

About XML

Patently ridiculous

Judith Wusteman

The author

Judith Wusteman is based in the Department of Library and Information Studies, University College Dublin, Dublin, Ireland.

Keywords

Computer software, Public domain software, Extensible Markup Language, Libraries

Abstract

The Open Source Software movement has much to offer the library community. But can it survive the onslaught of patent applications?

Electronic access

The Emerald Research Register for this journal is available at

www.emeraldinsight.com/researchregister

The current issue and full text archive of this journal is available at

www.emeraldinsight.com/0737-8831.htm

The open alternative

In May 2003, the local government in Munich voted to delete Microsoft Windows from its 14,000 computers and to install Linux, an open source operating system. Microsoft was so concerned that its chief executive, Steve Ballmer, interrupted his skiing holiday in Switzerland to try and persuade Munich's mayor to change his mind, but in vain (*The Economist*, 2003). The Munich decision reflects a worldwide trend: governments across Latin America, Europe and Asia are moving towards open source software. In some cases, the impetus is economic, in some political, and in some it is based on a respect for good software. Governments do not want to be reliant on proprietary standards or tied to commercial vendors, particularly when their products have a history of unreliability and poor security.

Open source software

The term "open source software" (OSS) was not coined until 1998[1], but the movement evolved from the Free Software initiative[2] that emerged in the 1970s. One of free software's most influential figures is Richard Stallman, author of the *Emacs Editor* and founder of the Free Software Foundation[3], which has overseen the creation of GNU operating system components. It was Stallman who coined the terms "freeware" and "copyleft" to describe concepts very similar to those epitomised in today's OSS. Stallman explains the origins of the term "copyleft" as follows[4]:

Proprietary software developers use copyright to take away the users' freedom; we use copyright to guarantee their freedom. That's why we reverse the name, changing "copyright" into "copyleft".

Stallman used his concept of copyleft to license GNU. The GNU General Public License (GNU GPL, or simply GPL), forms the basis of the licence that is still used by much of the OSS community today. However, use of the GPL can prevent the code it licences being included in commercial software. When Netscape released its source code in 1998, it used a license that would facilitate such commercial uses. The term "open source" was created to cover this wider definition of free software. All W3C software is described as "Open Source/Free Software, and GPL compatible"[5].

Software labelled as "open source" implies much more than simply access to its source code. It also

Received 11 March 2004

Revised 12 March 2004

Accepted 19 March 2004



Library Hi Tech

Volume 22 · Number 2 · 2004 · pp. 231-237

© Emerald Group Publishing Limited · ISSN 0737-8831

DOI 10.1108/07378830410543557

requires that the software be freely available to any party for any purpose, including all forms of modification or extension. Any such derivations must be distributed under the same open source terms[1].

The extensive list of software that has emerged from the OSS stable is impressive, and includes operating systems such as GNU/Linux, programming languages such as Perl[6] and PHP[7], Web servers such as Apache[8], the OpenOffice suite[9], the Mozilla browser[10] and databases such as MySQL[11] and PostgreSQL[12].

OSS development

OSS development methods vary between what the OSS guru Eric Raymond describes as the “cathedral” and the “bazaar” approaches. GNU and Apache epitomise the former, in that development proceeded “in a carefully coordinated way by a small, tightly-knit group of people”. Linux epitomises the latter approach in being “rather casually hacked on by huge numbers of volunteers coordinating over the Internet” (Raymond, 2000). Approximately 10,000 developers have contributed to the production of the Linux kernel. As a leaked Microsoft (1998) strategy memorandum points out:

The ability of the OSS process to collect and harness the collective IQ of thousands of individuals across the Internet is simply amazing.

Both approaches to development can result in software of higher quality and greater stability than that of many commercial rivals, as the examples above illustrate. In addition, most mature open source projects provide a Web site and discussion lists for users and developers, as well as other documentation.

The advantages of OSS for information users and developers are manifold. As well as the obvious economic advantage, there is also the major bonus for the technically minded of being able to fix bugs themselves rather than having to report them to a commercial company that may not get around to solving problems for weeks or even months. Similarly, products can be customised locally to fit a particular need, again without the delay of contacting the company.

