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ESSAY

THE TECHNOLOGICAL INNOVATION PROCESS: PATENT DOCUMENTATION AS A SOURCE OF TECHNOLOGICAL INFORMATION†

By

Ronald E. Myrick, William P. Skladony, and Ram Nath

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He who receives an idea from me, receives instructions himself without lessening mine; as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature.

Thomas Jefferson¹

INTRODUCTION

History has shown that it is in the nature of mankind to learn the ideas of others, to benefit from their use, and, in many instances, to improve upon them. The advisability of using the teaching of those that have already solved a particular problem is reflected in the proverbial admonition, "Don't reinvent the wheel."² Laboring over the solution to a problem which has already been satisfactorily solved by another is popularly understood to be a wasteful use of one's talents. It is better, or at least more efficient, to direct inventive energies toward improving upon a given solution, or devising a solution to an entirely different problem. Not only do ideas and information spread, the value of the ideas and information is often enhanced as they pass from one to another.

This essay focuses upon how patent documents³ can be an integral part of the process by which scientists and engineers learn from the teachings of others. More particularly, patent documents are a valuable source of technical information for advancing the understanding of a given technological art. In addition to discussing the intrinsic value of the information therein contained, this essay also discusses the ways in which patent documentation is made accessible. More particularly, the discussion highlights some recent developments in information storage and retrieval technology — such as

1. 6 WRITINGS OF THOMAS JEFFERSON, 180-181 (H.A. Washington ed.) (1854).

2. Recognizing the value of learning from others has often been metaphorically stated in terms of the person standing on the shoulders of a giant who is able to see even further than the giant himself. For example, Samuel Taylor Coleridge said, "The dwarf sees farther than the giant, when he has the giant's shoulders to mount on." SAMUEL TAYLOR, *THE FRIEND*, section i, Essay 8. And, Sir Isaac Newton said, "If I have seen further it is by standing on the shoulders of giants." SIR ISAAC NEWTON, *LETTER TO ROBERT HOOK*, February 5, 1675/76.

3. Unless otherwise noted, throughout this paper the term "patent documents" includes all published patent documents and patent related publications. Typically, such documents and publications would include: utility patents, patents of addition or improvement, dependent patents, patents of importation (revalidation, confirmation and introduction), inventors' certificates, precautional patents, secret patents when published, reissue patents, plant patents, petty patents, registrations and design patents.

the advent of Compact Disc-Read Only Memory ("CD-ROM") and on-line data accessibility. Such advancements have greatly improved the availability of patent documentation so that it is a viable, indeed convenient and economical, information resource. The essay concludes with a discussion of the role of the World Intellectual Property Organization ("WIPO") and the International Patent Documentation Center ("INPADOC") of the European Patent Office ("EPO") in the dissemination of patent documentation, especially to developing countries.

PATENTS AS A SOURCE OF TECHNOLOGY INFORMATION

Academic textbooks, scholarly treatises, journal articles, and the like, are well known to scientists and engineers as important sources of technological information. In addition to these more traditional sources of information, patent documents, which are published by and available through many patent offices around the world, likewise contain detailed technological information. Unfortunately, patents may be overlooked as an information source.⁴

Patents are a rich source of information which can be highly valuable in teaching the state of a given technological art, and thereby contribute to invention and innovation. One author stated,

Technological information is the life-blood of the innovative and inventive process and patents are also the vital source for such purpose. Patents should be, an integral part of the any data base from which relevant items are selected in the provision of both current awareness and retrospective searches. There is a need for the change in the attitude of scientists and engineers towards the patents. The academic training of technologists and scientists should be similarly oriented to make them rely equally on patent literature along with journal articles.⁵

4. L. O. Aina, *The Use of Patent Literature By Nigerian Scientists*, INSPPEL, Vol 23(3), 164, 168 (1989), [hereinafter cited as "Aina"]; D. Chester, *Getting Benefits From Patents*, LASIE, Vol. 15, No. 2, Sept/Oct 1984, 2, 8-9; Sophie K. Hudnut, *Patents as Information Sources*, ONLINE '82 CONFERENCE PROCEEDINGS, 1 (1982), [hereinafter cited as "Hudnut"]; Sudarshan Kumar, *Patents as Source of Technological Information*, HERALD OF LIBRARY SCIENCE, July-October, 1984, 175, 180, [hereinafter cited as "Kumar"]; William S. Lawson, *Patents as a Source of Technological Information* paper accompanying presentation in Chicago, Ill., on Dec. 1, 1979, 1, 6, [hereinafter cited as "Lawson"]; and Susan M. Tertell, *Patents are an Overlooked Information Source*, BULLETIN OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE, October/November 1986, 24, [hereinafter cited as "Tertell"].

5. Kumar, *supra* note 4, at 181.

Another author stated,

As a source of technological information across the whole spectrum of technology, the collection of patents has no equivalent. To researchers it can be a rich source of current state-of-the-art information, new ideas, and problem

Clearly, patents can serve a very useful role in providing current information to those attempting to understand a given technology.⁶

In certain instances, however, there are limits to the technological information that can be found in patents. For example, the patent statutes of some countries have listings of subject matter which is considered nonstatutory. Most countries limit patentable subject matter to inventions of a technological nature. Examples of subject matter which is nonstatutory in certain countries include inventions relating to national security, medicines, pharmaceutical products, scientific principles (computer programs), food, as well as inventions contrary to law or morality, or injurious to health. These exclusions are often based upon the given country's perceived need to promote unrestricted technological development, resulting in the exclusion of the granting of exclusive monopolies in certain fields. In India, for instance, substances per se relating to or produced by chemical processes, (including alloys, optical glass, semi-conductors and intermetallic compounds) are non-patentable. However, methods or processes for producing such substances are patentable for a relatively short term.

In spite of these particular limitations, there are a number of key reasons why patents are a valuable source of technical information. Firstly, a fundamental prescription of patent systems around the world⁷ is that in order to be granted a patent, the applicant must

solving technology, all of which may lead to more productive research and development. Patent documents are a vital information source which should be consulted before an industrial enterprise, research and development laboratory or an individual engages in costly and time consuming experiments with the objective of developing a new patentable product.

Chester, *supra* note 4, at 4.

