

# ASML—Technology Spill-over and Citation Analysis Report

Ideas are fruits of human endeavor that are cultivated through an innately human process called innovation. Granting legal protection to these fruits of innovation is jurisprudence of Intellectual Property System. While, we have systems in place for providing these protections, we have constant need of robust systems that can effectively and efficiently sieve through an infinite innovation forest and pick best ideas for providing protection. Novocus Legal presents a well-researched method for innovation inspection and screening. This document presents an example from your organization as we feel that inventors and investors are most close to their technology and can understand new concepts with respect their technology better. We hope it is worth your time to go through this document. We would welcome any queries in this regard.

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## Significance of Innovation Screening

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In the highly competitive world of knowledge driven economization, innovation is the key to success. In order to supply state of the art solutions on a systems level, new technologies must be continually mastered, even before they are required in final products. The components that result from this drive are also products in their own right and can be used as building blocks by other system suppliers. This concept of technology stacking often disturbs the precarious balance between innovation, development, and commercial advantages. Often, building blocks required for product development may not be end products for any industry but nevertheless important for overall development and success of certain products. Often, a technology can involve more than a few of such building blocks thereby leading to questions like commercial viability and cost benefit ratios. Often, a technology can have cross industry applications and developers might be so focused on current need of the invention, that rest of the potential can go largely ignored. All these scenarios lead to less than optimal commercialization.

Hence, there is a need for a holistic innovation map and spillover analysis before pursuing patent protection for any technology or product/process idea. This concept would also be equally applicable for early stage technologies and cases where commercialization needs to be done based on prototypes.

The innovation index is designed to provide up-to-date information about progress in a specific technical field.

For a client who is contemplating entry into a particular field, the results of an innovation map and spillover analysis results may approve or disapprove the advisability of such a decision. For a client currently active in a particular field, the innovation map and spill-over analysis results can lay out the path that must be followed for optimal commercialization.

When faced with a technical problem, there is no better way of determining what solutions already exist than by looking at patents. A State of the Art Search allows a client to learn what technology already exists, how such a technology came about and then to build on it. **An innovation map and spill-over analysis will also allow a company to spot new competitors and to identify new technological trends.**

Also, the innovation map and spill-over analysis can go a long way in identifying potential out-licensing opportunities for a given patent portfolio.

### **A theoretical example from radar electronics detailing need and importance of spill-over analysis and cross industry innovation analysis**

A modern radar system utilizes an extraordinarily wide range of technologies. Robust mechanical structures are needed to house and protect the system and sophisticated management of shock, vibration and other environmental factors is required. High precision electro-mechanical systems requiring a marriage of mechanical, electrical and power electronic subsystems point and stabilize the antenna. The antenna itself and the microwave and RF electronics that form the heart of the system require sophisticated design techniques. The signal processors that extract information from the received signals are reliant on the latest digital technologies to attain the high processing speeds required to meet ever-increasing client requirements. Therefore, it is very much apparent that radar technology is an amalgamation of various technologies and heavily relies upon electromechanical systems and micro-electromechanical systems. This observation makes any innovation study related to this technical domain not only an amalgamation of different technical domains like electrical, electronics, and mechanical sciences, but also an amalgamation of many interdisciplinary fields like material sciences, nanotechnology, micro technology and bioelectronics.

## Report Methodology and Index

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The report presented herein, would be focused on nanotechnology portfolio of ASML. Data collected for this research and analysis is obtained from public domain and analytical tools and techniques employed by author have been developed by author through years of learning and experimentation.

Purpose of this report is to present to you a glimpse of what a detailed innovation mapping study can do for your organization's licensing opportunities.

This reports includes following sections:

- Search Strings used and search strategy used
- Bibliographic analysis of patent portfolio under consideration
  - Technical field
  - Application year
- 3. Backward citation analysis of patent portfolio under consideration
  - Technical field
  - Application year
  - Assignee
- Forward Citation analysis of patent portfolio under consideration
  - Technical field
  - Application year
  - Assignee
- Code shift analysis in form of multiple generation forward citation analysis of patent portfolio under consideration
  - Technical field
  - Assignee

Since, this is a study undertaken out of academic interest of author, therefore, technical taxonomies and problems every invention aims at solving are not taken as parameters for mapping. A reader such as yourself, who has spent many years working with technologies would be able to appreciate importance of such an exercise in licensing studies.

Forward Citation and code shift analysis provide a flow to the technology and when they are restricted by number of years, they are converted into a potential gold mine of information as to were a technology can be headed in a couple of years and one can consider planning ahead. Such studies also lend credibility to a technology, in front of potential licensees. If you are planning to buy or sell a portfolio, then a spill over study would go a long way in providing new insights to your perspective.

If you are involved in planning research directions for your organization or are planning to raise or invest funds in technology, then detailed spill over maps including taxonomy and problem indexing provide assistance in terms of opportunities in a plethora of applications and also at the same time, warn us about threats. In other words, both carrot licensing and stick licensing approaches benefit from such studies.

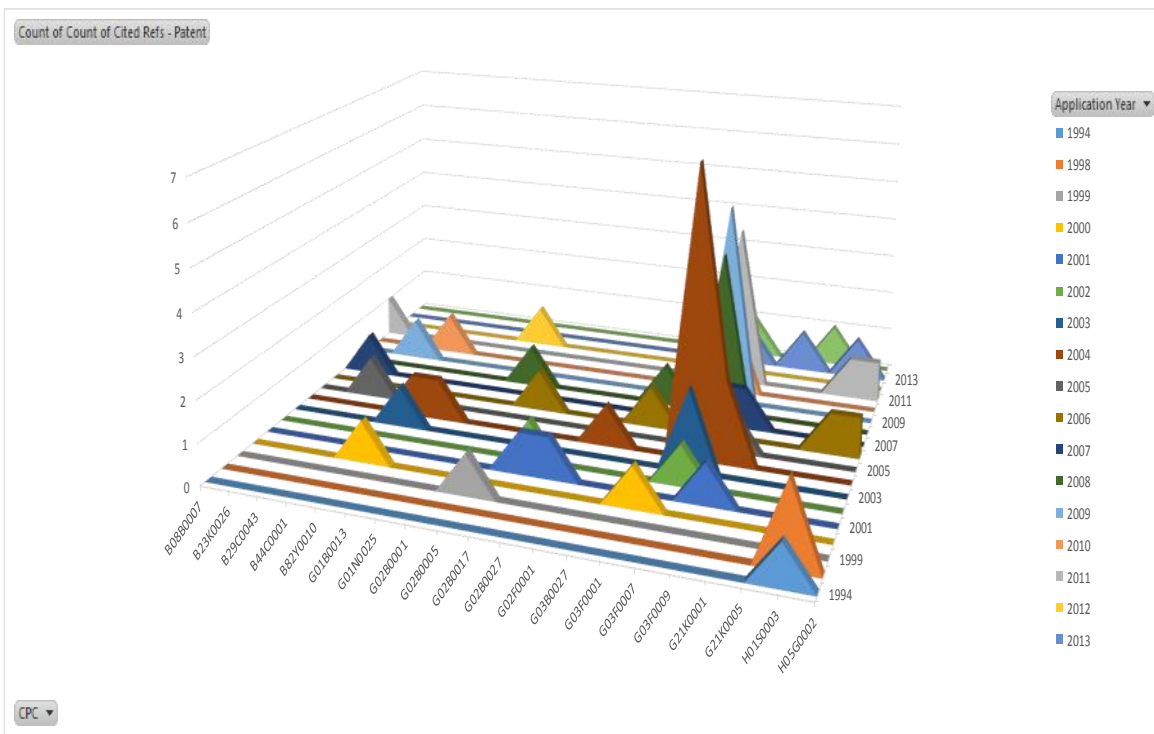
Following pages of this report will now include a glimpse of knowledge spillover analysis and innovation mapping.

