

# A New Tool for Identifying Possible Licensees or Infringers of Patents

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Patents are expensive and valuable properties to own, and to maintain. Companies patent inventions that have future economic potential. However, without effective patent management, the benefits of these patents might be very easily lost. This is the reason why companies that own patents should use every effective tool available to continuously monitor external use of their patents. Patent citation mapping is considered a useful new tool for patent administration and management. Companies can identify external interest in their patents by monitoring the citations they receive from other companies' patents. External citations to a company's patent reveals a close link between the citing patents and the cited patent. Many times, the complementary nature of the patents are so great that in order to commercialize its own patent a company might have to resort to either licensing or infringing other companies' patents. The author used a computerized technique developed by CHI Research Inc., to map the citation links between various patents of interest. This paper presents a real case of a patent citation map analysis the author has conducted recently for a Japanese oil company. This type of analysis is usually useful in identifying companies that could be future competitors, infringers, or even partners.

agers and consultants of those types of organizations need information before it is apparent in the marketplace or production floor. Patent-based technology indicators provide an early description of technological activity because patent activity falls between R&D and product introduction to the marketplace.

Over the last three decades, the use of patent data has been enhanced by the computerization of the patent system. CHI Research Inc. developed a number of patent-based technology indicators with support from the National Science Foundation. Unlike the previous aggregate uses of patents, the new technology indicators are more advanced in terms of information obtained from the patent document. They allow for quantitative, graphic and highly precise identification of key aspects of a company's technological competitiveness. These indicators are calculated from citations that are found on the front page of a patent document. One of these citation-based indicators is called "citation map." This paper explains the technique, and presents a real application of it in the form of a study the author has conducted for a Japanese oil company.

edge that is most closely related to it. The prior art usually consists of a number of previous patents and some research papers. Studies point to the fact that "citations to a previous patent represent evidence that current state-of-the-art developments are related to or were derived from the earlier inventions." (Ashton and Sen 1988 p. 43)

From its conception, the use of the new patent-based technology indicators has grown. "Increasingly, savvy companies are employing it to spot technological trends, unearth competitors' moves before they're apparent in the marketplace—and even help plan acquisitions, partnerships and overall strategic direction" (*Business Week* 1992, p. 68). The indicators have been continuously used to track the technological strength of different firms in various industries, and the position of different nations in high-tech industries (Albert et al., 1991; Ashton & Sen 1988; Basberg 1987; *Business Week* 1992, 1993; Narin 1993; Narin et al., 1984, 1987, 1988; National Science Board 1993; National Science Foundation 1995).

One recent study conducted by the National Science Foundation (NSB 1998) looked at patent citations to research papers, (as opposed to other patents), and

## INTRODUCTION

Today, more than ever, technology-based organizations are faced with technological change that continuously creates disruptions in industry structures. To make early, sound decisions and plans, man-

## PATENT CITATION ANALYSIS

The references cited in a patent, called the "Prior Art" by the United States Patent & Trademark Office (USPTO), provide a unique feature that captures the linkage between an invention and the prior knowl-

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found that patents granted in the U.S. patent system are increasingly citing research papers that are linked to public research<sup>1</sup>. The findings indicate that government funding of basic research especially in the "drugs and medicines" and "chemicals" fields, continually provides a critical seedbed for applied research conducted by the private sector.

Another recent study conducted by Professor Baruch Lev of New York University revealed a significant link between the technological strength of companies, measured quantitatively using patent citation analysis, and subsequent stock market performance (market-to-book value) of those companies (Lev 1999).

<sup>1</sup> Public research refers here to basic research performed in academic, non-profit and governmental research organizations that is in the public domain.

## Patent Citation Maps

One of the most fascinating and useful aspects of patent citation analysis is how it can reveal the structure of technological relationships among companies. It can show which companies are central to a given technology, and how technology transfers from one company to another. Companies could identify external interest in their patents by monitoring the citations they receive from other companies' patents. Because the references cited on a patent's front page identify prior art, they reveal not only the technical relationship between a patent and its prior art, but also a knowledge link between the owner company of the citing patent and companies which own the prior cited art (Narin 1993). This link can be captured using citation maps.

