Thomson Reuters

2015 Top 100 Global Innovators

Honoring the World Leaders in Innovation

FINDINGS AND METHODOLOGY

Featuring a special supplement on the Top Bay Area Innovators

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THOMSON REUTERS™

"Innovation is the key to growth and prosperity. Measures to effectively protect intellectual property rights are particularly vital..."

German Chancellor Angela Merkel
G8 World Economic Summit 2007

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Message from David Brown

Founding member of the Top 100 Global Innovators

Innovation. We hear and read about it every day, yet the word still holds a certain mystique. With necessity as the mother of invention, there's no shortage of ideas for doing things better, faster or in completely new ways, however the leap from idea to reality is long and challenging. What does it take to be truly innovation and who are the innovation leaders in our world today?

At Thomson Reuters, it is our belief that patents are a proxy for innovation and that innovation is a driver of economic growth and success. The Thomson Reuters Top 100 Global Innovator program, now in its fifth year, is evidence of this.

Our methodology is scientifically rooted in patent data and analysis. Looking at metrics involving patent volume, application-to-grant success, globalization and citation influence, we've developed an objective formula that identifies the companies around the world that are discovering new inventions, protecting them from infringers and commercializing them. This is what we call the "Lifecycle of Innovation:" discovery, protection and commercialization. Our philosophy is that a great idea absent patent protection and commercialization is nothing more than, a great idea.

With intangible assets now comprising more than 80 percent of the S&P 500 market value[1], understanding the effect of these assets is critical. Proof of the economic impact of intellectual property (IP) can be found in statistics like IP-intensive industries generating more than $5 trillion in economic activity and creating 40 million jobs in the US.[2] Similarly, companies with larger patent portfolios receive up to $12 million more in startup funding than those without[3]. And, the wages of employees in R&D-intensive industries are at least 30 percent higher than those in non-R&D industries[4]. We also found that the higher a country's GDP, the larger its investment in R&D, innovation, patenting and generally the better its IPR (intellectual property rights) protection.

Another proof point is that for five consecutive years the Thomson Reuters Top 100 companies have consistently outperformed other indices in terms of revenue and R&D spend. This year, our Top 100 innovators outperform the MSCI World Index in revenue by 6.01 percentage points and in employment by 4.09 percentage points. We also outperform the MSCI World Index in market-cap-weighted R&D spend by 1.86 percentage points. The conclusion: investment in R&D and innovation results in higher revenue and company success.

The Thomson Reuters 2015 Top 100 Global Innovators list starts on page 7 of this report. There are some noteworthy shifts in year-over-year activity. For instance, the Semiconductor and Computer Hardware spaces each decreased significantly over last year, whereas the Oil & Gas space increased 300 percentage points, Chemicals increased two-fold and Pharmaceuticals jumped up 75 percent. There's no doubt that semiconductors continue to play a significant role in the advancement of technological trends such as the Internet of Things and digital everything, however it's also clear that industries that were less active in the recent past have increased their volume, bleeding into tangential sectors where their expertise can be applied.

New in 2015 is the addition of a regional top 100 innovator list for the United States' Bay Area, comprising San Francisco, California and the surrounding region. This area is known as Silicon Valley and is home to some of the world's top technology companies, such as Apple, Google, Intel, Oracle and many others. We created a Top 100 list to see how the Bay Area compares to innovators on a global scale. See page 23 for the Top Bay Area Innovator list and its similarities and differences to the global Top 100 Innovators compilation.

Congratulations to all of the organizations making the 2015 Top 100 lists. Their commitment to innovation and dedication to ongoing R&D are drivers of economic success, not only for them but also for the countries in which they reside.

David Brown
Global Head of Sales & Service
Thomson Reuters IP & Science
Founding member of the Top 100 Global Innovator team

[1] *Ocean Tomo*
[2] *Intellectual Property & the U.S. Economy: Industries in Focus, 2012*
[3] *"Patents as Quality Signals for Entrepreneurial Ventures," Academy of Management Journal, 2008*
[4] *Global Intellectual Property Center, U.S. Chamber of Commerce*

Methodology

The Thomson Reuters Top 100 Global Innovator methodology analyzes patent and citation data across four main criteria: volume, success, globalization and influence using Thomson Reuters solutions including Derwent World Patents Index (DWPI), Thomson Innovation and Derwent Patent Citations Index (PCI).

Volume

Volume is the first criteria. An organization must have at least 100 unique inventions protected by a granted patent over the most recent five year period to advance for further analysis. A unique invention is defined as one instance of a published application or granted patent for an idea for which protection is sought. In DWPI, these are called "basic" patents. DWPI provides access to 50 patent-issuing authorities. Subsequent filings for the same invention are recorded as equivalents and collated into patent families which, for this analysis, were not included.

Once an organization passes the volume stage gate, it is measured across the next three criteria: success, globalization and influence.

Success

The success metric covers the ratio of inventions described in published applications (those patents which are filed and publicly published by the patent office but not yet granted) to inventions protected with granted patents over the most recent five years. Not all patent applications pass through the examination process and are granted.

Globalization

Globalization has to do with the value an organization places on an invention by protecting it across the major world markets. The premise being that inventions protected in all four of the Thomson Reuters Quadrilateral Patent Index authorities: the Chinese Patent Office, the European Patent Office, the Japanese Patent Office and the United States Patent & Trademark Office, are deemed to be of significant value to the organization. A ratio is created of the inventions protected across the Quadrilateral Patent Index authorities versus the total volume for that period.

Influence

Finally, influence is the downstream impact of an invention, measured by how often it is cited by other organizations. Via the Derwent Patent Citation Index, citations to an organization's patents are counted over the most recent five years, excluding self citations.

Scores for each of these areas are tallied and combined to produce the Top 100 Global Innovator list.

Economic Impact & Findings

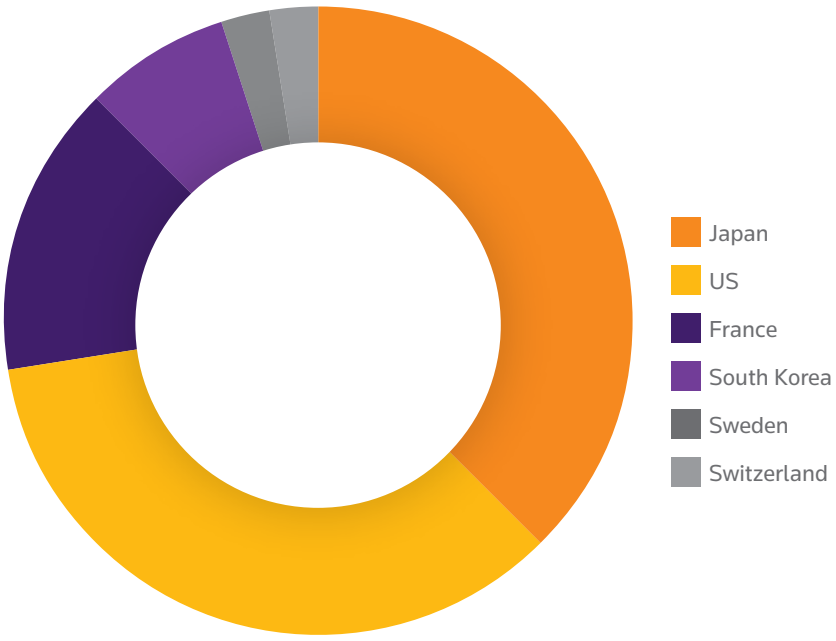
The 2015 Thomson Reuters Top 100 Global Innovators are a creative and successful group. Together they generated more than 429 trillion in revenue (in local currency) and invested more than 20 trillion in R&D (local currency) in 2014. They are the organizations leading us into the future, by innovating, protecting their inventions with IP rights and commercializing them. Without them, our world would be a very different place.

Proof of the Lifecycle of Innovation concept embodied in the 2015 Top 100 Global Innovators (that the discovery, protection and commercialization of ideas leads to economic success) can be found in the fact that the Top 100 outperform the MSCI World Index on several fronts. They beat MSCI in year-over-year revenue and employment figures by 6.01 and 4.09 percentage points, respectively. They also outperform MSCI in their market cap weighted R&D spend by 1.86 percentage points. These are clear indicators that companies that invest in R&D and convert their ideas into protected, commercialized products perform better than those that don't have such a focus.