Citing Eckhard Derday, a third author has said,

According to Derday (1985), the technological information contained in patent documents is very crucial in the field of innovation, and since the growth of any national economy is largely influenced by the degree of its innovativeness, the full exploitation of patent information becomes obvious. Derday further emphasized that patent information is a unique instrument for the transfer of technical knowledge from developed to developing countries.

Aina, *supra* note 4, at 164.

6. On the other hand, there may be countries where a patent application for nonstatutory subject matter is preliminarily published, but not patented. Consequently, preliminary patent publications could serve as exceptionally good sources of technological information.

7. In discussing the requirements of patent systems around the world, rather than offering a sampling of the patent laws of a number of specific countries, throughout this paper the authors will refer to the provisions of "The 'Basic Proposal' for the Treaty and Regulations", compiled by the Diplomatic Conference For The Conclusion Of A Treaty Supplementing The Paris Convention As Far As Patents Are Concerned, WIPO Doc. PLT/DC/3, December 21, 1990; [hereinafter cited as "Draft Harmonization Treaty"]. Additionally, the authors will refer to the draft "Agreement on Trade-Related Aspects of Intellectual Property

disclose the invention with sufficient clarity and completeness that the invention could be carried out by a person skilled in the art to which the invention relates.⁸ In fulfilling this requirement, applicants must usually disclose at least one mode, and possibly even the best mode, of carrying out the invention.⁹ This disclosure by the applicant is often accompanied by a set of drawings which aid in the description of the invention.¹⁰ Patent laws squarely place an obligation on the applicant to disclose the invention in a manner that would enable others to practice the art. Those skilled in the art can thus consult patents and gain practical insights into the technology.

Another reason patents are a valuable source of technological information is that the patent application will include a discussion of the background art which is useful for understanding the invention.¹¹ Patent drafters often address this aspect of the patent disclosure by describing a particular problem, the drawbacks of other solutions to the problem, the inventor's solution, and the advantages resulting from that solution.¹² By consulting patent documents for technical information, one gets a concise summary of the state of the art with the invention placed in a historical context. Additionally, because each applicant is required to clearly and concisely claim the matter which comprises the invention,¹³ the patent

Rights, Including Trade in Counterfeit Goods," draft version released by GATT Director General, Arthur Dunkel on December 20, 1991, MTN.TNC/W/FA, pp. 57-90, [hereinafter cited as Draft TRIPS Agreement]. The authors have elected to refer to these two documents because to the extent that the drafts are a culmination of many years of international negotiations focused upon the harmonization of patent and intellectual property laws, they reflect a degree of consensus by the international community on the purpose, content, and format of patents. Furthermore, a review of the general principles and requirements reflected by the draft treaty and agreement provisions cited in this paper will reveal these principles and requirements that are generally implemented, in one form or another, in the various national patent laws around the world.

8. Draft Harmonization Treaty, *supra* note 7, Article 3(1)(a); and Draft TRIPS Agreement, *supra* note 7, Article 29(1). Mandating the disclosure of the invention so that the rest of society can benefit from the teaching contained in the disclosure is generally regarded as the *quid pro quo* for the exclusive rights granted to the inventor through the patent.

9. Draft Harmonization Treaty, *supra* note 7, Rule 2(1)(vi), and Draft TRIPS Agreement, *supra* note 7, Article 29. International Patent applications filed under the Patent Cooperation Treaty ("PCT"), for example, are generally required to include a description of performing the invention in the best mode. (Rule 5.1 (a) (v) PCT). Thus, patents filed in countries requiring the disclosure of the best mode will likely contain more complete information than patents from countries without a best mode requirement.

10. Draft Harmonization Treaty, *supra* note 7, Rule 2(1) (v).

11. *Id.* Rule 2(1) (ii). See also General Introduction to the Use of Patent Documents and the Technological Information Contained Therein, prepared by the International Bureau of WIPO, Doc. No. WIPO/PD/SOF/90/1, dated October 1990, 21, [hereinafter cited as "WIPO Introduction"].

12. Draft Harmonization Treaty, *supra* note 7, Rule 2(1) (iii).

13. *Id.* Article 4(2) and (3), and also see Rule 3(2) stating that "[t]he definition of the

distinguishes the new from the old by highlighting the inventor's advancement of the technology.

A further requirement for the granting of a patent, which makes patents valuable sources of technological information, is that the invention must be new and it must involve an inventive step.¹⁴ These statutory provisions insure that the patented invention was not within the public domain before the effective date on which the patent application was filed.¹⁵ Once having conceived the invention or reduced the invention to practice, the threat of the loss of rights due to public disclosure of the invention by some other source motivates inventors to file for a patent promptly. Consequently, patent documents will generally reveal information which is at the forefront of the given area of technology.¹⁶

In addition to being a source for the timely disclosure of technology, patent documents are often the only source of disclosure of important scientific or engineering information. Studies show that approximately 70%, or more, of what is disclosed in patent documents is not revealed in other publicly available sources.¹⁷ Neglecting the information in patents can therefore disadvantage the researcher, insofar as he or she could be failing to consult a unique source of significant information. Without that information, the researcher may expend considerable efforts working on a problem to which there is already an acceptable solution. For example, accord-

matter for which protection is sought shall be in terms of the technical features of the invention."

14. *Id.* Article 10(1) of Alternative A and Article 11(1), and Draft TRIPS Agreement, *supra* note 7, Article 11(1). See also WIPO Introduction, *supra* note 11, at 7.

15. Draft Harmonization Treaty, *supra* note 7, Article 11(2)(b). Many countries today have absolute novelty requirements for inventions to be patentable. To meet this requirement, the invention should not have been made part of public knowledge prior to the date of patent application. In other words, the invention cannot have been divulged to the public by an act — such as public use, non privileged disclosure, publication, sale, or manufacture — anywhere in the world, such that one skilled in the art would be able to practice the invention from information obtained from the act. Other countries, such as Japan and the U.S., have relative novelty requirements whereby pre-filing publication of the invention anywhere in the world can result in the loss of novelty, but in order for a public use to result in the loss of novelty it must occur within the country. In the United States inventors are also given a one year grace period during which they may file a patent application even after public disclosure or use. See 35 U.S.C. sec. 102(b). In Japan, Article 30(1) of the Patent Law provides a six-month grace period in respect of printed publications (and certain other written disclosures) of the invention attributable to the applicant, provided written request for the application of Article 30(1) is made when the application is filed. Because failure to file within the grace period will result in a loss of rights, even under the relaxed standards of a relative novelty country, there is, nonetheless, motivation to file for a patent promptly.

