Open and Shut?

Thursday, June 15, 2006

Open Access: Stage Two

Public Library of Science (PLoS), the non-profit open access publisher, has announced the launch later this year of a next-generation publishing system. The new service will allow researchers in biology and medicine to publish peer-reviewed papers in an open access online repository called PLoS ONE. Chris Surridge, the UK-based managing editor of PLoS ONE, talks to Richard Poynder about the new initiative, and explains why he quit one of the world's top science publishers to work for a small upstart with a still unproven business model.

RP: *Can you begin by saying something about your background? You started out as a biophysicist?*

CS: Yes. I did an undergraduate degree in biophysics at Leeds University and then a PhD at Imperial College.

RP: *What was your area of research?*

CS: I was looking at microtubule assembly, mainly in vitro.

RP: *You'll forgive me, I'm not a scientist. What do biophysicists do?*

CS: Biophysics is a component of molecular biology. What you are looking at are the molecules that make up organisms and how they interact. So the focus is not on the chemical properties of those molecules but on their physical properties.

RP: *Their structure rather than their chemical interactions?*

CS: Well, structural studies are very important within biophysics, but the point is that we use physical techniques rather than chemical techniques to explore molecules.

RP: *Your web page says that your specialism was "the dynamics of microtubule assembly". What is a microtubule?*

CS: Microtubules are part of the cytoskeleton, which is the structure that holds a cell in its shape, and allows it to do the things it does. So in the way that an organism has a skeleton — whether an internal one consisting of bones like you and I have, or an external one like those that insects or, say, lobsters have — cells have a structure that holds them in shape and gives them mechanical stability. Microtubules also help cells to divide.

Sounded like fun

RP: *You subsequently went into science publishing and worked as an editor at Nature. Why publishing?*

CS: The opportunity arose at the point where I had done a couple of years as a postdoc, trying to get the experiments that didn't quite work for my PhD to work, and generally tidying the research up. My grant money was running out so I started exploring a number of different avenues and I came across an editorial job at *Nature Structural Biology*. I decided to take a punt, and applied for the job — as much to find out what an editor actually did as anything. It also sounded like it would be fun!

RP: *No regrets at leaving research?*

CS: Not really. While I enjoyed doing experimental research I could see that it could become wearing. I have always liked the breadth of science, which is something you can easily lose track of when you are doing research. You have to concentrate quite hard on the problems that you are specifically handling, especially when you are a postdoc.

RP: *You also edited Nature's Brief Communication?*

CS: Right. I was an assistant editor on *Nature Structural Biology* for eighteen months. Then an opportunity came up to work on *Nature* itself, again looking after primary

research in the biological field. I did that for about a year, and then I looked after the Brief Communication section of *Nature* half time for about nine months. I also spent some time as *Nature's* web editor.

Just another publishing job?

RP: *Then last year you gave up traditional publishing and moved to the open access publisher PLoS. You underwent a conversion to OA then?*

CS: You make it sound like moving to PLoS was some kind of road to Damascus thing! It wasn't quite like that.

RP: *So is working at PLoS just another publishing job to you?*

CS: No, it's not just another publishing job. It was more that moving to PLoS to look after this new project that we are calling PLoS ONE was too exciting an opportunity to miss.

That said, I have always had sympathy for open access publishing, which I think is a very, very good idea. Even while I was at *Nature* the logic of it seemed compelling. It wasn't so much a conversion to OA, therefore, but an opportunity to do something that I think is very important for scientific publishing.

RP: *How were you recruited? Did you answer a job advertisement?*

CS: No. A lot of the editors within PLoS are old colleagues of mine — at least four of them have passed through the *Nature* editorial office in their careers. They knew the kind of things I was interested in, so I was rung up and told about the PLoS ONE project, and asked whether I would be interested in being involved.

RP: *Clearly you were interested. But tell me, why does the world need PLoS ONE?*

CS: Because the system of disseminating scientific research has become extremely inefficient, and the concept of the journal has been eroded by the Internet.

