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Blogs, wikis and creative innovation

Introduction

When the World Wide Web first came into broad public view, around 1995, there were enthusiastic predictions that it would make everyone their own publisher, with the capacity to broadcast their thoughts on any topic, share their creative contributions, and talk about whatever was important in their daily lives. Lots of interesting things happened, but this vision was never properly realised. Running a website and keeping it up to date is hard work, and professional site designers and IT managers soon displaced the enthusiastic amateurs who had built the early stages of the Web.

In the last few years, however, the original vision has re-emerged, thanks to such developments as blogs and wikis. Opinions of the significance of these developments vary widely, from the 'triumphalist' view that blogs and wikis will soon displace mainstream media (Hewitt 2005) to the scornfully dismissive response of the media establishment, expressed in such aphorisms as 'nitpicking is to film criticism as blogging is to journalism' (Sutherland 2005). Bruns (2005) gives a more balanced and sophisticated treatment of blogs, wikis and other online media forms.

In this paper, I will argue that blogs and wikis are indeed highly significant, but more as instances of a new mode of innovation than as a direct replacement for existing communications media. This new mode has been christened the 'creative commons' and both elements of the name are significant. Innovation in the creative commons is driven by a set of motives (desire for excellence, self-expression, altruism and sheer enjoyment) that may be broadly classed as creative rather than monetary or organisational. The products of this innovation are a common pool, which users can draw on freely and replenish and extend with their own contributions.

The paper is organised as follows. The first section is a description of the essential features of blogs and wikis. The second section describes various kinds of innovations specifically associated with blogs and wikis. The third section describes the creative commons more generally. Finally, some concluding comments are offered.

Blogs and wikis

Blogs

A blog[1] is simply a personal webpage in a journal format, with software that automatically puts new entries ('posts') at the top of the page, and shifts old entries to archives after a specified time, or when the number of posts becomes too large for convenient scrolling.

From tiny beginnings in the late 1990s, blogging has grown rapidly and continously. An indication is provided by the free service Technorati which monitors links between blogs (links, rather than monetary flows are the main currency of the blog world). In September 2003, Technorati claimed to watch nearly 4 million weblogs, with more than half a billion links. By October 2005, the number had risen to 21 million, though an increasing proportion of these are 'splogs', spurious or 'spam' blogs set up automatically by computer programs and designed solely to attract automated advertisements from firms such as Google. Other estimates are as high as 50 million, but these are further inflated by various online communities that automatically create blog-style diaries for new members.

Blogs serve many purposes, from online diaries to corporate public relations. The bloggers who have attracted the most public interest are those engaged in political and cultural debate.

Some other elements, while not universal, are regarded by many as essential aspects of blogging. The most important are facilities for readers to make comments on individual posts and for other bloggers to link to posts with

[1] This unfortunate term arose as a contraction of 'weblog' and has resisted periodic attempts to find a more appealing alternative.

criticism, praise or merely to point to an interesting article. Most bloggers also locate themselves within a larger community through the device of a 'blogroll', that is, a sidebar with a list of permanent links to other blogs likely to be of interest to readers.

Although blogs can be run either by individuals or groups, content is typically individual. That is, each post is written by a single author. There is of course, nothing to prevent joint composition of either posts or comments, but standard blog software does nothing to facilitate such collaboration, and in some ways actively discourages it. For example, the standard setup for a group blog does not allow members of the group to edit each others' posts.

On the other hand, most blogs include a comments thread, attached to each post. While some blogs do not allow comments, the view is widely held that, in the absence of comments, a site is not really, or not fully, a blog. Typically, there is a group of regular commenters, mostly pseudonymous, but with well-established identities within the group, who may be regarded, to some extent, as subaltern authors, since the final product consists of the post and comments, taken together.

