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Evolution of Industry Knowledge in the Public Domain: Prior Art Searching for Software Patents

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Abstract

Searching prior art is a key part of the patent application and examination processes. A comprehensive prior art search gives the inventor ideas as to how he can improve or circumvent existing technology by providing up to date knowledge on the state of the art. It also enables the patent applicant to minimise the likelihood of an objection from the patent office. This article explores the characteristics of prior art associated with software patents, dealing with difficulties in searching prior art due to the lack of resources, and considers public contribution to the formation of prior art databases. It addresses the evolution of electronic prior art in line with technological development, and discusses laws and practices in the EPO, USPTO, and the JPO in relation to the validity of prior art resources on the Internet. This article also investigates the main features of searching sources and tools in the three patent offices as well as non-patent literature databases. Based on the analysis of various searching databases, it provides some strategies of efficient prior art searching that should be considered for software-related inventions.

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1. Introduction

As a consequence of the advances in software technology and the expansion of the Internet, the number of patent applications in the area of software-related inventions has increased rapidly over the last few years. Software patents, including business methods patents and Internet related patents, have become the focus of controversy among the software industry and IP practitioners. The heart of this debate relates to the issue of resolving the competing interests between inventors desiring incentive for their innovations and competitors wanting unhindered use of patented software. In the meantime, many software patents have been granted by major patent offices, and some of them led to lawsuits over the infringement of those patents.

One strong criticism concerning software patents is that patent offices issue too many patents that are not truly new or non-obvious due to the lack of relevant prior art. Critics have questioned the enforceability of software patents, arguing that the patent office has insufficient resources and expertise that are required to do quality examinations. It has been pointed out that prior art searches for software patents are difficult due to the complex nature of software technology and lack of relevant prior art databases. Furthermore, advances in software and Internet technology have also raised the question concerning the effect of electronic prior art that may affect the validity of software patents.

A principal objective of the present article is to study the mechanism of prior art searches that can be useful in patent infringement and invalidation proceedings. Another important objective of this article is to compare and contrast practices, and to analyse case law relating to prior art searches for software patents in the three patent offices: EPO, USPTO and JPO. With this in mind, this article explores the characteristics of prior art associated with software patents, dealing with difficulties in searching prior art due to the lack of resources, and considers public contribution to the formation of prior art databases. It addresses the evolution of electronic prior art in line with technological development, and discusses laws and practices in the EPO, USPTO, and the JPO in relation to the validity of prior art resources on the Internet. This article also looks at the main features of searching sources and tools in the three patent offices as well as non-patent literature databases. Based on the analysis of various searching databases, it provides some strategies of efficient prior art searches and proposes some solutions to the current debates over prior art searches for software-related inventions.

2. Characteristics of Prior Art of Software Patents

2.1. Definition of Prior Art

A comprehensive prior art search gives the inventor ideas as to how he can improve existing technology by providing up to date knowledge of the state of the art. The likelihood of an objection from the patent examiner will be significantly minimised if the patent attorney crafts the claims to circumvent the closely related prior art in accordance with the results of the search. If a thorough prior art search has not been carried out, it may cost much more money at the prosecution stage and in potential invalidation proceedings, even after the patent is granted.

Although there is no internationally agreed definition of prior art, prior art is generally understood as:

> *… the knowledge which has been made available to the public before the filing date or, where priority is claimed, the priority date of the application claiming the invention.*[1]

Another possible definition on what constitutes prior art can be found in one patent searching glossary as follows:

> *… the body of prior knowledge relating to the claimed invention, including prior use, publications, and patent disclosures.*[2]

Generally speaking, traditional prior art can be classified into three types of disclosures:

- A description in a published writing or a publication in other tangible form;

- A description in spoken words in public (oral disclosure);

- Use, sale or display in public, or putting the public in a position that enables any member of the public to use the knowledge (disclosure by use).[3]

Any materials can be used as prior art so long as they disclose sufficient information of the invention and are accessible to the public. More specifically, prior art includes:

- existing products or processes;

- national and foreign patents, or;

- printed publications including textbooks, professional journals, newspapers, catalogues, sales brochures, conference proceedings, press releases, technical presentations to the public, or published dissertations.[4]

Prior art searching is undertaken by a number of parties each with different objects:

- The patent counsel conducts pre-examination prior art search to see if the prospective claims of the invention read on the relevant prior art. The search report can serve as a basis for a patentability opinion so that the counsel can advise the inventor whether a patent application should be filed or not;

- The patent examiner searches prior art databases when examining the patentability of the invention, i.e. the novelty and inventive step of an invention is evaluated by referring to prior art; and

- The challenger of an issued patent, in patent litigation, investigates the prior art to invalidate the patent.

Searching prior art is a key part of the patent application and examination processes. Most patent specifications provide information relating to public knowledge as well

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[1] WIPO (6-10 November 2000) *Disclosure of Technical Information on the Internet and Its Impact on Patentability*, prepared by the International Bureau for the Standing Committee on the Law of Patents, 2.

[2] C. Lening, and Cavicchi, R. Jon, *Patent Searching Glossary*, Franklin Pierce Law Centre, 52.

[3] See note 1 above.

[4] These lists of prior art are not exhaustive.

as some issued patents in specific fields of technology, i.e. the prior art, and distinguish this information from the claimed invention. Even if an inventor creates a software product without referring to other people's inventions, there may be a chance that the information already exists in the public domain prior to the filing date of the patent application. If the patent examiner finds the claimed subject matter is not new or is obvious (lacking inventive step) in view of the prior art, the patent application will be rejected.

Most patent systems, including the EPO and JPO, adhere to the first-to-file system[5] in which the first person that files an application for an invention obtains a patent over the invention. On the other hand, the US system operates on the basis of the first-to-invent system in which a patent is granted to the first person to invent. If any type of prior art is found, it means that the claimed subject matter was already known at the time of filing the patent application in the EPO and JPO, or at the time of the invention in the USPTO.[6] Thus, prior art should meet certain time constraints in order to be applied effectively to examining or invalidating processes. In the EPO and the JPO, the prior art should come earlier than the filing date or the priority date of the subject matter to be claimed under the Paris Convention.[7] To be qualified as prior art, it is required in the USPTO for the prior art to be known to the public before the date when the inventor conceived of the invention. There is no explicit duty of disclosing prior art in the EPO, whereas the USPTO[8] and the JPO[9] require the applicant to disclose the closest prior art that he acknowledges when the patent application is filed.