## Search Strings used

1. Assignee=("ALMS" OR "CYMER") AND Claim, title, Abstract =(nano\*).
2. Backward citations of string 1
3. Forward Citations of string 2 restricted by application year = (2004-2014)
4. Forward Citations of string 1
5. Forward Citations of string 4
6. Backward Citations of string 4 restricted by application year = (2004-2014)

Some analytical visualizations are presented herein for your reference regarding results.

### String 1 Analytics—Chart Depicting Technical Field Vs Application year mapped for Backward Citations Number.

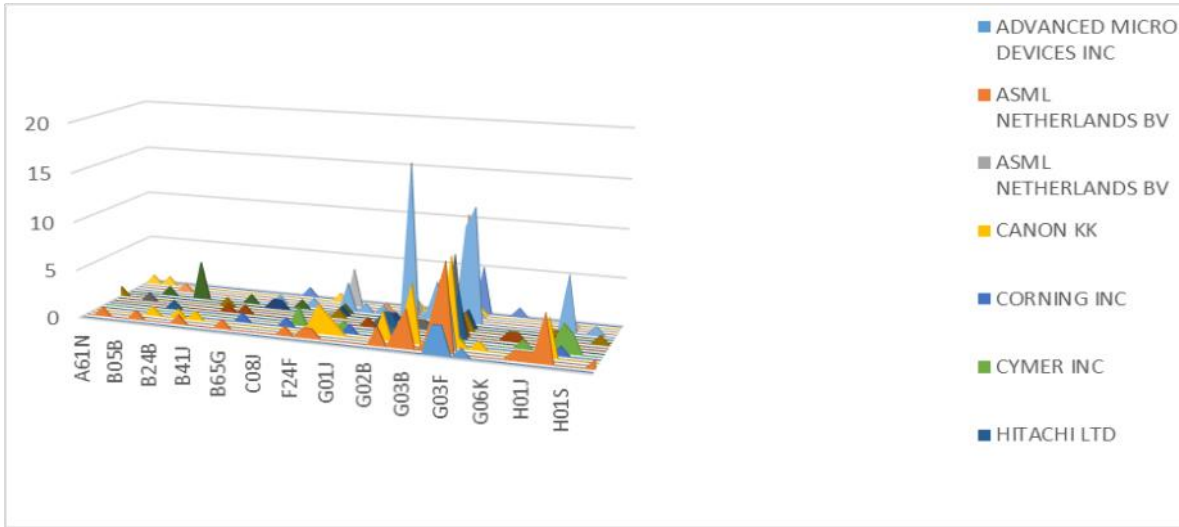


In this chart, each of the hill top corresponds to a number of backward citations for that particular year and technical field. For a commissioned business project we map this for taxonomy on x-Axis and applications on Y axis, thereby providing an indicator about which technology has a lot of precedents and which technology is relatively new.

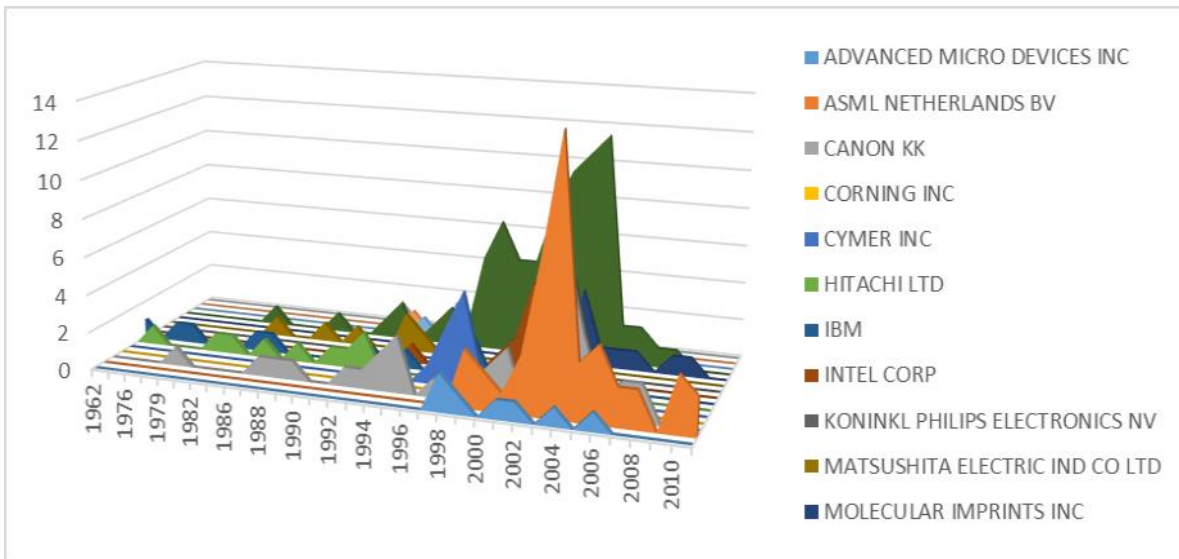
It would help determine the state of technology, size of market, probability of validity, alternative ways to solve a problem, and the like.