RP: *How do you mean?*

CS: The Internet is providing us with all sorts of new tools for communicating science, so simply publishing journals, and distributing them electronically isn't using the full potential of the Web to make the dissemination of scientific information efficient and effective. It just isn't the best way to do it anymore.

Inclusivity

RP: *When I interviewed PLoS co-founder Harold Varmus he described PLoS ONE as "a very large compendium of papers that have been vetted for scientific quality, but which*

will not be confined in terms of their likely importance." Is PLoS a journal?

CS: I haven't got a better word for it, but it's not really a journal: it's somewhat different.

RP: *In what way?*

CS: If you think of a journal you immediately start asking questions like "So what area of science will this journal cover?" But we can't think of a good reason to sub-divide PLoS ONE.

RP: *Why?*

CS: Because if you are looking to provide an extremely efficient and cost-effective way of disseminating the results of scientific research, and you start to think about dividing things up into biology and medicine, and specialities like biophysics, you quickly run up against a boundary question: where, say, does biophysics end and biochemistry begins? You find yourself starting to have to make lots of unnecessary decisions about borders.

RP: *The way that science has been divided into different disciplines says something about the way that it has developed presumably?*

CS: Actually, I think science subjects developed in a pretty arbitrary way. The boundaries have effectively been imposed as a consequence of the way that journals work, and the way that universities are structured.

RP: *So there is no need for such rigid boundaries?*

CS: No. At least, not when publishing. Consider, for instance, if you were to have a study that compared the genomes of man and the great apes, looking at a cluster of genes that controls the development of the brain cells associated with language. Now what subject is that? Is it neuroscience? Is it evolution? Is it genetics? Is it genomics? Actually, it is all of these things, so you could classify it in any one of these subject areas.

RP: *Why the name PLoS ONE? What does "one" imply here?*

CS: One implies inclusivity. What we are saying is that we offer one place to publish; that if you can go to PLoS ONE you don't need to go elsewhere.

RP: *So your message to the scientific community is, "If you have a paper you want to publish we are happy to take a look at it?"*

CS: We are happy to look at your research.

RP: *You must have some boundaries in mind though. After all, if someone came to you with, say, some research on nuclear physics you would presumably say that that is not what PLoS ONE is about?*

CS: Actually, I wouldn't say that at all. What we are about is science, and science is a way of answering questions about the world.

So if someone came to PLoS ONE with nuclear physics we would welcome them with open arms, and go and find some editors who knew something about nuclear physics who could make a decision about whether the paper was worth publishing. And if they felt it was worth publishing we would then publish it. That's what I mean when I say we are about inclusivity.

That said, we don't anticipate people with nuclear physics coming to us to begin with because that is not where PLoS' reputation currently is.

The idealised general reader

RP: *Right. PLoS' reputation is in biology and medicine. So PLoS ONE is not so much a journal as an online repository — or to use Harold Varmus' word, compendium — of peer-reviewed papers in biology and medicine?*

CS: Right. The other point to make is that if you think of a journal you start imagining selecting papers for presentation to a particular target audience. The problem is that the decisions surrounding this selection are generally done in a subjective way.
RP: *Can you explain what you mean?*

CS: What happens is that journals like *Nature*, *Science*, *Cell* and even *PLoS Biology* and *PLoS Medicine* work on the principle that they want to take the most interesting and best science that they can lay their hands on, and provide a selection that their audience will want to read.

Yet the audience that these journals have in mind is in the main a convenient fiction, since they are thinking about some idealised general reader for every journal, and assuming that that general reader will be interested in pretty much everything that the journal publishes. No journal editor believes that such a 'general reader' exists but that is the mindset behind the journal model.

RP: *And as you say, that is an outdated mindset in the age of the Web. One could perhaps also argue that PLoS ONE harks back to the idea of "Proceedings" or "Transactions"?*

CS: In a sense, yes. Certainly we are making it much easier for authors because they won't have to ask questions like: "So what journal am I supposed to submit my work to?" They won't have to worry about establishing the subject remit of a journal when publishing with PLoS ONE.