16. WIPO Introduction, *supra* note 11, at 7.

17. Chester, *supra* note 4, at 5; Hudnut, *supra* note 4, at 1; Lawson, *supra* note 4, at 6; Tertell, *supra* note 4, at 24; and WIPO Introduction, *supra* note 11, at 8.

ing to one author international studies have estimated that at least 10% of all R&D expenditure is duplication of what could have been determined through a patent search. This translates into the waste of approximately 100 million R&D dollars per year in Australia.¹⁸

Patent laws require the invention to be industrially applicable.¹⁹ This insures that the invention has some utility. Frequently, the patent will include not simply concepts, but also detailed information on the possible practical applications of the invention.²⁰ Moreover, the expense associated with securing and maintaining a patent will generally insure that the invention has some perceived value, since the patentee would not incur that expense otherwise. Patents therefore include relevant technological information, which will have a practical utility for members of the engineering and scientific communities.

THE ACCESSIBILITY OF PATENTS AS AN INFORMATION SOURCE

Patent documents are inherently valuable to scientists and engineers because of the technical information they contain. However, due to the sheer volume of patent documents published around the world each year,²¹ their value as an information re-

18. Chester, *supra* note 4, at 6.

19. Draft Harmonization Treaty, Article 10(1), Alternative A, and Draft TRIPS Agreement, Article 27, *supra* note 7.

20. WIPO Introduction, *supra*, note 11, at 8.

21. A report of the World Intellectual Property Organization, reveals that in 1990, the year for which the most current data is available, the total number of patents applied for in the 82 nations covered by the report was 1,663,280. During that year the total number of patents granted in the 82 nations was 548,304. *Intellectual Property Statistics 1990*, Publication A of the World Intellectual Property Organization, Doc. No. IP/STAT/1990/A (Publication A).

Focusing upon the United States, for example, statistics of the United States Patent and Trademark Office ("USPTO") reflect the trend toward more patents being applied for and granted, suggesting that an increasing amount of technical information is revealed in patents.

<i>Year</i>	<i>No. of App. *</i>	<i>No. Granted Pats. *</i>
1985	117,006	71,661
1986	122,433	70,860
1987	127,917	82,952
1988	139,825	77,924
1989	152,750	95,539
1990	164,558	90,366

* Figures only relate to utility patents.

During the fiscal year ending September 30, 1991, the USPTO had granted 92,474 utility, plant, and reissue patents.

In addition to patents, patent offices also collect and index other publications, which are used in prior art searches, along with the patents. Again referring to the USPTO, statistics reveal the daunting volume of documents that are added to the collection of just one patent

source would be greatly diminished if they could not be conveniently and efficiently accessed by those interested in using them.

Fortunately, patent documents are catalogued in a manner that is designed to facilitate their easy access. Ease of accessibility is due in part to the classification of documents within the given patent system, and also to the typically uniform format by which individual patent documents tend to be structured. Accordingly, an individual who is familiar with general research techniques can quite readily access documents within the system, and quickly assess the usefulness of a given document.

Naturally, the first concern of the researcher interested in using patents is how to access the system. The classification of patents, according to their respective areas of technology, is the means by which individual documents are catalogued, and therefore accessed.²² Using a variety of search aids,²³ the researcher can find the class and subclass in which the given technology is catalogued. Frequently, a given technology area may be catalogued in more

office. For example, during the years shown, the USPTO added the following U.S. and non-U.S. documents to its collection.

<i>Year</i>	<i>U.S. Docs.</i>	<i>Non-U.S. Docs.</i>
1985	285,000	359,000
1986	291,000	373,000
1987	353,000	363,000
1988	506,000	378,000
1989	436,000	381,000
1990	458,000	512,000

Patent Type Summary Report as of December 31, 1990.

As of December 31, 1991, the USPTO housed a total of 31 million U.S. and non-U.S. documents, comprised of patents and other printed publications.

Finally, although it is not known precisely how many patent documents have been published *in toto*, estimates place the number at about 30 million, with an additional 1 million patent applications and granted patents being added each year. WIPO Introduction, *supra* note 11, at 6 - 7; Chester, *supra* note 4, at 8.

22. Presently, over 50 countries apply the International Patent Classification ("IPC") system to their patents. Also, as of January, 1990, the IPC divided technology into 8 sections, 118 classes, 616 subclasses, 6,871 main groups and 57,324 subgroups, for a total of 64,195 divisions or subdivisions. "The International Patent Classification (IPC), Its Philosophy and Use," Prepared by the International Bureau of WIPO, Doc. No. WIPO/PD/SOF/90/2, dated October 1990, [hereinafter cited as "WIPO Classification"], at 4 and 6. Also see WIPO Introduction, *supra* note 11, at 10 - 12. Current versions of the IPC are available in English and French. There are also translations into other languages, such as Chinese, German, Hungarian, Japanese, Korean, Polish, Portuguese, Spanish, and Thai, which makes the use of IPC relatively economical and simple for use by searchers from developing and industrialized countries alike. It is estimated that more than 90% of the patent documents in the world bear the IPC symbols and can be accessed therefrom.

In addition, the patent system in a given country will also have its own classification system, and there are naturally variations in their respective levels of sophistication. As of January, 1992, the United States Patent Classification System has 415 classes and 127,194 subclasses for its patent documentation. Issued U. S. patents include within the bibliographic

than one class or subclass, which may make the research project somewhat more complex, but still manageable. Having located the appropriate classes and subclasses, the researcher can then retrieve the individual documents within the class or subclass for review.²⁴

The researcher is further assisted by the fairly uniform format by which standard information is presented in the patent.²⁵ Patent formats include a title,²⁶ an identification of the technical field to which the invention relates,²⁷ a discussion of the background art,²⁸ a description of the invention with reference to the background

information the appropriate U.S. Patent Classification numbers as well as International Patent Classification ("IPC") numbers.

