An IP-based business model for equity research

Regulatory reforms and technological disruption are transforming the research functions within major financial institutions. Now Japan's biggest bank is attempting to harness IP big data to give it an inside edge on equity analysis

By Tatsuo Nakamura and Kunihiko Shiohara

The business environment for securities companies has changed dramatically since the 2008 credit crisis. In particular, the updated EU Markets in Financial Instruments Directive (MiFID II) – which is due to come into effect in January 2018 – looks set to spur significant transformations in the equity research business model, with companies in the securities industry struggling to respond.

MiFID II addresses research services in two ways. It will require securities companies to provide assessment material about the commission they charge when institutional investors submit their buy or sell orders for listed shares. It will also oblige them to completely separate research services from the execution of investors' buy or sell orders, while simultaneously allowing service fees for the best services in each category only.

These measures are designed to lead institutional investors to demand research with higher added value and more substantial analysis. They will provide investors with more opportunities to buy information from a wider array of providers, such as accountants, attorneys, consultants and technical experts external to traditional securities companies and their research divisions. This in turn may lead to the demise of securities companies which can supply relatively undifferentiated, low value-added information only.

The changes do not stop there. Information vendors, which up until now have mainly provided data and news, are developing user-friendly interfaces which bundle their products together while also delivering analytics tools and execution platforms. They are also enlisting industry analysts to deliver insights similar to those of analysts at securities companies. This is steadily eroding the existing business platform of securities companies.

Further, the evolution of big data analytic methods and the emergence of artificial intelligence (AI) and financial technology (fintech) are starting to affect the research divisions of traditional securities companies. Securities analysts leverage past financial data to analyse individual stocks and prepare future earnings forecasts; they then supply recommendations to investors based on these. However, big data analysis is leading to significant technological progress when it comes to recognising changes in businesses in near real-time, with methods for immediately connecting these insights to operating performance becoming commonplace. Significantly, this often takes place before statistical and financial data is available, which makes it exceedingly difficult for traditional analysts to offer new added value in the domain of buy or sell trades.

New challenges

In addition, significant structural changes to the operations industry surrounding institutional investors are also taking place. Global assets are beginning to favour passive management, which matches the performance of the indices themselves, in light of the difficulty of seeing significant returns through active management, which selects investment stocks through the research and analysis of individual names and seeks to outperform target indices. Moreover, high-frequency trading, which applies high-speed algorithms to short-term trading, is having a growing impact. This and other factors mean that there is a much smaller role for traditional research based on financial analysis and earnings forecasts.

Active management is thus struggling to distinguish itself through the more difficult practice of forecasting mid to long-term investments and by offering more focused investment in small and mid-cap names which are less connected to index investing. The emphasis on company compliance with corporate governance codes, institutional investor compliance with stewardship codes and environment, social and governance priorities in long-term management is starting to seep into Japan and the United States from Europe. It is possible to argue that we have entered an age which demands new analytical approaches rooted in diverse quantitative and qualitative information over and above financial analysis.

Against this background, the equity research division of Mitsubishi UFJ Morgan Stanley Securities has, since May 2015, begun efforts to carefully analyse companies' ecosystems and prepare in-depth reports covering mid to long-term earnings capacity and sustainable competitive strength, with over 150 of these now having been published. In particular, the three-part report on the automotive industry ("Comprehensive study", "Finished goods study" and "Components study") issued from October to November 2016 presented what is arguably the first analytic approach of its kind from a securities company to assess group strategies for each company in the industry via an analysis of intellectual property. The report garnered a highly positive response from institutional investors as well as businesses. This article thus examines how patent data can help with industry-level equity analyses.

Non-incremental innovation

What type of strategies are automotive and automotive component makers deploying to address the steady progress of disruptive (non-incremental) innovation? And who will be the winners? In order to address these questions, we put together an overview analysis of the directions and differences of each company's strategies based on global patent data.

Based on automotive-related patent data filed in Japan, the United States and Europe, we created technology maps and carried out timeline, manufacturer and function-specific analysis. For this, we received comprehensive assistance from Valuenex Japan Inc. We randomly sampled approximately 120,000 records from over 2 million patent documents, sorting them based on similar technical content, and created a macro overview with a two-dimensional (2D) visual representation (see Figure 1).

The patent data here is expressed as dot clusters. The cluster size (dot size) is relevant to the number of documents in a related technical area, while the distance between clusters illustrates the similarity and the degree of connectedness between interrelated patent technologies. The x and y axes of this macro chart have no particular meaning, although the density and positioning of the clusters shows how technology fields are related.

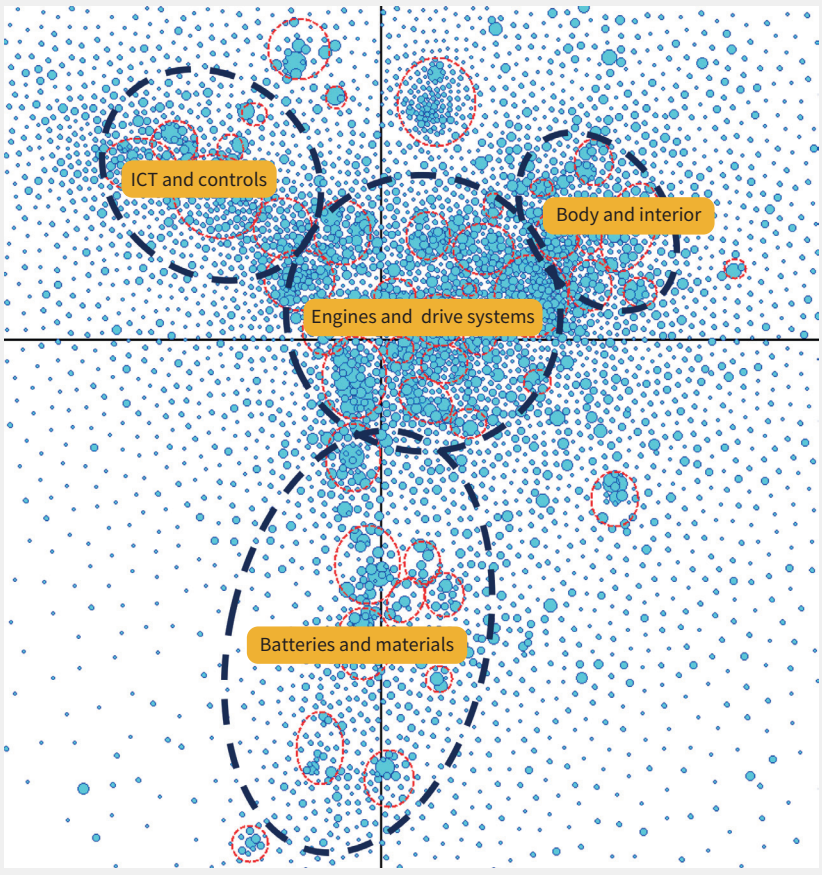
A macro analysis of the automotive-related patents over the previous 10 years in Japan, the United States and Europe shows four major categories:

- engines and drive systems;
- vehicle interiors;
- information and communications technology (ICT) and control systems; and
- batteries and materials.

These all, overall and unintentionally, resemble the shape of the continental United States. Following the timeline details of the macro chart shows, on the whole, an expansion from conventional technology development domain focused on mechatronics to the wider domains of ICT, control systems, communications, and batteries and materials, while simultaneously highlighting the increase in R&D man hours, which has been identified as an operational challenge for automakers in recent years. In other words, this illustrates the background forces which are driving up R&D expenses.

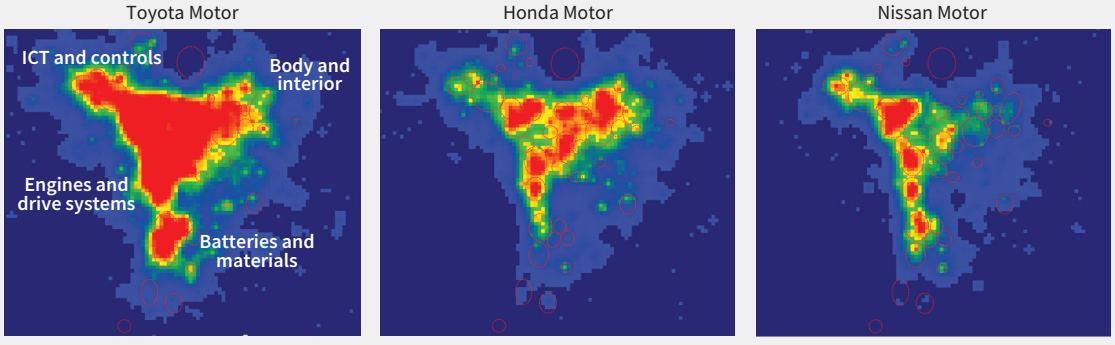
Working from the 2D information on this technology landscape, we then created a coloured heat map corresponding to the density of the clusters, yielding the three-dimensional (3D) Figure 2. Next, we compared three of Japan's automakers. Toyota Motor Corp, with its approximately ¥1 trillion (approximately $9.087 billion) annual R&D expenditure, covers a wide area of the darker (red) areas of the heat map, showing the company's even, nearly exhaustive breadth and depth. Meanwhile, Nissan Motor Co – with its specialisation over the left side of the graph representing the ICT, control systems, communications, and battery and material domains – is on the other end of the spectrum, showing its commitment to selection and focus on its R&D domains. In contrast, Honda Motor Co, with approximately half of Toyota's revenue yet a similarly broad scope of R&D

FIGURE 1. Birds-eye view of automotive technology patents



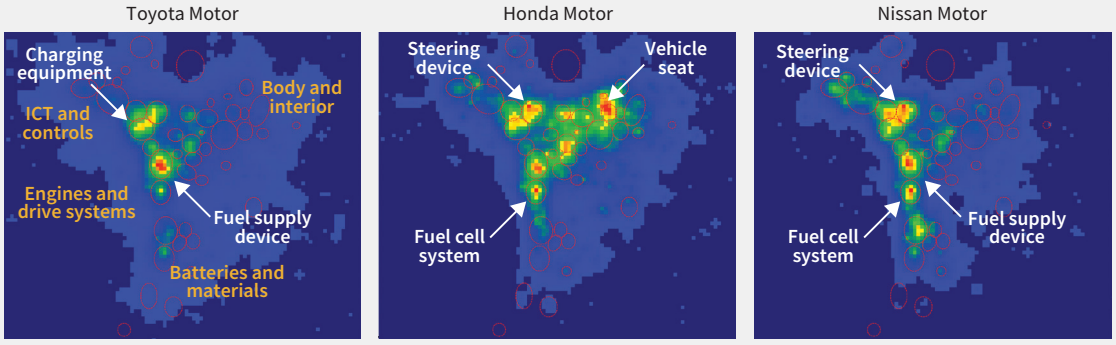
Source: Joint research by Valuenex and Mitsubishi UFJ Morgan Stanley Securities

FIGURE 2. Technology coverage of Toyota, Honda and Nissan (uniform standard)



Source: Joint research by Valuenex and Mitsubishi UFJ Morgan Stanley Securities

FIGURE 3. Technology coverage of Toyota, Honda and Nissan (individualised standard)