Patent Citation Maps are based on patent linkages. Given the

patents of a starting company, the map can be used to show the links between the starting company and those companies holding patents that cite the starting company patents. In essence, this is a forward-looking technological scan. The citing patents are the successor patents from related technologies, which have built upon the technology of the starting company. Many times the complementary nature of these patents are so great that in order to commercialize its own patent a company might have to resort to either licensing or infringing other companies' patents. Hence, this type of information is usually useful in identifying companies that could be future partners, competitors, or even infringers.

Figure 1 shows an example of citation links made by patents of three companies (B, C, and D) to the patents of company A (client in this example). As illustrated in

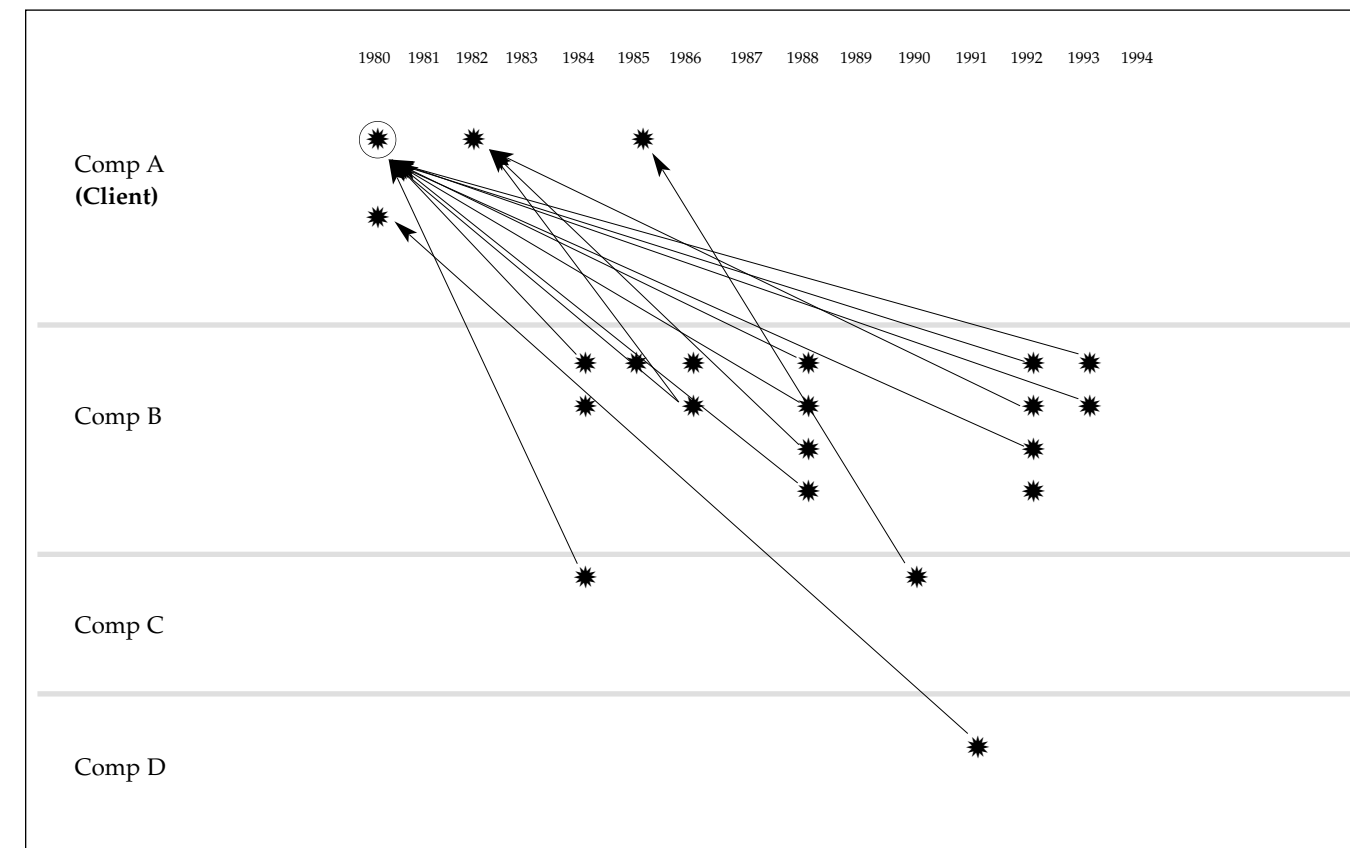


Figure 1. Citation Map Illustration of Across Company Citations ( each \* represents a patent )

Figure 1, two of company A's patents received many citations from the patents of other companies. These two patents are considered high-impact patents. One of these patents (the one circled) had received many citations specifically from company B patents, this indicates that B has been developing technology that is building on, or around, the technology of this patent. Therefore, company A should continuously monitor company B future patents to identify the R&D direction B is taking. Furthermore, company B's future products should also be monitored to check for possible infringements of company A's patents.

#### ANALYSES

This paper presents a real case of a patent citation map analysis conducted for a Japanese oil company (company X). The analysis focused on patents related to Liquid Crystal Film technology. A set of 36 U.S. patents was identified as patents owned by company X and related to Liquid Crystal Film technology. A citation map was made for this set of patents with the aid of CHI Research Inc., and the map was then analyzed.

Patent	Citations received from other companies' patents
1	12
2	9
3	7
4	22
5	9
6	7

Table 1. The Most Cited Patents of Company X.

#### 1. Identifying high-impact patents of company X.

The analysis revealed that, from the 36 patents analyzed, six high-impact patents were identified, as shown in Table 1. High-impact patents are those patents, that are cited more often by other companies' patents; they are deemed to be important patents.

These important patents listed in Table 1 are considered prior art to many other patents that followed them (an important patent usually receives citations from other patents two years after it is issued). From the list above, patent number four has been identified as being the highest impact patent.