In many cases, a blog post serves more to initiate a conversation, held in public view, than as a discrete piece of communication from author to reader. The majority of visitors to a blog site never comment, and are thus viewers rather than participants. The mildly pejorative term 'lurker', sometimes used to describe such visitors, dates back to the days of UseNet discussion groups, when there was an expectation that all participants in the group would contribute to the discussion. However, there is normally no such expectation in the case of blogs.

Thus, as Chesher (2005) observes, the rise of the Internet has not led, as predicted by Foucault (1977) to the death of the author, at least as far as blogs are concerned. (See also Poster 1990 and Landow 1992.) On the other hand, the role of the author in blogs is different in crucial respects from the traditional producer of a text. In important respects, blogs (at least full-scale blogs with comments and trackbacks) are collaborative productions.

Wikis

By contrast with blogs, and most other websites, wikis are designed to facilitate editing by as many people as possible. The most prominent single example of a wiki is Wikipedia http://en.wikipedia.org , an online encyclopedia, from which information for this section has been drawn.

A wiki enables documents to be written collectively (co-authoring) in a simple markup language using a web browser. A wiki is a collection of pages, which are usually highly interconnected via hyperlinks; in effect, a very simple relational database. The name was based on the Hawaiian term wiki wiki, meaning "quick" or "informal."

Wikis work by making it easy to correct mistakes, rather than making it difficult to make them. A typical wiki allows editing by anyone visiting the relevant page, without any requirement for membership of a specified group, or even for registration.

While wikis are very open, they provide a means to verify the validity of recent additions to the body of pages. The most prominent, on almost every wiki, is the "Recent Changes" page—a specific list numbering recent edits, or a list of all the edits made within a given timeframe.

Most of the relevant features of wikis may be illustrated by Wikipedia, which is summarised by itself (Wikipedia 2005), as follows:

> Wikipedia (pronounced as [ˌwi·kiˈpidi.ə] or [ˌwɪki-], also [-ɐ]) is a multilingual Web-based free-content encyclopedia. It is written collaboratively by volunteers, allowing articles to be changed by anyone with an Internet connection. The project began on 2001-01-15 as a complement to the expert-written Nupedia, and is now operated by the non-profit Wikimedia Foundation. Wikipedia has more than 2,550,000 articles, including more than 873,000 in the English-language version. Since its inception, Wikipedia has steadily risen in popularity,[1] and its success has spawned several sister projects.
>
> Articles in Wikipedia are regularly cited by both the mass media and academia, who generally praise it for

> its free distribution, editing, and diverse range of coverage. Editors are encouraged to uphold a policy of "neutral point of view" under which notable perspectives are summarized without an attempt to determine an objective truth. But Wikipedia's status as a reference work has been controversial. Its open nature allows vandalism, inaccuracy, inconsistency or uneven quality, and opinion. It has also been criticised for systemic bias, preference of consensus to credentials, and a perceived lack of accountability and authority when compared with traditional encyclopedias.

Most successful wikis have both a core of active users and a large body of occasional contributors. In the absence of these conditions, wikis tend not to work well. As a result, the number of wikis is much smaller than the number of blogs. The list of public wikis at http://www.worldwidewiki.net/wiki/SwitchWiki which aims to be comprehensive, has only about 1000 entries, and, as with blogs, many of these are dead (link produces an error message) or moribund.

In most respects, the concept of authorship is irrelevant for wikis. The typical wiki entry is the product of dozens of separate amendments by largely pseudonymous contributors. However, the novelty of this characteristic can be overstated. Typically, original authors of encyclopedia entries are anonymous or identified only by their initials, and considerable changes often take place between editions.

Blogs, wikis and innovation

Blogs and wikis generate a steady stream of innovation. Most obviously, the openness of these media allows for innovation in the content and style of the text and other material presented. This in turn produces formal innovations of various kinds, as models based on pre-existing media turn out to be inadequate. Finally, the desire to extend the medium, and to respond to problems that emerge produces a steady demand for, and supply of, technical innovations of various kinds.

