Intellectual Property on the Internet: What's Wrong with Conventional Wisdom?

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Introduction

The growth of the Internet has put pressure on traditional intellectual property protections such as copyright and patent. Some forms of information, when made accessible on the Internet, are easily copied. Because the costs of copying are low and because copying is often anonymous, publishers have often responded with more aggressive enforcement of existing intellectual property rights and with calls for extensions of those rights to cover additional content, new media and new forms of access. This effort can actually be seen as part of a twenty-year trend toward tighter intellectual property enforcement and extensions of intellectual property rights.

Yet this response and this trend toward tighter intellectual property rights are not always appropriate, especially on the Internet. This paper argues that the Internet and World Wide Web possess characteristics that may make such policy inappropriate—the Web is a "community" that is highly interactive and dynamic. Indeed, much of the software that runs the web is Free/Open Source software. This paper summarizes a formal economic model applied to such an interactive and dynamic environment. The model suggests that both individual publishers and society more generally may benefit from *weak* intellectual property enforcement and protection in such an environment.

As policy-makers address this new environment they should tread carefully. The conventional view that tighter intellectual property protections always improve innovation incentives is based on a limited economic model that often is inappropriate in such highly interactive and dynamic environments.

The Traditional Intellectual Property Model

The conventional argument for tight intellectual property protection is that it preserves the incentive for authors and inventors to create. The argument goes as follows:

Creative activity typically involves substantial development costs. Artists, authors and inventors are not necessarily motivated exclusively or even primarily by the prospect of financial gain. Nevertheless, the potentially high expense of originating, developing and distributing creative works imply that many creators need a financial return to recoup their development costs. This return provides the "innovation incentive."

If a work is copied, the original author/inventor may lose potential sales and profits, and thus an environment that permits copying reduces the innovation incentive. With a smaller prospect of profits, some

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authors/inventors will be unable or unwilling to make the initial investment in development. They will choose not to create.

Intellectual property rights inhibit imitation, and thus counteract this effect. With such protection, authors and inventors are encouraged to create and, because creative activity is enhanced, society benefits as well.

Thus, in this model tighter intellectual property is better. Tighter protection leads to less imitation, which promotes innovation incentives, which ultimately enhance social welfare. The argument is compelling and has been a mainstay in support of strong intellectual property protection for over two hundred years.

Yet the economic model underlying this traditional argument is surprisingly limited. The simple truth is that much creative activity is not the work of lone creators. Rather, it is *interactive* and involves the contributions of many different parties. Indeed, innovation is often *sequential,* where each creator *improves* improves on the work of the previous iteration. The standard model equates imitation and copying. However, when innovation is sequential, imitation is more than copying; it adds important value.

But the conventional model is based on the idea of the single creator. There is a strong cultural image of creative activity as the work of a romantic individual: the artist in the garret or the inventor in the garage. Part of the persuasiveness of the standard model relies on our habit of thinking of creative activity as the province of such lone geniuses.

One place where this habit of thought conflicts with reality is the World Wide Web. The Web has often been called a community. It provides a fine opportunity for individual creators to publish their works, but it also includes many opportunities for interactive communication and so constitutes a good environment for sequential improvement. It is helpful to examine examples of interactive and sequential innovation on the Web in order to understand the inappropriateness of the traditional intellectual property model here.

Some Examples of Interactive and Sequential Innovation

Interactive Forums

A common example of interactive creation is the interactive forum. As print periodicals have come to the Web, they have frequently set up sites where readers and the public-at-large can submit independent comment and opinion. Typically various forms of dialogue are established with authors of articles that also appear in print. Sometimes these take the form of real-time dialogue and other times e-mail archives. The authors contribute new material and pursue lines of discussion with readers; readers provide feedback and often expand the discussion. The result is a greatly expanded version of "Letters to the Editor," with much more complicated intellectual property rights.

One interactive site where intellectual property concerns have come into conflict with uninitiated communication is the Online Guitar Archive (OLGA). OLGA was founded in 1992 by James Bender. It is an archive of some 28,000 user-submitted guitar tablatures as well as guitar lessons and other aids to guitarists. The site, formerly hosted by the University of Nevada-Las Vegas, was highly popular, with users downloading some 200,000 files per week.

