popularity and the ease of the Internet, the project aims to have a web-enabled platform that will list the design challenges involved in developing a drug. The various steps involved in the development of the drug shall be broken up into smaller and simpler tasks and scientists, researchers and students would be open to contribute solutions for the same. This might involve information about a new drug target or an algorithm to make a protein bind to a particular site on a cell. After the drug has been developed, the formulation as well as the process of development will be in public domain, accessible by everyone and not just to people who contributed to the development of the drug. Patents will not be given to those solving a particular part of the drug discovery process, hence anyone who has the capability to make the drug can now manufacture it. However, companies who want to reap monetary benefits by modifying the drug and then selling them at exorbitant prices won't be able to do so

### **Collaboration is the key**

The innovative concept will see global IT firms (Sun Microsystems), researchers, undergraduate students and companies working in tandem. Sun Microsystems is setting up the architecture since they have experience with open source, so they are interacting with the scientists to put up a system in place. Researchers attached to foreign institutions such as The royal Society of UK, Imperial college of London, Medicine Sans frontiers institute will also be involved along with Several CSIR institutes including IGIB (Institute of Genomic and Integrative biology), CDRI, IMTECH Chandigarh, National Institute of Immunology. Many institutes and pharma companies are also showing interest. TCG life sciences and AstraZeneca are a few companies who have expressed interest in the project. To encourage contributors to come up with innovative ideas, there are rewards and incentives as well. For instance, scientists and researchers would be upgraded to gold and platinum memberships from a silver one on the website based on their contributions and the number of credits they accumulate. There will be monetary rewards for students as well for their contributions.

### **The advantage**

The model has a long term goal of making health affordable to all by reducing the cost of patented drugs especially for chronic diseases requiring long term treatment low. This along with putting up a web enabled open source platform both computational and experimental would further reduce costs. Discovering and bringing one new drug to the market typically costs a pharmaceutical or biotechnology company nearly \$900 million and takes an average of 10 to 12 years wherein 5,000-10,000 compounds are screened before a new drug reaches the market. The project also hopes to mitigate the high failure rates that plague drug discovery and development. With open sharing of information, the time taken to find a possible drug for a disease can be reduced to 4-5 years as opposed to a period of 10-12 years.

Shalini Gupta