DEMOCRATISATION OF SCIENTIFIC INFORMATION

January 2010

Introduction

This title arose out of discussions the author had with Richard Boulderstone of the British Library who pointed out that there was a need to consider how Web 2 and social networking trends in general were impacting on scientific and technical information (STI). For convenience, these various social networking trends were combined under the catch-all term of ‘democratisation of STI’.

This area gets very little attention as STI has a culture all of its own, protected by licensing arrangements put in place by publishers, and supported by a research community which still seeks recognition and acceptability based on traditional forms of evaluation. However, there are growing concerns that the licensing model is no longer appropriate in a digital world, and there is speculation that the current STI system in general is less than effective and some claim it has become downright dysfunctional (see previous issue of ICSTI Insights). Changes are occurring in a variety of ways, many of which are opening up STI to wider scrutiny.

Much of the information in this report is compiled from an ongoing doctorate programme at UCL entitled ‘Information habits and needs of global disenfranchised Knowledge Workers’. It is contended that knowledge workers represent a particular new area (or market) for STI arising out of the democratisation processes.

Structure of Report

There are several interacting forces at work which is leading to what some might consider greater democracy in the provision of scientific information. These forces have been identified as:

- Market trends
- Technology developments
- Business models
- Administrative changes
Social systems

The net effect of these interactions is that the debate has surfaced again in recent months questioning whether these democratisation features are spelling the decline of the STI publishing system as we know it. The conclusion, focuses on whether democratisation (and its leading weapon, ‘openness’) can coexist with the formal, somewhat ‘elitist’, STI publication process, or whether all existing stakeholders may need to revise their portfolio of products and services in the light of emerging external trends.

Google, Wikipedia, FaceBook, Twitter, iPhone, PC tablets and related phenomena allow no room for complacency even within the specialist area of scientific publications. One commentator on the scholarly information scene, US based consultant Joseph Esposito suggests that “This is because in a networked world, the number of nodes connected to a network matter (Metcalfe’s Law), and the consumer market has the big numbers. Scholarly needs will be layered on top of consumer infrastructure. Rather than ask, What kind of technology should we bring to the platforms of an academic institution?– we should be asking, How do we meaningfully layer academic needs and interests onto the platforms of the consumer market?” (Esposito, 2009). The consumer market is already using features which are likely to spill over into STI in due course.

This interplay between consumer markets and scholarly information markets has been marginal in the past. We think of scholarly communications as having unique attributes which distinguish it from the rest of the information industry. However, these specialist attributes may be subject to destruction from some of the democratic trends which are now enveloping the market, being facilitated by ubiquitous technology, and being pushed through by administrative support for open access.

Market Trends

Here it is important to look at the demographics of the information industry. Several consultancies (Gartner, Outsell amongst others) have highlighted that there are between 600 and 800 million ‘knowledge workers’ in the world. These are people who have higher education or similar training, but rather than practice within the closeted garden walls of an academic, governmental or corporate research institution, have established careers in the professions; are involved in a career transition; who work in developing world countries; who are so-called ‘amateur scientists’ eager to keep abreast of a subject in which they have personal interest but not related to their primary work activity. They can also include patients who are seeking everything there is to know about the illness they are suffering from. And there are more:

- Financial and City traders (interested in the exploitability of the results of research projects in the corporate world)
- Policy makers, administrators, research funders
- Government officials
- Engineers, such as those located in remote locations for long periods such as at oil rigs, construction sites, etc.
- Entrepreneurs, particularly in small and medium enterprises (SMEs) which have a strong scientific, technical or medical emphasis
- Distance learners, unable to gain easy access to a local institutional libraries
- People retraining or developing new skill sets
- The general public involved in global warming and climate change, environmental protection, etc.