Guitar tablatures are a form of music notation indicating fret and string fingering and are usually accompanied by song lyrics. Because guitar chords can often be fingered different ways, the tablatures provide

performance instructions. In particular, they help guitarists who want to sound like performers on CD's and other recordings. Often, sheet music is not available, and even when it is, it generally does not closely match recording performances. Sheet music is typically notated by musicians other than the original performers. Although it is transcribed from recordings, different musicians typically hear a recording differently and, in any case, commercial sheet music tends to present simplified fingerings with a "pretty" sound.

The guitar tablatures found in OLGA are worked out by individual guitarists listening to recordings and represent individual interpretations and fingerings. As such they add unique value to both the recording and to sheet music where it exists. The important economic significance is that the tablatures are a *complement* to the sound recordings, not a substitute. Both the creator of the tablature and the user learning a song will start by listening to a recording. Although guitar tabs may in some circumstances substitute for sheet music, they are overall a strong economic complement to the recordings.

As such, the distribution of guitar tablatures over the Internet probably constitutes a violation of traditional intellectual property rights. Certainly the record company EMI thinks so, for in January 1996 it sent a letter to UNLV threatening to take legal action. UNLV promptly shut down the site and several mirror sites were shut as well. Some mirror sites have stayed open, although with a diminished ability to accept new guitar tabs. Guitarists on the Web became incensed and began a boycott of EMI recordings. OLGA itself, lacking clear legal standing, was unable to get a direct response from EMI in order to open discussions at resolving this situation. In 1998, these difficulties were compounded by the Harry Fox Agency, an organization that licenses recorded music. Without identifying any particular songs that allegedly violated copyrights, the Harry Fox Agency gave OLGA seven days to shut down its entire archive, including mirrored sites, and refused to discuss licensing. OLGA has continued only by starting a new archive that accepts only guitar chords without complete lyrics.

Within the context of the traditional intellectual property model, EMI's action made sense. But in a world like the Web where interactive users add unique value, EMI seems short-sighted. A better course of action, in our view, would have been for EMI to *host* the OLGA site, creating links between guitar tabs of EMI recording artists and information about their records, sound clips, fan club information, etc. Indeed, other companies are spending large sums in establishing new sites to do just those sort of things. What could be better than to sponsor an already-existing site that has a proven volume of traffic?

The traditional intellectual property model fails to recognize the added value brought by additional parties. And so it turns out to be a poor guide for both company intellectual property activity or for social policy.

Sequential Improvement

Software publishing provides a particularly useful example of sequential innovation because software intellectual property protection went through a natural economic experiment during the 1980's. Software distribution on the Web is an important area of publishing in its own right, but large numbers of other publishers are affected by software intellectual property concerns in two other ways.

First, common forms of Web activity have been potentially threatened by software patent holders attempting to exercise their patent rights. Patents with broad claims over common activities seem to appear regularly, including the Compton multimedia patent, the Freeny electronic sales patent, and the Unisys GIF patent.

Second, many forms of "content" are really offered in a package with software, that is, an integral part of the content delivery is the software that makes delivery possible. For example, news is provided on the Web in databases, as a fax service, in customized editions, as an e-mail service, as a real-time service, as a radio-distributed service, in addition to traditional means of delivery. Database providers also typically provide a bundled service with unique means of database access, and technologies are available to provide technically-controlled access to just about any content.

The particular importance of software for our discussion is that software typically undergoes rapid sequential development: each innovation is imitated and improved upon by competitors, each making a unique contribution. Software concepts originally conceived in the 60's, such as electronic publishing, hypertext, multimedia and artificial intelligence, have required decades of sequential improvements by many firms before achieving widespread commercial success.

During the mid-1980's the intellectual property status of software changed, constituting a limited economic experiment. Software had been largely protected by copyright prior to this time and although a series of court battles served to further define the nature of this protection, copyright protection was largely perceived as preventing direct copying, but not most other forms of imitation, such as providing products with similar functions but a somewhat different appearance. Before this time, relatively few patents for software inventions had been upheld.

