

## **Sorting the wheat from the chaff — the use of patent analysis in evaluating portfolios**

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According to Mark Twain quoting the 19<sup>th</sup> Century British Prime Minister, Benjamin Disraeli, there are three kinds of lies: "Lies, damn lies, and statistics". And certainly, a measure of caution is essential in using statistics. But to dismiss them completely is to deny a valuable tool for helping to evaluate and understand sets of data.

### **Applications of patent analysis**

The use of patent analysis to evaluate and understand trends in the development of technologies, and in the competitive positioning of organizations within areas of technology, is an evolving field with many exciting recent developments. These include improved techniques for:

- Assessing the technological and competitive landscape in which an organization operates
- Changing emphasis in activities over time
- Identifying the key technologies on which an organization's portfolio is built

Understanding the content of an organization's portfolio can help explain how and where it fits in with the organization's competencies, and what the market opportunities are for exploiting the owned technology. It can also help to identify gaps where complementary technology can be licensed-in, and identify non-core technology where know-how can be licensed-out or divested for financial return. These analyses are an essential part of assessing the competitive positioning and potential value of an organization's technology competencies and holdings.

Some of the techniques used within patent analysis are illustrated here, using a couple of NASDAQ-listed companies as examples.

### **Intel Corporation (Nasdaq: INTC)**

Founded in 1968, Intel introduced the world's first microprocessor in 1971. Today it supplies the computing and communications industries with chips, boards, systems, and software building blocks that are the ingredients of computers, servers, and networking and

communications products. This technology is based on many thousands of patented inventions, protected around the world.

A review of Intel's patents holdings reveals the depth and breadth of their technology: a search for Intel as patent assignee amongst US granted patents returns 9,401 results. But what are the key areas of technology covered by these patents, and how does this coverage compare with Intel's competitors?

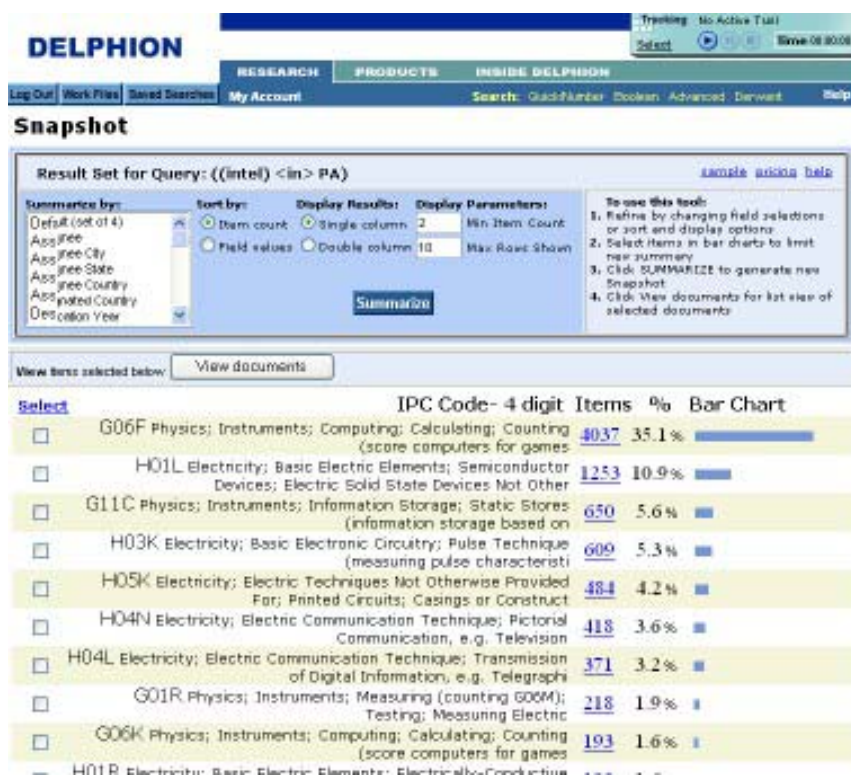


Figure 1: IPC analysis of Intel's patents

An analysis of the IPC (International Patent Classification) for Intel's patents shows dominance in the area of digital data processing (IPC G06F), with 35.1% of patents relating to this area (figure 1).

A complementary analysis (figure 2) can divide the patent portfolio into clusters of similar technology, as defined by the terminology used within the patents to describe the technology:



Figure 2: Clustering Intel's patents by technology

The twelfth cluster in the patent portfolio analysis contains 476 patents and comprises technology relating to flash memory devices.