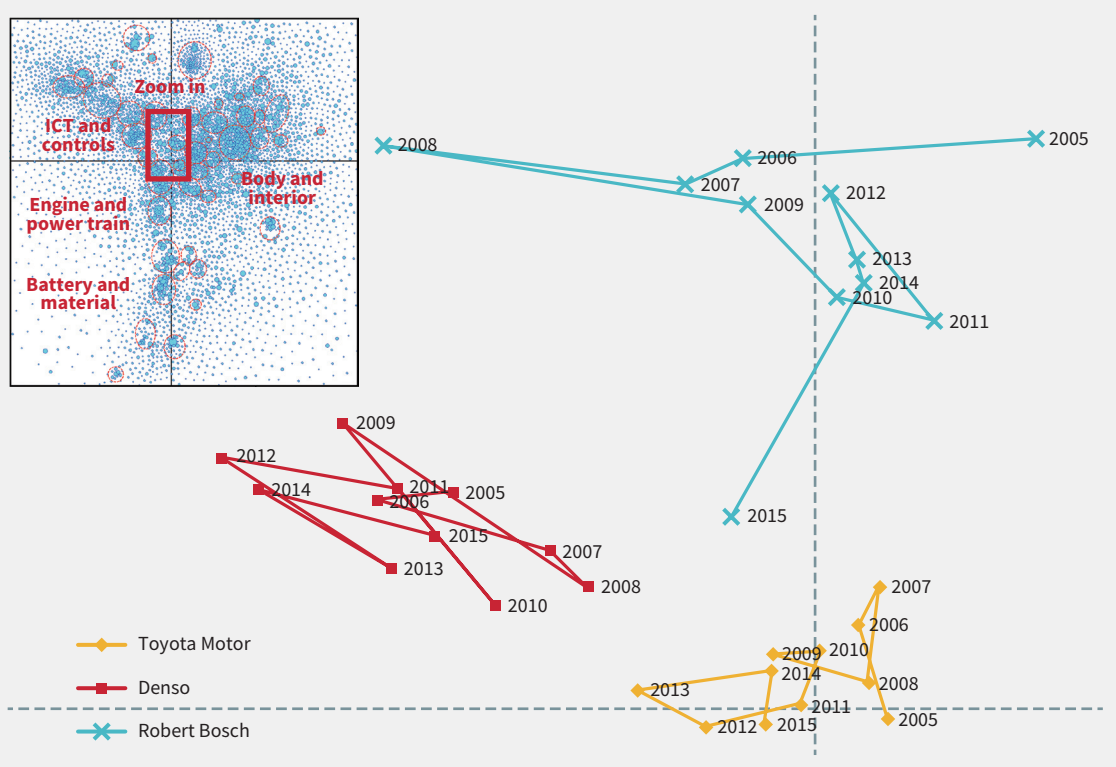
Source: Joint research by Valuenex and Mitsubishi UFJ Morgan Stanley Securities

domains, has much lighter overall colouring on the heat map compared to Toyota. One can theorise that its R&D is struggling to secure technical superiority.

Using a similar method, Figure 3 highlights the focus domains and how they compare between the three companies. Both Toyota and Nissan have a particular emphasis on ICT, control systems and fuel cell domains – a hotbed of competition. The graph gives a clear image of Toyota's characteristic high uniformity of R&D within its group and Nissan's characteristic emphasis on a selective and focused approach. In contrast, Honda's R&D domains are dispersed. The likely explanation of this is that, regardless of a limited total budget for R&D spending, there is a strong influence from the vertically divided organisational structure of Honda R&D Co, Ltd, which is an independent entity. This structure results in broader, more scattered R&D domains. A point of concern will be whether the comparative technical competitiveness of these companies continues going forward.

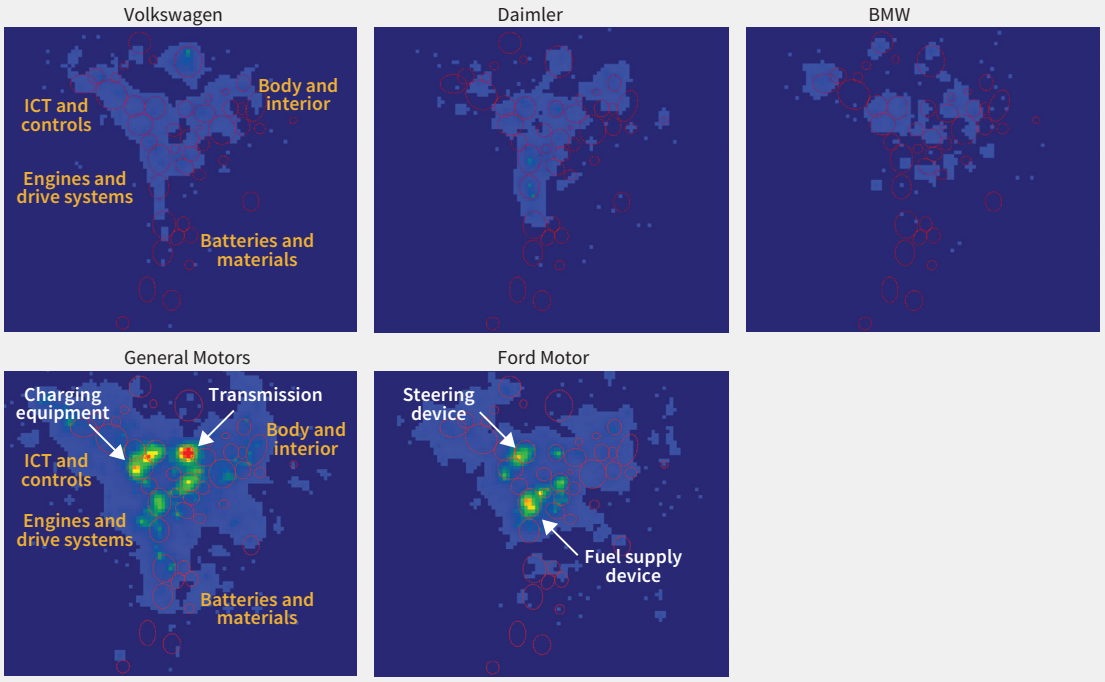
Next, Figure 4 compares changes in patent focal points on the macro chart for three companies: Toyota, Denso Corp and Robert Bosch GmbH. The focus for Toyota and Denso, which have internal divisions of labour in their groups for each area of specialty, has remained largely unchanged over the 11-year period (2005 to 2015) being analysed. Meanwhile, Bosch, which is researching a broad swathe of non-automotive fields, including consumer electronic components, has significantly changed its focus in recent years and, in 2015, is approaching a mid-point between Toyota and Denso. Incidentally, Bosch is the only company which can begin to match Toyota's nearly perfect coverage (if the group is taken as a whole) of domains on the technology macro chart. Bosch's movement to a mid-point between Toyota

FIGURE 4. Changes in development focus of Toyota, Denso and Bosch



Source: Valuenex

FIGURE 5. Technology coverage of Volkswagen, Daimler, BMW, General Motors and Ford Motor (uniform standard)



Source: Joint research by Valuenex and Mitsubishi UFJ Morgan Stanley Securities

and Denso in terms of R&D focus may presage the emergence of fierce competition in the future.

