

Bench philosophy (17): OpenWetWare

# Don't Hide your Research, Share it!

Technology is slowly allowing scientists to take information distribution back into their own hands as demonstrated by *OpenWetWare.org*. Not only does it allow researchers to publish bits of information that do not fit in with the conventional channels of journals but it also serves as a platform to interact with other researchers in an environment that is not owned by a profit-seeking company.

OpenWetWare (OWW) started up small in 2005, as a private lab resource created by students from Drew Endy's bioengineering and Tom Knight's bioinformatics groups at the Massachusetts Institute of Technology (MIT). Shortly after, the server gates were opened to the scientific community, allowing anybody from anywhere in the world to register with a real name, a valid email address and, typically, a scientific affiliation. Successful registration, usually a matter of 48 hours, then grants editing rights in addition to the viewing rights given to any visitor. Although OWW shares the underlying software with Wikipedia, this minimal entry check avoids the anonymous edits that can be made on the latter platform and which can compromise article quality. The OWW project was initially funded using the resources of the Endy lab and several small MIT grants. Since May 2007, it has been supported by a single National Science Foundation grant, which has contributed US-\$700,000 (€538,000) to the budget so far and will be up for renewal in 2009.

Since its birth three years ago, OpenWetWare has been steadily growing. In 2007, 1,500 new users registered. Last year, the number was already up by a fourth to 1,900, bringing the total member count to 4,800, as of February 2009. With a larger user community the content is being reworked and extended more frequently. Edits made per month climbed more than a third, from an average of 318 edits in 2007 to 440 in 2008.

## Versatile platform

Due to the flexibility of the platform you can use it for a variety of purposes. For one, you could host your lab homepage on OpenWetWare for free. No annual server and domain name charges. Of course, you may already have allocated space on your institute

servers but the content update there tends to be a bottleneck, often with only a single person having access rights. On OWW on the other hand, you can build the lab homepage collaboratively, with a contribution from each lab member. You can go as far as organising your lab with OWW by listing lab materials, writing common protocols, and announcing journal clubs, etc. OpenWetWare is also the home or additional platform for several larger scientific organisations like the Institute of Biological Engineering (Lexington, USA), the OHSU Knight Cancer Institute Research Groups (Portland, USA) and iGEM, the international genetically engineered machines competition. Several facilities have discovered that OWW can help them organise their work. Examples include the MIT's BioMicroCenter, the University of Toronto's microfluidics foundry and the Fermentation Suite of the University of British Columbia, to name just a few.

While the social organisation of scientists makes for a large part of the activity on OWW, its content is by no means limited to this area. During its relatively short history, OWW has already accumulated a sizable library of biological protocols and material pages. Methods range from basic biochemistry of DNA, RNA and proteins to instruction for specific species, data analysis and modelling. Protocols can be general or lab-specific, in which case they are preceded by the lab name like Endy:FACS. The material pages contain everything from media recipes to individual enzyme descriptions, buffers, chemicals and dyes. For both, protocols and materials, there is

a central starting page which collects protocols automatically from the entire site using tags given to pages. However, most users find what they need, using either the OWW search functions or arriving via a Google search, where the well cross-linked pages of OWW often feature prominently.

Open access has a double meaning for OpenWetWare. Firstly, the requirements to receive editing access and becoming a con-



tributor are intentionally minimal. Basically, it only involves the registration process. There is no need for titles or expert status to get started on a protocol. Pages are built incrementally and all contributions are tracked and viewable via the history tab at the top of every page and the author box. Because real names are associated with the changes, there have been no recorded spamming or defacing incidences. Unlike in a printed journal or in a book, mistakes are quickly corrected and updates are incorporated in real time.

## Sharing results

The second implication of open access is the content licensing of OWW. The founders opted for a Creative Commons license, enabling sharing and building upon previ-

ous work. This means that, although the work has to be attributed to its authors, it may be freely distributed and altered as long as the derivations are shared under a similar license. Unlike with normal publishers, you can do so without asking for explicit permission. Assuming for example, you find a well drawn diagram on OWW, you can download it, alter it according to your needs and include it in a presentation as long as you give credit and use a similar license. In addition, if you upload your own material to OWW you do not give up ownership, unlike with much of your work submitted to journals. You can later republish and re-license as you see fit but you cannot retract the open access license of the previous versions that you placed on OWW.

OpenWetWare can be a free repository for your own information. It does not only safely store the data you choose to deposit but it also saves all previous versions, unlike a simple back-up of your local hard drive, making it easy for you to follow changes over time. The data is currently stored on rented Rackspace servers, which have several redundancies for storage, network access and power.