Patent Reform

There's been some influential intellectual property legislation that is shaping how companies innovate, where they seek protection and when. Some of these initiatives include the America Invents Act and the Patent Trial & Appeal Board; the European unitary patent and unified patent court; the UK's Patent Box legislation; and impactful court rulings, such as Alice 101 in the US.

Figure 1: Five-Time Top 100 Global Innovator Honorees



Source: Thomson Reuters Derwent World Patents Index

The landscape is ripe with reform as patent offices and filers grapple with how best to implement these changes given their goals and needs. Despite these changes, one thing remains certain: the patent system is vital to protecting innovation and to the economic wellbeing of organizations, nations and our world. OECD statistics confirm that nations with higher GDPs have similarly high patent filing rates (aka strong patent infrastructures), whereas the converse holds equally true. One way for developing nations to propel their economies forward is to invest in innovation and building a reliable intellectual property infrastructure.

Repeat Honorees

2015 marks the fifth consecutive year of the Top 100 Global Innovator program. There have been 40 consecutive, repeat honorees over this time, with Japan providing 15 five-time winners, the US contributing 14, and four other countries comprising the remaining 11 spots: France, South Korea, Sweden and Switzerland (see Figure 1).

Absentees

The United Kingdom is absent from the list yet again this year. Innovation incentives introduced in the UK, such as Patent Box legislation, do not have enough legacy yet to have had an impact. Additionally, the UK spends much less on R&D as a percentage of Gross Domestic Product (GERD) than the Top 100 Global Innovator countries do. The UK's GERD is 1.63 percent, whereas, for example, Japan's is 3.47 percent.[5] The region's underuse of its patent system and lack of significant commercialization keep the UK from making the list once again.

China is also absent from the 2015 list. It joined the innovation-leader ranks in 2014, for the first time, via Huawei, however wasn't able to replicate that performance to join again in 2015. A big factor contributing to China's shortcoming is the fact that most of its innovation is domestic and therefore is not realized outside of its borders. In fact, only about six percent of China's innovation activity is protected, and commercialized, outside of China. In order for China to see more organizations join this prestigious group, it will need to think more internationally and look to bring its inventions to market around the world.

There are 27 companies that dropped from the prior year (see Table 1 on page 12), including AT&T, IBM, Siemens and Xerox. While these companies are still innovating at noteworthy levels, their respective scores across all of the metrics did not advance them to the Top 100. It's expected that we will see them again in the future.

Bleeding into Tangential Areas

There is a bleeding of innovation into tangential industries, as companies expand their portfolios and apply their inventions to related technologies or applications. This is seen across all sectors, and especially in some areas with notable increases, such as in Chemicals, where small molecules are being used in new ways as related to cosmetic applications, food chemistry, flavoring, and otherwise.

YOY Changes

One of the most significant year-over-year changes is in the Semiconductor space. This category dominated the list in the past, comprising nearly one-quarter of the 100 companies. However, there are just 12 Semiconductor companies this year, a 43 percent drop from last year. This is not to say that Semiconductors have decreased in importance, but rather that there are new technologies or methods to make computers and electronic devices faster, smarter and capable of more functionality.

New in 2015: Top Bay Area Innovators

For the first time, Thomson Reuters analysts studied Silicon Valley, known as the technology and innovation corridor in the US, to see which companies are leading there. Following a methodology similar to that of the Top 100 Global Innovators, except for the Volume criteria, all companies headquartered or with a major subsidiary in that region were investigated. The Top Bay Area Innovators list can be found on page 19. There are 11 companies that overlap with the Top 100 Global Innovators; meaning 31 percent of the leading US innovators and 11 percent of the world's top innovators are located in the Bay Area.

[5] *2013 OECD data*

Introducing the Thomson Reuters 2015 Top 100 Global Innovators

Organization	Country	Industry	Previous Winners
3M Company	USA	Chemical	2011, 2012, 2013, 2014
Abbott Laboratories	USA	Pharmaceutical	2013, 2014
Advanced Micro Devices	USA	Semiconductor & Electronic Components	2011, 2012, 2013, 2014
Air Products	USA	Chemical	2013
Aisin Seiki	Japan	Automotive	2014
Alcatel-Lucent	France	Telecommunication & Equipment	2011, 2012, 2013, 2014
Alstom	France	Electrical Power	
Amazon	USA	Media Internet Search & Navigation Systems	
Analog Devices	USA	Semiconductor & Electronic Components	2011, 2012, 2013
Apple	USA	Telecommunication & Equipment	2011, 2012, 2013, 2014
Arkema	France	Chemical	2011, 2012, 2013, 2014
Avago Technologies (previously LSI)	USA	Semiconductor & Electronic Components	
BASF	Germany	Chemical	2011, 2014
Bayer	Germany	Pharmaceutical	2011
Becton Dickinson	USA	Medical Devices	
Blackberry	Canada	Telecommunication & Equipment	2013, 2014
Boehringer Ingelheim	Germany	Pharmaceutical	
Boeing	USA	Aerospace	2011, 2012, 2013, 2014
Bridgestone	Japan	Automotive	
Bristol-Myers Squibb	USA	Pharmaceutical	2011
Canon	Japan	Imaging	2011, 2012, 2013, 2014
Casio Computer	Japan	Computer Hardware	2014
Chevron	USA	Oil & Gas	2011, 2012, 2013
CNRS, The French National Center for Scientific Research	France	Scientific Research	2011, 2012, 2013, 2014
Commissariat à l'Energie Atomique	France	Scientific Research	2011, 2012, 2013, 2014
Daikin Industries	Japan	Industrial	2011, 2014
Dow Chemical Company	USA	Chemical	2011, 2012, 2013, 2014
DuPont	USA	Chemical	2011, 2012, 2013, 2014
Emerson Electric	USA	Electrical Products	2012, 2013, 2014
Ericsson	Sweden	Telecommunication & Equipment	2011, 2012, 2013, 2014
Exxon Mobil	USA	Oil & Gas	2011, 2012, 2013
Fraunhofer	Germany	Scientific Research	2013, 2014
Freescale Semiconductor	USA	Semiconductor & Electronic Components	2013, 2014
Fujifilm	Japan	Imaging	2012, 2013, 2014
Fujitsu	Japan	Computer Hardware	2011, 2012, 2013, 2014

2015 Top 100 Global Innovators

Organization	Country	Industry	Previous Winners
Furukawa Electric	Japan	Electrical Products	2014
General Electric	USA	Consumer Products	2011, 2012, 2013, 2014
Google (now Alphabet Inc.)	USA	Media Internet Search & Navigation Systems	2012, 2013, 2014
Hitachi	Japan	Computer Hardware	2011, 2012, 2013, 2014
Honda Motor	Japan	Automotive	2011, 2012, 2013, 2014
Honeywell International	USA	Electrical Products	2011, 2012, 2013, 2014
Idemitsu Kosan	Japan	Oil & Gas	
IFP Energies Nouvelles	France	Scientific Research	2011, 2012, 2013, 2014
Intel	USA	Semiconductor & Electronic Components	2011, 2012, 2013, 2014
InterDigital	USA	Telecommunication & Equipment	
Japan Science and Technology Agency (JST)	Japan	Scientific Research	
Johnson & Johnson	USA	Pharmaceutical	2013, 2014
Johnson Controls	USA	Automotive	
JTEKT	Japan	Automotive	
Kawasaki Heavy Industries	Japan	Industrial	
Kobe Steel	Japan	Primary Metals	2014
Komatsu	Japan	Industrial	2014
Kyocera	Japan	Electrical Products	2014
LG Electronics	S Korea	Consumer Products	2011, 2012, 2013, 2014
Lockheed Martin	USA	Transportation Equipment	2012, 2013, 2014
LSIS	S Korea	Electrical Power	2011, 2012, 2013, 2014
Makita Corporation	Japan	Machinery	
Marvell	USA	Semiconductor & Electronic Components	2012, 2013, 2014
MediaTek	Taiwan	Semiconductor & Electronic Components	2014
Medtronic	USA	Medical Devices	2014
Micron	USA	Semiconductor & Electronic Components	2012, 2013, 2014
Microsoft	USA	Computer Software	2011, 2012, 2013, 2014
Mitsubishi Electric	Japan	Electrical Products	2011, 2012, 2013, 2014
Mitsubishi Heavy Industries	Japan	Machinery	2012, 2013, 2014
Mitsui Chemicals	Japan	Chemical	
NEC	Japan	Computer Hardware	2011, 2012, 2013, 2014
Nike	USA	Consumer Products	2012, 2013, 2014
Nippon Steel & Sumitomo Metal	Japan	Primary Metals	2012, 2013, 2014
Nissan Motor	Japan	Automotive	2013, 2014
Nitto Denko	Japan	Chemical	2011, 2012, 2013, 2014
Novartis	Switzerland	Pharmaceutical	2014