However, without a thorough assignee and technical filed analysis of said backward citations, one might get less effective results. The same is provided below.

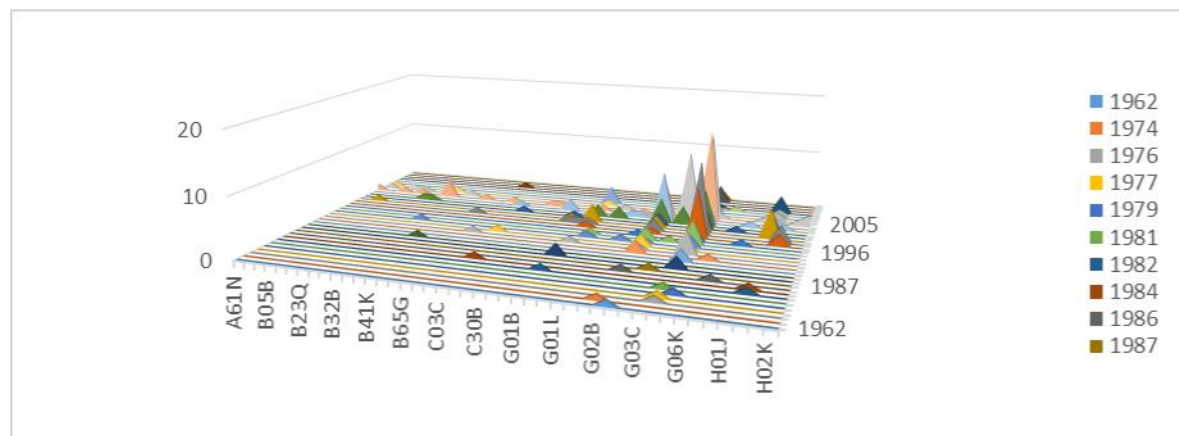
## String 2 Analysis—Backward Citations for Mains String 1



CPC Vs Assignee

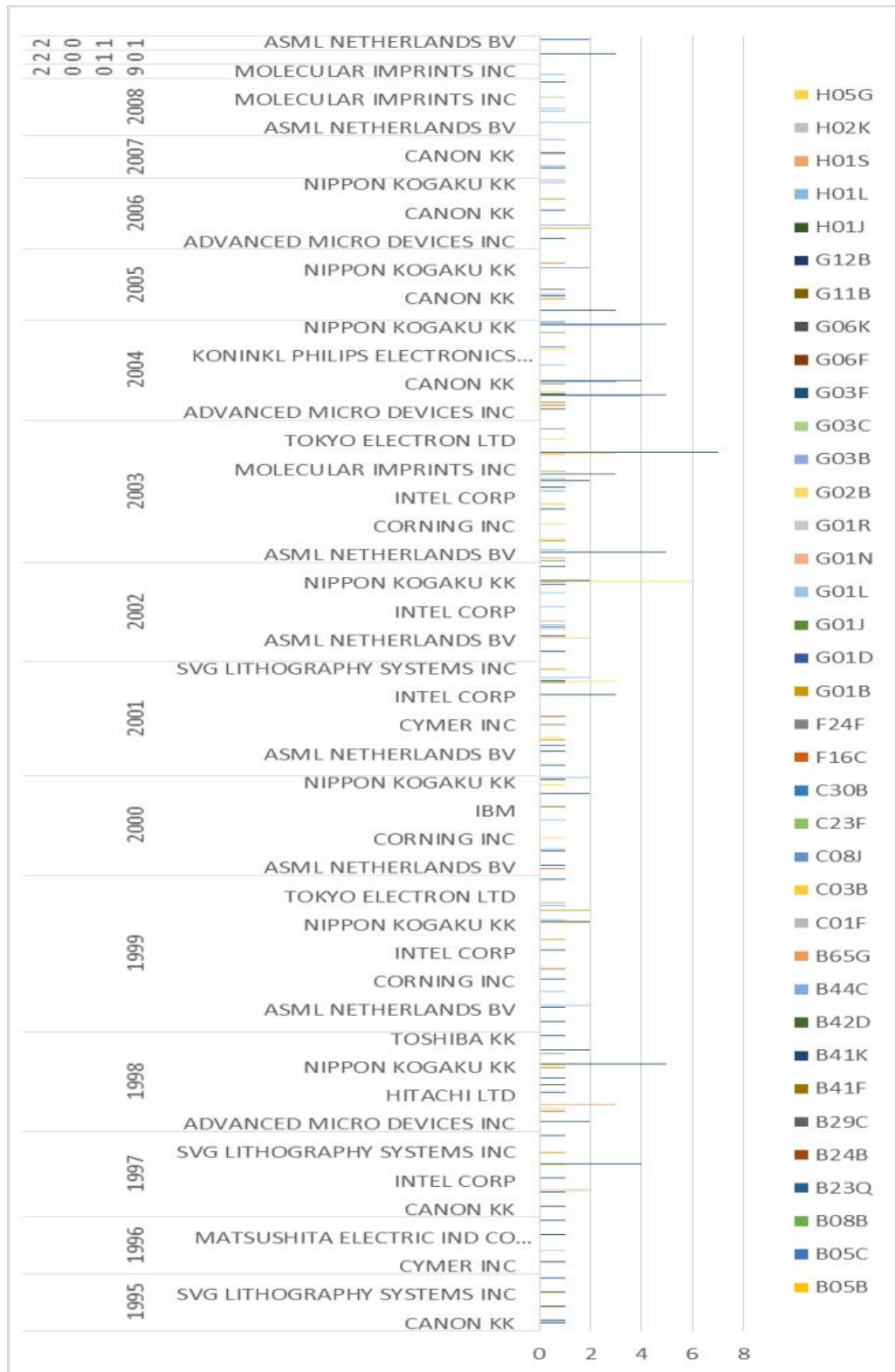


Application Year Vs. Assignee



CPC Vs Application Year

This chart presents summarises backward Citation activity for patent portfolio under consideration. Author choose to study citation activity till 1995 for maintain credibility of the technology flow.