Content innovation

There is no easy way to measure either the volume or the significance of the material published in blogs of various kinds. Technorati claims to monitor around 800,000 and 900,000 new posts made each day, with an associated growth of half a terabyte (500 Gigabytes) in data every day. For comparison, the total content of the US Library of Congress (holding 28 million volumes) has been estimated at between 5 and 20 Terabytes, or from 10 to 40 days of Technorati content. Of course, most of the material published in blogs is trivial and ephemeral, but the same is true of a fair proportion of the holdings of the Library of Congress.

Although the differences between blogs and static websites are subtle, they are crucial. Blogs have made available to ordinary people with no special skills or capital a vast range of opportunities for publishing all manner of material. A simple way to see this is to form an arbitrary word with the suffix "-blogging", such as "babyblogging", "carblogging", "photoblogging" or "carblogging", and run a Google search. Searches for quite obscure words are likely to turn up at least some instances of such compound terms, and the numbers for popular items can be startling - "catblogging", popularised by blogger Kevin Drum, turns up 45 000 results.

Rather than attempting the impossible task of assessing the total content contributed by blogs, it is more useful to look at a restricted field, such as the analysis of Australian politics and current affairs. The Australian quality press is generally agreed to comprise four newspapers (*Age*, *Australian, Australian Financial Review* and *Sydney Morning Herald)* each of which has a daily edition including one or two editorials and three or four opinion columns, along with occasional feature articles. The total output is therefore around 40 articles per week, or about 30 000 words.

Although it is hard to identify the corresponding set of blogs exactly, there are at least twenty Australian bloggers who maintain an average standard comparable to that of the opinion pages in the quality dailies. This subjective

assessment may be supported by the observation that a number of these bloggers are, in fact, regular or occasional contributors of opinion pieces to the quality press. On average, each would post three or four substantial pieces (300 to 500 words) per week, implying an output comparable to that of the quality press.

At the tabloid level, different measures of quality are appropriate. The tabloid blogosphere seems at least as lively and raucous as its analogues in the press and radio, and the volume of blog output of this kind is large.

A similar comparison based on the United States would almost certainly be more favorable to bloggers. The number of political bloggers is larger, both absolutely and in relation to the population, while the number of papers that could be regarded as constituting the 'quality press' is not much greater than in Australia. The *New York Times*, *Washington Post*, *Wall Street Journal*, *Chicago Tribune* and *Los Angeles Times* are obvious candidates, but most other US papers have a parochial focus and rely heavily on syndicated content for national and international political comment.

Political analysis and comment is a core feature of newspapers, with even the tabloid press offering editorials and a letters page. The fact that blogs are already competitive in the field of political analysis and comment is striking evidence of the growth of the medium. In other areas, particularly those related to technology, blogs and related media have already become the primary source of information.

Assessing the content innovation associated with wikis is, at this point, rather simpler, since the various versions of Wikipedia account for the majority of generally accessible wiki output. Commencing in 2001, the Wikipedia project has already produced an encyclopedia comparable, and in some respects superior, to the long-dominant Britannica. The total number of words and entries is larger, and a number of informal comparisons have suggested that the average quality is similar, though the variance is higher.

Although the Wikipedia model has been controversial, one of the two major online competitors, Microsoft's Encarta, has recently implemented a similar editing capacity, though with a lengthy approval process (MSN Encarta

2005). Imitation being the sincerest form of flattery, Encarta's partial adoption of the wiki model is a clear indication of its success. On the other hand, a brief experiment by the *Los Angeles Times* was rapidly overwhelmed by vandals posting obscene material.

Similarly, the blog format has been adopted by business enterprises as a way of keeping regularly updated interactive websites, displacing commercial content management software. Blogs are also being used in education, again challenging well-established commercial software providers of educational courseware.

Formal innovation

As McLuhan (1964) observed 'the medium is the message'. One interpretation of this aphorism is that every new medium of communication creates new possibilities, which influence the kinds of messages that can be transmitted. Thus, for example, the combination of radio and the telephone allowed for talkback radio, which encouraged a particular style of populist harangue.