Parenthetically, how does the technology macro chart of US and European automakers compare with Japan's three companies? The macro chart in Figure 5 uses a similar approach and compares Volkswagen, Daimler, BMW, General Motors and Ford Motor by uniform criteria. Nearly no (dark) red areas are present and analysis of patent data shows that no specific examples of technological superiority could be identified for Europe's big three automakers.

Looking at the actual number of open patents belonging to US and European automotive-related manufacturers, Bosch has more than 1,600, which exceeds the total for all three of the leading automakers. In what appears to be a system of counter-control being built out on the technological front, even companies such as Continental and Valeo have patent numbers equalling or exceeding those of finished vehicle manufacturers (see Figure 6). This structure is completely different from Japan's industrial pyramid, which has increasing patent numbers as one ascends the hierarchy (see Figure 7).

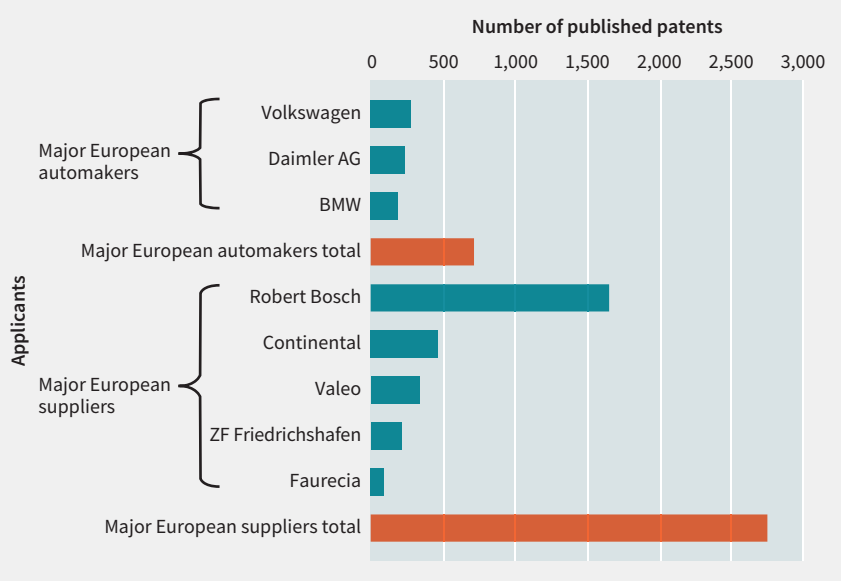
Intellectual property as trigger for M&A and business expansion

The tides of technology convergence and open innovation are stimulating more active joint research, business alliances, M&A and the like in various industries – not only for securities companies but also for institutional investors, venture capitalists and the like. It is thus crucial to analyse these activities and incorporate their findings into the decision-making process. Let us further consider some case studies.

Exploring potential alliances based on IP analytics

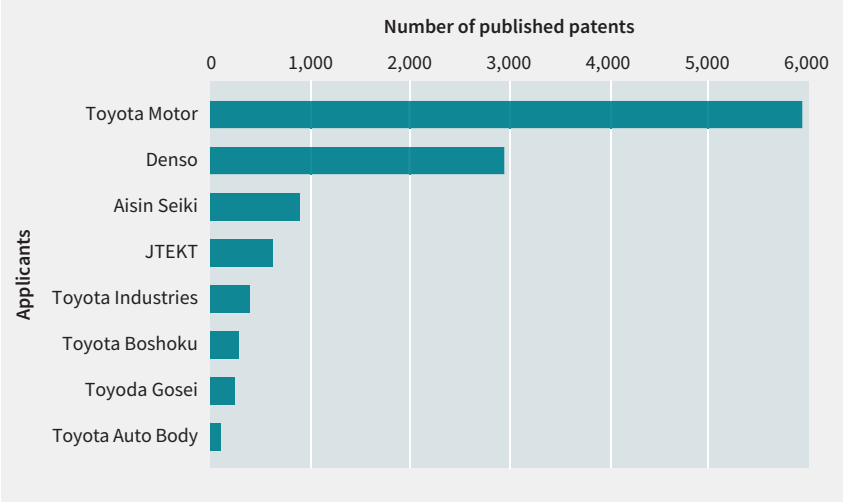
Markets continue to expand as a result of the diversification of needs, the progress of globalisation and the awakening of emerging economies. In addition, redesigned goods and services transcend the bounds of conventional industrial domains thanks to the progress of automation and the evolution of substitute services from the application of advanced ICT, the Internet of Things, big data and AI. There is talk of the potential for upending consumer lifestyles in the next 10 to 20 years as a result of communication networks using ICT and AI to connect disparate goods and services, and by developing platforms for delivering information analysed by AI in real time.

