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Making drug development less secretive could lead to quicker, cheaper therapies

September 14, 2016 10.00pm AEST

By working in real time together, we can create something robust and inexpensive in a short time frame. Johan Larson/Shutterstock

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Almost all new medicines are discovered by the pharmaceutical industry. It's an expensive process that requires investment up front, so investors need guarantees, secrecy and patents to safeguard their return.

This financial model is a major constraint on the pharmaceutical industry. Medicines for diseases with small markets are not prioritised and areas associated with unclear basic science are considered too risky.

The world was surprised to learn there were no medicines for Ebola, or Zika, but why would there be? Before the outbreaks, these diseases were of little interest to a profit-making industry.

Our new research, published today in the journal ACS Central Science, shows that with the right investment, an open source drug discovery system – based on sharing all information in the public domain in real time – might compete with the traditional pharmaceutical industry to deliver the drugs we need.

Secrecy vs openness

Secrecy ruins the efficiency of the research process. Competing groups operate in ignorance of each others' results, experts fail to talk to each other and there's unnecessary duplication.

There are groups pursuing projects known to others to be dead-ends.

In contrast, open source projects are developed by communities where everything is shared. Mutual

learning is fast.

The ability to “look over the shoulder” of people working on the same problem can lead to extraordinary leaps of productivity. Contributors can rapidly identify problems and can join and leave a nimble team as required.

Examples of open source products are the Android operating system on our phones, the Firefox and Chrome web browsers on our computers and much of the infrastructure of the internet. Such things are often market-leading.

By working together in real time, we can create something robust and inexpensive in a short time frame; as well as something that has community ownership, rather than being owned by an individual.

Opening up drug discovery

Our new paper explains how we’ve used open source principles in the discovery of new medicines for malaria.

The aim was to enable anyone in the community (from professors and pharmaceutical professionals, to undergraduates and school classes) to help solve our most pressing health concerns.

As part of an international consortium of people called Open Source Malaria, we investigated some chemical compounds that work well at killing the malaria parasite, and employed an open source research framework.

Anyone could take part, all the data and ideas had to be public domain, and there were to be no patents. Our lab notebooks were no longer sitting on the bench of a locked lab, but were updated in real time on the internet.

We showed the molecules have great promise. Ultimately, we couldn’t take them any further because of problems with their solubility and how long they were active in blood.

But although we decided to move on to other potential medicines, everything is in the public domain so anyone can continue the project if they can see a way to solve the problems that we didn’t.

The research mechanism works. People contributed, probably for all sorts of reasons that were selfless (to cure a terrible disease) and selfish (to get an academic publication or community recognition).

Pharmaceutical industry professionals ran experiments and gave valuable advice. Students contributed new molecules and insights. Academics advised and steered the project as it was happening. Open source is inclusive.

Decisions were made communally in open meetings recorded online. All the details, warts and all, are

visible, so it should be simple for anyone to reproduce any of the research or to adopt a similar model for a different purpose.

Why doesn't everyone do this?

As you move a molecule towards the market, the process becomes more expensive. This raises the question: who's going to pay?

Discovering a drug is said to cost US$2.6 billion. Some people dispute that, and of course it depends on the disease – it's thought to take about a twentieth of that to discover a new drug for malaria.

Open Source Malaria is now looking at later, more expensive stages of drug development for a promising set of molecules, and there are more community inputs than ever.

Clinical trials are ultimately needed if a drug is to be approved. But it's unclear who is going to pay for these. Nobody has taken an open source drug through to market before and that makes investors nervous.

There are, however, lots of other possible ways of funding drug development. The research that led to the polio vaccine, for example, was funded by a remarkably successful crowdsourcing campaign, the March of Dimes.

If we operated in an open source way, we could involve patients in the design of clinical trials and we would be unable to hide any "bad data" that came from those trials, since all the data would be visible to everyone.

Governments, philanthropists and entrepreneurs will be interested in the open development of medicines. An open source project allows for the self-assembly of talented teams, committed to the maximum value for each research dollar.

Open source drug discovery need not be limited to medicines where there is little market. Rather, it could become a new approach to medicines for a range of diseases, from health crises such as antimicrobial resistance through to rare forms of cancer.

We could work together to get the medicines to market that we really need – and be responsive to threats such as Ebola or Zika – without the need for a prospective profit.

The licence covering Open Source Malaria is a Creative Commons licence, meaning manufacture could be handled by the thriving generics industry, keeping costs for patients as low as possible.

There's no need for secrecy, anywhere. With the right investment, open source could provide the traditional pharma industry with some genuinely distinctive competition.

Pharmaceuticals **Malaria** **Open Source** **Drug discoveries** **Drug discovery**