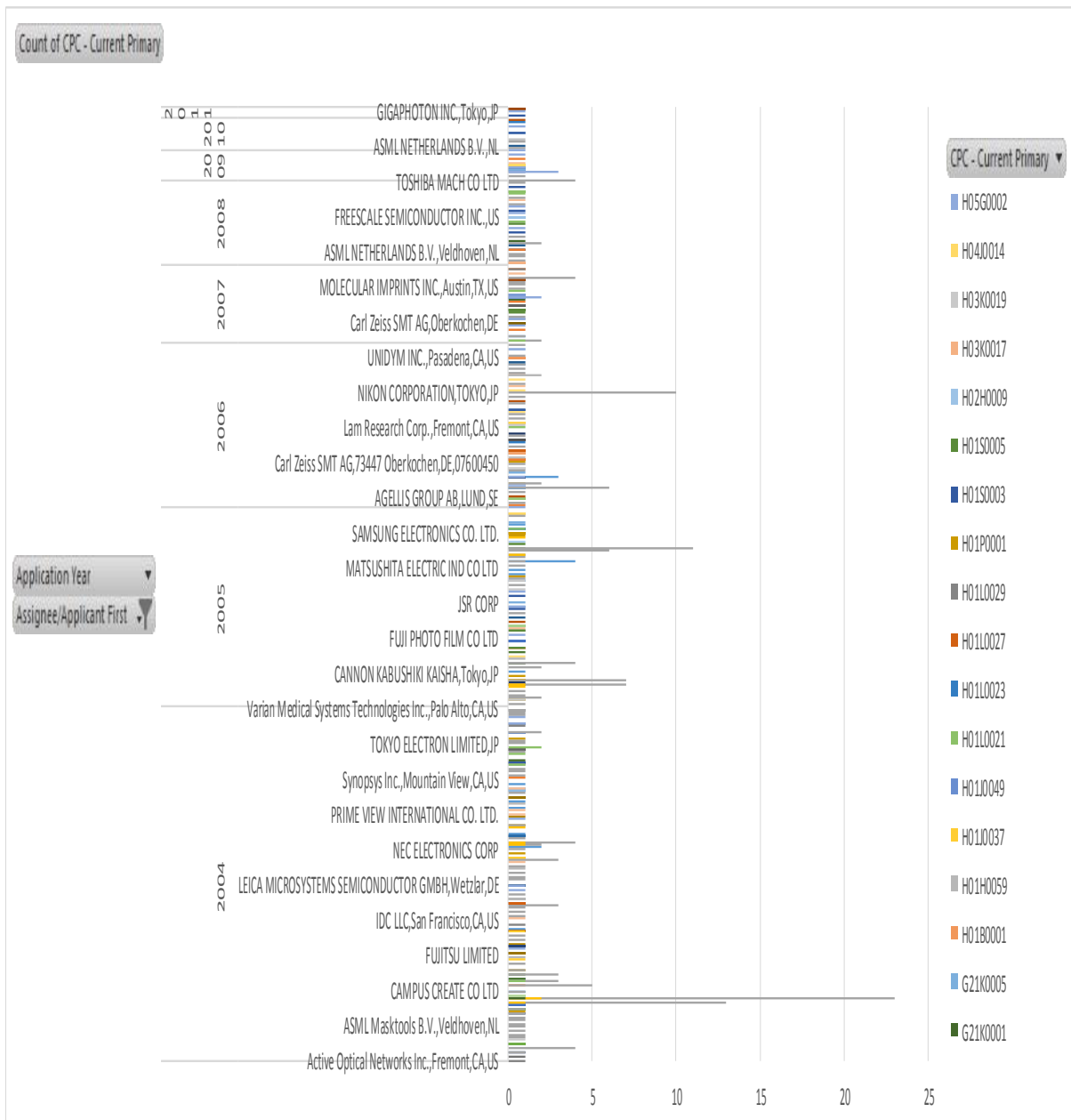


This diagram presents an easily comprehensible view of what a particular competitor or corporation had been doing in which technical domain in which year.

In this case also, value derived can be increased many fold if instead of patent classification codes, one uses , ones own technology breakdown structure.

## String 3 Analysis—Forward Citations of Backward Citations for Mains String 1

This chart presents summarises Lateral Citation activity for patent portfolio under consideration. Author choose to study citation activity from 2004-2014 for maintain credibility of the technology flow. Also, main portfolio under consideration has been developed during this period.



This diagram presents an easily comprehensible view of what a particular competitor or corporation had been doing in which technical domain in which year.

In this case also, value derived can be increased many fold if instead of patent classification codes, one uses , ones own technology breakdown structure.

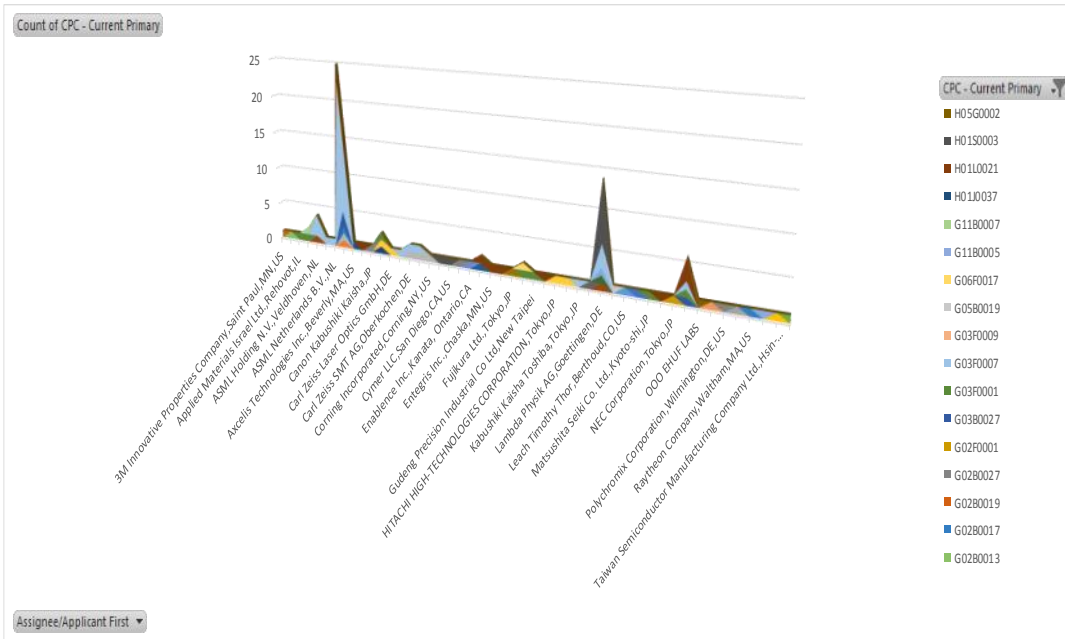
Also, such studies are useful in determining radical innovations, radical innovators, follow—on innovations and follow—on innovators.