FIGURE 6. Published automotive patents by major European automakers and suppliers



Source: Joint research by Valuenex and Mitsubishi UFJ Morgan Stanley Securities

FIGURE 7. Published automotive patents of Toyota and its key suppliers



Source: Joint research by Valuenex and Mitsubishi UFJ Morgan Stanley Securities

These transformations will force us to look externally for the enterprise resources we lack. These could cover a broad range, from intangible assets such as know-how, technology and patents, to materials and devices needed for our product lines, as well as other companies' goods and services that we would like to incorporate into our own. Since procurement sources and approaches differ for each item, while areas of caution also remain, we will need to continually review and adjust our business objectives. Patent literature includes a wealth of information on people, products and quantities (including the scale of R&D investment), so patents make it possible to formulate optimal strategies which are objective and broad based. We have already entered an age in which it is possible to scientifically pursue technological due diligence when exploring candidates for sustainable alliances, carrying out M&A to boost the quality and scope of business and fostering next-generation services in untapped fields. Below are three examples of broad-based analyses applied to recent, noteworthy cases of global M&A.

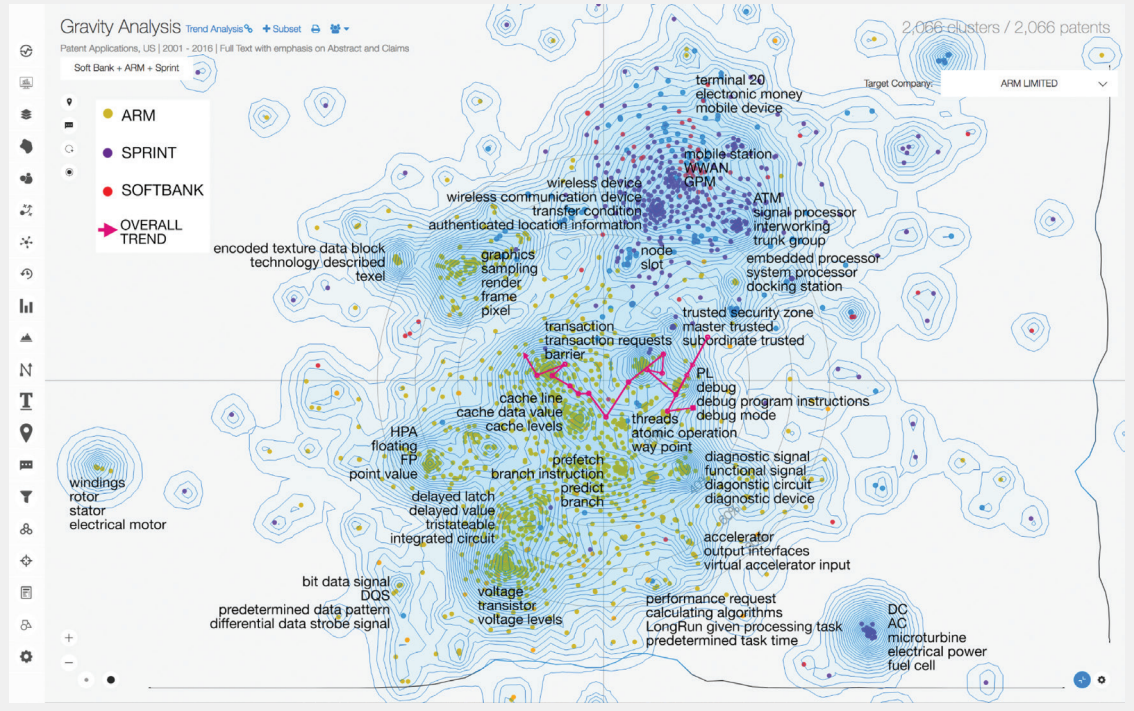
Targets of Softbank's M&A activities

On September 5 2016 SoftBank (TYO: 9984) acquired leading UK semiconductor supplier ARM for £24.3 billion (approximately ¥3.3 trillion). Since its revenue, net income and operating income surpassed NTT Docomo in 2013, SoftBank and CEO Masayoshi Son appear to have shown no hesitation in their aggressive course to expand outside Japan. Before the ARM acquisition, SoftBank had paid ¥1.75 trillion in 2006 to acquire the Japanese unit of Vodafone (UK) and ¥1.8 trillion four years ago, in July 2013, for the subsidiary acquisition of US telecommunications carrier Sprint. However, the ARM acquisition far exceeded these other M&A deals.

M&A on such a scale attracted public attention to the ambitions and business acumen of Son, although few articles addressed the details of the technological synergies from these deals. We gathered US patent data for patents filed or held by Soft Bank, ARM and Sprint and carried out macro analyses of each company's R&D trends, recent movements, commonalities between the companies and domains that appear to be their future targets. The patent literature we looked at included 2,066 documents published since 2001, with these showing a surge in recent years.

Softbank had a small number of patents, only 61, most of which were related to communication base stations. Being a telecommunications carrier, Sprint has filed the following WiFi, long-term evolutionary (LTE) system

FIGURE 8. Softbank, Sprint, ARM's 2014-2016 US patent applications



Source: Valuenex

and video transmission-related patents since 2014:

- enhanced scheduling of resources based on use of carrier aggregation – 20150236839;
- user equipment control in a multi-core LTE – 20160007331;
- hand-over control between WiFi systems and LTE systems – 20160014664;
- communication systems to provide selective access to a wireless communication device – 20150215273;
- screen freezing for a wireless communication device – 20140198054;
- video presentation quality display in a wireless communication device – 20150146012 (Figure 8).

Meanwhile, ARM's patents demonstrate that since 2014 it has honed its R&D focus on graphics chip technology and the peripheral areas of data cording processors, video recording processors and display controllers. Of particular interest should be the fact that Sprint and ARM's focus on R&D from 2001 to 2016 have converged (Figure 9), with image processing, video transmission and medical technology situated in the less populated middle region (Figure 10). This reveals the possible future objective of Son's M&A strategy: achieve convenient connectivity using SoftBank's base station technology, while distributing content by combining Sprint's high-speed network technology with ARM's image processing technology, then eventually branch out into medical fields. There appears to be a solid master plan behind the scenes of the company's huge M&A movements.