OSS and commerce

Although a few of the more extreme proponents of free software, such as Richard Stallman, oppose the concept of proprietary software entirely, the involvement of commercial interests in the OSS

movement is widely established. Many versions of Linux are maintained and sold for a profit by commercial companies such as Red Hat[13]. Such companies make their profit by packaging the software and improving the ease of installation and maintenance. Other companies offer commercial products that build on open source technology to add extra features. The IBM Web Server, for example, builds on the Apache server. Companies such as IBM and Oracle have ported software to Linux. In addition, commercial training and support are available for the most widely used OSS such as Linux and Apache (Bretthauer, 2002).

Some companies that develop OSS offer open source and commercial licences for the same software[14]. The latter licences may incorporate fewer restrictions on use than the former. The MySQL commercial licence, for example, does not require developers of commercial applications incorporating MySQL to make their source code freely available[15].

An open source business model is not only viable, it can be very profitable. IBM attracted great attention when it invested \$1 billion in improving Linux in 2001, but it recouped most of this in sales in the first year. And, in 2002, Hewlett Packard and IBM reported \$3.5 billion of Linux-related revenue (Orzech, 2003).

OSS is now mainstream; as OSS advocate Bruce Perens points out (Boyd, 2004): “We are no longer isolated geeks making a system only we know is good”.

OSS and libraries

Not surprisingly, the development and use of OSS in libraries is growing rapidly. The benevolent nature of the open source ideal fits well with librarianship culture. As Eric Lease Morgan (2000), one of the most enthusiastic proponents of OSS in libraries, explains:

Open source software development and librarianship have a number of similarities – both are examples of gift cultures ... and gain reputation by the amount of “stuff” they give away.

The list of OSS applications that have found uses in libraries is long and is growing. As well as general tools, such as those already mentioned, specific library applications have also been created for all areas of library technology. The oss4lib Web site[16], itself maintained as an open source project, provides links to dozens of examples. Morgan (2003) summarises some of the categories as follows. An example project is listed for each category.

- document delivery applications (Prospero[17]);

- Z39.50 clients and servers (Yaz[18]);
- systems to manage collections (Greenstone[19]);
- MARC record readers and writers (XMLMARC[20]);
- integrated library systems (Koha[21]); and
- systems to read and write bibliographies (bp[22]).

Central to an increasing number of these applications is XML.

The concepts behind OSS have now spread to other creative content such as Web sites, scholarship, music, film, photography, literature and courseware. Creative Commons[23] is an attempt to make such content freely available for copying and creative reuse.

OSS as threat

Unfortunately, OSS is perceived by some organisations as a major threat to product dominance and revenue.

In public, Microsoft representatives have dismissed OSS, and Linux in particular, as “Pac-Man-like” (Ricciuti, 2001), “a cancer, un-American” (McMillan, 2004) and “communist” (*The Economist*, 2003). However, in a leaked strategy memorandum, Microsoft (1998) admits that:

The intrinsic parallelism and free idea exchange in OSS has benefits that are not replicable with [Microsoft’s] current licensing model and therefore present a long term developer mindshare threat.

One such “mindshare threat” is OpenOffice.org[9].

Open source versus shared source

Like Microsoft Office, OpenOffice.org is an office software suite incorporating word processing, spreadsheet, presentation and drawing applications. Unlike Microsoft Office, OpenOffice.org is open source and multi-platform. Both products use XML file formats: in the case of Microsoft, the incorporation of XML is a recent development, only appearing in Office 2003. The ability to save documents in XML means that they should be readable by other software. In addition, both software suites have the potential to become clients for viewing and manipulating data from applications such as Web services (Becker, 2004a).

Microsoft has hailed its adoption of XML technology as an illustration of its move towards openness and standards. It has recently published

the XML schemata used in Office. It is also considering making other sections of Office code available, for viewing only, to certain approved clients including some governments and large corporations. Microsoft refers to this as a “shared source initiative”: it appears to have been adopted largely to calm the fears of governments concerned about “secret security backdoors” in Office (*The Economist*, 2003).

OpenOffice.org has contributed its XML file format to OASIS, the Organization for the Advancement of Structured Information Standards, with the aim of standardising formats amongst the various open office suites. The developers of OpenOffice.org believe that XML can allow the user to “regain ownership to his/her own data, by allowing access and manipulation of office documents by arbitrary tools which support the file format”[9]. XML, announces Tidwell (2001), is “shifting the balance of power from software vendors to software users”. But how far will Microsoft allow this to go? Efforts to standardize office document formats are described as posing one of the “few viable threats to MS desktop dominance” (Gonsalves, 2003). An increasing awareness of XML has escalated the concern of Microsoft customers about being locked into proprietary formats; Microsoft has to appear to support open formats. However, cynics suggest that it cannot afford to allow its formats to be truly open – users cannot be allowed to regain ownership of their own data.

