

# Virtual Public Networks

*First Author talks to Nature Publishing Group's Timo Hannay about the growth of networking site Nature Network Boston, and Nature's adventures in the virtual world of Second Life.*

## Social networking

The idea of networking is nothing new: love it or hate it, making contacts has always been a vital part of business, academia, and, of course, social life. However, transferred to the web, social networking is beginning to revolutionize the workings of the Internet itself, with 'friendship' links between pages and sites changing the way information is processed and the conduct of business and research. Although online networking sites did exist previously, it was in the early years of this century, added by new web tools like wikis, blogging and tagging, that social sites like [Friendster](#), later [MySpace](#) and most recently, [YouTube](#) and [Bebo](#), took off as a way to contact friends, meet their friends, share photos, music or video and sent reminders of birthdays and events. The music world was forced to take MySpace seriously when bands like the Arctic Monkeys reached the pop charts without having signed to a record label or released a single in the conventional way. Communications companies are now vying to strike deals with these services. For example, [Skype](#) recently agreed to provide calling services from within Bebo.

Social networking sites have now begun to be used to extend traditional media: an example is the [Sun Online's](#) attempt to construct its own networking site. Businesses have also seen their potential: sites such as [LinkedIn](#) and [Doostang](#) collect details of users' employment sector and educational history and use these data to establish targeted business networks for recruitment and deals. The way the site works, through introductions by colleagues or former classmates, is intended to build the trust of users in the contacts they make online.

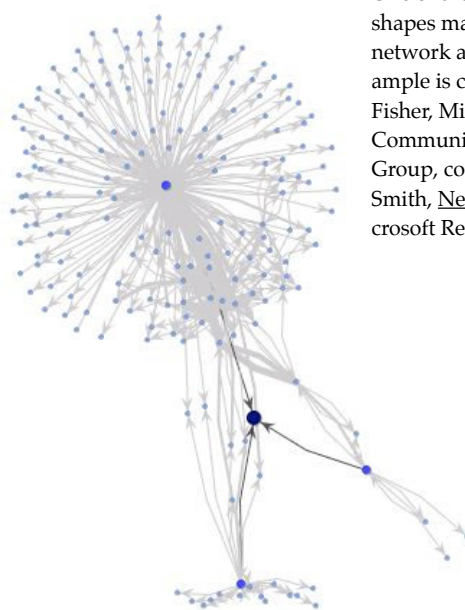
Academics have also begun to realize the potential of social networking. Like their business counterparts, sites like [Academi](#) ask members to enter details of their education, experience and interests. Users can then form groups and build discussions based on these interests. This has led to the formation of a wide range of mini networks involving academics and those in related professions from all over the world. Topics range from obscure, scholarly discussions to practical advice for PhD students to communications between publishers and authors.

## Nature's Networks

Nature Publishing Group has taken on the concepts of social networking with [Nature Network Boston](#) (NNB), launched in summer 2006 and soon to receive an upgrade adding discussion and message boards to the existing infrastructure for the creation of groups. NNB is also due to be joined by a sister site, Nature Network London, enabling a unique combination of local and international networking depending on context within the same network. First Author talked to Nature's Director of Web Publishing, Timo Hannay, about the new directions for the site.

**FA:** I noticed a comment from the editor of Nature Network Boston saying that the service is about to be re-launched as a global networking service, Nature Network. How will this operate? Do you see it as a network of local sites or a networking service without geographical boundaries?

**TH:** Both! It depends on what you are looking for. There will be a London-based site launching during 2007. We are working to build a more generic application that will make it easier to roll out new sites for different locations. The upgrades to NNB that are coming out in February next year will include messaging and discussion services and these will



One of the almost organic shapes made through social network analysis. This example is courtesy of Danyel Fisher, Microsoft Research Community Technologies Group, courtesy of Marc Smith, [Netscan](#) project, Microsoft Research.

allow researchers to form groups that can be either local, for example when discussing an event, or global, such as a debate on the avian flu pandemic.