#### 2. Identifying organizations heavily citing company X patents.

In order to reveal the companies and organizations that are heavily citing the six important patents of company X, the next step in the investigation required concentrating on the six most cited patents of company X.

The analysis revealed that OIS is the most citing company to X patents (see Table 2). In fact, further investigation revealed that this company is mostly citing patent number four. This indicated that OIS is

working hard on developing the technology of patent number four.

Based on the outcomes above, the recommendation given to company X was that OIS product lines should be continuously monitored by company X for possible infringement to patent number four. Furthermore, if OIS patents are complementary in nature to company X patents in Liquid Crystal Film then, OIS should be approached for possible cross licensing or joint ventures.

Other investigations and recommendations were also provided to Company X regarding the other organizations found in Table 2.

#### CONCLUSIONS AND RECOMMENDATIONS

Citation map analysis is a useful tool for patent management. As illustrated by this case, most of the analyses are investigative in nature and are conducted after the map reveals the patent to patent linkages. The first step a company should make after a map reveals a strong linkage between its own patents and another company's patents, is to investigate the complementary nature of these patents. If the citing patents were highly complementary to its own patents then these patents should be continuously monitored in the future

for events such as a transfer of assignee, expiration of protection period, or movement of the inventor to another organization. The company with a greater need for merging the complementary technologies could always transfer the technology via a license agreement, an acquisition of the patent, or a corporate joint venture. In case none of the above happens, the product lines of suspected companies should be continuously checked for possible infringement.

Companies could also use this objective technique to determine which patents should be maintained and which should be discontinued. Highly cited patents are usually strong patents, which should be maintained throughout their full protection period.

The patent citation analyses discussed in this paper are examples of what is now termed "Competitive Technical Intelligence" (Ashton & Klavans 1997). These new tools are basically designed for providing proactive managers with information needed to make informative decisions.

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