In the few years since blogs rose to prominence, a variety of new forms have been adopted in attempts to take advantage of the capacities provided by the blog form and overcome a variety of limitations. Not all of these innovations will last and not all have been positive contributions (though that assessment is necessarily subjective).

One early innovation was the practice of 'fisking', that is reprinting an article in part or whole, interspersed with critical or abusive comments (the mode was first popularised among rightwing 'warbloggers' in the aftermath of the 2001 terrorist attacks, and is named after journalist Robert Fisk, a frequent target of their critiques). Although some instances constituted coherent critiques of the source article, the typical fisking consisted of a string of unrelated ripostes, convincing only to those already in agreement with the critic, and commonly padded out with personal abuse. Although fisking is still practised, it seems to have declined in popularity.

Until about 2002, most blog software did not allow for comments. The introduction of facilities for comments radically changed the medium, and led to a range of consequent developments. In the absence of comments, blogs were clearly identified as the product of their author(s), and discussion was typically undertaken through links between blogs. With active comments, blogs took on some of the characteristics (both positive and negative) of the Internet bulletin boards and newsgroups found, for example, on Usenet (now largely defunct, but, an important precursor of the World Wide Web).

Although highly successful for a decade or more after its inception in 1979, the Usenet discussion group model did not cope well with rapid growth in the number of users, particularly when new users were unacquainted with, and unwilling to learn the social norms ('netiquette') of the groups they joined. The effective demise of Usenet is commonly dated to 1993, when the online service America Online offered access to Usenet, previously dominated by universities[2]. A second crucial development was the arrival, in 1994, of spam, originated by two lawyers, Laurence Canter and Martha Siegel, advertising immigration law services. A range of other pathologies (most not new, but greatly expanded in scale) included flamewar, trolling, irrelevancies and sock-puppeteering (All these terms are defined and discussed in Wikipedia).

Most of these problems have reappeared on blogs. A good rule of thumb is that a comments thread with more than 100 entries will almost invariably degenerate into a repetitive flamewar. Bloggers have sought innovations to promote discussion while avoiding these pitfalls.

No particular innovation stands out in this respect so I will nominate one from my own blog, www.johnquiggin.com. This is the idea of a regular 'open mike' post, referred to on my blog as the Monday Message Board, on which posters are invited to comment on any topic of their choosing. Part of the idea is to allow free discussion of topics of concern which might otherwise be introduced as irrelevant asides in discussion of posts on unrelated topics.

[2] The term 'eternal September', sometimes used to describe this event, is a reference to earlier years when the main influx of new users took place in September, the beginning of the academic year in the United States

Another interesting innovation is due to Henry Farrell of the academic group blog, Crooked Timber. This is the idea of a seminar, focusing on a recently published book. Typically, reviews of the book are written by several members of the Crooked Timber group, along with others invited for the occasion. The reviews are sent to the author of the book who provides a response. The whole set is then posted on the blog and opened for comments before being archived as a PDF file. This approach yields benefits unavailable from a standard review.

Wikis are complex social institutions, and their construction has required a range of innovations to manage the interactions between users. The difficulty of this task explains the relatively small number of wikis. It appears, from the example of Wikipedia, that many of the relevant innovations require large numbers of participants to be successful: by contrast, blogs seem to work better with small groups. Essentially, the critical problem is to motivate input while preventing a small number of participants from hijacking the process, as happened with the *Los Angeles Times* experiment.

Technical innovation

The Internet has been at the centre of the technical innovation driving economic growth for the last decade or more. Much of this innovation has been collaborative. Open source software such as Linux has received much attention recently, but the open source concept is merely a codification of the culture of free sharing that created the Internet in the first place.

A more complex and tricky question is: to what extent do creative collaborations like blogs and wikis contribute to innovations that may then be applied more generally.