Figure 3: Titles for the cluster of Intel flash memory inventions

### How does Intel's technology stack-up against the competition?

Advanced Micro Devices are Intel's closest rival. By conducting a similar search of US patents, and analysis by IPC of AMD's patented technology, we can plot both holdings together on a radar map and identify areas of dominance and overlap.

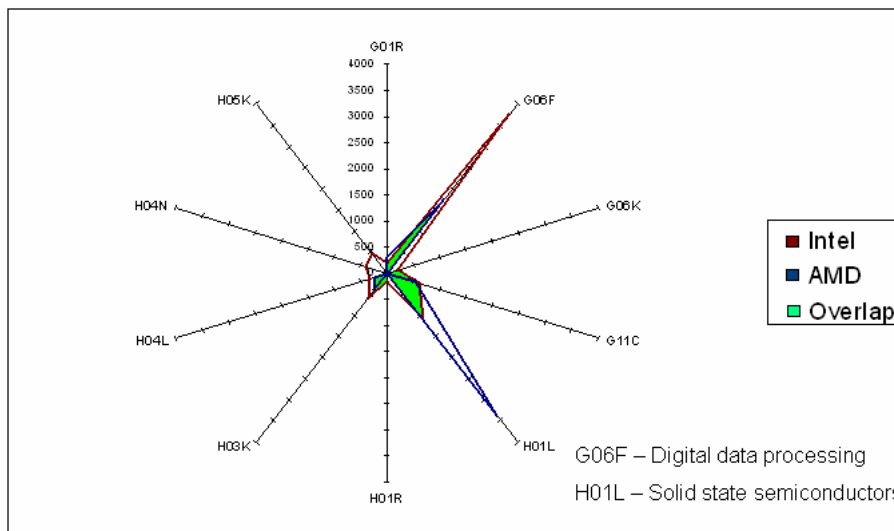


Figure 4: Radar map of Intel and AMD patented technologies

Where Intel's strength lies in digital data processing inventions, AMD's is in solid state semiconductor technology. There is some overlap with Intel in this area which may indicate significant competition for this technology space.

### Nanogen Inc (Nasdaq: NGEN)

One of the more recent Nasdaq-listed companies, Nanogen, was founded in 1993 and specializes in the integration of advanced microelectronics and molecular biology, with applications in the fields of medical diagnostics, biomedical research, genomics, genetic testing and drug discovery. Techniques for the analysis of nucleic acids and proteins, and clinical diagnostic assays, are important in a wide range of fields from drug discovery through to forensic science. An analysis of Derwent Manual Codes for Nanogen's portfolio (figure 5) shows this range of applications.

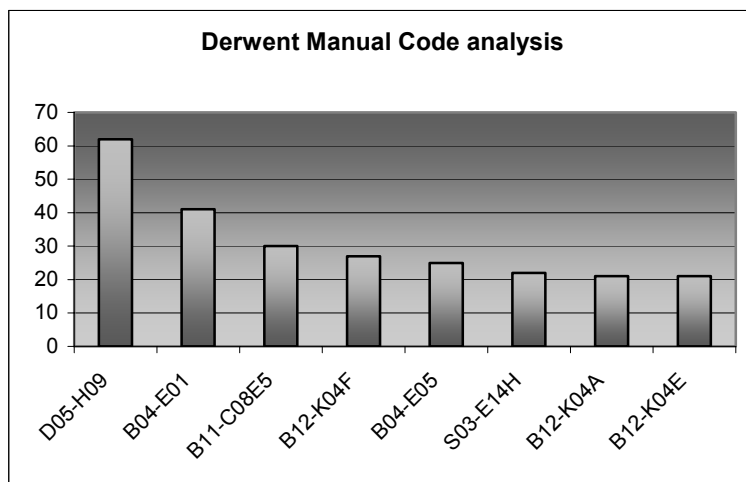


Figure 5: Derwent Manual Code analysis of Nanogen's patented technologies

D05-H09	MICROBIOLOGY, TESTING AND DETECTION
B04-E01	NUCLEIC ACIDS GENERAL
B11-C08E5	DNA HYBRIDISATION TEST METHODS, USE OF DNA PROBES
B12-K04F	DIAGNOSTICS, RESPIRATORY ACTIVE TYPE DIAGNOSIS, TESTS INVOLVING DNA, HYBRIDISATION PROBES ETC.
B04-E05	NUCLEIC ACID PRIMERS, PROBES
S03-E14H	INVESTIGATION METHODS (FOR) BIOLOGICAL MATERIAL
B12-K04A	DIAGNOSIS OF DISEASES OR CONDITIONS IN ANIMALS
B12-K04E	DIAGNOSTICS, RESPIRATORY ACTIVE TYPE DIAGNOSIS TESTING FOR SUBSTANCES OTHER THAN FOR DISEASES