Protecting market share

It is interesting to note that, in successive versions of Word, Microsoft has found it possible to create and disseminate filters to allow the import of virtually all the major word processing formats on the market. At the same time, it is often difficult for users to read a document in the latest version of Word using a previous version of Word software. Filters may or may not be available somewhere on the Microsoft Web site: in many cases, they might as well not exist because they are so difficult to find. This could be helpful in encouraging users to upgrade.

OpenOffice.org, on the other hand, appears to have no difficulty in providing filters for all versions of Word currently in use[24]. And herein lies a problem for Microsoft: how can it retain ownership of Word documents? Might copyright help? The purpose of copyright is to protect forms of expression (Lesk, 1997). Hence, it can only be used to protect software code, not the ideas or algorithms on which it is based. Thus, for example, vendors are at liberty to produce independent

implementations of the algorithms behind Microsoft Word. This “reverse engineering” process is both legal and common practice. Patents, on the other hand, do not protect forms of expression, but the devices or processes themselves.

The new weapon

A leaked Microsoft (2002) study implies that Microsoft’s battle against OSS has not been as successful as it might have wished. However:

Seventy-four percent of Americans and 82% of Swedes stated that the risk of being sued over Linux patent violations made them feel less favourably towards Linux. This was *the only message that had a strong impact with any audience* (my emphasis).

As with Linux, so with other competition. If, for example, Microsoft could claim to have invented new techniques for storing or manipulating Word documents using XML, it could then patent these techniques and prevent other vendors from using them. And this is what Microsoft is currently attempting.

Microsoft is not the only organisation interested in patenting XML. As of February 2004, there are 101 XML-related patents pending at the US Patent and Trademark Office. But Microsoft is sponsoring 56 of them (Loli-Queru, 2004).

Among the 56 are several concerning the processing of XML by Office. The patents will affect software, such as OpenOffice.org, that interoperates with Word through XML. For example, it could prevent competing applications from opening XML files created in Office without licensing the patent (*Cover Pages*, 2003). Office is the overwhelmingly dominant product in this sphere, and interoperability with Word is essential to the success of any word processor.

Using XML in applications such as word processing is hardly novel. Microsoft claims that the ideas being patented are unique because they describe a method of storing all document information in one file rather than several, as is the case in OpenOffice.org. This rather stretches the definition of “unique”.

Software patents

The patent is a relatively new class of weapon in the software world. Apart from the high-profile Unisys-LZW patent case over the GIF format[25], it is only in more recent years that software patents have been widely discussed.

The hardware industry is enveloped in patents. But it is a long time since Jobs and Wozniak designed the Apple I computer in Job’s bedroom and built it in his parents’ garage. These days, by and large, only major companies develop computer hardware. By comparison, there are hundreds of thousands of lone software developers and small groups creating useful software applications. This number includes thousands of librarians, often altruistically sharing their code with the international library community.

For an invention to be patented, its developers must prove that it is a novel and non-obvious idea. “Prior art” refers to the technology relevant to an invention that is publicly available at the time that the invention is made. For a patent application to be accepted, the invention in question has to be distinguished from any prior art.

It appears that in the US, the search for prior art goes no further than existing patents. If a patent does not yet exist in an area, the US Patent and Trademark Office (PTO) assumes that there is no prior art (Ulbricht, 1999). It is irrelevant if a dozen companies have already developed and are using something similar. If they have not patented their idea, that’s their problem. Most hardware is patented, and has been for years: a search of patents is fairly likely to show prior art if it exists. Most software has not been patented.

The nature of the software industry and the existence of the OSS culture makes the patents approach particularly unfair. Traditionally, patents have only been used for “concrete and physical inventions”[26]. Software and other abstract subjects such as mathematics have been regarded by law in many countries as falling outside the scope of patentable products. In recent years, however, the European Patent Office has granted more than 30,000 software patents. As the Foundation for a Free Information Infrastructure (FFII) comments: “the patent system has gone out of control”. The FFII blames a “closed community of patent lawyers” that is “creating, breaking and rewriting its own rules without much supervision from the outside”[26]. Within Europe, a battle is in progress between those organisations and governments that support the legitimisation of this process and those that oppose it.