**Overview of areas of knowledge workers**

Joseph Esposito, has given his personal list of information needs in one of the industry blogs. This highlights the situation facing many of the emergent knowledge workers.
“What I really want is remote access to the digital collections of the University of California, one of whose campuses is a mere 100 yards from my house. As I do not have a university affiliation, the only way I can use the digital collections is to go on campus and use a computer within the walls of the library. This would not be so bad if I were involved with a research project that required me to spend the better part of a day at the library, but for the most part my research needs are one-shot questions — the need to look up a single article from a journal, perhaps, or a desire to check out the etymology of one word in the Oxford English Dictionary”.

However, restrictions are placed by the publishers of much of the information he wants because of the nature of his (non-academic) occupation. It is inconceivable that he, or many like him, would be able to buy the required access to the diverse spread of relevant published information from his/her personal resources. The use made of a subscription would be casual and infrequent, and would not warrant an annual fee of several hundred dollars, pounds or Euros. This is the problem facing knowledge workers, and why they are “disenfranchised” from the STi information system.

The Gartner Group, a US-based consultancy, has estimated that knowledge work now represents the majority of jobs across multiple industries in developed communities. “Virtually nonexistent only 100 years ago, knowledge workers now make up the largest slice, 40%, of the American workforce” claimed business management guru Peter Drucker. He further suggested that “Knowledge worker productivity is the biggest of the 21st century management challenges... (it is the) only real competitive advantage in a global economy”. And it continues to grow. According to Morgan Stanley economist Stephen Roach “This is, by far, the most rapidly growing segment of white collar employment. Over the past seven years .... knowledge worker employment growth has averaged 3.5% per annum, sufficient to have accounted for fully 73% of total white collar employment growth over this period”.

But whilst there has been growth, it is not necessarily the case that they have become more productive as access to relevant information has fallen short of their needs. To take one part of the knowledge worker market – those employed in businesses - according to the Delphi Group, today’s knowledge worker costs an organisation $120,000, but each wastes about 30% of their day searching for information. The inefficiency loss amounts to US$36,000 per employee per year. This is a challenge facing the information industry as a whole – to come up with services which eliminate the loss of time knowledge workers face in coming up with relevant information to make their activities more efficient and productive. The competitive pressures of a globalised world are making productivity tools the lifeblood of any organisation that wants to stay one step ahead of its industry rivals. The high wage economies of North America and Europe, which now find themselves competing with the emerging BRIC (Brazil, Russia, India and China) economies can only compete in this ‘survival of the fittest’ with tools that significantly boost knowledge worker productivity.
It is a sine qua non that an educated society extends and nurtures both the range and scope of personal interest in scholarly information. This is something which has traditionally been denied them in the era of printed books and journals and the DRM (digital rights management) systems which surround them. However, the new digital world potentially breaks down the old barriers to the exclusivity of STI. It is now easy to know what has been published, by whom and when.

Technology trends

As has been reported in previous ICSTI Insights, the dramatic changes which have occurred in the efficiency of digital and network technology have driven the price of hardware and communications down to almost zero, and has produced new technical ICT devices which have been adopted by young and old. The mobile phone is one example of how a small device is now expected to provide a wide range of features un-thought of five years ago.

But perhaps the biggest impact arising from technological change has been Google. It transformed, within a short period of a decade, the search process so that it is usually the first port of call for anyone – academic, knowledge worker and layperson alike – seeking information. It does not always provide the most accurate or pertinent information, but it is usually seen as ‘good enough’ or as a starting point at least. The key issue, though, is that it opens the eyes of the world’s knowledge workers to what is available and to what has been published in their areas of interest. In the text-based world such information was not available and researchers became almost complacent in their enforced ignorance. Now, through services such as Google, their eyes have been opened. And in many cases they may want to get more, to get access to the specialist publications.

Google works because it relies on the millions of individuals posting websites to determine which other sites offer content of value. Instead of relying on the wisdom of editors – the STI traditional approach – Google ranks every web page using its PageRank system – the power of the user, or a more democratic approach. A few years ago Google issued a document entitled ‘10 things Google found to be true’. It described their success as being intricately linked to listening to the wide community of information users. In particular, one of their truisms was that ‘Democracy on the web works’. The more the sites, the more the votes, the greater becomes the ability of Google to give the users what they want – democracy in action.