OWW could also be used to coordinate joint projects. One of the very active associations which are coordinated on the Wiki is the RNA Club, Zürich. It was founded to promote the interaction of local RNA researchers and includes news, seminar listings, member and project pages. The move to allow only registered users to edit was not only done to encourage responsible editing but also in the hope that contributed content will become a source of academic merit, complementing the traditional publication record. This long-term aim will, however, require some changes on OWW. Some form of content peer review will, eventually, become necessary. It is already possible for all members to make corrections on all pages and to comment on the content but, currently, there is no quantifiable system to rate the quality and importance of a page.

For the part of OpenWetWare that deals with protocols and materials, there are several profit-making competitors who thrive on scientists' demand for reliable method descriptions. Recently established journals like *Nature Methods* (since '04) and *Nature Protocols* (since '06) have become more attractive to many scientists because the contributions are counted as publications and listed in PubMed. Book-like publications such as the Cold Spring Harbor Protocols, formerly the Molecular Cloning compendia, and Current Protocols pay the authors

royalties for their contributions but the exact amounts are not publicised. The problem with this method of dissemination is that the copyright of the scientists' protocol is given away to the commercial publisher who adds a little value to the material via editing, layout, and distribution but then sells the information back to the scientists themselves at a steep price. For even the smallest scientific institution in Europe the annual subscription to *Nature Protocols* alone is €2,561, a figure that has gone up 7% within only a year – no recession here. A lab subscription to *Current Protocols in Cell Biology* only, for example, is priced at US-\$700 (€540) per year.

With declining use of printed material and the advent of free collaborative publishing platforms online, like the modified MediaWiki used on OWW, it is doubtful whether the value added by commercial publishers is really worth the money. Whenever possible, authors should consider making a preprint version of their manuscript freely available on OWW similar to the preprint submission to PubMed Central, now required for NIH and Wellcome Trust funded research.

Nature Publishing Group, CSHL Press and competitors have all realised to varying degrees that interactive user features will become increasingly important. *Nature Protocols*, for example, provides comment and discussion space. CSH Protocols allows updates of and comments on existing protocols. The user activity, however, has been relatively limited. In a one year-old issue of *Nature Protocols* containing 20 protocols, only one had received a single comment. Users are understandably hesitant to register with a dozen of different sites and it will ultimately be the strength of a unified platform that will persuade scientists to register only once to access several types of services from protocols to networking.

Updating is crucial because most methods, especially novel ones, are not static. Locking them down in the format of a book or a journal article means freezing them in a state that can quickly become obsolete as new findings emerge. In addition, allowing user contribution is important because there is hardly any one expert that has more unified knowledge than a group of expert scientists. Both updating and a broad writers' base are, however, incompletely incorporated by commercial publishers, whereas this practise is the very principle of OpenWetWare.

OpenWetWare was made possible by the hundreds of volunteer programmers

that wrote the underlying MediaWiki software. In the future, it will be important to adapt the platform to the special needs of scientists, whilst not breaking off the connection to the very active MediaWiki programmer community. OWW is already being extended, for example, with author lists for each article and with labbook features not seen on Wikipedia, but there is still a long way to go.

Currently, English is the principal language on OWW. However, there are small groups of pages from labs around the globe written in other languages such as French, Chinese or Japanese. Multiple languages are a major strength of Wikipedia but there is an argument for not duplicating a protocol in several languages. The effort may be better spent on improving a joint protocol, which will be in English for the foreseeable future like scientific publications.

### Online reputation

At the moment, all users are equal on OWW, although they have very different levels of education and experience. Sales platforms like eBay have already taken care to establish a system of online reputation, mimicking the social equivalent in a group. OWW viewers and members could also profit from such a system. Readers would be able to quickly estimate the qualification of a writer and act accordingly. For members, it could be a system for receiving credit for their currently largely unrewarded work.

OpenWetWare has come a long way since its humble beginnings as a small lab Wiki on the American east coast. Its dramatic expansion is mostly due to the tearing down of academic hurdles that traditionally had to be surpassed before any written form of intellectual contribution was allowed to reach the research community. Its further growth, however, would be greatly sped up by some form of recognition to the contributors. This is a wider problem in the current science merit system, where publications are the only real currency. Accomplishments in peer review, teaching and open access projects like OWW, have hitherto gone largely unnoticed.

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Fancy composing an installment of "Bench Philosophy"?

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