Microsoft itself has suffered from this trend in the form of the Eolas patent suit[27]. In 2003, Eolas, a one-person company, sued Microsoft for breach of patent relating to the automatic launching of embedded objects such as Flash, Real Player and PDF readers in Internet Explorer. Microsoft lost but the case gained it sympathy from unusual quarters. The case also put the W3C on its guard and a W3C Patent Policy[28] was quickly drawn up that “all but bans the use of patented technologies in its recommendations” (Festa, 2003). However,

in March 2004, the US PTO invalidated one of Eolas's central claims. The outcome of a review is awaited. If the case fails, the patent will be one of only 152 out of nearly 4 million patents awarded since 1988 to be invalidated (Reuters, 2004).

FUD

Many patent applications are blatantly silly, but they can still cause problems. Microsoft's applications relating to XML and word processing are unlikely to succeed: there are too many "precedents for applications sharing XML data" (Becker, 2004a). But they may still cause problems. Even applying for a patent can cut out competition. Contesting a claimed patent infringement is prohibitively expensive for small firms. According to Stanford's John Barton, such suits are "among the most expensive kind of litigation in the US today" (Pascual and Fernandez, 2000). Large companies have been known to drag out cases for years: small software companies have become bankrupt even before the case is decided. Such claimed infringements would be particularly difficult for loose collection of OSS developers to fight. The FUD ("Fear, Uncertainty, Doubt" (FUD)[29]) that a patent threat engenders simply results in an avoidance of such areas of research and development by all but the largest companies. As Perens points out (Boyd, 2004):

[Y]ou can never finish a patent search. The definitions are so broad, you can't ever be sure a company would or would not assert their patent on what you are doing.

Microsoft states that, in increasing its use of patents, it is simply following "the precedent of other technology companies that have had licensing programs in place for some time, such as Intel, IBM, Hewlett-Packard and Fujitsu" (Fried, 2003). Its actions are, says Microsoft, "standard moves for the company to protect its innovations and don't affect its commitment to openly sharing the XML schemas used by Office" (Becker, 2004b). However, history should make us wary. FAT (file allocation table) technology is the software used to format hard drives and floppies. It is far from ideal, but has become the standard method of formatting such storage devices. Cleartype is a font display technology. Both of these standards have been patented by Microsoft for some time. They both have a large user base. Microsoft has recently decided to require licences for their use (Becker, 2004a).

The worst case scenario, as described by Perens (Boyd, 2004), is bleak:

We're looking at a future where only the very largest companies will be able to implement software, and it will technically be illegal for other people to do so.

Attacking OSS

In March 2003, a company called SCO began an action against IBM, claiming that the latter had illegally donated code to Linux. This code, it asserted, belonged to SCO's version of Unix, System V Unix. IBM counter-sued, claiming that SCO had released this code into the public domain by releasing a Linux distribution covered by the GNU GPL. SCO has announced a challenge to the legality of the GPL. It claims that the GPL violates the US Constitution, as well as copyright, antitrust and export control laws (Shankland, 2003). In January 2004, SCO wrote to all 535 members of the United States Congress to explain how the use of Linux and OSS was a "threat to the security and economy of the US" (McMillan, 2004). Ironically, SCO has used GPL-licensed software in some of its products. In addition, SCO has been severely criticised for failing to back up most of its claims with proof.

Some commentators have suggested that, by paying an undisclosed amount of money to SCO for a Unix license, Microsoft is indirectly funding the SCO lawsuit. Some go as far as suggesting that software sales are now a secondary activity for SCO, its main function and source of income being the Linux lawsuit (McMillan, 2004). US federal regulators may have begun investigating the two companies in relation to these and other allegations (Preimesberger, 2004). Meanwhile, the management of SCO have become hate figures to some in the broader OSS community.

Unfortunately, an extremist chose to demonstrate this by launching an email virus, "mydoom", which attacked the SCO site on January 31, 2004 (Kotadia, 2004).