The patent examiner compares the closest prior art with the claimed subject matter in terms of novelty and inventive step, and determines whether or not he will allow the application. Only a single prior art reference which has every element of the claimed invention can be used by an examiner for a novelty objection. On the other hand, more than two prior art references can be combined in denying the inventive step of an invention.[10]

2.2. Difficulties in Searching Prior Art of Software Patents

No patent attorney can advise his clients on the novelty or inventive step of the prospective patent application without an adequate prior art search. In order to enhance the accuracy and efficiency of prior art searching, the patent searcher must

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[5] It is submitted that the first-to-file system avoids the need to consider difficult questions about who was the first person to have a particular idea or to reduce the idea to a working model. Rather, the first-to-file system replaces such investigations with an administrative practice that delivers rough but simple justice. See Bently & Sherman (2001) "*Intellectual Property Law*", Oxford University Press, p. 346.

[6] European countries and Japan follow the "first to file" system, whereas the US adhere to the "first to invent" system.

[7] See note 1 above. Priority date is the date that subject matter was first filed in another foreign or domestic application. An earlier application can be claimed as a priority only if subsequent applications are filed within one year from the priority date.

[8] 37 C.F.R.§ 1.56.

[9] Section 36(4), The Japanese Patent Law.

[10] This is called 'mosaicing'.

have extensive knowledge of patent practice and the technology as well as comprehensive searching skills.

It has been pointed out that some granted software patents are highly likely to be invalidated in later proceedings, if a higher court finds the prior art containing the similar concept of the software of an issued patent.[11] This criticism reflects the idea that the number of patent examiners lags behind the increase in patent applications. The lack of technology experts is a serious problem because it will undermine the quality of issued patents. In addition, the fast-moving trend of software technology and the sharp increase of software patent applications have necessitated the demanding task for patent searchers to catch up with ongoing technology development. Nonetheless, it is submitted that the time allocated to each patent application is extremely short, despite the complexity of software technology, and there has been no relaxation of the time constraints by the patent office on patent examiners.[12] Given that the performance of examiners is normally judged by satisfying examination quotas, this has put pressure on examiners to deal with each application within a limited time.

When it comes to computer-related inventions, one possible reason for the lack of prior art may be that, prior to the *State Street* case[13] or the *IBM* case,[14] it had for many years been considered that computer programs or business methods were not eligible for patent protection.[15] Some companies tried to keep source codes of their software and their business methods secret in an effort to maintain competitive advantages over their rivals. Moreover, the relative youth of e-commerce technology did not contribute to the sufficient accumulation of prior art in this field.

Furthermore, most patent attorneys try to use broader terms than the subject matter really deserves in describing the inventions in order to achieve broad protection of their technology. Particularly, in the area of software technology, many patent attorneys have attempted to reword their claims to prevent a patentability objection, and this has resulted in many software-related patents that do not look like software patents. All of these have made it difficult for patent searchers to find out pertinent prior art references in the area of software technology.

One significant criticism against business method patents is based on the near impossibility of ensuring novelty of those patents. Prior art searches for software patents have become even more difficult, because much of the prior art in the areas of computer hardware and software technology lies outside the areas in which the patent

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[11] Considering that litigation parties have more time and money available for searching prior art than the patent examiner, it is probable that the best prior art will be found during invalidation or infringement trial stages. See D. L Burk,. and M. A. Lemley (Autumn 2002) Is Patent Law Technology-Specific, *Berkeley Technology Law Journa Issue 17:4.*

[12] N. O. Welch, (1998) An Introduction to Searching Software Prior Art

@*:* http://www.ipmall.info/hosted_resources/bp98/welch.htm.

13 State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998).

[14] EPO Decision T 1173/97.

[15] J. J. Regan, and J. J. Butts (January 2001) *Business Method Patent Litigation in an Uncertain World*, Hale and Dorr LLP.

examiner has traditionally looked, i.e. printed resources such as domestic and foreign patents and published literature.[16]

As Cohen indicates, most established publications do not keep up-to-date with many new developments in computer programming.[17] Some software innovations are merely incorporated into products and placed on the market. Others are discussed only in textbooks, developer specifications or user manuals including online FAQs that are not available to patent examiners.[18] Furthermore, it is often the case that methods of doing businesses on the web are not found in journals, libraries or searching databases, but they are rather to be found in business school papers, web materials, and the business plans of start-up companies. Consequently, this diversity of non-patent literature has made it difficult to retrieve the pertinent prior art. Given that the patent office mainly used to rely on published "official" prior art, it is unlikely that a rejection will be issued based on "common industry knowledge" that does not appear in the established patent literature.[19] This means that a patent may be allowed for the subject matter that is already in the public domain, if searches for non-patent literature are ignored. Accordingly, a more sophisticated approach to non-patent information is essential to improve the quality of searches for computer-implemented inventions.

Many commentators have suggested the necessity of training patent examiners and developing prior art databases containing non-patent documents as well as on-line based resources to have more accurate novelty and inventive step tests.[20] For example, a Report of The Royal Society recommends that novelty searches should include related journals and trade literatures as well as patents and pending applications. By so doing, it would be ensured that patents are confined within a scope no greater than that justified by the contribution made by the invention. This report also emphasises that patent offices should work more closely with the scientific community to improve the quality of examination by updating knowledge and gaining experience.[21]

Despite widespread belief that better prior art searches in a patent office are crucial in avoiding the problem of trivial software patents, Lemley challenged this. He points out that a more thorough examination of patent applications requires society to spend more time and more money.[22] Lemley argues that money spent improving the PTO examination procedures will largely be wasted on examining the ninety-five percent of patents that will either never be used, or will be used in circumstances that do not

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[16] J. E. Cohen (1995) "Reverse Engineering and the Rise of Electronic Vigilantism: Intellectual Property Implications of "Lock-Out" Technologies", 68 *S. CAL. L. REV*. p1178.

[17] Ibid.

[18] Ibid.

[19] See note 16 above.

[20] For example, Oracle Corporation Patent Policy, Patent & Trademark Office Software Patent Hearings (26-7 January 1994) @:

http://www.jameshuggins.com/n/tek1/software_patent_oracle.htmlpf.ai.mit.edu/Patents/testimony/statements/oracle.statement.html.

[21] The Royal Society (April 2003) 11.

[22] Lemley, Mark (February 2001) "Rational Ignorance at the Patent Office", *Northwestern University Law Review, Vol. 95, No.4.*

crucially rely on the determination of validity.[23] Considering the fact that the overwhelming majority of patents are never litigated or even licensed, he asserts that it is much efficient for society to make detailed validity determinations in those few cases than to invest additional resources.[24]

2.3. Public Contribution to Prior Art

Considering that many prior art resources of software technology are scattered throughout the industrial sector, it is helpful to gather some feedback on prior art resources from the industry. In particular, the USPTO has asked the public to suggest additional sources that might enhance the search effectiveness of the examiner in the area of software and business method technologies.[25] The software development community can assist the examiner by submitting the relevant prior art. Certain businesses in the software industry have cooperated in looking for decisive evidence of prior art in invalidating trivial patents that do not deserve protection. The Internet can also serve as an effective tool to find out the prior art to disprove the validity of a patent, especially in the area of emerging technology in which the databases of the prior art are not well established.