But in many cases Google and its many related services can only go so far. In STI at some stage they send the user crashing into a DRM gate through which they cannot enter. The metadata is provided free – the fulltext is less accessible for the wider audience.

Business Models
Most traditional STI literature is protected by garden gates and walls which reject access. Their need to pass through authentication and authorisation procedures is thwarted because they are not affiliated with an institutional library which subscribes to the journals or books they need. As far as the community at large is concerned this runs counter to their whole experience of the Internet which essentially involves free access to information. ‘Openness’ both of the software and of content has become a distinct feature of the Internet and frustrations arise when the ‘occasional’ knowledge worker wants to look at a particular item, unpackaged from its subscription entitlement, in detail.

The concept of ‘Free’ information has been explored recently in Chris Anderson’s book (2009). In this he reflects on the huge changes which are brought about when one moves from even the smallest of price charges imposed on a good or service to one where there is no charge at all. ‘Free’ opens the floodgates to usage. Venture capitalist Josh Kopelman of First Round Capital highlighted the fact that there is a huge divide between things which have a price tag of any sort on them, and those that are completely free. “The biggest gap in any venture is that between a service that is free and one that costs a penny”. The imposition of a price, no matter how low, typically decreases participation, often radically, according to Anderson.

It challenges one of the main planks to twentieth century business practice – that there is ‘no such thing as a free lunch’. Anderson showed that through cross subsidy of activities, through giving something away but seeking income from other related or premium services, it is still possible to survive commercially in a ‘free’ economy. This is something STI publishers have been loath to do in the past – giving away access to the full Article of Record and relying on peripheral and other value-added income streams for their revenues.

Set against the Anderson’ Free’ notion come recent research results from the Boston Consultancy Group (2009) which claims that people are willing – under certain circumstances – to pay for information particularly from newspapers. In a survey of 5,000 individuals conducted in nine countries, BCG found that the average monthly amount that consumers would be prepared to pay ranges from $3 in the United States and Australia to $7 in Italy. A BCG representative claimed “The good news is that, contrary to conventional wisdom, consumers are willing to pay for meaningful content. The bad news is that they are not willing to pay much.” The survey found that consumers were more likely to pay for certain types of content, specifically news that is:

- Unique, such as local news (67% overall are interested) or specialized coverage (63% overall)
- Timely, such as a continual news alert service (54%)
- Conveniently accessible on a device of choice

There is here a slight glimmer that the great unwashed may pay for timely, specialist information from authoritative sources but at a very low price. They are specifically not
interested in paying for news that is routinely available on a wide range of Web sites for free.

But some publishers have already taken the plunge and sought a more democratic (and totally ‘free’) exposure to their publications. The Gold open access movement in particular relies on authors (and their supporting funding agencies) paying upfront in order to allow anyone to access the article for free. It has also spawned much debate on how effective, viable and sustainable Gold open access is as a business model. There are a growing number of examples of Gold OA, but so far with limited evidence on whether they are profitable and scaleable (unless, like Hindawi, they are located in very low cost countries).

One other branch of open access which is also attracting much excitement and scorn in almost equal measure is Green OA (authors archiving their publications in local Institutional Repositories (IRs) or subject-based repositories (SRs)). This allows anyone worldwide to access any article on any IR or SR for free. It is a powerful driver towards greater democratisation of information.

Both open access movements have fermented a growing interest in open access information. Particularly as it is claimed that most of the information published behind subscription and licence restrictions was created using public funds. The feeling has grown strongly in recent years that it is illogical for research to be funded by the public purse, but for access to the results to remain controlled by commercial and learned society publishers.