2015 Top 100 Global Innovators

Organization	Country	Industry	Previous Winners
NTT	Japan	Telecommunication & Equipment	2011, 2012, 2013, 2014
Olympus	Japan	Healthcare Products	2011, 2012, 2013, 2014
Oracle	USA	Computer Software	2013, 2014
Panasonic	Japan	Consumer Products	2011, 2012, 2013, 2014
Philips	Netherlands	Electrical Products	2011, 2013, 2014
Qualcomm	USA	Semiconductor & Electronic Components	2011, 2012, 2013, 2014
Roche	Switzerland	Pharmaceutical	2013, 2014
Safran	France	Transportation Equipment	2013, 2014
Saint-Gobain	France	Industrial	2011, 2012, 2013, 2014
Samsung Electronics	S Korea	Semiconductor & Electronic Components	2011, 2012, 2013, 2014
Seagate	USA	Computer Hardware	2012, 2013, 2014
Seiko Epson	Japan	Imaging	2011, 2012, 2013, 2014
Shin-Etsu Chemical	Japan	Chemical	2011, 2012, 2013, 2014
Showa Denko	Japan	Chemical	
Solvay	Belgium	Chemical	2012
Sony	Japan	Consumer Products	2011, 2012, 2013, 2014
Sumitomo Electric	Japan	Industrial	2011, 2013, 2014
Symantec	USA	Computer Software	2011, 2012, 2013, 2014
TE Connectivity	Switzerland	Semiconductor & Electronic Components	2011, 2012, 2013, 2014
Thales	France	Transportation Equipment	2012, 2013
Toray	Japan	Chemical	
Toshiba	Japan	Computer Hardware	2011, 2012, 2013, 2014
Toyota Motor	Japan	Automotive	2011, 2012, 2013, 2014
Valeo	France	Automotive	2012, 2013
Xilinx	USA	Semiconductor & Electronic Components	2012, 2013, 2014
Yamaha	Japan	Consumer Products	2011, 2014
Yamaha Motor	Japan	Automotive	
Yaskawa Electric	Japan	Industrial	
Yazaki	Japan	Automotive	

Geographic Breakout

Global

The 2015 Top 100 Global Innovators hail from three continents and comprise eleven countries. Just two countries account for 75 percent of the list: Japan and the US, making them the true innovation hubs of the world. The remaining nine countries include Belgium, Canada, France, Germany, the Netherlands, South Korea, Sweden, Switzerland and Taiwan (see Figure 2). The majority of the nations in our world are absent from hosting even one of the world's leading innovators.

Figure 2: Composition of the 2015 Top 100 Global Innovators

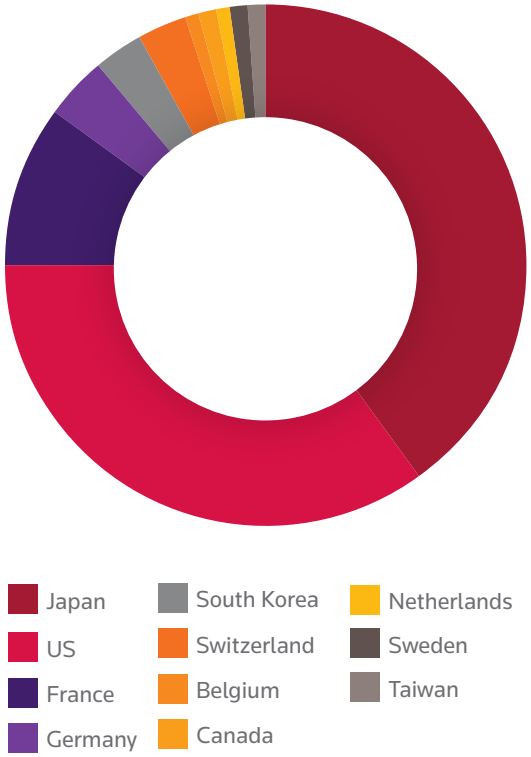
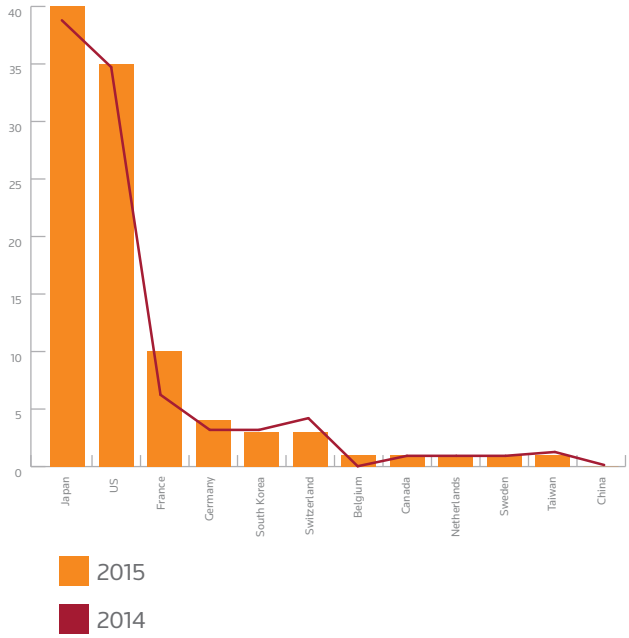


Figure 3: 2015 versus 2014 Top 100 Global Innovator Representation by Country



Source: Thomson Reuters Derwent World Patents Index

Asia

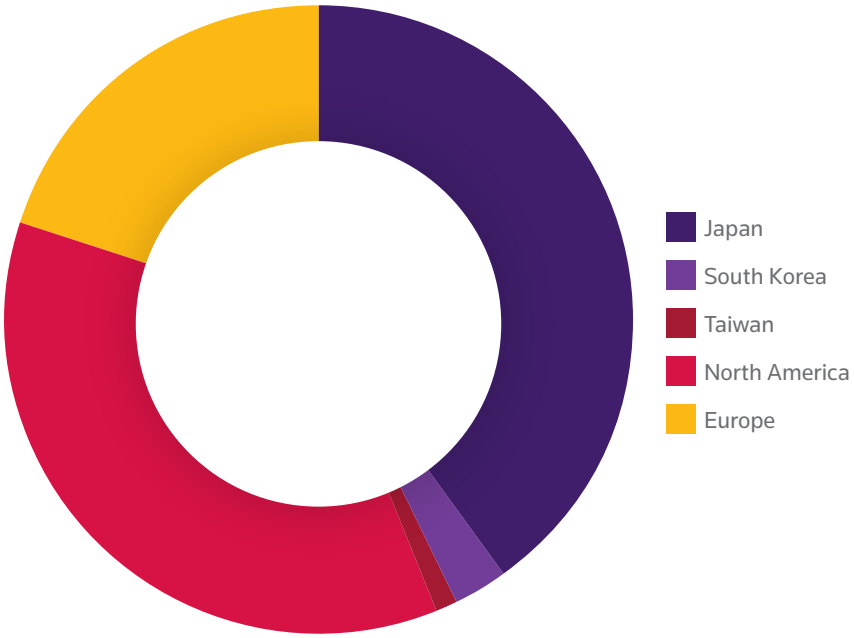
Asia continues to be the regional frontrunner in terms of its innovation activity. Japan once again takes the spot as the country with the most Top 100 Global Innovator representation, with 40 such companies on the 2015 list (compared to 39 in 2014). South Korea and Taiwan join Japan in solidifying Asia's innovation leadership position, contributing three and one companies, respectively. This cements Asia's leadership position in discovering, protecting and commercializing ideas with 44 percent of the top 100 slots (see Figure 4).

Missing from the list this year is China. There was one Chinese company in 2014: Huawei, however its Globalization score kept it from being a repeat honoree. Similarly, the volume from South Korea and Taiwan has decreased over the prior year; South Korea dropped by 25 percent and Taiwan by 50 percent over 2014 levels.