The next step after identification of such innovations and innovators would be to deduct vertical and horizontal externalities or spill overs.

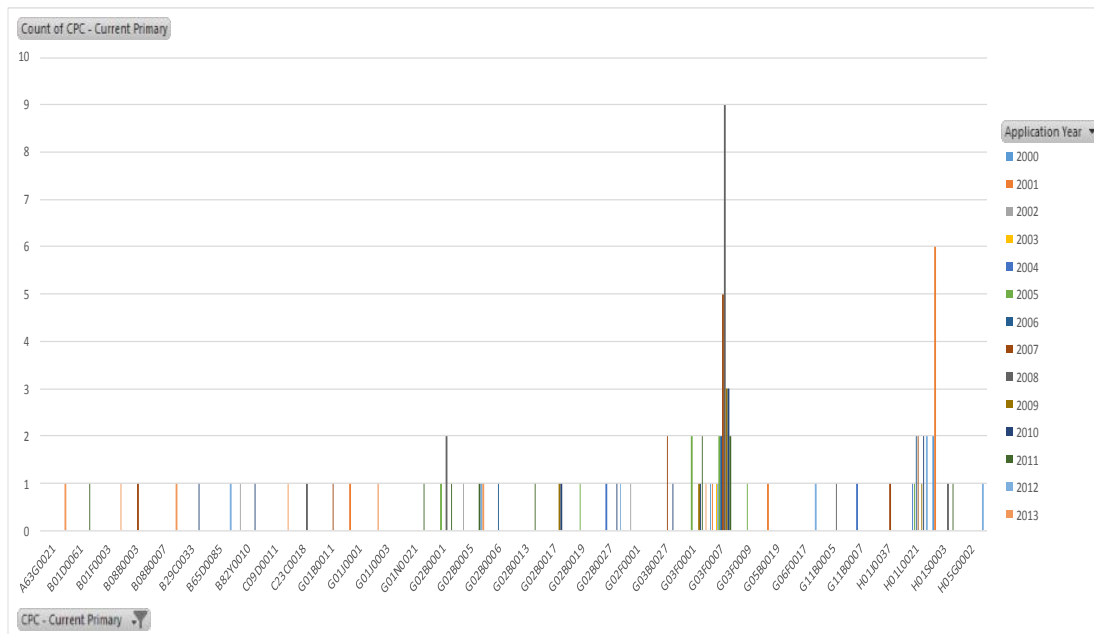
Next Section of report would deal with forward citations of main string for 2 generations, and backward citations of first generation forward citations



## String 4 Analysis—Forward Citations Mains String 1



Assignee Vs. Technical Field—Explained on next page



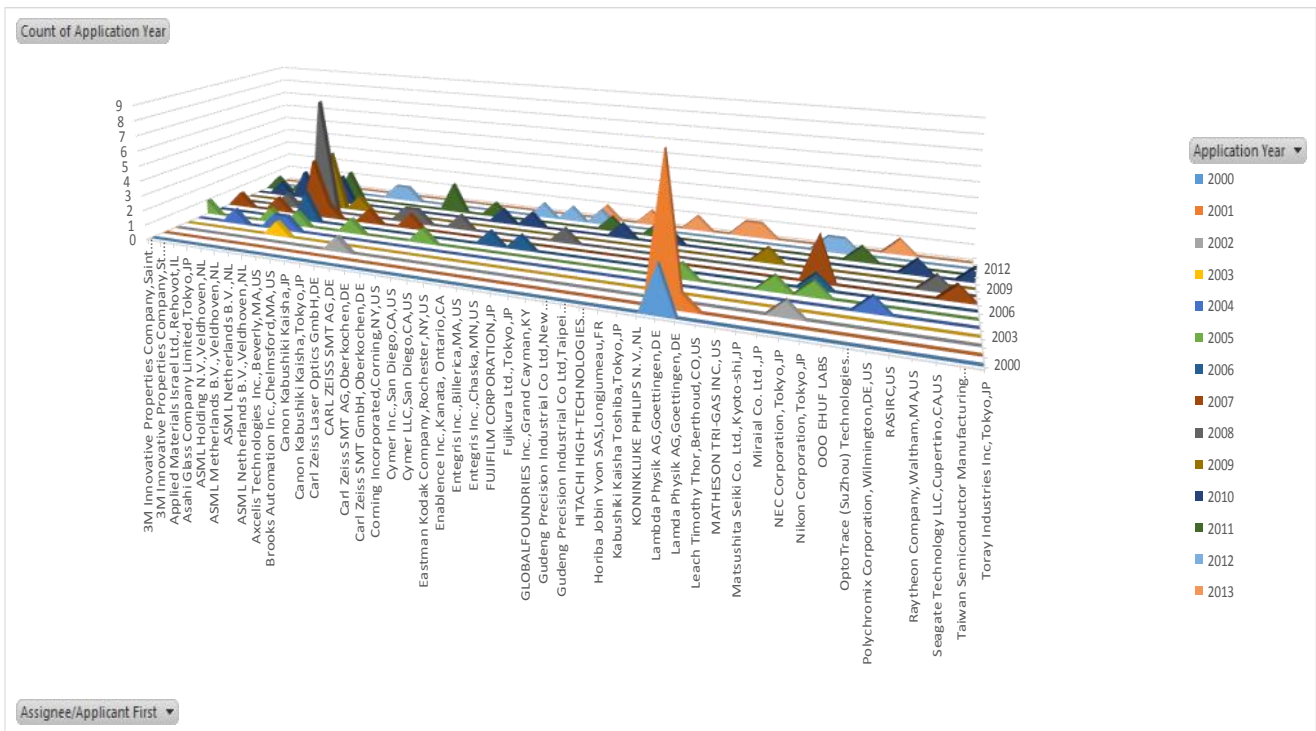
Technical field Vs. Application Year

Forward Citations are direct indicator of technology flow. Studying the same would provide any decision maker, investor, and inventor with useful insight about which way technology is flowing.

We all know that Intellectual Property acts as a conduit for infusion and diffusion of technology horizontally across various technical sectors and vertically within the same technical sector. Today, even diametrically opposite technical domains find some use same technology. Also, with advent of inter-disciplinary fields like biotechnology, nanotechnology, medical devices and the like, it has become impossible to segregate technical applications of a single technology for only one technical sector.



## Assignee Vs. Application Year



High peaks in above diagram depict assignees that have a connection to ASML technology portfolio. These assignees can prove to be valuable partners or potential infringers. Either case, one needs to know who has been using our technology to develop their own.