An obvious area of technical innovation concerns the general problem of navigating the Internet. How do readers find interesting material on blogs, and how do bloggers advertise the existence of new posts on particular topics? For the Internet as a whole, the dominant mode of navigation is the search facility provided by Google and other search engines. These engines treat the Web, at any point in time, as a static resource. Their automated agents crawl the web,

indexing its pages and the link between them, then seek to identify the pages most relevant to some particular topic. Although the details of Google's algorithm are confidential, the central feature is that sites are highly ranked if they receive many links from other (presumptively independent) sites.

An important feature of all this is that owners of sites are strongly discouraged from adopting strategies designed to boost Google page rank, such as the creation of 'link farms', or the use of 'comment spam' (of which more later). This marks a shift away from the early days of the Web when 'meta' tags were used to describe content. These tags were too easily manipulated, and have largely ceased to be used.

Many bloggers receive substantial amounts of traffic from Google search[3]. Nevertheless, this is usually not a very satisfactory solution to the search problem. Particularly when they arrive at blogs, Google searches tend to point to old and uninteresting posts, or to random collections of words in unrelated posts, reflecting the fact that Google isn't aware of the particular structure of blogs, as compared to other web pages.

Bloggers and their readers typically want to focus on new and recent posts, rather than trawling through archives, and they are typically have more awareness of the structure of the blogosphere than the implied user of Google or other search engines. A further difficulty with Google is the incentive it creates for 'comment spam', that is, automated submission of meaningless comments containing links that are designed to boost the Google ranking of the target page.

Conversely, blogs create problems for Google. Their dense hyperlinking creates a pattern that naturally boosts PageRank, but may or may not be of interest to general users of Google's search engine. Byrne (2004) discusses some of the resulting strategic interactions and their semiotic implication. Google has responded by modifying its PageRank algorithm to give lower weight to blog links.

Blogs have increasingly relied on alternatives to Google. The simplest of

[3] The listing of weird, wonderful and sometimes disturbing Google search strings used to reach a blog forms one minor component of the activity generically known as 'metablogging'

these is Trackback, which sends an alert when one blog links to another. These alerts can also be passed on to a link-tracking site such as Technorati, which currently (June 20 2005) claims to track 1.25 billion such links.[4] Unfortunately, Trackback is also subject to spam, which has rendered it less useful. Like Google, the Trackback/Technorati system relies on the hyperlinked structure of the Internet to draw inferences about the likely relevance of sites, rather than allowing for more conscious activity on the part of web users.

A crucial feature of Technorati is that it gives a more sophisticated treatment of links than Google's search algorithm, allowing them to be sorted by date (typically the most relevant point for blogs) and, in versions under development, by the use of classification tags, of which the category tag defined in most blogging software is the canonical example. [5] This technology is already being extended to non-blog sites such as Salon, which provide Technorati links to blogs discussing their stories.

A clearer example of technological innovation driven by blogs is that of the various versions of RSS. This acronym is used variously to stand for Rich Site Summary (RSS 0.9x), RDF Site Summary (RSS 0.9 and 1.0) and Really Simple Syndication (RSS 2.x). As one of these acronyms indicates, RSS is closely associated with RDF (Resource Description Framework) which, in turn, is the most important application of XML (Extensible Markup Language), the basis of future development of the HTML markup language used in the World Wide Web.

Cutting through the tangle of acronyms, RSS is an effective implementation of what used to be called 'push technology', an idea developed unsuccessfully during the the dotcom boom by now-vanished companies such as Marimba and Pointcast. The idea is that, instead of visiting the sites on your bookmark list in turn to see whether there is anything new, the sites themselves generate a short report noting recent posts and comments. A program such as NetNewsWire, called an aggregator, collects these reports for all the sites you

[4] The number of incoming links reported by Technorati is the most easily accessible measure of a blog's influence, and the associated Technorati Top 100 list is closely followed by those concerned with such things.

[5] Since this was written, Google has introduced a separate search engine for blogs.

wish to visit.