Other business models are also being introduced which take into account the occasional use of an extensive knowledge worker network. These include Pay-per-View – a user may pay an amount (for STI it can be as much as $30) to buy access to one particular article from a publisher’s online site. In the past this barely created a revenue stream – ten years ago it was cited by Karen Hunter from Elsevier that 2% of their corporate revenues came from PPV. Use of Google and other search engines’ exposing the content of publisher’s material on the web has increased the PPV proportion of publisher’s incomes, but so far it has hardly been a great success. One recent study showed the following for a sample publisher:

**Use of a representative Publishers’ STI Platform**

- Traffic per year: 40 million visitors
- Non-institutional traffic per year: 20 million visitors
- PPV sales per year: $1 million
- Average article price: $25
- Number of PPV transactions: 40,000
- PPV conversion rate of non-institutional traffic: 0.2% (40,000 transactions/20 million visitors)
The finding that 50% of the publisher’s visitors were non-institutional is similar to the proportion of fleeting visitors defined as being ‘promiscuous’ by CIBER in their deep log analysis of use of publisher platforms such as Emerald. This indicates that the former reliance by publishers on the institutional library market as their prime if not sole source of revenues needs to be re-thought. They may consider the benefits of democratising (and monetising) their product to enable a much wider community of knowledgeable people to access the information.

It has to be said that this is not universally applicable across all subjects and disciplines. Though derided at the time, Dr John Jarvis (then CEO of Wiley UK) in his contribution to the UK Select Committee investigating Scientific Publications (2002) may have spoken some truth when he said that scholarly publications were not written for, and therefore not relevant for, the mass audience. That only the experts would understand them. In areas of high energy physics, in specialist areas of bioinformatics, etc, this is undoubtedly true, but there are many areas where a rewritten article to reach a broader audience would indeed have mass appeal. The challenge and opportunity is to determine where these areas are and how to meet their demand.

Another business model which is also being touted is to extend the range and functionality of the library. Many librarians would like to grant remote access to their collections for their institutions’ alumni, and alumni are willing to pay an additional, if modest, fee for such rights. On the surface, this sounds like a neat solution. A library already has much of the infrastructure in place: subscriptions to publications, a means to make digital collections available remotely, and authorisation schemes to determine who is and who is not a bona fide user, not to mention years of experience in determining what materials are worth including in a collection. A publisher that charges, say, $1,000 for an annual subscription to a library, may grant alumni rights for an additional 10%. This is potentially new found money for the publishers.

However, enabling libraries to become broader resellers of materials is not necessarily in the publishers’ interests. Alumni go out in the world to take jobs in corporations, and would take their alumni privileges with them. It would undermine the much more profitable income publishers get from selling directly to corporations.

It is theoretically possible (though unlikely, practically) for publishers to collaborate, to create consortia whose aim would be to monetise the demands of countless knowledge workers, people who have a need to get access to the vast collections of a major university library, but whose anticipated use of any single publication is modest. This is a prospective market segment that will pay for information - it is, in other words, a market and not an unfunded social need. Consortia have served publishers well in other areas; consider CrossRef, the Copyright Clearance Center, and the recent development of CourseSmart, a joint venture of the major college textbook publishers, whose goal is to
advance the sale and use of digital textbooks. A carefully planned joint venture could open up a new market segment. For the price of a single subscription, an individual would then get remote access to a vast digital library. The cost of a subscription could be in the region of $500 to $1,000 per annum? The proceeds, after subtracting the cost of operating the service, would be shared pro rata by the participating publishers. An overall $1,000 subscription would yield pro rated income to the participating publishers,

The reason publishers resist this kind of formulation is that they mistakenly add up the value of all the content they create and confuse it with the amount of time an individual actually has to spend with any single publication. Few people who are not themselves academics or professional researchers spend many hours doing research. They can’t, as their days are filled with meetings, phone calls, email, and traipsing to and from airports and trade shows. The question for publishers to determine is not how much is a publication worth but how much of an “information tax” they can reasonably impose on one hour of a knowledge worker’s time. The profile of a publication for this service is one that is delivered electronically, has a casual readership beyond the world of specialists, and has little in the way of individual subscribers.