The European Classification ("ECLA") is a variation and an extension of the IPC developed by the European Patent Office. The ECLA system comprises 65,000 subdivisions of the IPC and additionally 39,900 more detailed subdivisions.

There are also private entities which have developed their own classification system. For example, the Derwent classification system, developed by Derwent Publications Limited, is well organized and continually updated. Derwent provides instruction manuals and a World Patent Index comprising listings of patent documents from thirty countries/groups including EP and PCT. The system also provides views of trends in technological innovation through patents-statistical-analysis. Derwent has international branches which allow access to its database from one of several geographic locations in the world.

Conversion tables for interconnecting patent classification systems of different countries have been developed, but are not as effective as would be desired by a modern searcher or user, because of the diversity in the approach to the classification by different countries.

23. The searching of patents classified according to the IPC is accomplished by reference to a Guide which explains the layout, use of symbols, principles, rules and application of the IPC, as well as a survey of the classes and a summary of the main groups. WIPO Classification, *supra* note 22, at 5.

In the United States the Index to the U.S. Patent Classification gives an alphabetical listing of subject matter headings or descriptions. Additional sources such as the MANUAL OF CLASSIFICATION contains the classification schedules, while the U.S. PATENT CLASSIFICATION DEFINITIONS gives a detailed definition of what is included in or excluded from a particular classification, adding useful search notes. Also see Hudnut, *supra* note 4, at 5; Lawson, *supra* note 4, at 11; and Tertell, *supra* note 4, at 24-25.

Yet another information tool available in the United States is the *Official Gazette* ("OG"), which is published weekly by the USPTO, and contains a summary of each patent issued during the week, arranged according to the subject matter of the patent. Typically, the OG entry for a given patent will contain the abstract of the invention and a representative illustration of the invention taken from the patent.

24. The U.S. PATENT CLASSIFICATION SUBCLASS LISTING lists the patent numbers which fall within a certain classification so that the researcher can then retrieve the documents. See Tertell, *supra* note 4, at 25.

25. WIPO Introduction, *supra* note 11, at 7.

26. Draft Harmonization Treaty, *supra* note 7, Rule 2(1).

27. *Id.* Rule 2(1) (i).

28. *Id.* Rule 2(1) (ii). A description of the background art is commonly found in the patents of most countries, even though the inclusion of such is not always mandated by statute. There are, however, patent systems which require the discussion of relevant prior art in sufficient detail. The European Patent Convention is an example of one such system. Rule 27, chapter II, Provisions Governing The Application, Implementing Regulations to Part III of the European Convention.

art,²⁹ an explanation of the invention by reference to examples, where appropriate, and by reference to the drawings,³⁰ and finally the claims.³¹ In addition, patents typically have an abstract which contains a concise description of the invention, sometimes including a drawing or figure.³² Abstracts are often translated into a number of different languages. Therefore, even if the patent is in a language which is not understood by the researcher, a translated version of the abstract may be consulted. Particularly, by reference to the title and the abstract, the researcher can easily and accurately determine whether the patent document is relevant.

Patent documents contain so-called bibliographic data that provides useful peripheral information. For example, the bibliographic data typically includes an identification of the inventor, the assignee, if any, the filing date, the publication date, and the issue date.³³ Such information can assist the researcher in determining the vintage of the technology involved. This may have a direct bearing on its usefulness. It can also assist the researcher in locating the inventor or assignee, to have direct discussions relating to the invention if necessary or desirable, or to obtain a license to avoid infringement. Such information also provides an indication of which individuals or corporate entities are involved in particular areas of technology.

The bibliographic data might further include, in addition to a national classification, the international classification of the invention. Using the classification, a searcher could further refine a search by narrowing the examination to: patents in a particular country; patents in a particular language; or patents which belong to a specific assignee.

The bibliographic data often also includes references to other patents and prior art documents which were considered by the pat-

29. *Id.* Rule 2(1) (iii).

30. *Id.* Rule 2(v) and (vi).

31. *Id.* Article 4. There are patent systems which permit the filing of provisional patent applications with no claims, to be followed by a complete application with claims. If no complete application is filed on time, the provisional application, without claims, might be published, laying open the complete specification. Such a system exists in the United Kingdom. In any event, a searcher must be aware that for an unexpired patent, the onus not to infringe is upon the user of the information.

32. WIPO Introduction, *supra* note 11, at 8 and 13. Also, information on abstracts may be obtained from the following sources:

— The Japanese Patent Office, Chiyoda-Ku, Tokyo, Japan.

— Derwent Publications Ltd., Rochdale House, 128, Theobalds Rd. London WC1X-8RP, U.K.

— Chemical Abstracts Service, Ohio State University, Columbus, Ohio, 43210, USA.

33. *Id.* Article 6(1), and *see also* WIPO Introduction, *supra* note 11, at 8.

ent examiner in connection with the examination of the patent application. Using the listed references, a searcher may obtain other patents and nonpatent literature, such as technical publications, articles and other documents, which might be relevant in the context of the particular invention in question. It is also possible to determine whether a given document has been cited as a reference in subsequently published patent documents, which further expands the linkwork of successive publications. All such information can be invaluable to the researcher in efficiently ferreting out the other documents which contain information on related technology. In addition, through the use of the cross-references, the researcher can develop a confidence that all, or virtually all, related sources of information have been consulted.

The documents that comprise the data collection of a given patent office are generally publicly accessible at the central patent office in any given country. So too are the various search aids that assist in finding relevant documents. To the extent that the central patent office of a given country is physically accessible to only a small percentage of the residents of the country, and an even smaller percentage of the world community, many patent offices are committed to the dissemination of patent information by expanding the availability of the documents through a number of different methods.³⁴

For example, within a given country, there may be a number of patent depository libraries which are geographically dispersed so that persons in other regions of the country will have access to many, but not all, of the same documents contained in the central patent office's collection.³⁵ In order to achieve world-wide distribution, the central patent office of one country may have exchange agreements with other countries through which they respectively exchange documents.³⁶ Through this distribution system, patent documents are made more accessible.

Patent offices around the world may be strongly committed to

34. William S. Lawson, *USPTO Perspectives - Use Automation Products Available From USPTO*, [hereinafter cited as "Lawson Perspectives"], for presentation at AIPLA mid-winter meeting, (January, 1992) at CI2, describing the mission of the USPTO.