The GPL has never been tested in a court of law: this uncertainty in relation to its legal status makes some lawyers nervous, and they welcome the SCO lawsuit. If the latter fails, confidence in the OSS sector will increase. However, as Perens points out (Boyd, 2004): "[T]he real threat to Linux and the open source movement is not from the SCO lawsuits, but from software patents".

What should librarians do?

In the spring of 2000, the oss4lib mailing list hosted a debate on how the library profession could best take advantage of OSS. The themes that

emerged are discussed in detail by Morgan (2003). They include a call for national leadership by library organisations in funding and facilitating methods to provide “credibility, publicity, stability, and coordination” to library-based OSS projects.

Also debated was the extent to which the current generation of library applications is “beyond [the] control” of librarians. OSS offers more control to librarians. But, given the uncertainty caused by lawsuits and patents, should librarians be using OSS? Consideration of the alternative may help put the discussion in context.

Imagine a scenario in which a major digital library of several million documents is archived in Microsoft Office 2003 Word format. It can be saved as XML so, of course, it is future-proof and hence an appropriate archival format. After a couple of years, Microsoft upgrades to Word 2006. A couple of years later, it upgrades again, this time to Word 2008. At this point, Microsoft “sunsets” Word XP, that is, it ceases to support it. Word 2008 may be able to read Word 2006 files but history tells us that it may not be able to read Windows 2003 files. But the files are in XML so it should be easy enough to create a reader for them – except that there’s a patent on the format so this would be illegal until that patent has expired. The result is several million unreadable documents. Archiving documents in formats encumbered by patents will always be a bad idea.

Notes

- 1 The Open Source Definition, available at: www.opensource.org/docs/definition.php
- 2 The Free Software Definition, available at: www.gnu.org/philosophy/free-sw.html
- 3 Free Software Foundation, www.gnu.org/fsf/fsf.html
- 4 “What is copyleft?”, Free Software Foundation, available at: www.gnu.org/copyleft/copyleft.html
- 5 W3C Open Source Software, www.w3.org/Status
- 6 Perl, www.perl.org/
- 7 PHP, www.php.net/
- 8 Apache, <http://httpd.apache.org>
- 9 OpenOffice.org, www.openoffice.org
- 10 Mozilla, www.mozilla.org
- 11 MySQL, www.mysql.com/
- 12 PostgreSQL, www.postgresql.org/
- 13 Red Hat, www.redhat.com/
- 14 Open Source case for business, available at: www.opensource.org/advocacy/case_for_business.php
- 15 MySQL licensing policy, available at: www.mysql.com/products/licensing.html
- 16 oss4lib: open source systems for libraries, www.oss4lib.org/
- 17 Prospero, <http://bones.med.ohio-state.edu/prospero/>
- 18 Yaz, www.indexdata.dk/yaz/
- 19 Greenstone, www.greenstone.org/cgi-bin/library
- 20 XMLMARC, <http://laneweb.stanford.edu:2380/wiki/medlane/xmlmarc>
- 21 Koha, www.koha.org/
- 22 bp, a Perl bibliography package, www.ecst.csuchico.edu/~jacobsd/bib/bp/index.html
- 23 Creative Commons, <http://creativecommons.org/learn/aboutus/>
- 24 OpenOffice filter description, http://framework.openoffice.org/files/documents/25/897/filter_description.html
- 25 “LZW patent and software information”, available at: www.unisys.com/about_unisys/lzw/
- 26 Foundation for a Free Information Infrastructure (FFII), “Software patents in Europe”, available at: <http://swpat.ffii.org/>
- 27 “FAQ on US Patent 5,838,906 and the W3C”, available at: <http://www.w3.org/2003/09/public-faq>
- 28 “W3C patent policy”, February 5, 2004, available at: www.w3.org/Consortium/Patent-Policy-20040205/
- 29 FUD – a whatis definition, available at: http://whatis.techtarget.com/definition/0,sid9_gci214113,00.html