After all, knowledge workers can be complex characters – they can be a prominent professional in their own area, as well as a parent, a sports fanatic, interested in cultural events, an amateur scientist. An information service which can tick a range of boxes without being too broad may prove to be the type of ‘customised’ or ‘personalised’ information service which many pundits have called for over the decades. Now technology is available to enable this to happen. Only the current business structures and business philosophies stand in its way.

**The wider market for STI**

The following chart illustrates the central theme of this report - the Nautilus model for scholarly communication. The participants at the outer circles of interest may need some guidance in evaluating the material. For these readers, formal publication validates a work and asserts that it is worth paying attention to. So we can imagine all scholarly communications as a nautilus spiral: the inner spiral represents the researcher’s (and author’s) intimate colleagues; the next spiral is for people in the field but not working exactly on the topic of interest to the author; one more spiral and we have the broader discipline; beyond that are adjacent disciplines; until we move to scientists in general, highly educated laypersons, university administrators, government policymakers, investors, and ultimately to the outer spirals, where we have consumer media, whose task it is to inform the general public.
Something may be lost in translation as research data moves outward from the core research colleagues to the disciplines beyond that. Without the “translators,” however, which consist of the editorial review systems of traditional publishing, the loss would be great, as many readers would not be able to determine the relative value of different publications. **At each spiral away from the centre, the role of the publisher grows and**
the merits of open access diminish. Researchers not familiar with the author will seek a way to evaluate his or her work, and a publisher’s brand is a form of insurance. Formal publishing, in other words, assists an author not in speaking with a tiny group of peers but to a broader audience beyond them.

A different, much more tertiary, form of publication may emerge in order to effectively translate science to the masses. This is expensive, and needs a business model which protects the rewriting of research reports to serve the wider market. Open access will not operate in this environment. Which is a bit of a dichotomy – on one hand it would appear that democracy is best served by openness and freedom, but for the democratic reach to be effective openness must be eschewed in favour of a paid-for information service in one form or another.

A different view on the opening of the market, but with the same conclusion – that there will be growing recognition of the need for experts as sifters – has been provided by Andrew Keen (2007). In his book on ‘The Cult of the Amateur’ he claims that we lose the sense of ‘value’ and ‘quality’ in going down a mass market consumerism path. Authors will become self-promoters, with the need to sell themselves to advertisers to get recognition and sales. It will create a totally different information system which will become less equal, less egalitarian. Access paths to information will have to change. All this could result in the emergence of a Web 3.0 where the role of the ‘expert’ is reinstated. The scenario of mass culture without quality is disturbing enough to be the catalyst for the return of those who can provide selectivity and quality to the information disseminating scene. According to Keen we need to eschew the consequence of Web 2.0 and rebuild value into the information sector. In this respect the role of the editors and publishers becomes vital again.

The impact of the democratisation process is not only felt in opening up the demand for publications. It is also to be seen in the creation of research papers. As Dr Liz Lyon (UKOLN) described in the ICSTI Summer Conference in Ottawa, ‘team science’ is capitalizing on sharing of input into a research project from a number of sources, national as well as international. The growth in the multi-authorship of research articles over the past decades has been a trend described by M. Mabe (STM) and others; the more recent growth of collaboratories working as remote teams has accentuated the process. It is a reflection of science no longer being the preserve of the individual working in isolation. It has become more of a social activity. Whilst it can hardly be classed as democracy, it does mean that the infrastructure is being built to enable more and better communications, a feature of democracy.

One of the tasks currently being undertaken at University College London (CIBER) is that of quantifying

(a) The numbers of ‘knowledge workers’ in each discipline and subfield worldwide
Their respective needs for and usage of scholarly information artefacts

Possible payment mechanisms which may be appropriate

How important it is to have ‘an expert opinion’

It is strange that this activity is focused through an academic institution rather than being part of an industry-wide activity fronted by the publishing (and related) business sectors. In the meantime there are strong indications that there is an emerging interplay between the masses and the sciences.