During the 1980's and 1990s, however, court decisions sharply extended patent protection for software. The result was a dramatic explosion in the number of software patents granted each year (see Figure 1) to over 20,000, comprising over 15% of all patents granted (Figure 2).. Nearly 200,000 software patents have been granted to date in the US. According to the traditional economic model, this significant extension of intellectual property protection should have sharply increased innovation incentives. Firms that had previously chosen not to develop new products because of an unfavorable imitation climate should have now entered the market. Projects that had been rejected as too risky, given the difficulty of recouping development costs, should now have become viable and so R&D spending ought to have risen.

To many people in the software and computer industries, the extension of patents to software appeared as an attempt to "fix what ain't broke." These industries were already highly innovative; firm entry, the number of new products and R&D investment were all high relative to sales. Still, the high level of innovation was not necessarily inconsistent with the traditional model. The innovating firms may have simply been the "tip of the iceberg," that is, they may have exploited the most profitable innovation opportunities, sufficiently profitable to overcome the loss from imitation. Following this reasoning, however, strengthening of intellectual property rights should have produced an even higher level of innovative activity. Moreover, we might expect stronger incentives to make it easier for more innovative startup firms to enter the industry. Indeed, small startup firms have been an important source of innovation in the software industry in the past.

But this is not what happened. An analysis by James Bessen and Robert Hunt (2004) paints a detailed picture of software patenting. Software patents have been largely acquired by large established firms. Moreover, most of these are *hardware* firms—they may incorporate software in their products (e.g., in an office copier), but software is not their primary product. The small startups that have been so important to innovation in the software industry have, in fact, a very low “propensity to patent.” So software patents cannot have provided these firms

stronger innovation incentives. More important, Bessen and Hunt find that the firms that did acquire relatively large numbers of software patents during the 90s actually *reduced* their R&D spending relative to sales.

Clearly these results are difficult to reconcile with the traditional model. It would seem that (a.) software patents have been obtained largely on the basis of R&D that would have been performed in any case, and, (b.) the extension of patent protection did not have a major positive influence on either R&D spending or the entry of new firms. Imitation does not appear to prevent innovation in a highly dynamic environment with rapid sequential innovation. Something more than the traditional model is involved.

Brief Economic Analysis

A richer economic model needs to recognize:

1. Creative imitation differs from copying; imitators can add important value.
2. Some environments are static, others are highly dynamic with sequential improvement.

Intellectual property may work very differently in each of these environments.

3. Some creative works have single authors, others have multiple, sequential authors.
4. The contribution of additional authors is often unpredictable and the value of each potential contribution is often the private knowledge of that author.

Developing such a formal model is beyond the scope of this paper, however, some major results of such a model as developed elsewhere [Bessen and Maskin, 2000] can be summarized as follows:

1. Imitation can increase the overall incentives to create in a dynamic environment. *Most* creative activity, in fact, tends to be partly imitation.
2. Strong intellectual property rights can decrease the incentives to create by reducing licensing and other sharing of information.
3. Overall, *moderately weak* intellectual property protection is optimal. The best sort of intellectual property rights are strong enough to prevent direct copying and knock-off products, but weak enough to encourage the greatest amount of cross-licensing and sharing of information between competitors.

The first three decades of the semiconductor industry provide an example of intellectual property protections working well in a dynamic environment. Beginning with Bell Labs (which licensed its basic patents on the transistor to all interested parties—all of whom must be considered potential competitors—at a low fee), semiconductor companies broadly cross-licensed whole patent portfolios. Patents did not prevent new companies from entering the industry and companies shared important patents. This environment finally changed, with the substantial tightening of intellectual property rights in the early 1980's.

Free/Open Source software also taps into the dynamism of sequential and complementary innovation. Free/Open Source licenses allow imitation and complementary improvements. Some licenses require these improvements to be shared, others licenses just encourage sharing, and sharing facilitates dynamic innovation.

Conclusion

Publishers will do best by recognizing and encouraging the complementary contributions of others. Society will do best by recognizing that subsequent authors/inventors may make important additions to original contributions. Intellectual property protections should be limited to achieve a balance that prevents direct copying but that encourages value-adding imitation.