35. In the United States, for example, there are presently over 70 Patent Depository Libraries in 45 states and the District of Columbia. See Lawson Perspectives, *supra* note 34, at CI2.

36. The United States has such exchange agreements with approximately 35 other countries resulting in the USPTO annually sending out a total of 51 sets of U.S. documents, either on paper or on microfiche. Given that the USPTO publishes on the order of 100,000 documents per year, over 5,000,000 patent documents are distributed around the world by the USPTO annually.

improving the availability of patent documents to their own citizens and the world community. Historically, however, there were significant impediments to the achievement of this objective. Traditionally, patent documentation was accessed manually using paper copies, microfilm, or microfiche. The searcher scrutinized abstracts or full texts in order to locate patents that were of interest. Thus, the search process was performed manually, and was understandably slow. In addition, unless the searcher was geographically situated close to the central patent office, or a depository library, accessibility was limited.

TECHNOLOGICAL DEVELOPMENTS IMPROVING DOCUMENT ACCESSIBILITY

There are presently a wide variety of data bases³⁷ which contain information covering patent documents. Recent technology developments have enhanced the means by which the information contained in the data bases are made available on both a local and remote basis. The availability of these improved sources and access services continues to spread. Two important technological developments which have improved the availability of patent documents are on-line access to computer stored data bases and access through CD-ROMs.³⁸

So-called "on-line" access to computer stored data bases refers to access over some type of telecommunications network. Such data bases are made accessible to subscribers of the given on-line service by the private entity which makes the service available.³⁹ Subscribers to the service may be charged one time or annual subscription fees, as well as actual use fees which are computed on the basis of the amount of time one is actually connected to the on-line resource, not unlike a regular telephone charge.

Typically, an on-line data base enables the searcher to direct the inquiry to the various items of bibliographic data, such as inventor's name, patent owner, title, abstract, classification, filing date, or publication date. Therefore, if a researcher was not familiar with

37. Generally, a data base is a collection of information which pertains to a given subject area or topic. The individual records within the data base are uniformly formatted so that each record contains the same type of information, though obviously not the same information, for each entry. Examples of data bases for patent documents, and the type of information contained in each data base are given in Appendix A.

38. *Lawson*, *supra* note 34, at CI6 - CI10; *Tertell*, *supra* note 4, at 25.

39. Examples of such private parties which provide on-line services are Dialog, Orbit, Patolis, and STN. Also see Appendix A for a selected listing of the data bases which they respectively provide, and their addresses and telephone numbers.

the most relevant classification of the technology which needs to be searched, these other data fields can be searched to identify one or more patents in the target area of the search.

In addition to accessing data bases on-line, the same or other data bases can be stored and accessed on CD-ROM.⁴⁰ A CD-ROM provides a very convenient, compact, electronic medium for storing relatively large amounts of information in word searchable form. For example, about 1000 U.S. patents could be stored in full text and image form on a single CD-ROM disc. In their protective plastic cases, 100 CD-ROM discs storing about 100,000 U.S. patents could be housed in less than three and a half feet of shelf space.⁴¹ The use of CD-ROMs requires a PC-AT computer, a high resolution screen, a CD-ROM drive and printer. The printing of facsimile images will require a laser printer.

CD-ROMs which contain full bibliographic information, text and drawings in facsimile form, are available to facilitate local reproduction of individual copies in a quick, inexpensive manner. At present, the availability of such CD-ROMs is limited to U.S., EPO, PCT, German and U.K. patent documents.⁴² There are also CD-ROMs which contain bibliographic information, abstract and representative drawings in facsimile form, or bibliographic information only. Naturally, the type of information on a given CD-ROM will determine the limits of the search one is capable of performing using that resource.

SOME ON-LINE AND CD-ROM SEARCHING TECHNIQUES

It should first be noted that although patent documents can be accessed and searched through a variety of known data-bases all over the world, the consistency and value of the search results depend heavily on the limitations of the data-base and the manner of searching. Additional variables affecting the search relate to the peculiarities and the features of the accessed patent system, and the specific kinds of patents being accessed.⁴³

40. A selected listing of CD-ROM products and the sources that make the products available are shown in Appendix B.

41. *Lawson, supra* note 34, at CI8.

42. *Lawson, supra* note 34, at CI10.

43. For example, searchers should be aware that applications filed under the European Patent Convention ("EPC") or the Patent Cooperation Treaty ("PCT") will typically result in national applications/patents in designated countries. EPC/PCT applications are, however, subject to preliminary publication at about eighteen months after the priority date of the respective application. Such preliminary publications also are documented and stored in databases and can be accessed during a search. EPC/PCT applications in the course of their prosecution enter the national stage, and, if granted, culminate in national patents which are

Nonetheless, the availability of patent information on CD-ROMs and on-line data bases provides alternatives to local searching. For example, using CD-ROMs, a local search and retention facility can be set up to permit full text document reproduction without incurring the expense associated with accessing on-line data bases. Searches can be conducted using CD-ROMs containing only bibliographic data, titles and/or abstracts to locate patents of interest. CD-ROMs storing full images can then be used to provide screen displays or hard copy full text and drawings of those patents. One disadvantage of this approach is that despite their storage capacities, several CD-ROMs may need to be searched to cover a desired period or range of patents, thus slowing down the search process.

Alternatively, a search could be conducted using an on-line data base service to identify patents of interest from one or more data bases. Once those patents are identified on line, one could then access those patents from a full text/image CD-ROM and reproduce the complete patent. This approach facilitates a more comprehensive search over a range of patents from various sources while minimizing the expense through local reproduction and review of full text copies.⁴⁴ However, the cost of accessing on-line data bases over international data links could be quite significant.

THE ROLES OF WIPO AND INPADOC

The World Intellectual Property Organization ("WIPO") plays a central role in promoting the use of patent documentation as a source of technological information. WIPO promotes the free exchange of patents and related publications between patent offices all

documented and classified just like other national patents, by interested agencies, eg., patent offices, WIPO and other data bases. The searcher will be able to observe the differences, if any, in the text and other portions of the preliminary publication as compared with those in the final granted patent.