Citizen Science

As was referred to in ICSTI's Annual Conference (June 2009, Ottawa) there is now a clearly identifiable segment of society that has a need to engage with the latest scientific developments, not just as passive observers. The culture of ‘citizen science’ is emerging. The Wikipedia entry for the term Citizen Science states:

“Citizen science is a term used for projects or ongoing program of scientific work in which individual volunteers or networks of volunteers, many of whom may have no specific scientific training, perform or manage research-related tasks such as observation, measurement or computation”.

The Internet has created new opportunities for the lay person to participate as both users and creators of scholarly information. The Internet is a leading component of the ‘democratisation of information’ process. This is particularly evident in the use being made of some of the world’s leading data centres. Data is now easily shareable. For example, the Sloan Digital Sky Server (http://cas.sdss.org/dr5/en/) contains some three terabytes of free public data provided by 13 institutions with 500 attributes for each of the 300 million ‘objects’. In effect it is a prototype virtual e-Science laboratory. In astronomy, some 930,000 distinct users access the Sky Server.

This is in contrast to the 10,000 officially recognised ‘professional astronomers’ worldwide. The amateurs exceed the professionals by almost 100 to 1, and this could be but the tip of the iceberg. Over the past six years there have been 350 million web hits on the Sky Server.

If we take the participation theme a step further and extend the science team to include interested volunteers or amateur scientists or citizens, then some other examples emerge. In several domains, citizen science has a long history - for example, the Victorian naturalists and areas of ornithology (e.g. National Audubon Society Christmas Bird Count which has taken place annually for over 100 years), astronomy, meteorology and archaeology, where an emphasis on observational recording was central to the science and to the scholarship. We are now seeing a veritable resurgence in citizen science with
the social culture of the Web beginning to influence and radically change the way science is performed.

The announcement of the formation of the Citizen Cyberscience Centre, a collaboration between CERN, UNITAR and UNIGE, is a strong indication of the perceived importance of this approach, particularly for international collaboration, for developing countries and for neglected diseases. It is indicative that the move towards a democratized science is not confined to a few select areas – it has a broad base particularly in environmental subject areas.

A mature open science example is GalaxyZoo, which has developed a community of amateur (armchair) astronomers who collectively help to classify galaxies via customised user interfaces, successfully combining human observational and pattern recognition capacity with categorisation capability. The public work alongside disciplinary experts in a truly global initiative to help to collaboratively map the universe. In the ‘GalaxyZoo.org’ web site there are some 27 million visual galaxy classifications, many provided by the general public. 100,000 people participate in open access blogs.

In a further example in the UK, the BBC LabUK Initiative is harnessing community effort in online experiments and is seeking to work with scientists to help solve professional research challenges which are suited to the type of mass participation which can be achieved through this medium. Exemplars such as BBC SpringWatch, eBird and Bioblitz Bristol have harnessed Web and mobile technologies to engage the public in collecting natural history data and this approach is particularly effective for monitoring species living close to humans.

Democratisation is also to be seen in some of the innovative collaboratory clubs which have arisen. In a recent book describing the new ‘wikinomics’ business models, the authors Tapscott and Williams contend that the conditions are emerging for ‘the perfect storm’ in corporate R&D. The interactions which occur between new platforms for social collaboration; the new generation of those who are accustomed to collaborating; a new global economy which supports new forms of economic cooperation; and a new business model which aligns itself more to the world of the Internet than to the book – all these have an impact on the way research corporations conduct their R&D.

The days when organisations such as IBM, Linux, Motorola, HP, etc conducted their own R&D efforts within their own labs are disappearing according to Tapscott and Williams. They now open up their R&D efforts to the professional community at large, to the world of skilled users, to knowledge workers. A collaborative approach has developed, with these companies exposing their formerly cherished software programmes and research results for all to use and, in so doing, improving them at a fraction of the cost it would take to do so in-house. It also enables speedier and more innovative developments as the power of the community exceeds the power of a few dedicated in-house researchers. Google has been a classic adopter of this approach, offering its APIs for other
organisations to apply to other datasets and create new ‘mash-ups’. Transparency, the disclosure of pertinent information, is a growing force in the networked economy.