North America

North American representation of the 2015 Top 100 Global Innovators is exactly the same as it was in 2014: 35 companies from the United States and one from Canada. However, the US composition is much different, as shown in Table 1, with new entrants such as Amazon, InterDigital and Johnson Controls all making the list for the first time. The one company from Canada remains the same: Blackberry.

Figure 4: Asian Representation Compared to Rest of World for the 2015 Top 100 Global Innovators



Source: Thomson Reuters Derwent World Patents Index

Table 1: Change in Representation of the 2015 Top 100 Global Innovators

New 2015	Country	Dropped from 2014	Country
Air Products	US	ABB	Switzerland
Alstom	France	Altera	US
Amazon	US	Asahi Glass	Japan
Analog Devices	US	AT&T	US
Bayer	Germany	Bosch	Germany
Becton Dickinson	US	Brother Industries	Japan
Boehringer Ingelheim	Germany	Corning	US
Bridgestone	Japan	Covidien (merged into Medtronic)	US
Bristol-Myers Squibb	US	Denso Corporation	Japan
Chevron	US	ETRI	S Korea
Exxon Mobil	US	Hewlett-Packard	US
Idemitsu Kosan	Japan	Huawei	China
InterDigital	US	IBM	US
Japan Science & Technology Agency	Japan	ITRI	Taiwan
Johnson Controls	US	Kao Corporation	Japan
JTEKT	Japan	NGK Corporation	Japan
Kawasaki Heavy Industries	Japan	Ricoh	Japan
Makita Corporation	Japan	SanDisk	US
Mitsui Chemicals	Japan	Semiconductor Energy Lab	Japan
Showa Denko	Japan	Sharp	Japan
Solvay	Belgium	Siemens	Germany
Thales	France	STMicroelectronics	Switzerland
Toray	Japan	Sumitomo Rubber	Japan
Valeo	France	TDK	Japan
Yamaha Motor	Japan	Texas Instruments	US
Yaskawa Electric	Japan	Tokyo Electron	Japan
Yazaki	Japan	Xerox	US

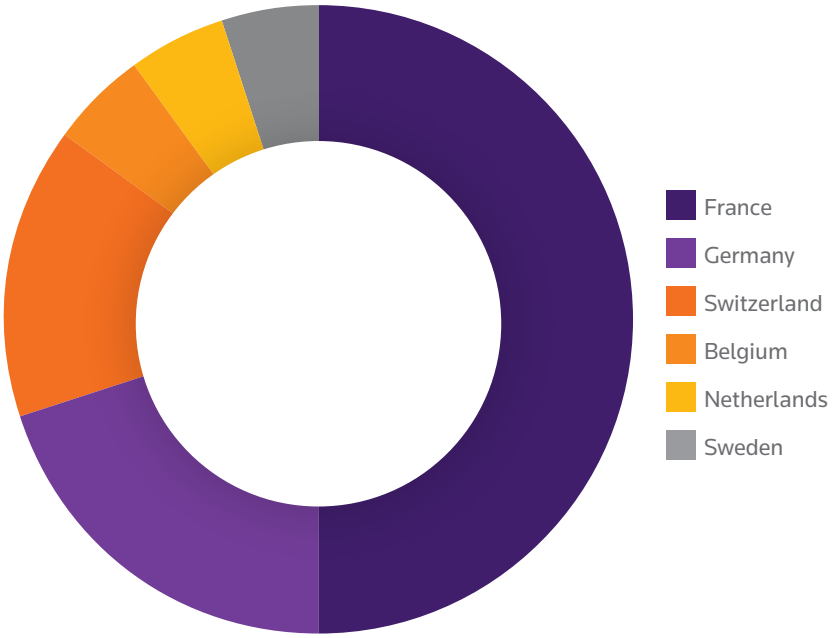
Source: Thomson Reuters Derwent World Patents Index

Europe

Europe increased its overall share in the Top 100 by two percent over 2014, and now holds 20 percent of the overall pie. Its country distribution has shifted slightly as well. France continues to lead the region, this year with 10 percent of the 100, versus just seven percent last year, adding Alstom, Thales and Valeo to its roster. Germany stayed consistent with four companies on the list, while Belgium rejoined the group once again with the reappearance of Solvay. Switzerland contributed three (versus five in 2014), while the Netherlands and Sweden remain with one honoree each. Figure 5 shows the regional contribution of each country.

The United Kingdom is noticeably absent from the list again this year, as has been the case in the past. Several factors contribute to this, one of the most important of which is that the UK's investment in R&D as a proportion of GDP (GERD) is only 1.63 percent, a noteworthy difference from the 2.73 percent in the US, 2.23 percent in France, 2.85 percent in Germany, and whopping 3.47 percent in Japan. Initiatives such as the UK Patent Box, which provides tax credits and incentives to UK-based companies with profits derived from sales of patented products or processes, will take a couple of years to take effect given the lag time between discovery, protection and commercialization.

Figure 5: European Representation of the 2015 Top 100 Global Innovators



Source: Thomson Reuters Derwent World Patents Index

Industry Breakout

Industry representation across the 2015 Top 100 Global Innovator companies covers all of the same industries as in 2014, as well as three new ones: Electrical Power, Imaging and Oil & Gas (previously Petroleum), as shown in Table 2.

The biggest year-over-year jumps were made in Chemicals, Media Internet Search & Navigation Systems, and Oil & Gas. The latter didn't have any representation in 2014, while this year there are three such companies on the list: Chevron, Exxon Mobil and Idemitsu Kosan. The increase in Oil & Gas is influenced by the uptake of hydraulic fracking as well as these companies expanding from their traditional base in petroleum to new areas of innovation related to alternative energy.

Similarly, the Chemical sector saw a large uptick, doubling its representation over 2014. New entrants in this area include: Air Products, Mitsui Chemicals, Showa Denko, Solvay, Toray and Nitto Denko (the latter of which was reassigned from Industrial to Chemical). This change is indicative of the growing role chemicals play in our world, from influencing drug development and food chemistry to agriculture crops and industrial solvents. And, these needs are growing, as governments and organizations grapple with multiple issues related to caring for and feeding the world's growing population, at 7.2 billion and counting.

Media Internet Search & Navigation Systems is an emerging innovation area, as traditional web-based search companies expand from their original base into tangential sectors that also require patent protection.

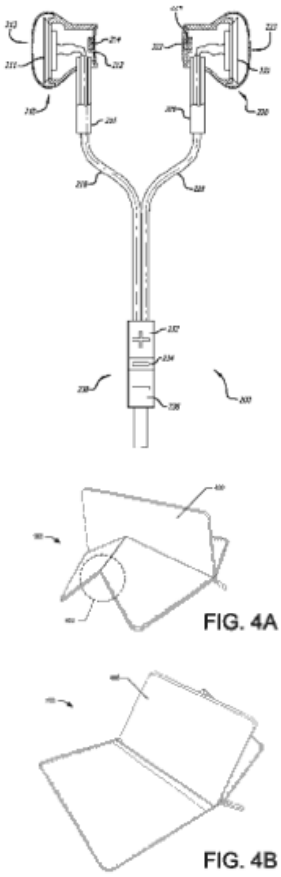
Amazon joins the ranks of the Top 100 Global Innovators for the first time, generating several handfuls of new US inventions each month. Its innovation falls into three broad buckets: data centers, devices, and electronic methods and systems. These include everything from identifying and responding to malicious or potentially malicious activity (US9154515B1) to headphones with asymmetric coupling (US8891798B1), to carrying cases for electronic readers, such as the Kindle (US8915357B2), as shown in Figure 6. These underscore the online shopping giant's plans to continue investing in the manufacture and sale of its own goods.