**FA:** Who are the main users of NNB so far? Are they drawn more from the academic or commercial sectors?

**TH:** My impression is that our users tend to be academics. Like other social networking sites, NNB has attracted a younger audience than traditional journals.

**FA:** The new-look Network Boston will have a messaging service and discussion boards. How will this change the service?

**TH:** The social networking tools on NNB are a first stage at the moment. You can form a group, but the new services will allow these groups to operate as forums for the exchange of ideas.

**FA:** Do think scientists will be willing to share ideas freely in a networking space like NNB or are researchers usually too protective of their data to want to share in such an unrestricted environment?

**TH:** NNB allows three levels of group formation. The first is an open, public group. It has an administrator, but there is no system of approval, anyone can join. The second is called a formal group and, although the content is open, participation is at the discretion of the administrator. Finally, a private group is completely closed, with those not invited to participate not even being aware of the existence of the group. This can be used by labs who want to have an internal discussion about their work that is not ready to be made public.

## Second Life is Second Nature

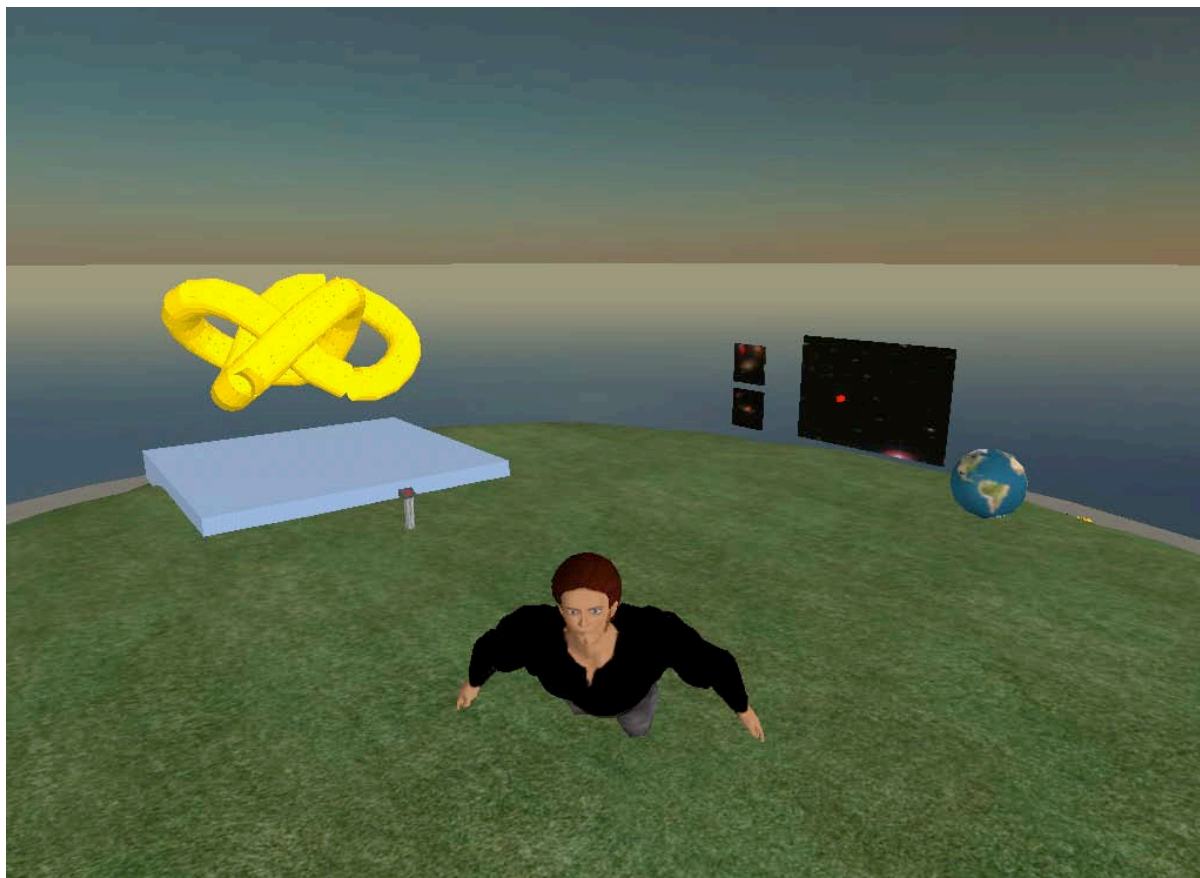
The success of many networking sites has been aided by the ability to add multimedia content. A genre of social networking site that takes this further involves the creation of an entirely new environment, build by members of the network, in which they then interact. The best known example of this is [Second Life](#) (SL), a 3D environment created by members using a simple scripting language and inhabited by their 'avatars', computer-generated animations that move around the world, create buildings and other content, and interact with other users. Famous for having a GDP and a carbon count higher than some real countries, the virtual world created by [Linden Labs](#) recently counted over two million users. Many are beginning to agree with Linden Labs' community and education manager John Lester that 'Second Life is no more a game than the Web is a game. It's a platform' (1). Understandably, businesses have regarded their potential avatar customers with interest. IBM recently announced plans to populate twelve islands to be used for conferences, training and commerce (2), while Reuters pledged to regularly cover developments in-world through their 'atrium' (3). Other initiatives that hope to bridge the divide between real and virtual worlds include Sim Teach's Second Life Education, whose [wiki](#) includes discussion of issues from how to host a conference in the real world and second life simultaneously to the ethics of conducting social research in-world. Meanwhile some charities have managed to raise over 40,000 (real) dollars from virtual campaigns (1). Further, in a reversal of the traditional concerns over the detrimental effects of computer games on the development of social skills in children, there are already reports of therapists using SL to teach communications skills to autistic children (4).