Sometimes intellectual property policy is described as balancing the protection of incentives to create ideas against the benefit to society of disseminating those ideas. This analysis suggests that policy needs to address not only the general (and somewhat amorphous) dissemination of ideas, but also the specific practice of imitating to improve, especially in dynamic environments.

The Internet in particular is a highly interactive environment with sequential innovation, and attempts to impose new intellectual property protections or to extend existing protections on the Internet may be inappropriate because they fail to consider the value of creative imitation.

As Robert Frost wrote in *Mending Wall*,

"Before I built a wall I'd ask to know

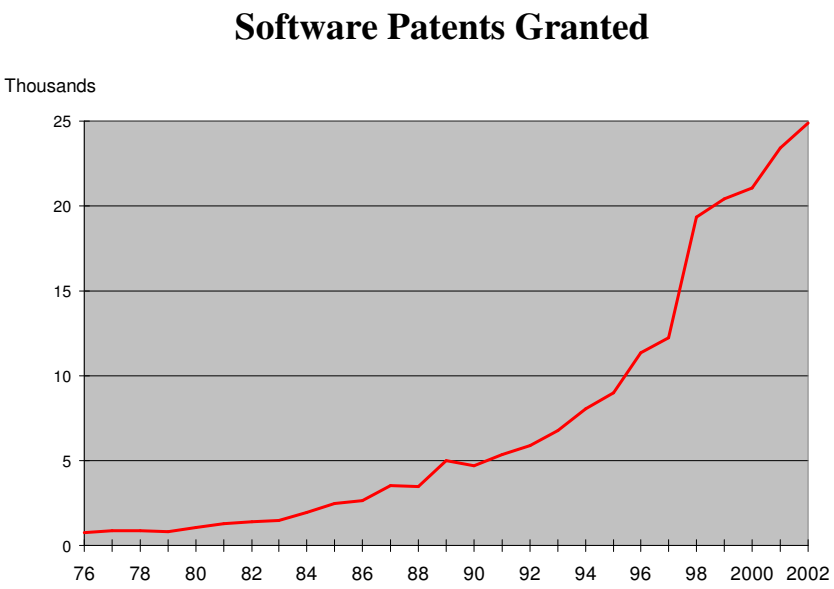
What I was walling in or walling out."

References

Bessen, James and Robert M. Hunt. 2004. "The Software Patent Experiment," OECD, forthcoming.

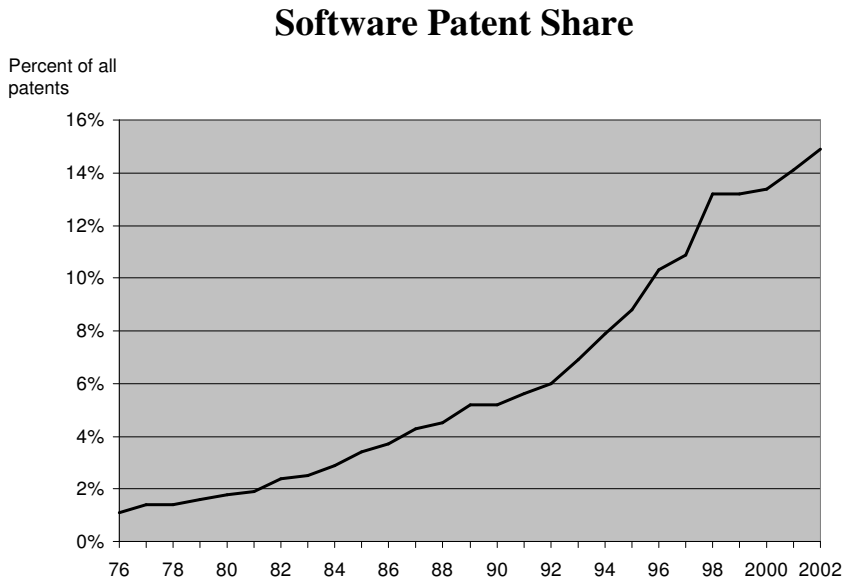
Bessen, James and Eric Maskin. 2000. "Sequential Innovation, Patents and Imitation,"
MIT Working Paper 00-01.

Figure 1.



Note: The table plots software patents by grant date, not application date.

Figure 2.



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