Table 2: 2015 versus 2014 Industry Comparison of Top 100 Global Innovators

Industry	2015	2014	% Change
Chemical	12	6	100%
Semiconductors & Electronic Components	12	21	(43%)
Automotive	10	6	67%
Pharmaceutical	7	4	75%
Computer Hardware	6	13	(54%)*
Consumer Products	6	7	(14%)
Electrical Products	6	5	20%
Industrial	6	8	(25%)
Telecommunication & Equipment	6	7	(14%)
Scientific Research	5	6	(17%)
Transportation Equipment	3	3	0%
Computer Software	3	3	0%
Imaging (new)	3	n/a	
Oil & Gas (previously Petroleum)	3	-	300%
Electrical Power (new)	2	n/a	
Machinery	2	4	(50%)*
Media Internet Search & Navigation Systems	2	1	100%
Medical Devices	2	2	0%
Primary Metals	2	2	0%
Aerospace	1	1	0%
Healthcare Products	1	1	0%

Source: Thomson Reuters Derwent World Patents Index
** Declines in Computer Hardware & Machinery are partially due to a re-assignment of companies to more appropriate sectors.*

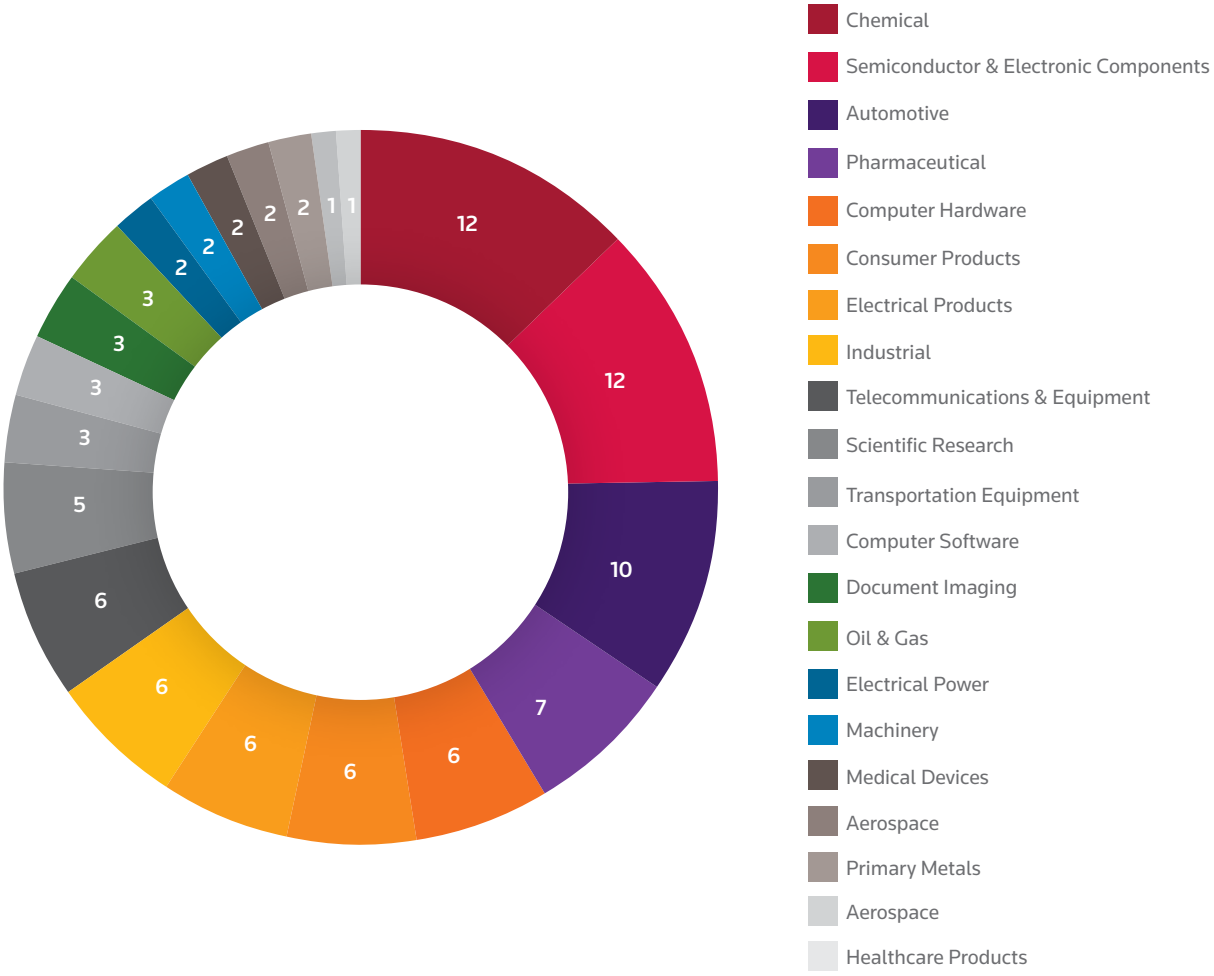
Figure 6: Amazon Technology Inc.'s US Patents 8891798B1 for headphones and 8915357B2 for a carrying case for electronic readers



Source: Thomson Innovation

The full distribution of the Top 100 Global Innovators, Figure 7, shows that despite the increases in Chemical, Media Internet Search & Navigation Systems, and Oil & Gas, the largest industry sectors continue to be led by Semiconductor & Electronic Components, Automotive and Pharmaceuticals. And this is still despite the fact that the Semiconductor sector experienced a 43 percent year-over-year decline, dropping from 21 representative companies in 2014 to just 12 in 2015. This is the lowest Semiconductor representation since the inception of the Top 100 Global Innovators, which have ranged from 14 to 23 companies over the course of the program (see Table 3).

Figure 7: Industry Representation across 2015 Top 100 Global Innovators



Source: Thomson Reuters Derwent World Patents Index

Table 3: Top 100 Global Innovator Industry Representation Comparison (2011 – 2015)

Industry	2015 %	2014 %	2013 %	2012 %	2011 %
Aerospace	1%	1%	2%	2%	3%
Agriculture & Forestry	0%	0%	0%	1%	0%
Automotive	10%	6%	8%	7%	3%
Chemical	12%	6%	6%	8%	13%
Colleges/ Universities	0%	0%	0%	2%	0%
Computer Hardware	6%	13%	11%	13%	11%
Computer Software	3%	3%	3%	2%	4%
Consumer Products	6%	7%	7%	7%	9%
Electrical Power	2%	n/a	n/a	n/a	n/a
Electrical Products	6%	5%	4%	5%	6%
Government Agencies	0%	0%	2%	2%	0%
Healthcare Products	1%	1%	1%	1%	1%
Imaging	3%	n/a	n/a	n/a	n/a
Industrial	6%	8%	7%	3%	6%
Machinery	2%	4%	5%	6%	8%
Media/Internet Search & Navigation Systems	2%	1%	1%	1%	0%
Medical Devices	2%	2%	1%	0%	0%
Oil & Gas (Petroleum)	3%	0%	2%	1%	2%
Pharmaceuticals	7%	4%	3%	1%	2%
Primary Metals	2%	2%	1%	1%	0%
Scientific Research	5%	6%	4%	5%	3%
Semiconductors & Electronic Components	12%	21%	23%	18%	14%
Telecom Equipment	6%	7%	7%	7%	7%
Transportation Equipment	3%	3%	4%	7%	5%

Source: Thomson Reuters Derwent World Patents Index

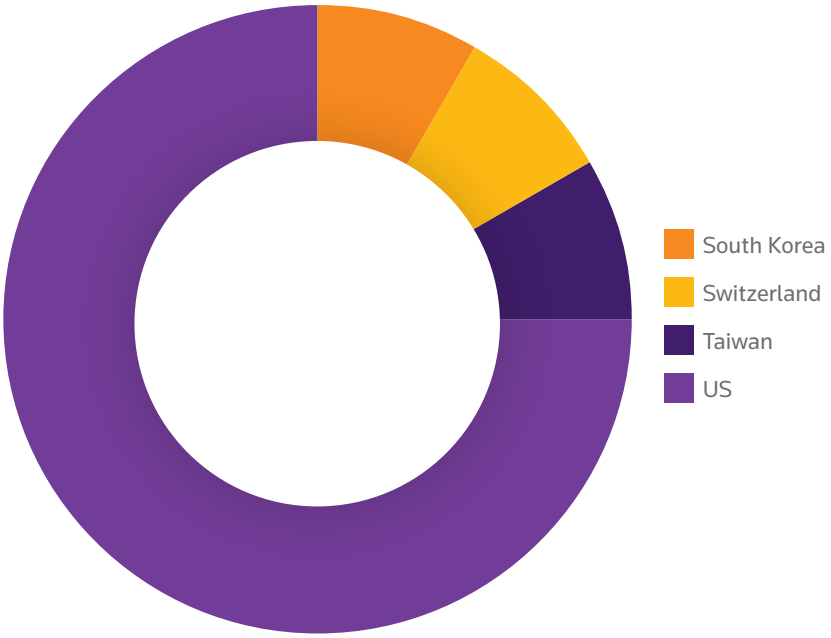
Semiconductors

The Semiconductor & Electronics Components space is evolving, with decreased representation on the overall Top 100 list, despite it being one of the largest categories again this year. The US leads the world in Semiconductor activity with nine companies or 75 percent of the sector's representation. The remaining three are from South Korea, Switzerland and Taiwan, each contributing one to the overall list, as shown in Figure 8. Silicon Valley, in the Bay Area of California, is the world's hub for Semiconductor innovation, as all nine of the companies are from that region.