The rather extreme example of a psychiatry professor who inflicted hallucinations on the avatars of his students in order to improve their understanding of schizophrenia reveals how much visualization can aid comprehension (4). This is also true in other scientific disciplines: for example, in the field of structural biology to design appropriate experiments to test interaction between molecules the use of 3D models to provide details about binding is crucial (5). Visualisation becomes increasingly important, and simultaneously more difficult to achieve using conventional methods, when examining interactions in large complexes. Electron tomography allows the creation of three-dimensional models, which be invaluable for cases in which the entire structure of an interaction network is not known but can be homology modelled on the basis of structures determined in related species (5). To allow these models to become more accurate representations of the physical world involves the addition of data such as expression patterns. Placing such models online, therefore, has the added advantage of allowing constant communication with datasets containing such information.

NGP has been swift to realise the potential of virtual worlds both for interaction and visualisation: [Nascent](#) recently announced the creation of a Second Life island, Second Nature. I sent my avatar to visit. Second Nature was newly created and a fairly barren place on my first visit but it was already beginning to be inhabited by some interesting little gadgets. One of these was the Magical Molecular Model Maker (M4) created by SL experts the [Electric Sheep Com-](#)

pany, the development of which was overseen by Joanna 'Wombat' (in first life, Joanna Scott, a member of the NPG team). Resembling its familiar school bench predecessor, it works by creating 3D models which can be requested by simply by entering the name of the desired molecule.

On my second visit, further fascinating creations had begun to converge on the island: a miniaturized version of the real world had appeared in the shape of a globe, near to a strangely flat, though simultaneously 3D, model of the universe. Both maps enable the user to point to a part of the sky map or to direct a 'virtual telescope' at the SL sky and zoom in to view that section of the world or universe in detail. Floating overhead were a collection of objects, notably including an Escheresque knot, created by avatar Matt Basiat (programmer Matt Biddulph), which constantly formed and reformed its tubular limbs to create 'ideal knots'; curves which maximise the scale invariant ratio of thickness to length. I returned to Timo to learn more about what was behind these creations and the aims for Nature's virtual space.