RP: *So talk me through how PLoS ONE works in practice, and how that differs from the traditional journal model?*

CS: OK. Researchers will submit papers to PLoS ONE and the editors — of which there will be a large number in order to cover the breadth we expect PLoS ONE to have — will make a decision whether to publish the paper. In this regard we will not be changing the system hugely.

RP: *The criteria for accepting a paper, however, will be different will it not? The PLoS ONE press release, for instance, says that "subjective considerations like 'likely impact,' 'degree of advance,' or 'interest to a general reader' will not play a role in deciding whether an article should be published or not."*

CS: That's right. Traditionally a lot of the work that goes into peer reviewing consists of asking questions like: "How significant is this? How surprising are the conclusions?" Essentially, these are subjective questions. A more objective question to ask would be: "Is this properly done science".

Simpler question

RP: *So what question will peer reviewers be expected to answer when considering whether a paper submitted to PLoS ONE should be accepted for publication?*

CS: They will be asked to answer a simpler question than has traditionally been asked. Essentially, that question will be: "Has the science in this paper been done well enough to warrant it being entered into the scientific literature as a whole?"

What is also different about PLoS ONE, by the way, is that we do not see peer review ending on publication of the paper.

RP: *Can you expand on that?*

CS: Sure. We believe that the more subjective questions about how a paper relates to other work, and where it fits into the whole corpus of scientific literature are still important questions — but we feel that these can be better answered via an open peer review process that takes place after the paper has been published.

RP: *So the intention is to go through the traditional peer-review process (although asking a simpler question when considering whether a paper should be published), but then to have additional reviewing take place after the paper is published?*

CS: Exactly.

RP: *How will this open peer review take place?*

CS: Every paper in PLoS ONE will have a discussion thread attached to it. We are also developing ways to allow people to directly annotate the papers themselves.

RP: *What else will PLoS ONE do as part of the publication process?*

CS: We will also be tagging the papers so that references to them can be linked into the major databases. And we will be assigning DOIs [Digital Object Identifiers] to them, and to their component parts.

In addition, we will undertake archival maintenance of the papers, and we will also submit them to PubMed Central for archiving, as we do with the other PLoS journals.

RP: *Do you expect people to find the papers primarily by searching PLoS ONE, or will they come via PubMed Central, or even perhaps Google?*

CS: People will come through Google Scholar, and through PubMed Central, but we hope that they will also come to PLoS ONE. After all, with such a broad spectrum of papers we are offering more than a single journal. We also hope to make the experience of coming to the PLoS ONE site a very personalised one.

RP: *Can you elaborate on that?*

CS: What we plan to do is to give users of PLoS ONE an identity. This will allow us to develop a number of personalised features for them. When they come to the site, for instance, we will already know the sort of things that they are interested in, and so will be able to suggest recently published papers that they are likely to be interested in.

If they tell us that they are only interested in biochemistry papers, for instance, we will show them the biochemistry papers first. And instead of traditional table of contents alerts we will tailor alerts for them that will signal when papers in the subject area that they are interested in have become available on PLoS ONE.

Semantic Web

RP: *Presumably these will be based on automated keyword searching. Do you expect PLoS ONE to also embrace the Semantic Web in the future? I'm thinking, for instance, of a scenario where, instead of scientists having to input a search query into the PLoS ONE database, or indeed into Google Scholar or PubMed Central, software agents will be sent out to discover and interrogate papers. They would then analyse and manipulate the data in them, and deliver the results to researchers in the form of a computer-generated report; alerts if you like, but a step beyond today's notion of an alert.*

CS: The Semantic Web makes a lot of sense in the context of PLoS ONE, and we are having lots of discussions about how to exploit the tools of the Semantic Web in the service.

Certainly we want to make PLoS ONE papers accessible by those sorts of routes. We also think it is important to try to establish links between papers. Scientific papers don't exist in isolation but have a host of other papers related to them both closely and more

distantly, by virtue of their content. We want to make those connections discoverable. So we are looking to provide lists of articles related to the article you are reading in PLoS ONE.