IP licences accelerated by Alibaba's business expansion

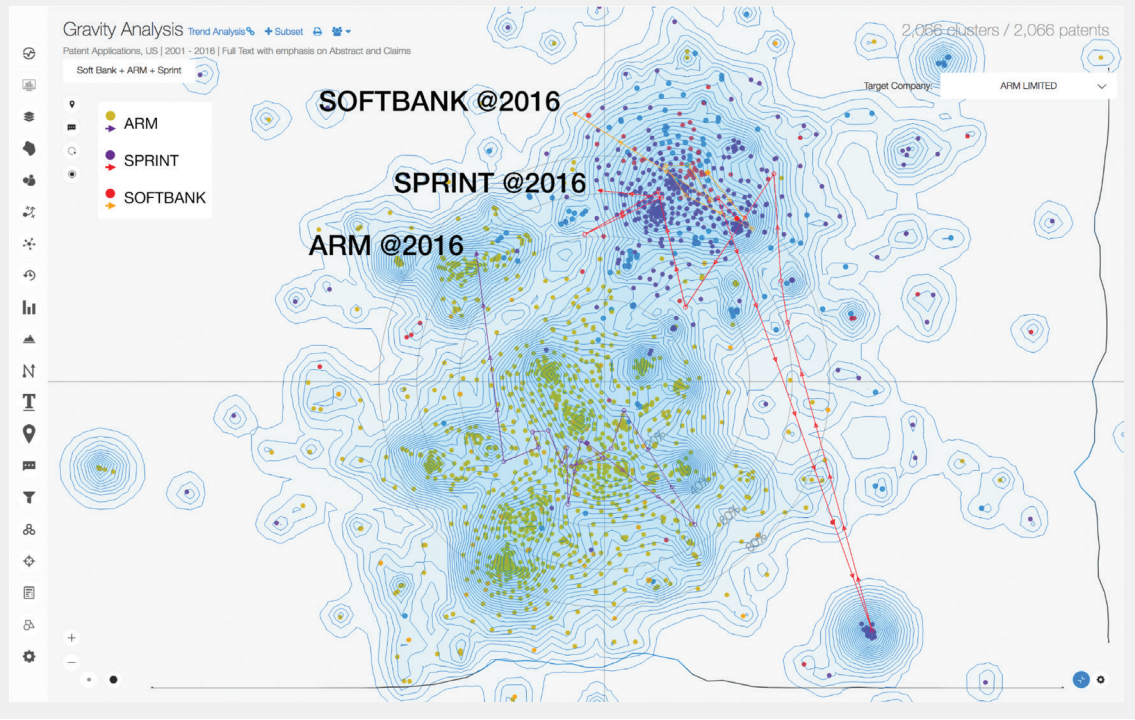
An examination of Alibaba's US patent portfolio shows an extremely well-balanced mix. As an online e-commerce business in China, Alibaba requires a solid technology platform to accompany its multidimensional business. Nearly half of this platform is based on IP licensing, transfers and other M&A from the United States and advanced jurisdictions in Europe. It appears that Alibaba's management has a clear idea of the patent portfolio it wants. This is particularly obvious if we look at its pre-initial public offering (IPO) M&A and patent transfer activity (the IPO took place in September 2014). It is catching up with more advanced companies by supplementing its technological gaps with patent licences. This practice is not limited to Alibaba. With patent licences and other approaches, emerging Chinese companies are solidifying their business foundations and building previously unseen R&D structures. As this pattern becomes more widespread, there is a high possibility that in just a few years' time the flow of patent licensing will shift from entering China to leaving it and flowing instead to other countries (Figure 11).

Foxconn – transforming from EMS to an independent brand

Negotiations over the bailout of Sharp have reignited public debate. With the ¥300 billion offer from the Innovation Network Corporation of Japan facing off against the ¥700 billion rights acquisition by Taiwan's Foxconn (Hon Hai Precision Industry Co), Sharp's current management team is in turmoil. When it was hit by crisis in 2012, it approached Foxconn – its partner in the LCD business – to explore possible investment. Negotiations progressed, with part of Foxconn's motivation being Sharp's advanced technology. However, differences in the two companies' mid and long-term strategies resulted in roadblocks for negotiations. Over the ensuing four years, Foxconn's business has steadily expanded and it now has the clear upper hand in negotiations with Sharp.

In order to verify each company's business and areas of

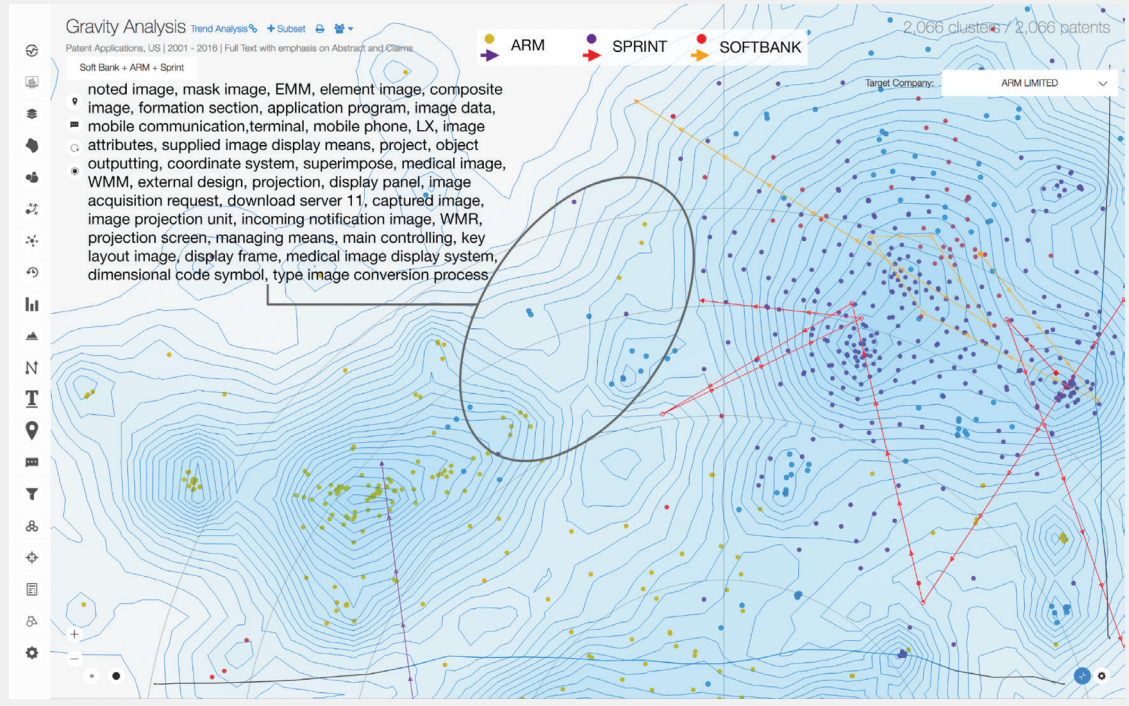
FIGURE 9. Sprint and ARM's converging focuses in recent years