Two New Categories

There are two new categories on the 2015 Top 100 Global Innovator list: Document Imaging and Electrical Power. The former is a compilation of three repeat honorees re-assigned to this category from either Computer Hardware or Machinery. Document Imaging is a much clearer designation for Canon, Fujifilm and Seiko Epson, all of which hail from Japan. The latter, Electrical Power, is indicative of the increase in activity to find alternative sources of power for our planet. Alstom Power (France) is brand new to the Top 100 list whereas LSIS of South Korea was reassigned to this category.

Figure 8: Semiconductor & Electronic Component 2015 Top 100 Global Innovator Regional Distribution



Source: Thomson Reuters Derwent World Patents Index

Automotive

The Automotive sector has its largest representation on the Top 100 Global Innovator list ever, a 233 percent increase since the inception of the program. In addition to there being more auto manufacturers, the composition of those companies has also changed somewhat. Five years ago, the three representative companies were from Japan (Honda and Toyota) and Sweden (Volvo). Now, Japan continues to dominate with 80 percent representation, including Honda and Toyota, while France (Valeo) and the US (Johnson Controls) each contribute one, as shown in Figure 9.

As automobiles transition to their new existence: computers on wheels, more of the traditional manufacturers are being replaced by other companies on the Top 100 list that supply new technology and innovation to cars. Additionally, the advent of autonomous driving vehicles and smarter, more fuel-efficient cars have brought new players into this space, such as Alphabet (Google) and Tesla, among others.

Pharmaceuticals

The pharmaceutical sector has seen consistent growth over the past four years and has its largest representation on this list to date. This area is fairly evenly split, with three companies from the US, and two each from Germany and Switzerland, as shown in Figure 10.

As genomics drives the era of precision medicine and more and more therapies are being developed to specifically target mutant cells, especially as witnessed in oncology, in addition to the use of biologics in developing new treatments, the pharmaceutical space is experiencing a pseudo rebirth, despite the decline of the Blockbuster drug era.

Figure 9: Automotive 2015 Top 100 Global Innovator Regional Distribution

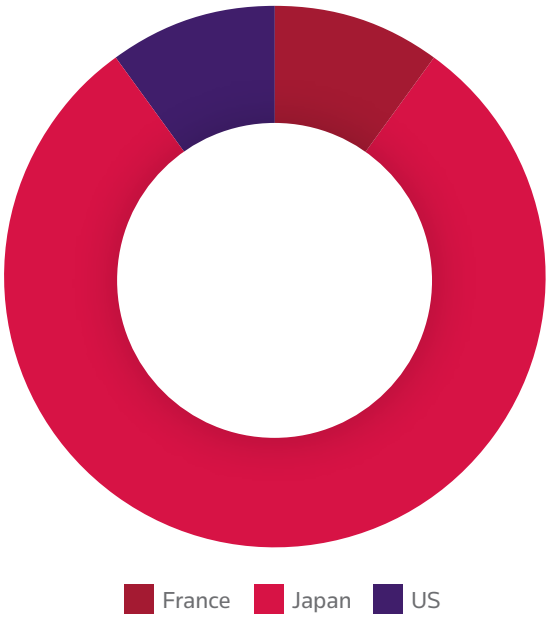
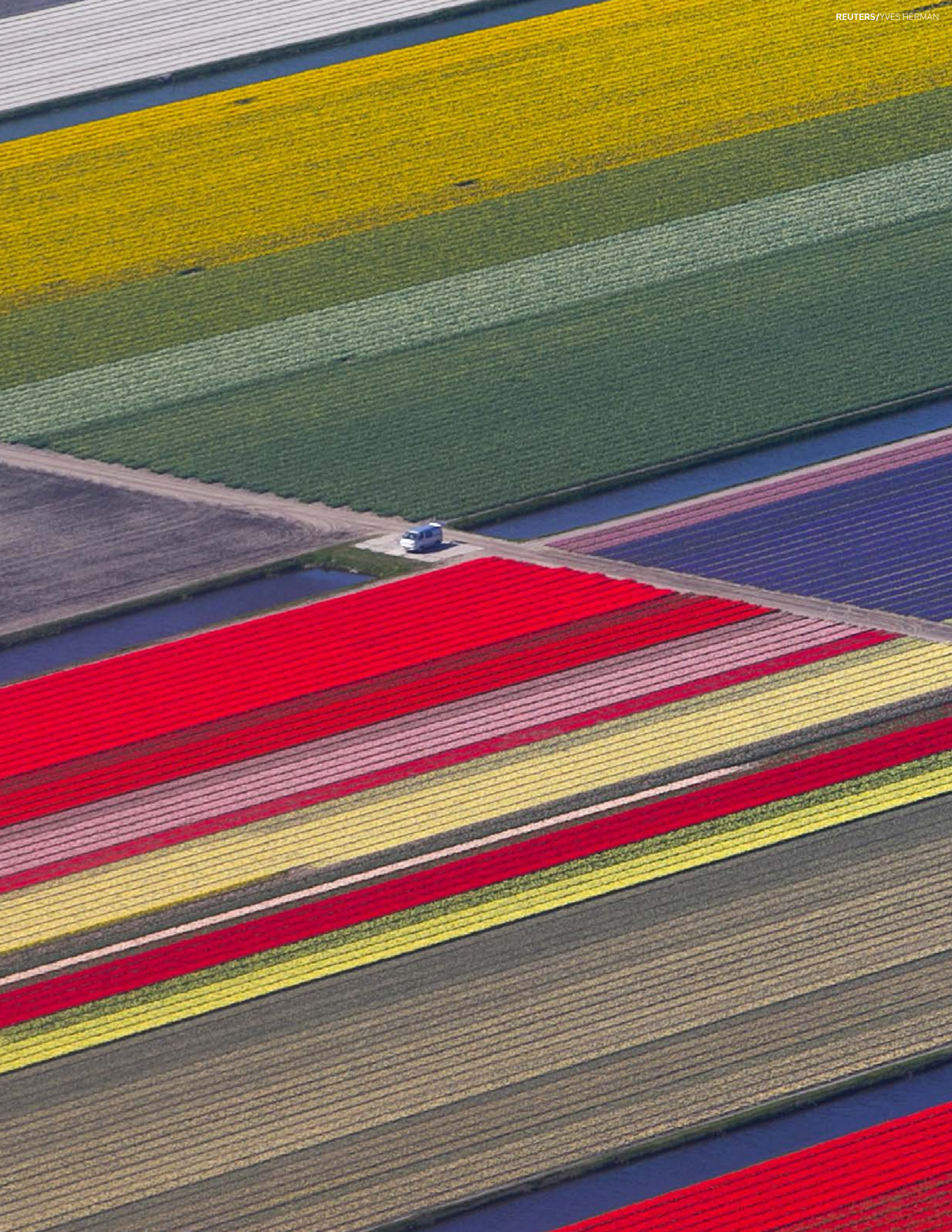
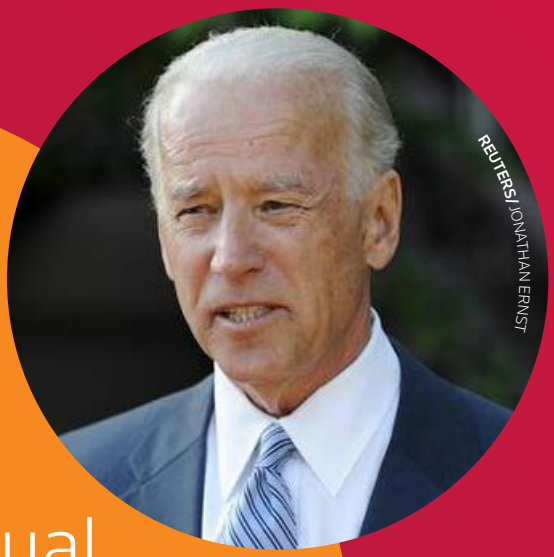


Figure 10: Pharmaceutical 2015 Top 100 Global Innovator Regional Distribution

Source: Thomson Reuters Derwent World Patents Index



REUTERS/YVES HERMAN



"Protecting intellectual property fosters innovative growth and not protecting it stifles opportunity."