Netscape, for example, established a website and posted "prior art" wanted messages on the website frequented by software engineers after being sued by Wang over its browser function "save as."[26] Within a few days, Netscape received hundreds of responses related to the prior art. Similarly, the website BountyQuest.com has operated for the purpose of invalidating bad patents as well as encouraging good patent applications.[27]

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[23] The overwhelming majority of these lawsuits settle or are abandoned before trial. Only about one hundred cases per year (and 125 patents) actually make it to trial. Based on these numbers, it is reasonable to estimate that at most only about two percent of all patents are ever litigated, and less than two-tenths of one percent of all issued patents actually go to court. Ibid. at.7.

[24] Ibid.

[25] For example, the USPTO issued a Federal Register in an effort to inform the public of the prior art resources that are currently available to the Office, and to identify additional information and materials that could be considered during the examination process. See U.S. Department of Commerce (5 June 2001) Federal Register/ Vol. 66, No. 108/ Notices at 30169.

[26] On its website, Netscape urged to submit the prior art as follows:

> If you know of additional prior art publications, software programs, books, or systems in existence --prior to March 30, 1983-- which disclose and/or describe the claimed elements, send us a message. Send responses or questions to mozilla.org. Please include the following information:
>
> ● Name of the Publication or System
> ● Date of the Publication or Date System Was Publicly Known
> ● Features it Discloses
> ● Where Can the Publication or System Be Found (i.e. university, reference library, company, contact person)

@: http://www.mozilla.org/legal/wangsuit.html.

[27] The public is encouraged to submit prior art information and receive a bounty. Some of the postings were on some familiar patents such as Amazon.com's 1-click patent ($10,000 bounty) and Priceline.com's reverse auction patent ($20,000 bounty).

In the US, the case of the multimedia data retrieval patent granted to Compton's New Media[28] prompted widespread criticism over the validity of extremely broad patents. As a result, the USPTO re-examined the patent and ultimately rejected it on the ground that the Compton's patent did not make a novel and non-obvious technological contribution to existing technology.

3. Evolution of Electronic Prior Art and Its Validity

Along with the rapid growth of patent applications,[29] technological development has contributed to the diversity and expansion of prior art. Particularly, the Internet enables a user to publish and disclose any technological information simultaneously at a global level, and user-friendly software helps a user to upload and download information easily on the web. However, such technological developments raise a variety of issues as to the prior art effect of technical information that may have been known or distributed to the public through the Internet. Given that alteration and modification of the content of prior art is easy and occurs frequently, the authenticity, veracity, and integrity of prior art are crucial in determining its validity.[30]

Moreover, public accessibility to prior art information and the timing of disclosure are additional key factors in examining whether or not the prior art is relevant. If the prior art has not been documented or dated properly like a "printed publication", the process of proving the validity of the prior art may become extremely difficult and complicated. Case law and the guidelines concerning the effect of electronic prior art varies according to the patent office concerned. The following discusses existing laws and practices in the three patent offices in relation to prior art resources on the Internet.

3.1. JPO

Japan revised its patent law to cover website and other electronic disclosures as well as to clarify the meaning of electronic prior art. According to Section 29(1) of the Japanese Patent Law, disclosing an invention on the web or otherwise electronically prior to the priority date results in the loss of novelty of the invention:

> *Any person who has made an invention which is industrially applicable may obtain a patent therefor, except in the case of the following inventions:*

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[28] In August of 1992, Compton obtained its US patent 5,241,671 for the "Multimedia search system using a plurality of entry path means which indicate inter relatedness of information." Compton's patent was mainly for developing a computerised way to retrieve text, photo, audio, animation and video information from multimedia databases. After issuing the patent, the USPTO came under sharp criticism for issuing "broad, non-technical patents". On 25 March 1994, Commissioner Bruce Lehman of the USPTO reversed the Compton's patent, rejecting all 41 claims.

[29] The number of total patents in the US is over 6 million and there are more than 40 million worldwide.

See Bay Area Intellectual Property Group, LLC (2004) Patent Prior-Art Search

@: http://www.bayareaip.com/Services/Searches/Patent/Patent.htm.

[30] See note 1 above.

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(iii) inventions which have been described in a publication distributed in Japan or elsewhere or <u>inventions which became available to the general public through telecommunication lines</u> in such places prior to the filing of the patent application.[31]

The underlined part of Section 29(1) was added in an attempt explicitly to establish the disclosure on the Internet as a ground for lack of novelty.

According to the Operational Guidelines of the JPO, "available to the public" means that "the information is in a state where it can be seen by unspecified persons, and does not necessarily imply that it has actually been accessed."[32] The Guidelines also indicate that information is considered as being available to the public if it is linked with any other sites on the Internet, registered with any search engines, or the URL of the site is published in a means of providing information to the public, and if public access to the site is not restricted.[33] Even if the access of a website is restricted by a password, the website is considered to be accessible by unspecified persons, if a password can be obtained merely by payment.[34]

In contrast, the Guidelines provide cases where electronic technical information is not considered as being available to the general public. Here are some examples of the cases:

- Websites that are on the Internet but are only accessible by chance due to the lack of publication of the URL.

- Websites that are only accessible by members of a specific body or a company and of which information is treated as secret (e.g. an in-house system only usable by the employees, etc.).

- Websites on which information is encoded in such a way that it cannot generally be read (excluding cases where a decoding tool is openly available through a set of means, with or without a charge).

- Information that is not published over a period of time sufficient to allow access by the general public (e.g. information published on the Internet for a short period of time).[35]

The time of publication of cited electronic technical information is crucial since the novelty and inventive step tests are dependent upon this information. Given that there is a possibility of alteration of electronic documents on the Internet, it is important to make sure whether the cited electronic technical information was published with exactly same content at the indicated time of publication. The Guidelines indicate that

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[31] Section 29(1)(iii) of the Japanese Patent Law; the underlined part of Section 29(1)(iii) was introduced by the amendment in May 1999.

[32] JPO (December 1999) *Operational Guidelines on Treatment of Technical Information Disclosed on the Internet as Prior Art*, Examination Standards Office, Coordination Division, at 1; these guidelines has been applied to patent applications filed on and after 1 January 2000.