The key restrictions to prevent a more widespread development of this democratization of science are the barriers created by the publishing industry, both financial and legal, to protect the commercial viability of individual refereed research papers carrying their logos. The question is how long and how entrenched will these barriers remain.

**Administrative Changes**

Whilst there are indications of a latent market for the occasional article, what is needed is a more open and barrier-free information service, one which the vast number of knowledge workers would be able to access, if full democracy is to be achieved.

The sticking point is that publishers see no profitable outcome from an open access business model in relation to the subscription/licensing one. This has led to controversy between the established, traditional publishers and those who advocate the adoption of free access to scholarly information, a controversy which at times has become emotional.

There is lack of evidence that the open access publishing systems are viable and scaleable, or that the Green (author archiving) system in particular will affect the commercial sustainability of the subscription/licensing model (toll-based) system. This is currently under investigation through a European Commission funded project within which CIBER at the University College London is analysing the usage logs of publishers’ journal platforms and comparing these with the usage of several institutional repositories. The results of this analysis, and the economic models which will be derived, will only appear in 2011. Meanwhile the degree to which open access systems will emerge and open up an easy route for the greater democratisation of scholarly information usage will remain uncertain.

Several leading research agencies and research councils have anticipated that a viable open access system will prevail and are instructing the beneficiaries of their funding to deposit the research results in open access repositories, either institutional or subject-based. This is particularly the case in the UK where the Wellcome Trust has been pioneering support for both Gold and Green open access dissemination, a lead which has been followed by all the main UK research councils. Should such administrative insertion into the creation of published information become global, this would be a major driver towards democratic usage of scholarly information.

**Social changes**
However, the real impetus for a move to a more demographic STI system will lie in developments taking place at the social level. There is a link between democracy and what has been defined as ‘the commons’. ‘Commons’ is a resource shared by a group of people that is subject to social dilemmas. The term ‘tragedy of the commons’ was highlighted by Garrett Hardin (1968). In that article he created the memorable metaphor for overpopulation, where herdsmen in the Middle Ages sharing a common pasture put as many cattle as possible out to graze – each acting in their own self-interest but ultimately ensuring the collapse of the common land for grazing purposes. How does the tragedy relate to the process of democratisation? It highlights that ‘information’ would not suffer the same fate as any other product or service, which could become over-used, because unlike anything else information is not ‘subtractable’ (or suffer from competitive claims against each item). In fact it is cumulative. Information shared is of benefit to everyone, and does not mean a loss to the originator or other users. So information is ideal in its function within a democratic process.

The democratic move maintains at its heart that information is seen as part of the ‘commons’ and therefore should be accessible to wider society. The Internet provides the mechanism for greater interaction, for easier communication, with like-minded individuals throughout the world. This is changing the goalposts in many aspects of social interaction, notably that specialists, elevated to an elitist position in society, can be challenged. The power of the people is becoming evident, a derivation of a social mechanism traditionally termed ‘wisdom of the crowd’ (Surowiecki, J (2004). Consensus among the crowd is achieved by virtue of a mathematical truism – if enough people participate the errors cancel themselves out. Whilst with most things the average is mediocrity, with decision-making it often results in excellence.

Wisdom of the crowd debunks the idea that experts are always right. If the net is spread more widely over a much greater number of interested people, the likelihood of a ‘correct’ answer being reached is much greater. In scholarly communication this comes up against the refereeing system, the bulwark of traditional scholarly communication. Instead of reliance on the decisions of one or two experts on whether a particular research article is of value, the wisdom of the crowd, or the power of the people, suggests that more interactivity in the assessment process would produce better results. There are many indications of traditional refereeing being slow, inaccurate and self-serving – introducing more democracy into the process would resolve some of these problems.