Source: Valuenex

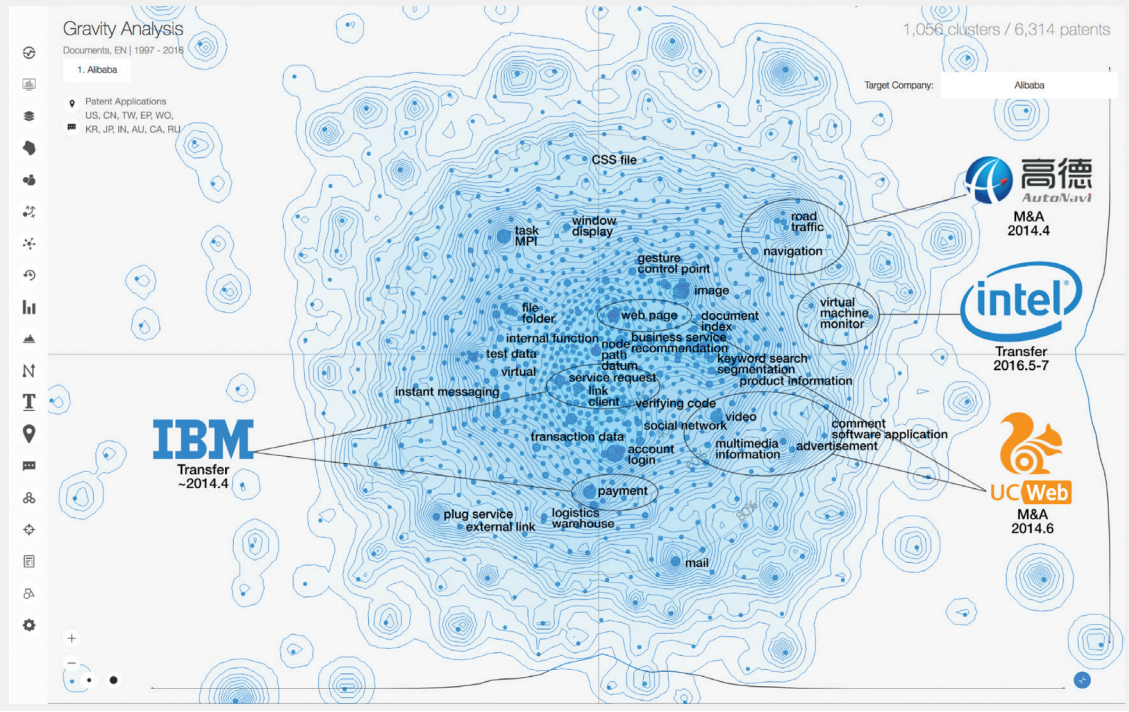
strength from the perspective of technology resources, we used Valuenex's Patent Radar to carry out a macro analysis of their US Patent and Trademark Office registered patent data from 1980 to 2016. Until 2014, Sharp's US patents had grown by 6% a year. The number of rights transfers was also steady at around 110 to 120 cases per year. These numbers did not change in the periods before and after Sharp's business crisis. The Children's Medical Center Corporation was the largest recipient of patent transfer rights, with a cumulative number exceeding 2,500 patents during the period. Transfers since 2011, in particular, numbered 400, suggesting the continuation of deep connections in recent years. With regard to patents up to 2012, when the

FIGURE 10. Technical area related to image processing at the centre of Sprint and ARM's convergence