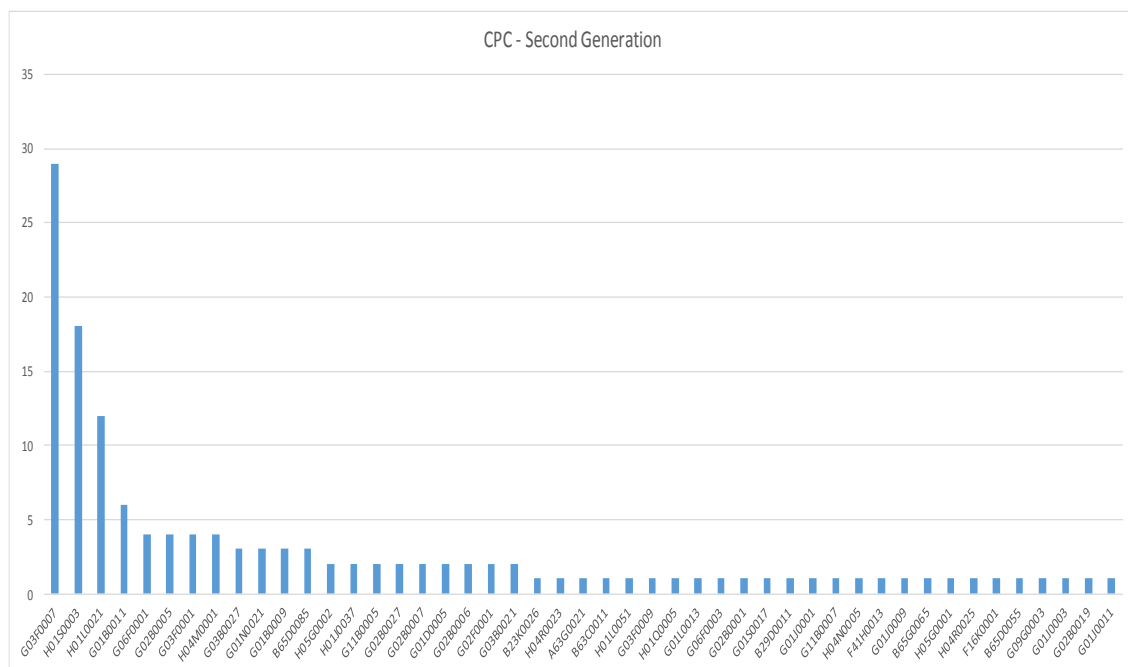
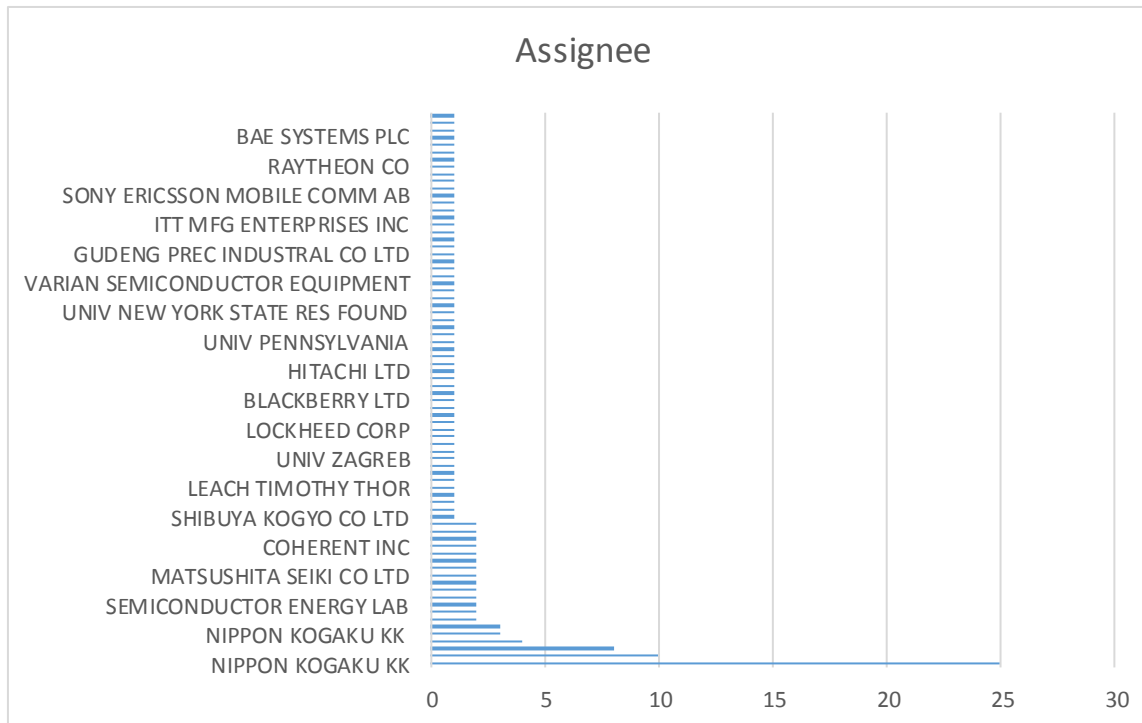
Previous chart depicting Assignee With respect to technical field signifies technology flow into that particular technical field.