[33] Ibid. at 1-2.

[34] Ibid. at 5.

[35] Ibid. at 6.

examiners should not cite any electronic prior art if there is any doubt as to the reliability of the prior art information.

3.2. EPO

Unlike the JPO, there is no explicit provision or guidelines concerning the legal validity of Internet disclosures of prior art information in the EPO. However, a legal basis of prior art can be found in Article 54(2) of the EPC, which states that:

> *The state of the art shall be held to compromise everything made available to the public by means of a written or oral description, by use, or in any other way, before the filing of the European patent application.[36]*

In relation to the interpretation of "the public", one case in the Boards of Appeal of the EPO provides a definition. In *Telemechanique*,[37] the Boards made clear that information is considered as available to the public only if a single member of the public is in a position to gain access to it and understand it, and if there is no obligation to maintain secrecy in relation to it. In its decision, the EPO Boards held that a single sale is sufficient to render the article sold available to the public within the meaning of Article 54(2) of the EPC, provided the buyer is not bound by an obligation to maintain secrecy.

3.3. USPTO

35 U.S.C. Section 102(a) and (b) state that a "printed publication" constitutes prior art.[38] The Manual of Patent Examining Procedure (MPEP) indicates that a reference is regarded as a "printed publication" upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.[39] The MPEP also explains that an electronic publication, including an on-line database or Internet publication, is considered to be a "printed publication" within the meaning of 35 U.S.C. 102(a) and (b) provided the publication was accessible to persons concerned with the art to which the document relates.[40] In re *Hall*, the US Court of Appeals for the Federal Circuit stated:

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[36] Article 54(2) of the EPC.

[37] EPO Decision T 482/89 – 3.5.2.

[38] Section. 102. - Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or … (omitted).

[39] Manual of Patent Examining Procedure (MPEP) §2128, USPTO.

[40] Ibid.

> *The [printed publication] bar is grounded on the principle that once an invention is in the public domain, it is no longer patentable by anyone…. Because there are many ways in which a reference may be disseminated to the interested public, "public accessibility" has been called the touchstone in determining whether a reference constitutes a "printed publication" bar under 35 U.S.C. § 102(b).[41]*

Consequently, website-posted technical information may well be prior art as a "printed publication" if the information has been already in the public domain.

Availability to the person skilled in the art is critical in determining whether a particular dissemination of the invention is a "printed publication".[42] If an invention has been disseminated to the person skilled in the art without restriction, the invention should be regarded as a "printed publication". For example, information disclosed on a general employee's website of a large company is highly likely to be regarded as publicly known prior art. On the contrary, information which is limited only for internal use or distribution, such as an Intranet available only to an R&D team, is less likely to constitute prior art.[43]

Another important criterion relates to the date of availability for first public access. Prior art disclosures on the Internet or on an online database are considered to be publicly available as of the date when the item was publicly posted. If the publication does not include a publication date (or retrieval date), it cannot be relied upon as prior art under 35 U.S.C. 102(a) or (b).[44]

Information exchanged through or within an e-mail, a discussion group, a chat room or a news group may constitute prior art. Soma and Nuedeck assert that any chat room or discussion group may form part of prior art if it satisfies the "indexing and searchability" tests.[45] Normally, information distributed by an e-mail has less possibilities to be regarded as pertinent prior art (a printed publication) than information posted on the website because the information transmitted by a private e-mail is restricted to the recipient. However, if an e-mail containing the invention was sent to a group of people skilled in the art, it may be held that the invention was distributed to the public and the e-mail may well be regarded as a "printed publication", i.e. valid prior art.[46]

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[41] *In re Hall*, 781 F.2d 898, 899 (Fed.Cir.1986).

[42] H. C. Wegner (November 2001) *Prior Art Invalidity Defenses to E-Patent Infringement,* prepared for SOFTIC 2001 Symposium, Tokyo, Japan [quoting *Northern Telecom, Inc.* v. *Datapoint Corp.,* 908 F.2d 931,936 (Fed.Cir.1990)].

[43] MPEP §2128.01. See also *In re Kratz,* 592 F.2d 1169 (CCPA 1979) and *In re George*, 2 USPQ 2d 1880 (Bd.Pat.App & Inter. 1987).

[44] MPEP §2128.01.

[45] J. T. Soma, and A. J. Nuedeck (1996) The Internet and the Single Document Rule: Searching for the Four Corners of the Electronic Paper, *Journal of the Patent Office Society, vol. 78,* 751-788.

[46] See note 42 above at 13-4.

3.4. Evaluation

When it comes to the patentability of a computer-implemented invention, the USPTO permits the broadest possible scope, focusing on the "useful, concrete and tangible result" of the invention. In contrast, the EPO has the highest "technical nature" requirement. In the EPO, the "technical character" with a technical contribution is essential to be a statutory invention and the technical contribution should be non-obvious. The JPO takes a similar legal stance as the EPO, but less extreme. Although the JPO requires a technical aspect, this can be achieved by drafting a patent claim to specify a computer or by combining a process with a technical apparatus. In terms of the technical nature of an invention, the JPO allows inventions having both technical and non-technical features so long as the invention involves information processing using hardware resources. The evolution of electronic prior art will help the patent community by providing up-to-date technical information in assessing novelty or inventive step of an invention. Nonetheless, the patentability of an invention is not likely to be much affected by electronic prior art because the process of determining patentability depends on patentability criteria of each patent office rather than the existence of prior art.

Although the law and practice concerning the prior art effect of electronic documents disclosed on the Internet varies in different jurisdictions, it seems that at least one thing is quite certain: the disclosure of technical information on the web prior to the filing of a patent application can qualify as prior art information so long as the public can have access to that information without restriction. This is because there are no significant differences between disclosures through the Internet and through traditional printed publications in terms of public accessibility, except for the possibility of modifying the publication date or the contents of electronic materials. It is even much faster and easier to distribute the electronic prior art to the public than printed materials.

The web resources that have existed after the date of the invention (in the US) or after the filing date of the invention (in Europe and Japan) are not deemed to be adequate prior art. In order to be qualified for any web material as proper prior art, the date of uploading or publishing the material should be provided. For authenticating the timing of the information on the Internet, a number of technical means have been suggested: a notary system;[47] the Digital Object Identifier;[48]the Wayback Machine;[49]or the use of web sites such as www.ip.com[50] or http://hotbot.lycos.com.[51]

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[47] "Electronic Notary System" is used for securing safety and credibility in the electronic interchange involved in commercial transactions on a network:", Summary of "Electronic Notary System guidelines, Electronic Notary WG, @: http://www.ecom.jp/ecom_e/report/summary/wg15-1.pdf.