U.S. Vice President Joseph Biden
U.S.-India Bilateral Investment Treaty Meeting
July 2015

Top Bay Area Innovators

The Bay Area. For those in the technology space, up on the hottest startups, following venture capital funders or tracking America's top universities, saying "the Bay Area" needs no additional explanation. It's that stretch of land in northern California, occupying approximately 7,000 square miles, that's home to many of the world's leading high-tech companies, entrepreneurial startups, best-in-class universities and a burgeoning "disruptive-innovation" mindset. The Bay Area's southernmost region is dubbed Silicon Valley, given the abundance of silicon chip (semiconductor) manufacturers that comprise this section of Santa Clara Valley.

Japan's Prime Minister Shinzo Abe recently traveled to the region, in search of the secret recipe for innovation success that he deemed unparalleled anywhere else in the world. During his trip, Mr. Abe said, "I want to soak up all that Silicon Valley has to offer and take the lessons to [the] Japanese."[1]

Considered the high-tech innovation hub of the world, the Silicon Valley is home to many global powerhouses, a number of which are, or have been, Thomson Reuters Top 100 Global Innovators.

Given the dynamic composition of the region, Thomson Reuters analysts with a passion for identifying innovation hotspots took a regional view of innovation for the very first time this year, focusing just on the Bay Area. They looked for the innovation leaders in "the Valley," to see how they compare to the global Top 100. Here's what they found.

Semiconductor Valley

More than a quarter of the Top Bay Area Innovators are from the Semiconductor & Electronic Components space. This is also an industry that tends to lead in the Top 100 Global Innovators list, however the overall representation is more than double the Top-100 rate for the Bay Area group (26 percent, to be exact), as shown in Figure 11.

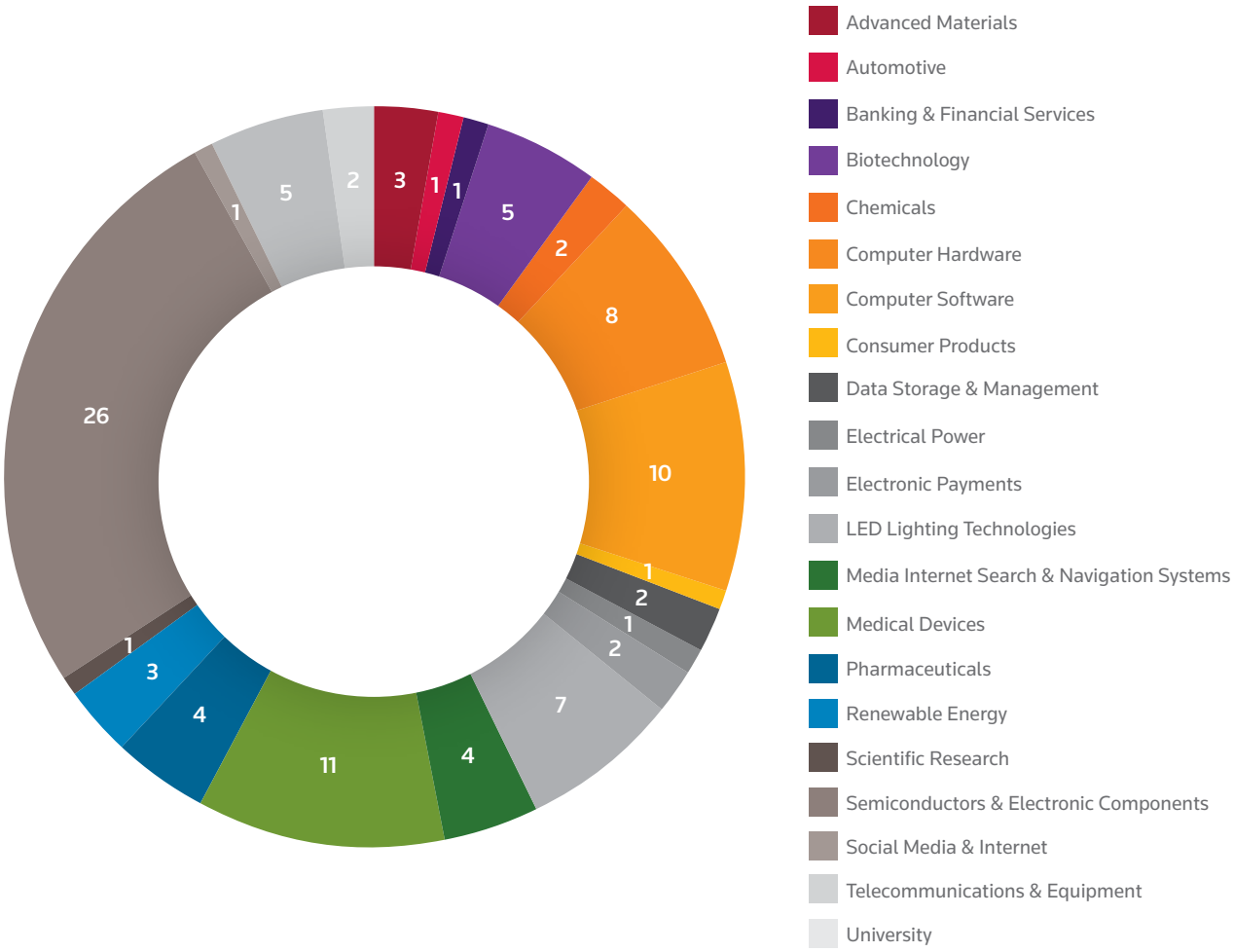
Well-known Semiconductor companies on the list include some present and past Top 100 Global Innovators, such as Advanced Micro Devices, Applied Materials, Avago, Intel, LSI Corporation, Marvel Semiconductor Inc., Qualcomm and Xilinx, as well as some new entrants specific just to the top Bay Area innovator listing, such as Analog Bits Inc., Cypress Semiconductor Corporation, Invensense, and Tessera Inc., among others.

Categories Unique to the Bay Area

Some of the industries represented in the Top Bay Area Innovators list are unique to this region; they don't also appear on the Top 100 Global Innovators listing. For example, LED Lighting Technologies ranks high on the Bay Area list, whereas there is no such category for the Global comparison. Additionally, Banking & Financial Services, Biotechnology, Data Storage & Management, Electronic Payments, Renewable Energy, and Social Media & Internet all appear on the Bay Area list but not the Global one (see Table 4). The sectors unique to the Bay Area give a glimpse of some of the growing fields of importance in the technology space and are ones to watch for how and when they propagate globally.

[1] *http://www.reuters.com/article/2015/05/01/us-usa-japan-abe-idUSKBN0NL0A420150501*

Figure 11: Thomson Reuters 2015 Top Bay Area Innovators by Industry



Source: Thomson Reuters Derwent World Patents Index

Table 4: 2015 Top Bay Area Innovator vs. Top 100 Global Innovator Industry Comparison

Industries	Bay Area Organizations	Top 100 Global Innovator Organizations
Aerospace		1
Advanced Materials	3	
Automotive	1	10
Banking & Financial Services	1	
Biotechnology	5	
Chemicals	2	12
Computer Hardware	8	6
Computer Software	10	3
Consumer Products	1	6
Data Storage & Management	2	
Document Imagaing		3
Electrical Power	1	2
Electrical Products		6
Electronic Payments	2	
Healthcare Products		1
Industrial		6
LED Lighting Technologies	7	
Machinery		2
Media Internet & Search Navigation Systems	4	2
Medical Devices	11	2
Oil & Gas		3
Pharmaceuticals	4	7
Primary Metals		2
Renewable Energy	3	
Scientific Research	1	5
Semiconductor & Electronic Components	26	12
Social Media & Internet	1	
Telecommunication & Equipment	5	6
Transportation Equipment		3
University	2	

Source: Thomson Reuters Derwent World Patents Index

It's said that necessity is the mother of invention. Comparison of the two lists sheds light on the differing needs and innovation activity at the regional versus global level. Regionally, Silicon Valley is known for its high-tech prowess. The prevalence of semiconductor, medical device, biotech and other technology-related companies part of the Top Bay Area Innovators are evidence of this.