44. By way of example of the practical use of these on-line and CD-ROM resources, the Law Department of Digital Equipment Corporation in Maynard, Massachusetts, USA, currently uses on-line data base services to locate English language equivalents of non-English language patents, such as prior art references cited in Patent Office Search and Examination Reports. Also under consideration is the expanded use of on-line patent data bases and CD-ROMs for retroactive searching purposes, such as evaluating the novelty of invention disclosures as part of a decision making process prior to filing the patent application. CD-ROMs offer an attractive basis for self-contained on-site bibliographic and abstract searching and full text patent documentation retrieval, particularly for USPTO and EPO patent documentation. However, CD-ROM abstract searching currently is of limited value because CD-ROMs containing abstracts are available only for the past few years. For example, CASSIS/BIB contains only abstracts for the most recent previous three years while ESPACE CD-ROM products do not extend back before 1989.

over the world. Patent publications both in paper form and in microform are exchanged under various arrangements, with the flow of information designed to address the needs of developing countries.⁴⁵

Additionally, WIPO has assisted the patent offices of some countries and organizations, such as those of Brazil and the African Intellectual Property Organization, to modernize the documentation of their information and records. Representatives from developing countries have been invited to attend training courses arranged by WIPO which discuss the use of technological information contained in patent documents.

WIPO oversees a permanent committee on patent information ("PCPI"). PCPI comprises working groups which provide information to developing countries on requested searches, general information, and standards. WIPO also maintains a program which provides developing countries state of the art searches covering the technology in a requested area. This service relies upon the assistance of several donor countries, such as Germany, Sweden, Austria, which have contributed both time and energy.

Another significant contribution of WIPO is the publication of guidelines for establishment of regional patent information and documentation centers ("PIDC's"), to help promote the dissemination of technological information to developing countries. The document entitled "Guidelines for the Organization of a Patent Information and Documentation Center," was updated in 1987. The two objectives of the guidelines are first, to facilitate "the access of developing countries to technical information already existing in documents such as those concerning patents and other information important to the transfer and use of technology;" and second, to encourage developed countries to "make available in a systematic manner, in accordance with their national laws and regulations, the results of their research and development relevant to the social and economic development of developing countries."

WIPO has also published the so-called INID code which pertains to "recommendation concerning bibliographic data relating to patent documents," and a user oriented guide to the International Patent Classification system. The guide includes four key sections

45. One method by which patent documentation could become more accessible in developing countries is through the creation of Patent Information Document Centers ("PIDC") under guidelines published by WIPO. It seems desirable for WIPO to start PIDCs in developing countries where a PIDC does not exist and thus get the local government involved in technology acquisition/transfer efforts according to need.

of interest to developing countries, namely iron and steel, fertilizers, agro-industries, and agricultural machines and implements, for obtaining solutions to certain technical problems.

In addition to WIPO, a comprehensive international referral service relating to patent documentation is provided by the International Patent Documentation Center (INPADOC) located in Vienna. INPADOC was created in 1972 under an agreement between WIPO and the Republic of Austria. It is now operated as part of the Patent Information Directorate of the EPO.

INPADOC stores and updates basic bibliographic data on the published patent documents of a large number of countries, organizations, or other entities.⁴⁶ The bibliographic data processed and stored by INPADOC is available to government authorities and the public. Due to the comprehensiveness of the bibliographic data, documentation pertinent to specific technical categories and all corresponding patent documents filed for the same invention can be located. Using this information and the link established by the common convention priority date, a "family" of patents can be identified.⁴⁷ Once the members of the family of patents are identified, it can be determined whether the patent is available in a given language. Also, the number of members in the family, which is determined by the number of different countries in which the patent was filed, will give some indication of the perceived importance of the invention.

INPADOC presently makes available a Patent Register Service ("PRS") which gives information on the legal status of patent applications and the granted patents for 12 countries and organizations.⁴⁸ The INPADOC Patent Gazette (IPG), a weekly publica-

46. Those countries, organizations, or other entities are: Argentina, Aripo, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Peoples Republic of China, Cuba, Cyprus, Czechoslovakia, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Ireland, Israel, Italy, Japan, Kenya, Luxembourg, Malaysia, Malawi, Mexico, Monaco, Mongolia, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Republic of Korea, Romania, South Africa, Soviet Union, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America, Vietnam, Yugoslavia, Zimbabwe, the European Patent Office (applications for European patents), the International Bureau of WIPO (international applications under the PCT). The UK patents registered in Hong Kong and Singapore are also recorded.

47. Once a searcher locates a patent document using its classification, by calling the family of patent documents all of which relate to the same priority document, the patent document of a particular language or a particular country can be identified. The researcher should be aware, however, that unless the data base includes non convention countries, it is likely that the patents in the non convention countries, such as Taiwan, India, and Pakistan, would not be included in the family listing.

48. Those countries or organizations are: Austria, Belgium, Switzerland, Germany,

tion, has four indexes: a numerical index; an IPC symbol index; an index of names of applicants and owners; and an index of inventors names. Each index contains references to all patent documents entered in the INPADOC data bank during the proceeding week. Users can thereby readily monitor developments in a particular technical field, or the activities of a given firm, enterprise or inventor. INPADOC bibliographic data and legal status data for patent documents are available on microfiche and tape while the IPG is available on microfiche.

CONCLUSION

Patents are a well-indexed and well-classified source of technological information. They can therefore be beneficially used by individual researchers, corporations, research and development organizations, universities, governments, and others, to learn the technology revealed therein. Patent documentation can also be a useful tool for planning development, allocating funding, and producing statistical information. Whereas patent documentation has traditionally been an underutilized information resource, perhaps due to its more remote accessibility, modern technology has greatly enhanced its availability. Moreover, accessibility is made even easier due to organizations, such as WIPO, which are chartered to improve the wide distribution of patent documentation and the dissemination of technological information. To the extent that the course of history amply demonstrates the value of learning from the teachings of others, it would certainly be undesirable for patents to remain an overlooked source of technological information, especially by developing nations.

APPENDIX A - ON-LINE SERVICES

The following is a selected listing of several data bases and a brief statement of the scope of the contents of each. Also listed are the source entity responsible for maintaining the data bases, as well as the on-line service through which the data base is accessible. With respect to the source entities and each on-line service, the address and telephone numbers are provided. Address, telephone, and FAX numbers are also included for providers of the on-line services.