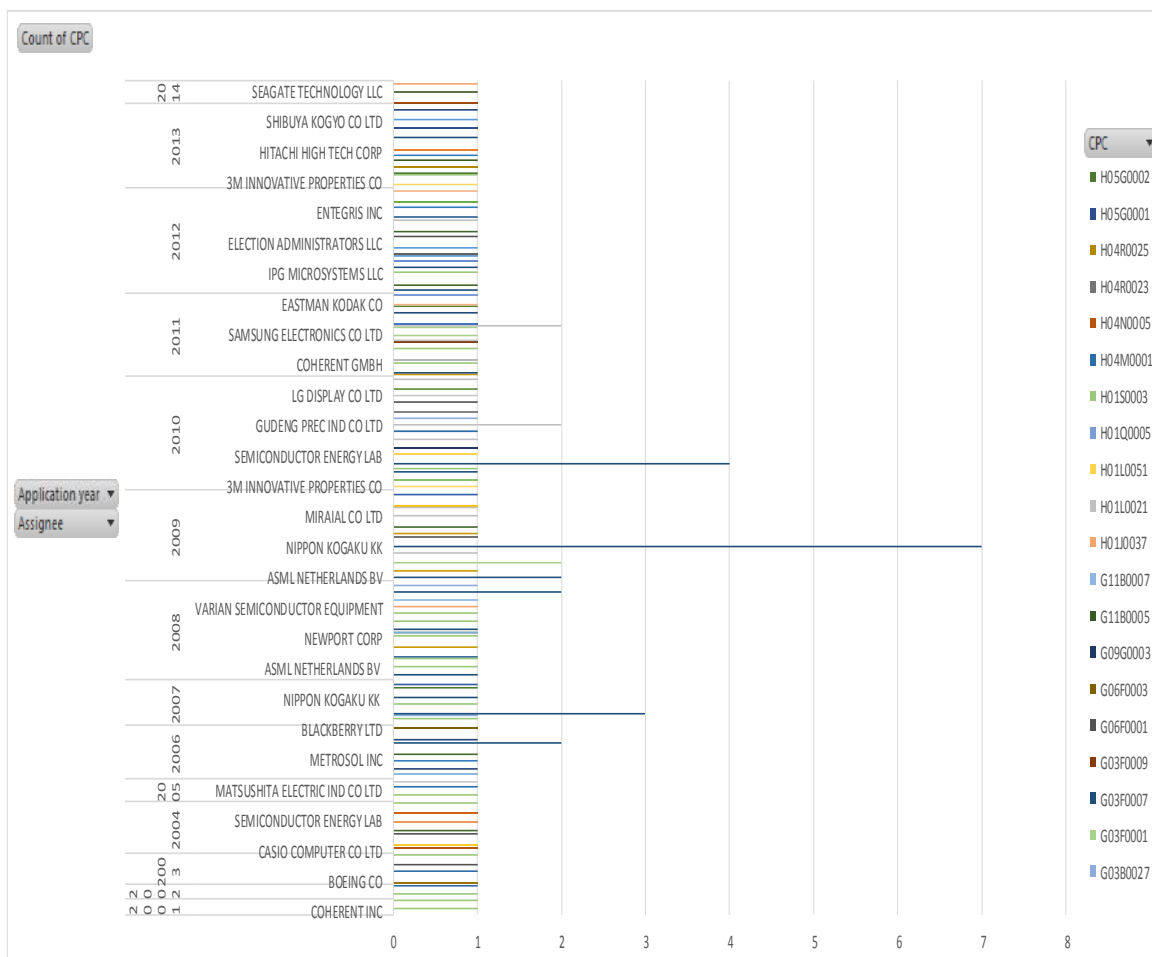
When technical fields are similar to ones of original portfolio, then one comes across a phenomena termed as VERTICAL SPILLOVERS OR VERTICAL KNOWLEDGE EXTERNALITY. These are direct indicators of technology components of our technology being used by competitors for further development

When technical fields are different and seem unrelated, to ones of original portfolio, then one comes across a phenomena termed as HORIZONTAL SPILLOVERS OR HORIZONTAL KNOWLEDGE EXTERNALITY. These are direct indicators of cross—industry innovation potential of a technology and presents lot of out-licensing opportunities.

## String 5 Analysis—Forward Citations (second generation)

This are biggest indicator of Cross—industry innovation potential, because they would include technology that would be sufficiently similar to our portfolio, yet in different technical domain.





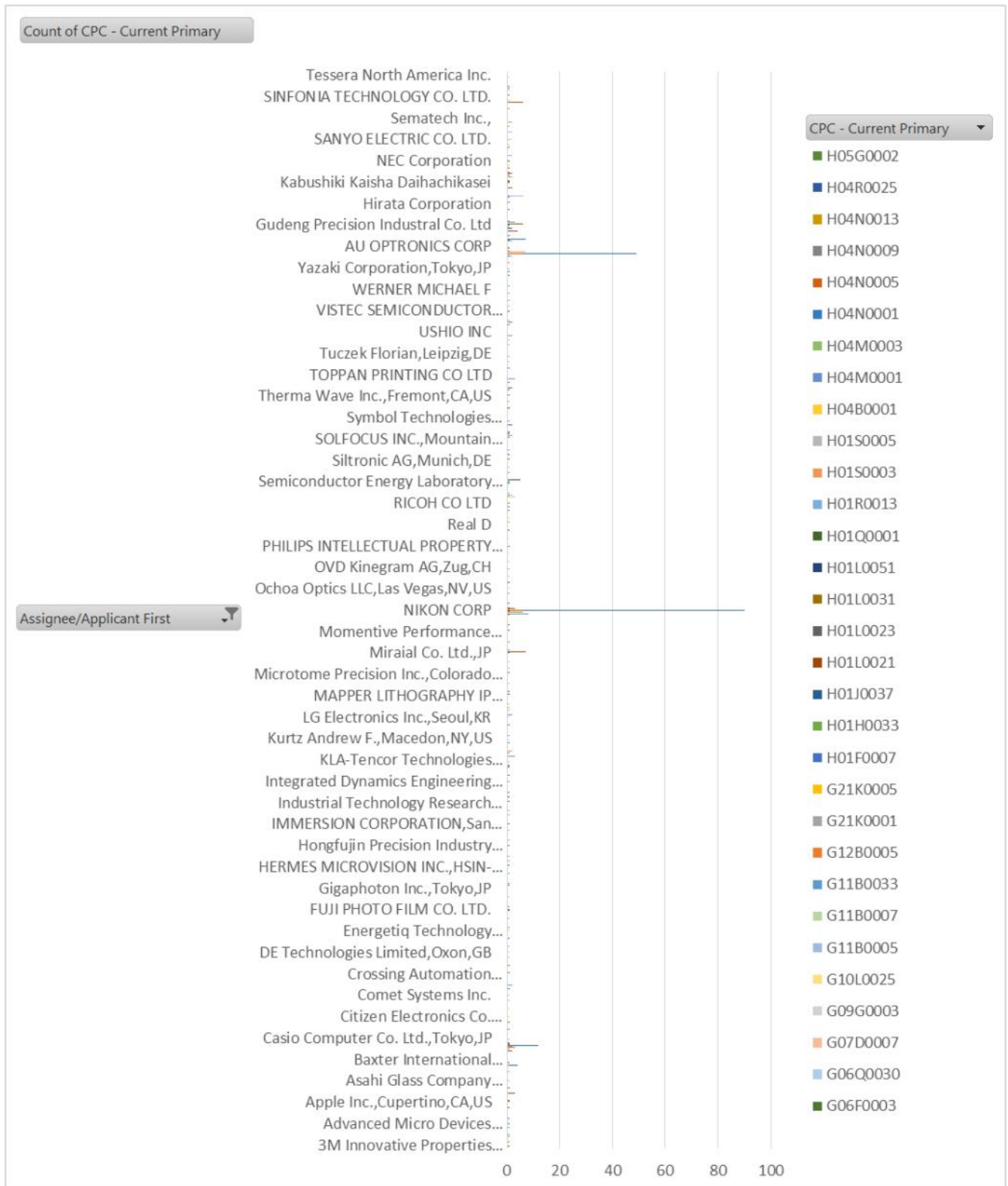
This is assignee vs. Application year vs. technical field chart for second generation forward citations for patent portfolio of interest.