Further evidence of the broad-ranging application of nucleic acid test methods is evident from the high citation frequency of patents describing different approaches to solutions in this area.

Nanogen's portfolio of

84 patents is a case in point. Analysis of the number of times individual Nanogen inventions have been cited by later published patents can help to measure the importance of those inventions. A scatter graph (figure 6)

shows a number of significant inventions as identified by this measure:

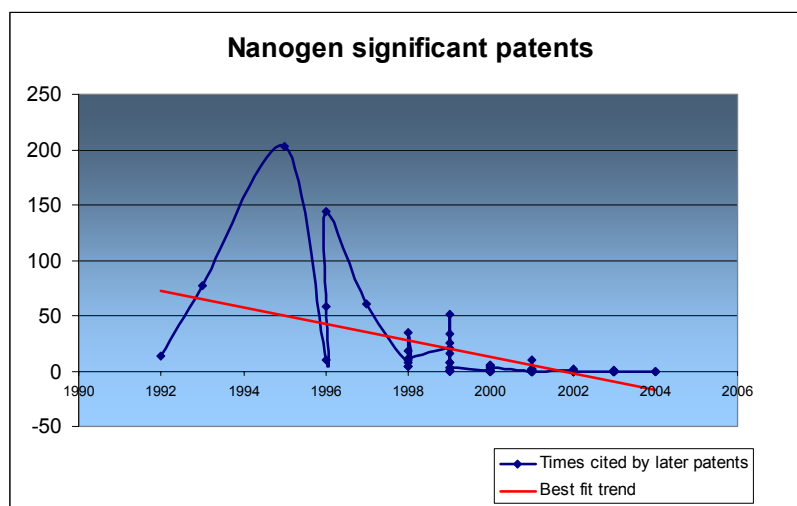


Figure 6: Scatter graph showing citation of Nanogen patents by other published patents

A straight count of the number of times an invention has been cited may be misleading, since the older an invention, the longer it has been in the public domain and therefore the more times it has opportunity to be cited. A best-fit trend line showing average citations per age of invention is used to identify those inventions above the line which have been cited more frequently than would be expected on the basis of their age. These represent significantly more important inventions by this measure.

The ten inventions identified as significant in this way are given in figure 7:

Patent number	Date	Cites	Topic
WO9309128-A	1993	77	New chromophore-contg. poly:nucleotide cpds. for assays
WO9512808-A	1995	203	New self-addressable electronic devices - used for reactions such as DNA hybridisation(s)
WO9601836-A	1996	58	Electronically self-addressable device - used for electronic control of, e.g. nucleic acid hybridisation
WO9607917-A	1996	143	Electronic device adapted for performing mol. biological processes
WO9712030-A	1997	61	Self-addressable and self-assembling system for biological reactions
WO9801758-A	1998	35	Biological electrode arrays, electrode sites, and methods of control -
WO9851819-A	1998	21	Hybridisation analysis using electronic stringency control device
WO9929711-A	1999	51	New microelectronic device designed to carry out and control multi-step and multiplex molecular biological reactions in microscopic format
WO9938612-A	1999	25	Channel-less separation of cell particles by dielectrophoresis
WO9942558-A	1999	33	Electronic device for DNA diagnostic assay

Figure 7: Significant Nanogen patents as identified by citation

As a further measure of the importance of these inventions, patents for protection of the technologies claimed in each are filed in between seven and ten jurisdictions, and are covered by between four and eleven granted patents.

## Conclusion

As we see here, analysis of an organization's portfolio to map key technologies (as identified by IPCs and Derwent Manual codes), comparison of that technology map with competitors, and identification of key patented inventions (as measured by forward citation frequency) are just some of the techniques that can help understand an organization's patent portfolio and help sort the wheat from the chaff.

## Resources used:

*Delphion*

*Derwent Innovations Index*

*Derwent Analytics*