*Data bases:**INPADOC*

This data base contains bibliographic information for patent documentation from over 50 countries and organizations. The source is the European Patent Office, and it is available on-line through DIALOG, ORBIT, STN and PATOLIS.

JAPIO

This data base contains English language bibliographic information and abstracts of published, unexamined Japanese patent applications published since 1976. The source is the Japan Patent Information Organization, and it is available on-line through ORBIT.

WORLD PATENT INDEX

This data base contains bibliographic information, abstracts, and special subject classification codes for patent documents from 31 patent issuing authorities. The source is Derwent, and it is available on-line through DIALOG, ORBIT and QUESTEL.

*Addresses and telephone numbers for selected sources:**European Patent Office*

Principal Directorate, Patent Information, European Patent Office, EPIDOS-INPADOC Services, Moellwaldplatz 4, Postfach 163, A-1041 Vienna, Austria. (From January 20, 1992). Telephone: 43-1-5261201; FAX: 43-1-52126-1493.

Japan Patent Information Organization

Japan Patent Information Organization, International Department, Sato-Dia Bldg.; 4-1-7 Toyo, Kotu-Ku, Tokyo 135, Japan. Telephone: 81-3-5690-5555; FAX: 81-3-5690-5566.

United States Patent and Trademark Office

U.S. Patent and Trademark Office, Office of Electronic Information Products and Services, Crystal Mall 2, Room 304, Washington, D.C. 20231, U.S.A. Telephone: 1-703-557-5652.

*Addresses and telephone numbers for selected on-line services:***DIALOG****Main office:**

U.S.A. - Dialog Information Services, Inc., 3460 Hillview Avenue, Palo Alto, CA 94304, United States. Telephone: 415-858-3785; FAX: 415-858-7069.

Other offices:

ARGENTINA - In/Base Argentina S.A./DIALOG, Paraguay 1345, Piso 8, Of. C-D, Buenos Aires. Telephone: 54-1-814-4258; FAX: 54-1-814-4258.

AUSTRALIA/NEW ZEALAND - Insearch Limited/DIALOG, P.O. Box 123, Broadway, Sydney, NSW 2007. Telephone: 61-2-212-2867; FAX: 61-2-281-5427.

BRAZIL - PTI/DIALOG, Publicacoes Tecnicas Internacionais Ltda., Rua Peixoto Gomide 209, 01409 Sao Paulo SP. Telephone: 55-11-257-2157; FAX: 55-11-258-6990.

CANADA - Micromedia Ltd./DIALOG, 158 Pearl Street, Toronto, Ontario M5H 1L3. Telephone: 416-593-5211; FAX: 416-593-1760

CHILE - Empresa Nacional de Telecomunicaciones, S.A./DIALOG, (ENTEL-CHILE), Santa Lucia #360, Piso 8, Santiago. Telephone: 56-2-71-21-21; FAX: 56-2-690-2638.

DENMARK - DataArkiv/DIALOG, Glentevej 65, DK-2400 Copenhagen NV. Telephone: 45-38-33-52-10; FAX: 45-31-19-93-51

FINLAND - Esselte Micromedia/DIALOG, Italahdenkatu 22 BA, 00210 Helsinki. Telephone: 358-0-692-6419; FAX: 358-0-692-7820

FRANCE - Learned Information/DIALOG, 75 avenue Parmentier, 75011 Paris. Telephone: 33-1-40-21-24-24; FAX: 33-1-40-21-24-00

GERMANY - EXIT Datenbankdienste/DIALOG, Graf-von-Stauffenbergstrasse 19, D-4800 Bielefeld 1. Telephone: 49-521-16-10-21; FAX: 49-521-10-99-00

HONG KONG - Information Services/DIALOG, 50 F'Aguilar Street, Central, Hong Kong. Telephone: 852-868-0877; FAX: 852-845-0141.

INDIA - Informatics (India) PVT Ltd./DIALOG, PB No. 360, Malleswaram 11th Cross, Bangalore, India 56003. Telephone: 91-812-845-2041.

ISRAEL - Teldan Information Systems Ltd./DIALOG, 7 Derech

Hasholom, Tel-Aviv, Israel 67892. Telephone: 972-3-25-00-73; FAX: 972-3-62-39-09.

JAPAN - KINOKUNIYA COMPANY LTD., ASK Information Retrieval Services, P.O. Box 55 Chitose, Tokyo 156. Telephone: 81-3-439-0123; FAX: 81-3-439-1093.

JAPAN - MARUZEN CO. LTD., MASIS CENTER, P.O. Box 5335, Tokyo International 10031. Telephone: 81-3-271-6068; FAX: 81-3-271-6082.

KOREA - Data Communications Corporation of Korea, Sales and Marketing Division, 10th Floor, Insong Building, 194-45, Hoehyundong 1 GA, Choong-Ku, Seoul. Telephone: 82-2-791-1114; FAX: 82-2-796-8811.

MEXICO - Asesores Especializados en Informacion y Documentacion, S.C., AEID/DIALOG, Ceres 43, Col. Florida, 01030 Mexico, DF. Telephone: 52-5-534-8950; FAX: 52-5-534-8950.

NORWAY - AXESS A/S/DIALOG, P.O. Box 86 Bryn, 0611 Oslo 6. Telephone: 47-2-72-12-70; FAX: 47-2-72-12-66

SAUDI ARABIA - Arabian Advanced Systems, AAS/DIALOG, P.O. Box 20129, Riyadh 11455. Telephone: 966-1-476-6337.

SPAIN- Editorial Garsi SA/DIALOG, Numancia, 85-87, bajo, 08029 Barcelona. Telephone: 34-93-322-99-11; FAX: 34-93-322-96-52

SWEDEN - DataArkiv/DIALOG, Box 1502, S-171 29 Solna. Telephone: 46-8-705-1300; FAX: 08-82-82-96

SWITZERLAND - Centredoc/DIALOG, Rue Brequet 2, CH-2007, Neuchatel. Telephone: 41-38-205-639; FAX: 41-38-25-48-73

U.K. - Learned Information/DIALOG, P.O. Box 188, Oxford OX1 5AX, United Kingdom. Telephone: 44-865-730-275; FAX: 44-865-736354

ORBIT

Main office:

USA - Maxwell Online, Inc., 8000 Westpark Drive, McLean, VA 22101. Telephone: 1-703-442-0900; FAX: 1-703-893-4632.