It show some interesting assignees like Blackberry, Miraial Co, Boeing, Hitachi and some others. These have not been present in backward citations, lateral citations and first generation of forward citations. All these 3 generations usually contain similar technology and technology players. However, technology landscape starts changing after 2 generations.

We at Novocus Legal LLP feel that in this era of knowledge based economization, it is of utmost importance that commercialization potential of every patent portfolio should be realized and worked upon. It is for this reason that we have developed state of art tools and methods like one presented above for effecting such analysis in a time efficient and cost effective manner while yielding excellent results.

Last section of this report will now present backward citations of these second generation forward citations restricted from 2004-2014. This set of results should provide insight into cross industry innovation potential of an organization, since backward citations of second generation forward citations, restricted by time should hint at latest technical developments that have been used into their development. Thus, paving a concrete laden way for cross –industry potential evaluation of a technology or technical portfolio. An example, of such an analysis is presented below.

## String 6 Analysis—Backward citations of Second Generation Forward Citations (second generation)

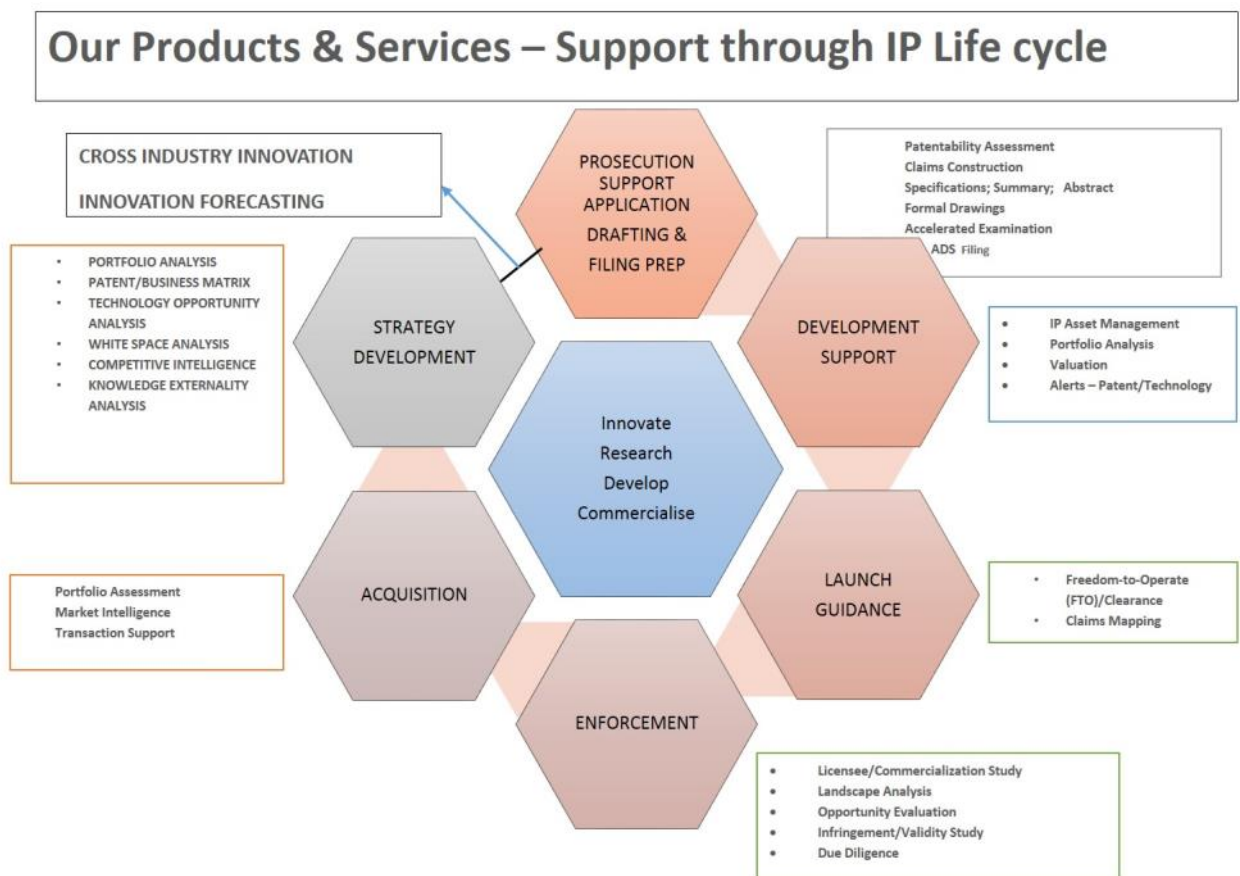


This chart would provide basis for both vertical and horizontal spill-overs. Just by varying assignees and selecting competitors, we would be able to study technology development vertically. By selecting technical areas, different from our own, we can find out horizontal or cross -industry prospects.

In, this document, we have presented an approach to efficiently generate effective intelligence on emerging technologies. This approach draws on monitoring, technical indexing and bibliometrics to mine the wealth of information available in major public electronic databases. The approach uses new software to expedite secondary analyses of database searches on topics of interest. We illustrate the range of information profiles possible by examining research and development (R&D) publications and patents pertaining to emerging technologies.

We keep track of latest research in informatics sector and keep updating our techniques used for quick services like patent searching. This has enabled us to reduce cost and time required for patent searching and allowed us a leverage of offering top quality services at low budgets to our clients.

This page will illustrate our various products and services that cater to your patent analysis and prosecution needs.



10 April 2015

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The author hopes that information and examples provided in this document will entice reader towards a detailed discussion for understanding how best can these approaches be used to add value to intellectual asset management.

By considering above approaches, one can add some value to ones opinions before investing in a portfolio, or capitalizing a portfolio.

I hope to hear from you soon with some your valuable feedback.

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