*A postcard from Second Nature, showing the ideal knots and universe models.*

**FA:** Are you expecting to attract different audiences for Second Nature and Nature Network Boston?

**TH:** Although the two services are similar in that both are social tools that improve the more people use them, Second Nature is much more experimental than NNB. I'm convinced that someone will make social networking work for science, simply because science is all about collaboration; this is shown by the way papers are coauthored and team work on research and development. So Second Life is a way of 'playing' with some of the possibilities offered by the format, particularly with visualization and collaboration.

One example of the use of visualization of data retrieved remotely is the Magic Molecule Model Maker (M4). While this was initially based on hard-coded atom coordinate data, the latest version under development retrieves structural data remotely from the [PubChem database](#). The universe models similarly make use of astronomical survey data from the Sloan Digital Sky Survey. The built-in scripting tools of SL (Linden Script Language) meant that this sort of thing is far easier to display than it would be if we were to build it as a web application. The ideal knots, which have wide relevance in disciplines as diverse as DNA biology and quantum physics, are an example of the use of Virtual Reality Modeling Language (VRML) data sets to create SL objects. Another use of VRML that we are developing currently utilises electron tomography data sets of bacterial cells from [EMBO](#) data (6).

In terms of collaboration, we have already held some team meetings on Second Life and we are constructing some venues on the island to house meetings as well as an induction area to explain the concept of Second Nature to new visitors. There are certainly instances when it is useful to be able to demonstrate a concept visually during an online meeting, and we have already had a request to host a lecture for PhD students on the island.

**FA:** So it sounds like Nature is planning to explore various different types of social interaction online. You did a [feature about Perplex city](#) on Nascent recently. Is this type of online game another possible forum for Nature?

Perplex city is an innovative alternate reality game by [MindCandy](#). Some of their teams, who happen to have scientific backgrounds, came to Nature recently to tell us about their work. Nature has never got directly involved in education, although of course NPG has produced textbooks, but something like Perplex city could be very interesting from that point of view. Already several of the questions are quite related to science or maths as well as popular culture, so it could prove a useful educational tool and I think that if Nature did get involved in education, an imaginative online game would be a great way to do so.

## Conclusions

So will social networking become an established tool for academic communication? Networking was always an uncertain venture, fraught with the perils of calling someone the wrong name or being ditched for someone more important. Naturally, there are also drawbacks, albeit different ones, to exchanging in a network with a collection of strangers represented only through a username or avatar. Second Life has already faced a host of legal problems, including law suits over the sale of virtual property. For any significant advance in scientific collaboration in the context of social networks, there will have to be clear means of identification and protection of the new types of intellectual property that are emerging.

There is also the question of the longevity of networking sites: MySpace, desperately cool six months ago, is already losing out to Bebo. The retention rate of users in Second World is also surprisingly low, at around 10% (5). This acts as a disincentive to invest time creating content and build up webs of connections for a brief period of pay-back before having to repeat the process on a new platform. Nevertheless, it is only through participation that social networks can evolve to suit the changing demands and requirements of real life research. The graphic representation of a social network shown above reveals the power of multiple overlapping connections: such a web grows stronger the larger it gets, allowing all users more opportunities for networking, whether to find an answer to a particular question, exchange content, or find the perfect partner for specialist collaboration.

The examples of in-world collaborative creation in Second Life are beginning to suggest that the participation of scientists in such networks could go beyond traditional networking and discussion, towards the provision of new platforms that transform the way research is conducted and communicated. Perhaps most important, however, is the potential of virtual world for visualisation based on ongoing communication with datasets. This capacity of online networks may be key to the comprehension of biological networks and chemical structures. It is hard to dismiss the view of Jaron Lanier, a veteran of virtual-reality experiments, that Second Life 'unquestionably has the potential to improve life outside' (4).

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