Other offices:

AUSTRALIA - Maxwell Online, Locked Bag 44, Botany, NSW 2019. Telephone: 61-2-316-9631; FAX: 61-2-316-9485.

JAPAN - USACO Corporation, 13-12 Shinbashi 1-Chome, Minatoku, Tokyo, 105. Telephone: 81-3-3502-6471; FAX: 81-3-3593-2709.

KOREA - Samsung Co., LTd., Business Development Dept., Taepyong-no. 2-GA, Chung-gu, Seoul, Korea 100-102. Telephone: 82-2-751-2542; FAX: 82-2-751-2776.

U.K. - Maxwell Online, Achilles House, Western Avenue, London W3 0UA, England. Telephone: 44-81-992-3456; FAX: 44-81-993-7335

PATOLIS

Japan Patent Information Organization, Sato Dia Bldg., 4-1-7, Toyo, Kotu-Ku, Tokyo 135, Japan. Telephone: 82-3-5690-5555; FAX: 82-3-5690-5566.

QUESTEL

Main Office:

FRANCE - Questel, 55 Avenue des Champs Piereux, 92012 Nanterre Cedex, France. Telephone: 33-1-46-14-55-55.

STN

Main Office:

GERMANY - STN International, P.O.Box 2465, D-7500 Karlsruhe 1. Telephone: 49-7247/82-45-66; FAX: 49-7247/29-68.

Other offices:

AUSTRALIA - CSIRO Information, Resources Unit, 314 Albert Street, East Melbourne, Victoria. Telephone: 03-418-7333.

U.S.A. - STN International, 2540 Olentangy River Road, Columbus, OH 43202. Telephone: 614-421-3698; FAX: 614-421-3713

Access to these on-line services from countries throughout the world is available through Public Data Networks ("PDNs") which facilitate international data communication. PDNs are generally run by the national telecommunication authority of the country. Subscribers to a national PDN can then use international networks such as DIALNET, TYMNET or SprintNet to connect to an on-line service. DIALOG, ORBIT and STN can be accessed via TYMNET and SprintNet; PATOLIS via Venus-P.

APPENDIX B - CD-ROM PRODUCTS

The following is a selected listing of sources which maintain and provide CD-ROM products, and the contents of those products. Included with each title is a brief description of the scope of the contents of the CD-ROM, and finally a listing of the addresses and telephone numbers of each source.

CD-ROM products of the European Patent Office:

ESPACE-EP

This CD-ROM product contains the complete EPO patent specifications published since 1989. Each is stored in image form so that the text, drawings, and formulae can be reproduced exactly as the original using a laser printer. All bibliographic data on the title pages are index coded and title searches can be made in English, French or German.

ESPACE-FIRST

This CD-ROM product contains the first pages of EPO and PCT patent applications published since 1989. Each is stored in facsimile format with searchable bibliographic information and abstracts.

ESPACE-WORLD

This CD-ROM product contains the complete PCT patent applications published since 1991. Each is stored in facsimile format with searchable biographical information and titles.

ESPACE-ACCESS

This CD-ROM product contains EPO patent applications published since 1978. Each is stored in image form with bibliographic information on the title page index coded for searching. Searchable English language abstracts are progressively being introduced.

ESPACE-UK

This CD-ROM product contains bibliographic data (searchable) and complete facsimile images of United Kingdom patent applications (A-documents) published since 1990.

CD-ROM products of the Japan Patent Information Organization:

JAPIO

This CD-ROM product contains the full text images of unexamined Japanese patent and utility model applications published since 1987, including bibliographic information. It is in Japanese.

CD-ROM products of the United States Patent and Trademark Office:

CASSIS/BIB

This CD-ROM product contains the U.S. classifications, assignees, titles, abstracts (most recent three years only) and patent origin (residence state or country of first named inventor) for U.S. patents issued since 1969.

*CD-ROM products of MicroPatent:**ClaimSearch*

This CD-ROM product contains the full text of all claims for patents issued by the USPTO since 1975 together with bibliographic information.

FullText This CD-ROM product contains the full text of patents issued by the USPTO since 1975. Patents can be retrieved by patent number only.

PatentImages

This CD-ROM product contains the full-text images of U.S. patents including drawings for patents issued by the USPTO since 1990, with backfiles to 1976 available during 1992.

*Addresses and telephone numbers for the selected sources:**European Patent Office*

Principal Directorate, Patent Information, European Patent Office, EPIDOS-INPADOC Services, Schottenfeldgasse 29, Postfach 82/P.O. Box 82, A-1072 Vienna, Austria. (From January 20, 1992). Telephone: 43-1-52126-0; FAX: 43-1-52126-1493.

Japanese Patent Information Organization

Japan Patent Information Organization, International Department, Sato-Dia Bldg.; 1-7 Toyo 4-chome, Kotu-Ku, Tokyo 135, Japan. Telephone: 81-3-5690-5555; FAX: 81-3-5690-5566.

United States Patent and Trademark Office

U.S. Patent and Trademark Office, Office of Electronic Information Products and Services, Crystal Mall 2, Room 304, Washington, D.C. 20231, U.S.A. Telephone: 1-703-557-5652.

MicroPatent

MicroPatent Canada - Micromedia Limitee, Mr. Gary Gibson, 265 Hotel de Ville, Hull, Quebec J8X. Telephone: 800-567-1914; FAX: 819-770-9265

MicroPatent Europe, Ms. Elisabeth Hearle, Cambridge Place, Cambridge CB2 1NR, England. Telephone: 44-223-311-479; FAX: 44-223-66440

MicroPatent France - Chadwyck-Healey France, 3, rue de Marivaux, 75002 Paris. Telephone: 33-42-86-80-20; FAX: 33-42-61-33-87

MicroPatent Mexico - Diffusion Cientifica Latinoamericana S.A., Glorieta de Claveria, Mexico, 08020 DF. Telephone: 52-5-396-1818; FAX: 52-5-341-3647

MicroPatent USA, 25 Science Park, New Haven, CT 06511. Telephone: 1-203-786-5500; FAX: 1-203-786-5499.