As with many innovations, there is a need to generate a virtuous circle. The success of the technology requires a workable underlying RSS/RDF specification, user-friendly aggregator software, and a large enough number of sites generating RSS feeds to sustain user interest. Blogs and their readers provided the third component of this cycle. The time-consuming nature of blogging meant that blog readers welcomed the RSS innovation, even with the rough edges that characterised its early stages. This in turn produced pressure on bloggers to implement RSS and therefore on developers of blog software to make this as easy as possible.

Once the groundwork had been laid in the blogosphere, RSS spread rapidly. Most major news sites now offer RSS feeds, and web browsers, such as Safari, are beginning to offer RSS as a routine part of their service.

Going beyond its direct importance, RSS/RDF is the most prominent single example of the benefits of the XML/XHTML approach over the simpler HTML which served the World Wide Web for its first decade. Progress in Web and Internet technology is driven by the most demanding users, and, increasingly, these are the members of creative communities such as the blogosphere and wikisphere.

The creative commons

Intellectual property is the subject of vigorous debate around the world, and particularly in the United States. The most prominent participants are, on the one hand, supporters of 'strong intellectual property' and, on the other hand, advocates of an expanded public domain, often referred to as the 'intellectual commons' (Lessig 2001).

Advocates of an expanded public domain focus on the argument that, once created, ideas and their expression have one of the characteristics of a pure public good, namely, nonrivalry. The fact that an idea is used by one person does not diminish its availability to others.

The metaphor of the 'intellectual commons' reflects this claim, since a

commons (a piece of land shared by all the residents of an agricultural community) may be seen as an archetypical public good. Historical studies show examples of effective management of such common property resources (Dahlman 1980; Ostrom 1990; Quiggin 1993).

Against this view, advocates of strong intellectual property commonly posit the notion of the 'tragedy of the commons' (Hardin 1968). The key idea is that since the commons is open to all, no-one has an incentive to invest in its improvement by producing and sharing valuable innovations. The solution, it is claimed, is 'enclosure' dividing the commons into pieces of individual property.

The relative merits of this arguments are different in different contexts. In some cases, for example those relating to indigenous culture, neither is particularly useful. But in the context of the leading sectors of the Internet, such as blogs and wikis, the ideas of the commons are clearly appropriate.

Institutions for innovation

For most of human history, innovation 'just happened'. People or groups saw a solution to a problem, and others copied it or improved upon it. Although attempts at secrecy were common, most ultimately failed[6]. Once new knowledge became public, it was part of a commons, available to all with the capacity to use it.

Beginning in the late 18th century, the process changed radically. Publishers of books and creators of inventions sought monetary rewards through copyrights and patents. These devices gave a temporary monopoly to the holder. Originally, under the Tudor and Stuart monarchs in England, monopoly patents were used as a general revenue-raising device, or to reward favourites, a practice that led to violent protests. It was only later that they were used specifically to reward innovation.

The terms of patents and copyrights were limited, reflecting a compromise between the desire to reward innovation and creation, on the one hand, and the well-known dangers of long-lived monopolies on the other. In the

[6] One secret that was kept successfully was 'Greek fire', a liquid incendiary used by the Byzantine empire and believed to have included sulfur, quicklime, and liquid petroleum.

United States, copyrights were initially limited to 14 years, and most works were not covered by them.

In the 19th and 20th centuries, systematic fundamental research became more important. Since the lag between fundamental discovery and useful application could be long, and the links difficult to trace, patents did not provide a useful way of promoting or financing fundamental research. Instead, universities and other institutions funded from public revenue or private philanthropy emerged.

As the scale of research problems grew, along with the cost, independent individual researchers (both fundamental and applied) were increasingly subject to bureaucratic control, either as employees of large corporations or through organised governmental efforts, of which the Manhattan Project to develop the atom bomb was the first big instance, and the NASA space program the most inspiring. University researchers preserved a fair degree of autonomy, but became increasingly reliant on project-based funding and the associated requirements to pursue specified research goals.