RP: *This would be similar to the way that Amazon makes recommendations to its users would it — telling them what books other people have bought?*

CS: That too. In addition to showing papers that are related because of the topic they are covering or the techniques they employ we want to be able to say "Other people who have read this paper also read these other papers." So we plan to incorporate a lot of different algorithms to help uncover the links and connections between papers.

Open Access 2.0

RP: *PLoS ONE is very different to anything else that PLoS has done to date isn't it? While they utilise an open access business model, for instance, PLoS' journals are still subject-based publications.*

CS: That's true.

RP: *Indeed, PLoS ONE seems closer to the original concept of the Public Library of Science. The PLoS Open Letter published in 2001, for instance, stated: "We support the establishment of an online public library that would provide the full contents of the published record of research and scholarly discourse in medicine and the life sciences in a freely accessible, fully searchable, interlinked form." Does that not sound more like PLoS ONE than the PLoS journals?*

CS: Of course. Personally, I don't see the journals as an end point in themselves. In a sense, the journals are a demonstration that the open access model can work. Certainly PLoS ONE is an idea that we have been kicking around from the start, and it underlies the core reason for the Public Library of Science to exist — which is to get as much of the literature into an open access environment as possible.

RP: *Perhaps we could say that PLoS ONE is stage two in the development of the Public Library of Science, and indeed of Open Access?*

CS: In some ways. Certainly we see PLoS ONE as an example of what we are calling Open Access 2.0.

RP: *This is a reference to Web 2.0?*

CS: Yes. There is a lot of buzz around Web 2.0 applications; and that is the way we are looking at PLoS ONE. Essentially, we are providing a new synthesis of the things you can do on the Web to improve the dissemination of primary research.

RP: *Web 2.0 implies greater interactivity and a more community-driven service I guess?*

CS: Indeed. So when we talk about PLoS ONE as Open Access 2.0 we are saying that we see it very much as a community-up approach to science.

RP: *Can you give me an example of how that might work?*

CS: Absolutely. We have, for instance, been looking at tagging as a way of organising the literature — in the manner of sites like Flickr, which is creating a vast resource of pictures where users themselves apply tags, and provide structure to the information.

RP: Folksonomies.

CS: Yes. So we see folksonomies as a way of letting the community organise the papers, and we are looking at having the community of PLoS ONE users rate the papers. Consequently, rather than having to guess how good a paper is (I don't like words like good but I will resort to it here) people will find that others have given them a status.

A distraction

RP: *At the moment scientists and administrators tend to judge how good a paper is in terms of which journal it has been published in — by reference to the so-called Impact Factor. Might new methods like folksonomies eventually replace today's notion of the Impact Factor?*

CS: Maybe. But the question of impact is in many ways a distraction. As you say, when scientists talk about the impact of a journal they tend to be thinking of Impact Factor, which is effectively the average number of citations that a paper in that journal gets. That is a useful measure for comparing journals with exactly the same scope, but it is a useless way to assess the importance of individual papers. The distribution of number of citations to individual papers is too broad and it isn't normal in shape.

RP: *Scientists and their institutions, however, still attach considerable value to the Impact Factor. Given this, why would an author choose to publish in PLoS ONE when publishing in a traditional journal like Nature, Science, or Cell, provides much great kudos?*

CS: The problem with the Impact Factor is that you are judging a paper by how good its neighbours are, and it tells you very little about the quality of an individual paper, since the Impact Factor is applied to the entire journal, not individual papers. It's strange that this is the only tool for assessing quality we have at the moment. If you think about it, it is like deciding whether someone is likely to be a bank robber on the basis of who their neighbours are!

PLoS Medicine has, by the way, just published an editorial explaining why we need to re-think the Impact Factor.

The point is that with PLoS ONE we want to maximise the true impact of every paper. By that we mean making them available to everyone who will be interested in their content, while providing efficient tools to allow readers to find the papers and for the papers to find them.