[48] The Digital Object Identifier (DOI) is a system for identifying and exchanging intellectual property in the digital environment. It is used to provide current information, including where it (or information about it) can be found on the Internet. Information about a digital object may change over time, including where to find it, but its DOI will not change.

The International DOI Foundation, @: http://www.doi.org/.

[49] This archives the state of the Internet at various points in time by crawling the Internet every few months. For example, see http://attrasoft.com.

[50] This website help the inventor create online electronic defensive disclosure prior art by releasing technical documents.

4. Prior Art Search and Databases

4.1. Prior Art Search in the Three Patent Offices

In November 2001, the EPO, USPTO and JPO published a report on "Concurrent Search Program using PCT (Patent Cooperation Treaty) Applications for Business Method-related Inventions".[52] The purpose of the Search Program was to promote mutual understanding of search sources/tools and search strategies for business method-related inventions in the three patent offices. Based on the above Report, this subsection provides comparative analysis of the prior art search of business method-related inventions in the EPO, USPTO and JPO.

4.1.1. EPO

In most cases, the EPO searches all of foreign patent literature including US, Japanese and WIPO/PCT patents as well as European patents. For searching European patents, the EPO uses ECLA index-search and text-search.[53] The EPO further searches non-patent literature (NPL) mainly by using INSPEC or COMPENDEX databases and other Internet search sites.

4.1.2. USPTO

The USPTO has launched a multi-faceted Business Methods Patent Initiative aimed at improving patent quality. The Director's Action Plan of March 2000 requires patent examiners to conduct a thorough mandatory search for all applications in Class 705 so that the search includes a search of US and foreign patent documents, a text search of US patent documents, and a search of relevant non-patent literature.[54]

The USPTO examiners use the Examiner Automated Search Tool (EAST) or the Web-based Examiner Search Tool (WEST) databases to search US patents. If further search is necessary, US examiners search non-patent literature (NPL) mainly by using DIALOG or STN databases and other web search engines. Likewise the EPO, the USPTO searches all of foreign patent literature.

4.1.3. JPO

The JPO applies the F-term system in searching domestic patent literature and uses the CSDB[55] in searching domestic non-patent literature (NPL). At the next stage, if necessary, the Japanese examiners conduct a non-patent literature (NPL) search through commercial databases or general search engines such as "Google" as well as

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[51] By using this website, the information associated with the timing of the web pages can be accessed by merely entering the URL.

[52] EPO, JPO and USPTO (5-9 November 2001) *Report on Concurrent Search Program using PCT Applications for Business Method-related Inventions*, Trilateral Project B3a Exchange of Search Results, San Francisco, California.

[53] For further discussion of ECLA, see the discussions in 5.1.below.

[54] USPTO (March 2000) Business Methods Patent Initiative: An Action Plan

@: http://www.uspto.gov/web/offices/com/sol/actionplan.html.

[55] CSDB (Computer Software Database) is JPO's internal database which contains non-patent literature including computer software manuals, books, journals, treatises and companies' technical reports.

a manual search. After the completion of the above steps, the examiners of the JPO investigate USPTO and esp@ce web databases for searching foreign patent literature. The JPO mainly uses WPI (DIALOG) to search other foreign patent literature.

4.2. Patent and Non-patent Databases

4.2.1. Patent Databases

Most websites of patent offices provide at least one search engine that facilitates the retrieval of patents by key word, class/subclass, inventor name, assignee name, or patent number. Patent documents can be searched through a variety of web databases, including:

- EPO (ESPACENET) (http://ep.espacenet.com) [56]
- JPO (IPDL) (http://www.ipdl.jpo.go.jp) [57]
- USPTO (http://www.uspto.gov/patft)
- WIPO (IPDL) (http://ipdl.wipo.int)[58]

Combining the above search tools with some of commercial databases will increase the possibility of locating the relevant prior art. The following shows the examples of commercial databases.[59]

- Questel-Orbit (http://www.questel.orbit.com)[60]
- Dialog (http://www.dialogweb.com)[61]
- STN (http://www.cas.org)[62]
- Thomson Delphion Patent Searching (http://www.delphion.com)[63]

4.2.2. Non-patent Databases

Along with patent literature, patent offices have tried to expand non-patent literature (NPL) information collections and databases. There are a wide variety of databases for searching non-patent literature. Table 1 shows primary databases and search engines in the three patent offices.

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[56] ESPACENET contains 45 million documents covering 71 different countries or organisations.

[57] Industrial Property Digital Library (IPDL) of the JPO is a public library which offers free access to the JPO's patent databases. It contains more than 47 million documents.

[58] Intellectual Property Digital Library (IPDL) of the WIPO gives access to patent documents and abstracts published under the Patent Cooperation Treaty (PCT).

[59]These databases can be used for retrieving patent and non-patent literature. It should be also noted that the above databases are not exhaustive and a myriad of prior art information can be found on the Internet.

[60] A complete list of Questel Orbit Database Catalog is @*:* http://www.questel.orbit.com/EN/customersupport/Userdoc/DocPDF/Databasecatalog.pdf

[61] A complete list of Dialog Bluesheets Databases are @*:* http://library.dialog.com/bluesheets/html/blf.html, accessed on 2 July 2004

[62] STN Database Summary Sheets are @*:* http://www.cas.org/ONLINE/DBSS/dbsslist.html.

[63] Patent collections of Delphion can be found @*:* http://www.delphion.com/collect_descrip.

[Table. 1] Main Databases and Search Engines used for Searching NPL

USPTO	EPO	JPO
Internet Sites	**Internet Sites**	**Internet Sites**
· Google · ProQuest	· Google · ACM · IEEE*Xplore*	· Google · ProQuest - ABI - Accounting - Core - Telecom · FindArticles · AltaVista · Nikkei BP · Yahoo
	Databases **(internal or external)**	
Databases **(internal or external)**	· INSPEC - Physics, electronics and computing abstracts (IEE) · TDB - IBM Technical Disclosure Bulletin · COMPENDEX	
· DIALOG - Marketing, business, financial · STN - NLDB - PROMT - SCISEARCH - PR Newswin · IBM TDB	· XPESP - Journal of Elsvier · Science Publications · COMPUABSTRACT · COMPUSCIENCE · MEDLINE · XPIEE	**Databases** **(internal or external)**
		CSDB (internal database) DIALOG - Group FINBUS databases JICST

Source: The European Patent Office[64]

One of the recent developments relating to NPL includes the Journal of Patent Associated Literature (JOPAL) of the WIPO. The electronic form of the JOPAL database is a part of the WIPO Intellectual Property Digital Library (IPDL), and contains bibliographic details of articles published in scientific and technical periodicals from the period 1981 to date. The JOPAL database supports fully searchable information retrieval and display of the latest month added to the database.[65]

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[64] EPO, JPO and USPTO (November 2001) Trilateral Project B3a Exchange of Search Results, Appendix 5.