Corporations also became important in the creative sphere, both as owners of the copyrights arising from the work of creative individuals, as in literature and music, and as creators in their own right, appropriating the output of their employees, as in the motion picture industry. These corporations pressed, with great success, for steady expansion in the scope and duration of copyright.

Markets and bureaucracies (including corporate bureaucracies) each imply a specific kind of rationality, which tends to crowd out all other motivations. This point was first made by Weber (1978 [1925], 1930 [1905]) who analysed bureaucratic rationality and also coined the term 'economic rationalism', which was independently reinvented in Australia and the 1970s.

Within bureaucracies, activities are directed by rules, and by the shared objectives of the organisation as a whole. Bureaucracies can produce innovations, but spontaneous innovation is prohibited or deprecated: new proposals, even if they originate at the bottom of a bureaucratic hierarchy must be approved and

implemented from the top down.

Within markets the prime motive for any activity is monetary return. Hence, innovations make sense only to the extent that they can be exploited financially, and this is determined by market demand and the externally given structure of intellectual property rights.

In most discussion of innovation policy, markets and bureaucracies are assumed to exhaust the set of institutions to produce innovation: individuals will produce new ideas, it is implied, only if they are either directed to do so by a manager or rewarded for doing so by the market.

Under the technical conditions prevailing in the 20th century, this implicit assumption was broadly correct: research required full-time work, and those who undertaking this work be had to be paid for it, one way or another. However, the growth of the Internet undermined the assumptions that dominated innovation and creation during the 20th century.

The Internet reversed the increase in scale that had long characterised research and innovation. Suddenly it became possible to undertake large projects on the basis of many small contributions. One example was projects in which large numbers of computer users allocated 'spare' computing power to collective tasks such as cryptanalysis, and searches for prime numbers and extraterrestrial intelligence. It is, in general, impractical to pay participants in these projects and monetary payments tend to crowd out altruistic and other motivations (Deci, Koestner and Ryan 1999; Frey and Jagen 2001; Solow 1971, Titmuss 1970).

Bruns (2005) discusses a variety of forms of collaborative online news production, including blogs and wikis. His analysis is centred on the notion of 'gatewatching', that is, the observation of the output gates of news organisations and other sources to identify interesting material as it becomes available. The Internet allows collaborative methods to be applied to gatewatching at various stages in the process of producing and distributing news.

In addition, the massive increase in the ease of reproducing, transmitting and storing information, facilitated by the Internet, changed the balance of costs

and benefits in relation to intellectual property. Under previous technology, the cost in terms of time, effort and materials of producing a copy of a book, musical recording and so on was usually equal to a significant proportion of the legal market price, including the royalty paid to the author or copyright owner. Hence, anyone making a copy could be assumed to be willing to pay a significant amount for the item in question. Under these circumstances, the welfare cost of enforcing copyright is often smaller than the benefit to the owner.

With almost costless copying and storage, the phenomenon of the 'long tail' is observed. Most of the benefits of the Internet come from very large numbers of relatively low-value uses. Attempts to extract copyright payments from these uses are futile, and the result is simply to prevent activity which in aggregate may generate larger social benefits than the bestsellers.

In these circumstances, older modes of innovation, displaced by market and bureaucratic rationality are being recreated under radically different technological conditions. The blogosphere and wikisphere, along with the open source software community and many others, form part of the emerging (or re-emerging) creative commons.

Concluding comments

The innovations associated with blogs and wikis are important in themselves, and the process of creative collaboration they represent is becoming increasingly central to technological progress in general. Spinoffs from blog and wiki development are increasingly being used in business and education, displacing proprietary content management software. Open source software is increasingly relied upon as the most secure foundation for computing projects of all kinds. The Internet itself, and even more the World Wide Web, which have driven much of the economic growth of the last decade, were produced in this way.

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