References

- Becker, D. (2004a), “Microsoft seeks XML-related patents”, *CNET News.com*, available at: <http://news.com.com/2100-1013-3-5146581.html> (accessed 23 January).
- Becker, D. (2004b), “Microsoft: XML patent moves are no big deal”, *CNET News.com*, available at: <http://news.com.com/2100-1013-5147390.html> (accessed 26 January).
- Boyd, C. (2004), “Software patents ‘threaten Linux’”, *BBC News, World Edition*, available at: <http://news.bbc.co.uk/2/hi/technology/3422853.stm> (accessed 23 January).
- Bretthauer, D. (2002), “Open source software: a history”, *Information Technology and Libraries*, Vol. 21 No. 1, March, available at: www.ala.org/ala/lita/litapublications/ital/2101bretthauer.htm
- Cover Pages (2003), “Microsoft announces licenses for use of Office 2003 XML reference schemas”, *Cover Pages*, available at: <http://xml.coverpages.org/ni2003-11-18-a.html> (accessed 18 November).
- (The) Economist (2003), “Microsoft at the power point”, *The Economist*, available at: www.economist.com/business/displayStory.cfm?story_id=2054746 (accessed 11 September).
- Festa, P. (2003), “Web patent critics spotlight old technology”, *CNET News.com*, available at: <http://zdnet.com.com/2100-1104-5100693.html> (accessed 31 October).
- Fried, I. (2003), “Microsoft opens technology to more licensing”, *CNET News.com*, available at: <http://news.com.com/2100-1012-5113033.html> (accessed 3 December).
- Gonsalves, A. (2003), “XML work poses one of few viable threats to MS desktop dominance”, *InternetWeek*, available at: www.internetweek.com/story/showArticle.jhtml?articleID=8800539 (accessed 22 April).
- Kotadia, M. (2004), “SCO recovers from MyDoom”, *Znet (UK)*, available at: <http://zdnet.com.com/2100-1105-2-5171499.html> (accessed 8 March).
- Lesk, M. (1997), *Practical Digital Libraries: Books, Bytes and Bucks*, Morgan Kaufmann, San Mateo, CA, July.
- Loli-Queru, E. (2004), “XML patent paradox”, *OSNews*, available at: www.osnews.com/story.php?news_id=6068 (accessed 10 February).
- McMillan, R. (2004), “SCO to Congress: Linux hurts the US”, *Computer World*, available at: www.computerworld.com/softwaretopics/os/linux/story/0,10801,89335,00.html (accessed 23 January).

- Microsoft (1998), "Open source software: a (new?) development methodology", Revision 1.00, available as Halloween Document I (Version 1.14) at: www.opensource.org/halloween/halloween1.php (accessed 8 November).
- Microsoft (2002), "Research e-bulletin: attitudes towards shared source and open source research study", September, available as Halloween Document VII at: www.opensource.org/halloween/halloween7.php
- Morgan, E.L. (2000), "Gift cultures, librarianship, and open source software development", available at: www.infomotions.com/musings/gift-cultures.shtml (accessed 28 December).
- Morgan, E.L. (2003), "Possibilities for open source software in libraries", *Information Technology and Libraries*, Vol. 21 No. 1, March, available at: www.ala.org/ala/lita/litapublications/ital/2101morgan.htm
- Orzech, D. (2003), "Can you make money selling Linux? Try \$3.5 billion", *CIO Information Network*, available at: www.cioupdate.com/news/article.php/1574431 (accessed 24 January).
- Pascual, J.S. and Fernandez, R.G. (2000), "Software patents and their effect on Europe", December, available at: www.dit.upm.es/~joaquin/report_en.pdf
- Preimesberger, C. (2004), "Analysis: Microsoft, SCO have a lot more explaining to do", *NewsForge*, available at: www.newsforge.com/trends/04/03/08/0457259.shtml (accessed 8 March).
- Raymond, E.S. (2000), "A brief history of hackerdom", available at: www.hackemate.com.ar/hacking/eng/part_00.htm (accessed 5 May).
- Reuters (2004), "Patent central to Microsoft: case invalidated", available at: www.reuters.com/newsArticle.jhtml?type=topNews&storyID=4509756 (accessed 5 March).
- Ricciuti, M. (2001), "Gates wades into open-source debate", *CNET News.com*, available at: <http://news.com.com/2100-1001-268667.html> (accessed 19 June).
- Shankland, S. (2003), "SCO attacks open source foundation", *ZDNet*, available at: www.zdnet.com.au/news/software/0,2000061733,20280278,00.htm (accessed 29 October).
- Tidwell, D. (2001), *XSLT*, O'Reilly & Associates, Sebastopol, CA.
- Ulbricht, J. (1999), "WG: [Patents] 1998 US software patent statistics", *Debate Mailing List*, available at: www.fitug.de/debate/9907/msg00284.html (accessed 24 July).