[65] See WIPO, JOPAL @*:* http://www.wipo.int/scit/en/jopal/jopal.htm.

Resources that are useful for uncovering non-patented prior art can be anything that includes relevant technical information.[66] Some examples of non-patent resources include:

- Trade association databases (e.g. www.srds.com);

- College and University Databases;

- Government databases;

- Publications and periodicals databases (e.g. www.gale.com);

- News stories and archives;

- Trade Shows, workshops and seminars papers and speeches (e.g. www.LexisNexus.com);

- Library databases (e.g. The British Library: www.bl.uk); and

- Published book search engines (e.g. http://www.electriclibrary.com)

In addition, the following examples illustrate some of well-known databases for non-patent literature:

- First Search http://www.oclc.org/oclc/menu/fs.htm;[67]

- Software Patent Institute (SPI) http://www.spi.org;[68]

- IEEE/IEE Electronic Library (IEL Online) http://www.ieee.com;[69]

- INSPEC http://www.inspec.org.[70]

Some databases, including Dialog, Lexis/Nexis, Questel/Orbit, STN, provide access to a number of other sub-databases simultaneously and retrieve search results from the sub-databases merely by a single search inquiry.

More often than not, non-patent technical information is found on the web. A search engine enables a user to locate information on the World Wide Web (www) collected by a computer program called a robot. The following shows various types of search engines and their examples:[71]

- Mega-search engines (Alta Vista, Google);

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[66]   A.   Gibbs,   (March   2000)   Non-Patent   Art   Search   Projects   (Part   2)   @: http://www.cafezine.com/index_article.asp?deptId=2&id=65.

[67] This is an online service that gives end users access to a collection of reference databases.

[68] The SPI provides prior art information of software technologies, including computer manuals, older textbooks and older journal articles, conference proceedings, computer science theses, and other such materials.

[69] The IEEE/IEE Electronic Library (IEL) provides access to electrical engineering and computer science literature from the Institute of Electrical and Electronics Engineers (IEEE) and the Institution of Electrical Engineers (IEE).

[70] This is bibliographic database, which covers literature in the fields of physics, electronics and computing. INSPEC consists of three Science Abstracts: Physics Abstracts; Electrical and Electronics Abstracts; and Computer and Control Abstracts. Its data coverage is from 1966 to present.

[71] See note 66 above.

- Meta-search engines[72] (Dogpile); and

- Human powered search directories (About.com).

5. Strategies for Searching Prior Art

5.1. General Strategies

Considering that there are countless sources of prior art, one should set the scope of the search before embarking on a search plan. The scope of the prior art searching is dependent upon time, budget, and the subject matter of the invention. The determination of search scope should be done in consultation with the inventor who best knows the field of technology.

Even if the procedures of searching prior art may vary with an examiner, typical searching procedures by a patent examiner go through the following steps:

- Determine the classes/subclasses of the invention;

- Developing an initial search strategy, considering:

  o The date of filing a patent application (date of an invention in the US)

  o The category of the subject matter (product, process, machine …);

  o Keywords and phrases based on the function, structure and the use of an invention;

  o Boolean search criteria: essential elements (ANDs) and optional elements of search (ORs), and elements to be excluded (NOTs);

- Searching patents in the same classification as the claimed invention;

- Applying the search strategy to the examiner's own collection of prior art information;

- Refining the search strategy following the previous searches;

- Searching electronic databases; and

- Searching paper collections (non-patent literature).[73]

The inventor should try to provide as much information as he can in identifying the following:

- budget for search - what prior art sources can be consulted;

- time-frame for search - which of search sources will yield the best results in the time required;

- the date of the subject matter was invented (in the US), or the date of filing a patent application (in Europe and Japan), or the priority date under the Paris Convention;

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[72] A meta-search engine allows the user to search a number of different search engines simultaneously.

[73] N. O. Welch, (1998) *An Introduction to Searching Software Prior Art* @: http://www.ipmall.info/hosted_resources/bp98/welch.htm.

- the technology on which the invention is based - class/subclass(es), keywords and phrases;

- the sources used by the inventor, e.g., journals, catalogs etc.- prior art materials to be searched;

- other inventions the inventor relied on - prior patents.[74]

Patent literature is indexed or classified in accordance with a particular technology involved, similar function, and the use or structure of the subject matter. This classification makes prior art searching much easier. In order to enhance the accuracy and efficiency of searching and retrieving patent documents, the determination of appropriate technological field(s) to be searched, i.e. class/subclass(es) of the invention, should be the first consideration. This is because the class of a patent is the criteria by which various fields of technology are classified. Writing down important keywords or phrases can be a good start to identify what is the core of the subject matter and related technology.

Therefore, it is important for the prior art searcher to be well aware of the patent classification system and to determine the correct class/subclass(es) for the subject matter. Together with the use of the International Patent Classification (IPC)[75] developed by the WIPO, each patent office has their own patent classification system: the European Patent Classification (ECLA)[76] of the EPO; FI/F-Term[77] of the JPO; and the US Patent Classification (USPC)[78] of the USPTO. By referring to these classification manuals, several appropriate class/subclasses of the invention can be determined.

However, if it is difficult to identify a class/subclass, it is helpful to conduct a keyword search and try to find a patent that has a similar concept with the claimed

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[74] Ibid.

[75] The IPC is a hierarchical classification system comprising sections, classes, subclasses and groups (main groups and subgroups). It has been published and managed by the World Intellectual Property Organisation (WIPO). The seventh edition of the IPC, which is in force from 1 January 2000, consists of 8 sections, 120 classes, 628 subclasses and approximately 69,000 groups.

[76] The European Patent Office has further refined the International Patent Classification (IPC) by adding subgroups. It contains 129,200 subdivisions, i.e. about 60,000 more than the IPC.

[77] FI (File Index) classification is an extension of the IPC, and consists of IPC classes and their subdivisions. The F-term search system ('F-term' is short for 'File-forming term') developed by the Japanese Patent Office (JPO) consists of 2500 F-term themes. Of these 2500 themes, 1800 were further developed into tables that characterise each theme according to multiple technological viewpoints.

[78] The United States Patent Classification System (USPC) divides the entire set of U.S. patents into searchable collections based on the technology claimed in patents. The primary groupings of patents in USPC are called "classes". Utility classes are based on (1) technology associated with a particular industry, or (2) subject matter having similar function, use, or structure. Design classes are based on ornamental appearance. Plants are provided for in a single Plant class. Classes are subdivided into relatively small, ordered collections of patents called "subclasses". A subclass is the smallest searchable collection of documents in the USPC.