Related to the ‘wisdom of the crowd’ is the sociological concept – ‘the Long Tail’. As put forward by Chris Anderson (2006) it was mainly aimed at showing that the large number of small transactions which are possible to make on the Internet (such as book buying through Amazon) more than made up for the few large transactions which came from the core market. However, the same principle exists for potential users of STI information – the many disenfranchised knowledge workers could create a demand equal to if not in excess of that currently shown by the institutional research libraries. The long tail in this instance is the millions of engineers, teachers, other professionals, SME’s, interested
laymen, etc. What is required to transform this current latent ‘long tail’ of the disenfranchised into a buying community for STI is an appropriate business model and some ‘tipping points’ being achieved (Malcolm Gladwell, 2000).

However, the scholarly research communication still remains wedded to the double blind refereeing system despite the availability of interactive, open refereeing systems – in part because the established system is closely attuned with the traditional methods for research funding, assessment, promotion, tenureship, etc. No one wants to rock the boat – though for how long the boat remains buoyant remains a question as the rest of the social institutions adapt to greater openness and democracy.

Democratisation and the Future of Scientific Publishing

How will the confluence of these various trends – social, technical, and administrative – impact on the current structure and viability of the scholarly publishing system?

In the previous ICSTI Insight, a number of reports were mentioned which referred to concerns about the ‘Decline of STI’. This question was raised by Michael Nielsen (2009) in a blog item about the future of science. His premise is that there are a number of industries which have been sidelined because they were structurally unable to cope with the new economics facing their particular industry sectors. It is because the underlying structure of their industry, primarily their scale of operations, was unsuitable for the new and emerging market. As identified by Michael Nielsen, the immune system of scholarly communication is strong in protecting traditional publishing formats and systems. The question is whether their existing scale of operations will sustain STI organisations given the economic, financial, social and technological challenges they are facing. Nielsen asserts that large publishing houses will have to compete with new companies which are focused on meeting specific new digital demands within the information industry.

He claimed that in ten to twenty years time “scientific publishers will be technology companies”. “Their foundation will be technological innovation and most key decision-makers will be people with deep technological expertise”. He suggests there is a flourishing ecosystem of start-ups in scholarly publishing that are experimenting with new ways of communicating research, radically different in approach from journals. They are better prepared to cope with a change in the techno-market conditions, and the emerging democratic trends, than those publishers wedded to the elitist principles.

If democracy becomes a key component both of the supply of scholarly material and the usage of it, will the ‘power of the people’ dislodge the experts from having a crucial role in determining what become part of the Minutes of Science? Or will the wider audience which will be targeted by the new democratic STI publication system demand even more sifting, validating and re-wording of research material to make it more comprehensible and useful for their purposes? Will this produce a new profile for publishers, balancing both primary research output with tertiary reviews of scientific progress?
At the heart of the debate is still the question – how big is the potential democratized market for STI? We have large global numbers – 600-800 million – which contrasts with the 30 million or so who are current automatic beneficiaries of the licensed-based publishing system. Even if these knowledge workers only bought one research paper a year on average, the resulting distortion to the publication system would be immense. At the height of the document delivery business the combined delivery of all the key national docdel centres was less than 10 million documents supplied per year. Would publishers whose online platforms would be at the forefront of delivery of refereed articles be able to cope with the traffic and the micropayments processes required to support hundreds of millions of items delivered?

Or will we keep with the existing players and the same STI publication system as publishers shore up the protective procedures around their output? As referred to earlier, University College London is one centre which is investigating the dynamics of the relationships between enfranchised and disenfranchised knowledge workers, and intends providing hard, quantitative evidence in support of new business models which will meet the anticipated future market demands for STI.

References:


Esposito, J (2009). Personal correspondence and http://quod.lib.umich.edu/cgi/t/text/text-idx?c=jep;view=text;rgn=main;idno=3336451.0011.203


Surowiecki, James (2004); The wisdom of crowds – why the many are smarter than the few, Random House/Doubleday