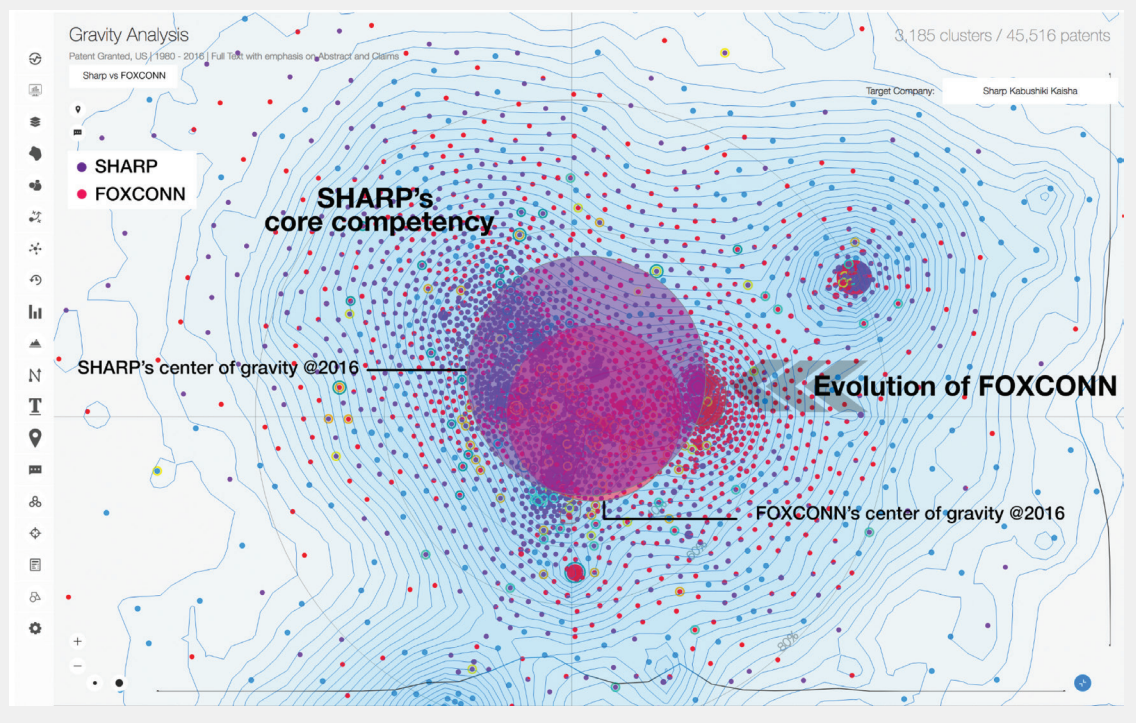
Source: Valuenex

FIGURE 11. Alibaba's pre-IPO patent portfolio boost and continued expansion



Source: Valuenex

FIGURE 12. Foxconn's evolution into Sharp's core competency



Source: Valuenex

company's crisis hit, public patent transfers to Samsung stand out during the years from 2002 to 2008. Meanwhile, patent transfers since 2011 shifted from Samsung in favour of Huawei. Transferred technology included radio communication system and mobile station devices and so on. Foxconn, meanwhile, registered more than 1,000 patents in total from 2010, then nearly 2,000 in 2013. It appears that the company's momentum during the past five years has been supported by R&D strength as well.

However, the number of patent transfers accepted has been a mere 10 to 15 a year, suggesting that the company's in-house R&D culture is thin. Foxconn's management structure, which focuses on self-sufficiency, may change in the following ways if the management merger with Sharp takes place. First, Sharp's technology portfolio will be taken on by Foxconn and brought in-house, with any areas of technical redundancy becoming sell-off candidates. Foxconn's management is currently insisting that Sharp's resources will not be sold piecemeal. Up until about 2011, the technological domains of Foxconn and Sharp were far removed from one another. However, Foxconn's recent R&D progress has made steady inroads into Sharp's territory, which represents a threat to Sharp's researchers. Meanwhile, the success of Foxconn's strategies will likely be determined by whether it can carry out a proper macro assessment of the existence (or non-existence) of Sharp's appealing technology.

High-precision IP analytics indispensable for business strategy formulation

When formulating business strategies, including capital tie-ups and M&A, it is essential to first clarify sustainable synergies and multiplier effects. High-precision analytics are required to optimise sustainable mixes of complex and diverse technology portfolios. The objective and comprehensive perception of information, in addition to understanding time-sensitive trends, are indispensable for building consensus. The above case studies utilised broad-based analytic tools to try to interpret corporate stories while addressing not only technical synergies, but also enterprise and management synergies as well. Since patent data includes information on people, products and scales, it is one meaningful resource for strategy formulation.

The financial industry is currently starting to make inroads into new territory that fuses its products and services with technology. Fintech – while acting as a threat to supplanting existing financial business models – is also an opportunity for collaboration, as it offers components to build new services and for actually strengthening competitiveness. Fintech may thus prove crucial for transforming the industry.

In April 2017 we announced our business alliance with Valuenex. Together, we combine specialties in patent analysis and the text-mining technology underlying it with industry or company analysis and financial service solutions, which we expect to translate to developing more multidimensional solutions. This type of cross-divisional alliance and co-creation may be key to survival, given that we see almost certain and significant impairment to the earnings foundation of the financial industry accompanying the development of fintech.

Challenges for IP-based equity research going forward

We continue to leverage patent information as a way to forecast a highly uncertain future, helping managers try to out-perform investment returns over the mid to long-term. However, we are keenly aware of the challenges to this.

One of these is that patent information is not necessarily exhaustive. Patents for highly confidential technology are often not filed until immediately before commercialisation, while there are reportedly many cases where patents

Action plan

As the industry changes, the research departments of major financial institutions are looking for ways that big data can give them an analytical edge. Analysing patent portfolios is one potential tool they are exploring:

- New regulatory rules, as well as an increasing trend toward passive asset management, have put additional pressure on research departments to produce more complex and in-depth equity analysis.
- Patent data can supplement analysis of a particular industry sector, such as auto, to show what direction innovation is moving in and the strengths of individual companies.
- Analysis of patent holdings can shed some light on the technological factors underlying a corporate merger or acquisition, as well as how a company is preparing for an initial public offering.
- While financial technology is a challenge to the traditional financial services industry, financial institutions which can leverage data (including IP information) to provide new services to their clients will be best positioned to survive changes in the industry.
- There are significant challenges to crafting a so-called 'equity narrative' using patent information, including fragmentation of data, company secrecy and the need for significant ancillary knowledge to analyse raw macro data.

are not filed at all for manufacturing technology. This means that we are forced to piece together fragmented information and theorise about their strategic significance.

Further, various mechanisms hinder general searches of patent content, while companies also try to hold large numbers of unregistered patents in order to obstruct their competitors. Such strategic factors require creative steps to filter out the noise which comes with handling patent data. Additionally, there are cases where working from basic cluster analysis alone results in an opaque strategic narrative; some cannot interpret the meaning of the macro charts themselves without a great deal of ancillary knowledge.

After thoroughly understanding the peculiarities of these types of data, it is then necessary to use them as the building blocks for a so-called 'equity narrative' which is applicable to the process of investment decision making. We may then take this information and combine it with organisational theory and so on to pursue analyses that raise the level of probability. The process for plumbing the turnaround possibilities for a company in a prolonged slump involves technical development, restructuring, occasional changes in top management and major transformations in corporate behaviour. Approaching this process is possible only by combining information and analysis of all these elements, which is arguably not something that can be casually supplanted by AI and machine learning. iam

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