See USPTO (December 2002) *Overview of the Classification System*

@: http://www.uspto.gov/web/offices/opc/documents/overview_dec02.pdf.

subject matter. A patent retrieved by keyword searches can be a good starting point to determine the appropriate class/subclass(es) of an invention.[79]

The majority of business method inventions are normally classified as Class 705[80] in the USPTO, because the methods and apparatuses claimed in these inventions are related to financial and business data processing. Class 705 of the USPTO is for the inventions relating to data processing, including financial, business practice, management, or cost/price determination. Table 2 illustrates some selected subclasses of US Class 705.

[Table 2] Selected Subclasses of US Class 705

Subclasses	Title
1	Automated electrical financial or business practice or management arrangement
50	Business processing using cryptography
400	For cost/price
500	Miscellaneous (e.g. by generic or non-electrical computing)

However, it should be noted that a business method invention is classified and examined according to its technology. Thus, there are some other classes into which a business method claim can be classified. The following shows the examples of other classes for business methods associated with:

- teaching - Class 434 (Education and Demonstration);

- playing games – Class 273 (Amusement Devices, Games); and

- improving crop yields – Class 47 (Plant Husbandry).[81]

Business methods applications are normally classified in G06F 17/60 of the IPC in the EPO and the JPO, and F-term themes 5B 049, 5B 055, 5L 099 in the JPO. Table 3

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[79] Oklahoma State University (2003) *Preliminary Patent Searching on the Web*, Patent & Trademark Library @: www.library.okstate.edu/patents/websrch.htm.

[80] This is the generic class for apparatus and corresponding methods for performing <u>data processing</u> operations, in which there is a significant change in the data or for performing <u>calculation operations</u> wherein the apparatus or method is uniquely designed for or utilised in the <u>practice</u>, administration, or management of an <u>enterprise</u>, or in the processing of financial data.

This class also provides for apparatus and corresponding methods for performing <u>data processing</u> or <u>calculating operations</u> in which a charge for goods or services is determined.

This class additionally provides for subject matter described in the two paragraphs above in combination with cryptographic apparatus or method. USPTO, Class Definition, @: http://www.uspto.gov/go/classification/uspc705/defs705.htm.

[81] W. W. Coggins, Prior Art in the Field of Business Method Patents - When is an Electronic Document a Printed Publication for Prior Art Purposes? Presented at AIPLA Fall 2002, @: http://www.uspto.gov/web/menu/pbmethod/aiplafall02paper.htm.

shows the IPC classes for business method-related inventions and their corresponding F-term themes.

[Table 3] IPC/FI Classes and F-term Themes for Business Method Inventions

Classes	F-Term Themes	Contents
G06F 17/60- 17/60,124	5B049	Computers for specific applications
G06F 17/60,126 - 17/60,126@Z	5L099	(No F-terms for this theme)
G06F 17/60,128 - 17/60,176@Z	5B049	Computers for specific applications
G06F 17/60,200 – 17/60,250	5B055	Banking and disbursement calculation
G06F 17/60,300 – 17/60,342	5B049	Computers for specific applications
G06F 17/60,400 - 17/60,432@Z	5B055	Banking and disbursement calculation
G06F 17/60,500 – 19/00,140	5B049	Computers for specific applications

After having all possible class/subclasses for the invention identified, the searcher should retrieve all patent documents assigned to the above class/subclasses and examine them one-by-one. Such manual searches can be conducted at any patent offices or some major libraries, and paper copies, CD-ROMs and microfilms are available free to the public in most patent offices. Although manual searches are quite thorough, it may take more time than automated searches.

Furthermore, the performance of manual searches is too dependent upon the capability of an individual searcher. If a manual searcher is not experienced and does not know exactly where to look for, searching processes will be delayed without any desired results.

Therefore, manual searches are usually supplemented by automated searches that employ keywords describing the invention. In most cases, using automated searches enables a searcher to retrieve the prior art relevant to the technology much faster and easier than manual searches. Automated searches using keywords and Boolean operators can be further developed by defining the following categories: [82]

- critical dates to limit the search (if an invention is to be filed to the EPO on 1 October 2004, any prior art which comes after this date is meaningless, therefore, need not be searched;

- required keywords - by the AND logical operator;

- optional keywords - by the OR logical operator;

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[82] See note 73 above. See also Canadian Intellectual Property Office (CIPO) (June 1998) *Searching the Patent Literature In the Electronic Age,*41.

- excluded keywords –by the NOT logical operator;[83]

- adjacent keywords –by the ADJ(n)[84] or NEAR operator.

However, keyword search engines are not always effective in retrieving relevant prior art, because some common keywords of an invention are often hidden or expressed differently in the patent specification. For example, Priceline's patent[85] is related to a "reverse auction" system, but the term "reverse auction" is not found within any claims of the patent. Similarly, Amazon's "one click" patent[86] may not be retrieved by merely combining the keywords, "one" and "click".[87]

A concept-based search will minimise such difficulties of losing any good references, and improve the accuracy and relevancy of the keyword or Boolean search. Searching multiple concept terms increases the possibility of retrieving patents relevant to the application. Concept terms can be derived by considering many aspects of the invention including: background, objects and the field of use of the invention; problems to be solved by the invention; primary advantages and outcomes of the invention.[88]

Furthermore, the scope of search can be expanded by including the synonyms of the essential terms of the invention. A set of synonyms for each component of the invention can be combined by OR operators and each search query of the component can be linked by AND operators. For example, if an invention consists of a server and a client computer operating on the Internet, one possible form of a search question can be constructed as follows:

> *(server OR host) AND (client OR user) AND (Internet OR web)*
> *AND (computer OR system)*

Therefore, it is imperative to think of, and list, as many expressions as possible having similar concepts to describe the same subject matter, so long as it does not extend the scope of the search in an overly broad way.

Along with a concept-based search, it is necessary to conduct a wildcard search to include a variety of terms derived from one word with same meanings. The search of transform*[89] can retrieve the terms: transformer, transforming and other terms that start with transform. *driver will include every word that terminates with the word "driver".

There are, however, some pitfalls to avoid when using keyword searches. If too many synonyms, wildcards or spelling variations are used for the Boolean inquiry, the

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[83] For example, in *A* NOT *B*, *A* must appear but *B* must not appear in any record retrieved by the search.

[84] For example, in *A* ADJ(n) *B*, *B* must appear within a certain number (n) of terms of *A*, either before or after.