RP: *Nevertheless is it not likely that — at least until people feel more confident about new ways of measuring the quality of a paper — PLoS ONE will be viewed as a second rate place to publish; the place to go if you cannot get published anywhere else?*

CS: We definitely don't see PLoS ONE as a journal of last resort. It is an alternative to conventional journals, and so stands outside the hierarchy of journals that we have got so hung up on.

RP: *So the appeal of PLoS ONE to authors will be what?*

CS: PLoS ONE will be a great place to publish work that is so hot that everyone wants to talk about it, because that is exactly what can happen. Everyone can talk about it within PLoS ONE, and listen to what is being said.

It is also a great venue for the papers that only a handful of people wish to read. To that handful of people — those doing highly related work — such "minority interest" papers can be vitally important. Currently, however, their access is inhibited because the papers take too long to publish, and appear in obscure journals — many of which the interested reader's institution may well not have a subscription to in any case.

RP: *So who exactly should be looking to publish in PLoS ONE?*

CS: We want everyone to use PLoS ONE. We aren't looking at this as a competitor for "conventional" journals, but rather as an alternative to them.

So the issue for researchers is this: if you want to spend months revising and re-revising your paper to satisfy the demands of two or three experts — who may or may not be the most appropriate people to do so — with a vanishingly small chance of eventually being published; and if you are happy for your paper to be inaccessible to many of the readers who might wish to read it, then conventional journals are for you.

If, on the other hand, you want to share your results — as soon as possible — with the whole scientific community in a way designed to stimulate discourse and so scientific advance, then PLoS ONE will be your journal of choice.

Rates will be lower

RP: *The business model utilised by PLoS journals requires authors to pay to publish their papers. Will PLoS ONE authors also be charged to publish?*

CS: Yes. PLoS is a not-for-profit organisation but we still have to be self-sustaining.

RP: *Will the article processing charges for PLoS ONE be the same as those applying to the journals, which I understand have just risen from $1,500, to between $2,000 and $2,500 per paper*?

CS: Hopefully the rate can be lower. One of the driving forces of PLoS ONE is that we want to be able to publish lots of papers. To that end we are setting up the system in a completely scaleable way so that we can cope with as many papers as people want to publish with us. One of the advantages of doing so is that we can start getting economies of scale, and this will keep author fees as low as possible.

RP: *So you expect author fees to be lower than the journals?*

CS: We haven't worked out a figure yet, but I am almost able to guarantee that the author fees will be less than the PLoS journals. This is because we expect PLoS ONE to be much less expensive to manage than the PLoS journals. And so it is fair that the journals should cost more.

RP: *Why are the journals more expensive to manage?*

CS: Because the PLoS journals require quite a lot of intensive editorial work in order to answer those subjective questions I talked about: establishing exactly how exciting a paper is, for instance, or how much of an immediate impact it will have. Essentially their task is to select the cream, although I hate to use that term. That means that both *PLoS Biology* and *PLoS Medicine* have a very low acceptance rate, and the selection process associated with that requires a lot of time-consuming work.

Faster and more efficient

RP: *When will PLoS ONE be launched?*

CS: We hope to launch at the end of the year. We have just announced the service, and we plan to start accepting submissions at the beginning of August.

RP: *In conclusion then, what will PLoS ONE offer to science, and to researchers, that is not currently available?*

CS: A faster and more efficient way of publishing papers. As I said, we are looking at an easier decision on whether to publish, and researchers won't have to find the right journal to publish in, since PLoS ONE has sufficient scope that it will be able to publish any paper that is worth publishing. This will also give us sufficient economies of scale to make it a far less expensive way to publish. Moreover, since we hope it will stop the problem of reviewers being asked to review the same paper for a number of different journals it should free up researchers' time.

The point is that the whole hierarchy of journals we have today is wasting huge amounts of scientists' time, whether they are authors, referees or readers. It is an inefficient system that needs replacing. PLoS ONE provides an alternative; one that will make science more efficient, and will see much more of the literature becoming available within an open access environment.

RP: *OK, thank you for your time; and good luck with PLoS ONE.*