[85] US Patent 5,794,207.

[86] US Patent 5,960,411.

[87] Rather, it was found that Amazon's patent could be retrieved by combining the keywords of 'single' and 'click'.

[88] U.S. Department of Commerce (5 June 2001) Federal Register/ Vol. 66, No. 108/ Notices at 30169.

[89] Some databases such as DIALOG use '?' for wildcard.

search result may contain too many irrelevant documents, thereby increasing the time of search and making the search meaningless.[90] On the contrary, if a searcher attempts to reduce the total number of hits by a too simplified search question, many pertinent references will not be retrieved. Consequently, it is important to see whether the search results are relevant, and to modify the search questions to narrow or expand the scope of the search.

Furthermore, in particular for those technological areas where the structure of an apparatus is essential to the core of the subject matter, or where images, including flowcharts or block diagrams, should be considered for understanding the invention clearly, it is better to start a manual search first. This is because some automated databases are based on text based-search engines, which are not efficient in retrieving and illustrating graphic-related data.[91] Given that most software patents are based on the processes or functions of computer programs, it is more helpful to look into flowcharts or block diagrams associated with the software than merely to rely on text-based search engines. Thus, if any searches are based solely on full-text keywords searching engines, the results of the searches will be of limited use and should not be relied upon too much.

Notwithstanding the combination of manual and automated searches, there is a possibility that some very pertinent patents have been misclassified, and therefore could have been missed. If the initial search has not been successful, it is desirable to refine the search by dividing the components of the invention and conducting separate searches for an each component, or using another parameter for the syntax of the searches. A keyword search can also be combined with a certain patent class to narrow the search result.

5.2. Strategies for Searching Non-patent Literature

If no prior art is found by a patent literature search,[92] the patent searcher should consider using further applicable databases containing non-patent literature such as printed publications, or online materials on the web. Particularly in the field of relatively new technology, the relevant prior art is highly likely to be found in literature databases rather than patents. As the number of citations of non-patent literature increases in patent specifications,[93] non-patent literature serves as good sources of prior art. Unlike patent databases, non-patent prior art databases are not standardised well in terms of search capability and options. In addition, non-patent resources do not provide consistent searching formats such as references to related patents, classes of technology, inventors, and assignees.[94] Thus, it is important to apply different approaches when searching non-patent literature.

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[90] See note 82 above, Canadian Intellectual Property Office (CIPO) at 37.

[91] However, some graphic searchable software has been used in retrieving graphical information. For example, OHIM (Office for Harmonisation in the Internal Market) has developed software to cope with 3D trademark applications.

[92] This is often the case especially for software-related inventions.

[93] In 1999, the rate of citations for non-patent literature in the field of electricity/physics amounted to 12.73 %. See G. Gerard (19 May 2000) *Use of Scientific Literature by the Patent Offices*, European Patent Office.

[94] A. Gibbs (March 2000) Non-Patent Art Search Projects,

It is worthwhile looking into the general strategies of searching the web. There are some tips that can be applied to web pages to increase the relevancy and efficiency of the searches.[95]

- Enter as many precise search terms or phrases (if allowed) as possible in order to limit the search. For preventing irrelevant search results, using the required/prohibited term operator (+/-) helps reduce unrelated web resources, e.g. +radio* -radiology;

- Use singular terms. Most search engines will find and return plural words for a singular term request, i.e. devices for device. To generalise a subject, wildcards can be used;

- Include common, generic search terms in a phrase with more specific terms. The term a "process" would be far too generic unless it is limited by some phrases like an "image displaying process";

- Use Boolean functions in search engines and especially proximity operators to increase the relevancy of searches. It is desirable to use the adjacency operator where word order is important.

Some of the above strategies can be applied to patent literature searches as well.

Many software companies operate their websites with up-to-date information concerning their products. In this regard, a visit to each company's home page may provide a source of prior art.[96] If product-based references need to be found, online shopping malls can be a good resource. Using multi-lingual search engines enhances search results by extending the scope of searches beyond domestic resources.

The strategies of using databases should be tailored to the principal characteristics of each database. Given the diversity of searchable databases, it is important to know the characteristics of databases with general and specialty purposes, and to determine which database to try first. Because the methods of using operators for Boolean and keyword searches vary from database to database, even the same search syntax may result in different outcomes according to database. Therefore, it is important to understand the strengths and weaknesses of each search tool in view of the purpose of the search. In addition, subject specific databases should be consulted along with general-purpose databases, if one intends to search the technology relating to one subclass classification.

5.3. Analysis of the Search Result

The final search report should contain the closest prior art relevant to the present invention and all other materials which might have a bearing on novelty and inventive step of the invention. Having completed prior art searches, there may be a few references to products or previous patents similar to the invention. This is the time to consult the patent attorney to discuss the prospects for the patentability of the invention. Based on the search results, the inventor and the patent counsel should

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@: http://www.cafezine.com/index_article.asp?deptId=2&id=64.

[95] T. A. Gray, How to Search the Web A Guide To Search Tools @: http://daphne.palomar.edu/TGSEARCH/.

[96] See note 73 above.

cooperate to provide a comparative description in the patent specification, and to articulate how the invention is better, more effective, and has more advantages than the closest prior art.

6. Conclusion

Voices from the anti-patent and the pro-patent lobbies have been divided as to whether the patenting of computer software helps promote innovation and ultimately benefits society. The lack of prior art resources has been a major issue of debates over software patents, since it may lead to trivial patents in software. In order to prevent abusive enforcement of trivial patents and to enhance the quality of issued patents, prior art searches should evolve in line with advances in technology. Considering the diversity of prior art in the field of computer technology, it is crucial to construct and update relevant databases for prior art and share those prior art resources between national patent offices. In this regard, the trilateral co-operation between the EPO, USPTO and JPO for patent searches will expand available prior art resources in the patent offices. From the perspective of non-patent information, WIPO's JOPAL Project can be a good example of a fully searchable database that contains up-to-date bibliographic details of scientific and technical publications for efficient non-patent literature searches.

Last but not least, one of the possible solutions to the current debates would be the introduction of prior art disclosure requirement particularly in the countries where there is no obligation to disclose prior art when filing a patent application.[97] This is because the lack of prior art information within the patent description has resulted in low efficiency in examinations or prior art searches for filed inventions. Pursuant to the prior art disclosure requirement, an applicant is required to disclose any prior art that he acknowledges when filing the patent application. Given that much of the prior art in computer technology resides in non-patent literature, the disclosure of prior art would increase the efficiency of patent examination by providing up-to-date information concerning the filed invention.

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[97] In most countries other than the US and Japan, there is no requirement for prior art disclosure.