Conversely, innovation needs are different when you look across the planet. Industrial, Machinery, Oil & Gas, Primary Metals, and Transportation Equipment companies appear on the Top 100 Global Innovator list but not on the Bay Area one, and some sectors are much more active globally, like Automotive and Chemicals. This makes sense, as Global innovators represent the whole world, which reflects needs of both developed and developing nations. From energy to industrial products and equipment that drive development, the world as a whole has an innovation footprint that extends well beyond just high tech.

Synergies

While there are differences between the two groups of top innovators, there are also several noteworthy synergies. In addition to semiconductors being an important driver of technological advancement, both regionally and globally, we see how technology is also a strong driver for related fields, like Medical Devices, Biotechnology and Telecommunication & Equipment, among others.

The high number of Pharmaceuticals both in the Bay Area and on the Global list is indicative of the importance of this sector and the evolving role pharmas play related to precision medicine, genomics and drug repurposing. It's also proof of how medically drug-dependent humans have become. According to a recent Mayo Clinic study, nearly 70 percent of Americans take at least one prescription medication, and approximately 50 percent take two. The prospect for continued pharmaceutical growth appears to be strong.

The Bay Area is undoubtedly a key innovation hub for the US and the world. It's paving the way for high-tech advancements and leading our planet through the technological evolution of the 21st century. "California's Bay Area is the world's high tech hub, which is why our business has established an office here," said Bahman Koohestani, chief technology officer, Thomson Reuters IP & Science. "We utilized our core assets and tech platforms to shine an important light on the leading innovators in the region and their global influence."

"We utilized our core assets and tech platforms to shine an important light on the leading innovators in the region and their global influence."

Bahman Koohestani,
Chief Technology Officer,
Thomson Reuters IP & Science

Introducing the Thomson Reuters 2015 Top Bay Area Innovators

Company	Industry	Town
A9.com Inc.	Media Internet Search & Navigation Systems	Palo Alto
Abbott Cardiovascular Systems Inc.	Medical Devices	Santa Clara
Abbott Diabetes Care Inc.	Medical Devices	Alameda
Acclarent Inc.	Medical Devices	Menlo Park
Accuray Incorporated	Medical Devices	Sunnyvale
Adobe Systems Incorporated	Computer Software	San Jose
Advanced Micro Devices Inc.	Semiconductors & Electronic Components	Sunnyvale
Agilent Technologies Inc.	Medical Devices	Santa Clara
Altera Corporation	Semiconductors & Electronic Components	San Jose
Alza Corporation	Pharmaceuticals	Vacaville
Amyris Inc.	Renewable Energy	Emeryville
Analog Bits Inc.	Semiconductors & Electronic Components	Mountain View
Apple Inc.	Telecommunication & Equipment	Cupertino
Applied Materials Inc.	Semiconductors & Electronic Components	Santa Clara
Avago	Semiconductors & Electronic Components	San Jose
Avaya Inc.	Telecommunication & Equipment	Santa Clara
Bio-Rad Laboratories Inc.	Medical Devices	Hercules
Bridgelux Inc.	LED Lighting Technologies	Livermore
Brocade Communications Systems Inc.	Computer Hardware	San Jose
Chevron	Chemicals	San Ramon
Cisco Technology Inc.	Computer Hardware	San Jose
Coherent Inc.	LED Lighting Technologies	Santa Clara
Cordis Corporation	Medical Devices	Fremont
Cypress Semiconductor Corporation	Semiconductors & Electronic Components	San Jose
Danisco US Inc.	Chemicals	Palo Alto
Dolby Laboratories Licensing Corporation	Consumer Products	San Francisco
eBay Inc.	Media Internet Search & Navigation Systems	San Jose
Extreme Networks Inc.	Telecommunication & Equipment	Santa Clara
Facebook Inc.	Social Media & Internet	Menlo Park
Finisar Corporation	Telecommunication & Equipment	Sunnyvale
Genentech Inc.	Biotechnology	South San Francisco
Gilead Sciences Inc.	Biotechnology	Foster City
Google (now Alphabet Inc.)	Media Internet Search & Navigation Systems	Mountain View
Headway Technologies Inc.	Semiconductors & Electronic Components	Milpitas
Hewlett-Packard Company	Computer Hardware	Palo Alto

2015 Top Bay Area Innovators

Company	Industry	Town
Hexcel Corporation	Advanced Materials	Dublin
Ikanos Communications Inc.	Semiconductors & Electronic Components	Fremont
Immersion Corporation	Computer Software	San Jose
Infineon Technologies North America Corp.	Semiconductors & Electronic Components	Milpitas
Integrated Device Technology Inc.	Semiconductors & Electronic Components	San Jose
Intel Corporation	Semiconductors & Electronic Components	Santa Clara
Intematix Corporation	LED Lighting Technologies	Fremont
Intuitive Surgical Operations Inc.	Medical Devices	Sunnyvale
Invensense	Semiconductors & Electronic Components	San Jose
KLA Tencor	Semiconductors & Electronic Components	Milpitas
Lam Research Corporation	Semiconductors & Electronic Components	Fremont
LED Engin	LED Lighting Technologies	San Jose
Linear Technology Corporation	Semiconductors & Electronic Components	Milpitas
Livermore Software Technology Corporation	Computer Software	Livermore
LSI Corporation	Semiconductors & Electronic Components	Milpitas
Marvell Semiconductor Inc.	Semiconductors & Electronic Components	Santa Clara
Maxim Integrated Products Inc.	Semiconductors & Electronic Components	San Jose
Medtronic Vascular Inc.	Medical Devices	Santa Rosa
Micrel Inc. (pending acquisition by Microchip Technology)	Semiconductors & Electronic Components	San Jose
Nanosys Inc.	Advanced Materials	Palo Alto
NetApp (previously Network Appliance Inc.)	Data Storage & Management	Sunnyvale
O2 Micro Inc.	LED Lighting Technologies	Santa Clara
Oracle	Computer Software	Redwood City
Palo Alto Research Center	Computer Hardware	Palo Alto
Philips Lumileds Lighting Company LLC	LED Lighting Technologies	San Jose
Polycom Inc.	Telecommunication & Equipment	Pleasanton
Power Integrations Inc.	Semiconductors & Electronic Components	San Jose
Proteus Biomedical Inc.	Biotechnology	Redwood City
Qualcomm Atheros Inc.	Semiconductors & Electronic Components	San Jose
Rambus Inc.	Semiconductors & Electronic Components	Sunnyvale
Rigel Pharmaceuticals Inc.	Pharmaceuticals	South San Francisco
Roche Molecular Systems Inc.	Pharmaceuticals	Pleasanton
Rovi Technologies Corporation	Computer Software	Santa Clara
SanDisk	Data Storage & Management	Milpitas

2015 Top Bay Area Innovators

Company	Industry	Town
Seagate Technology LLC	Computer Hardware	Cupertino
Silicon Image Inc.	Semiconductors & Electronic Components	Sunnyvale
Silicon Storage Technology Inc. (now called Microchip Technology)	Semiconductors & Electronic Components	Sunnyvale
Silver Spring Networks Inc.	Electrical Power	Redwood City
Sling Media Inc.	Computer Hardware	Foster City
Solazyme Inc.	Biotechnology	South San Francisco
Solexel Inc.	Renewable Energy	Milpitas
Square Inc.	Electronic Payments	San Francisco
SRI International	Scientific Research	Menlo Park
Stanford University	University	Palo Alto
Stryker Corporation	Medical Devices	San Jose
Sun Microsystems Inc. (now Oracle)	Computer Hardware	Santa Clara
SunPower Corporation	Renewable Energy	San Jose
Symantec Corporation	Computer Software	Mountain View
Synopsys Inc.	Computer Software	Mountain View
Tela Innovations Inc.	Advanced Materials	Campbell
Tesla Motors Inc.	Automotive	Palo Alto
Tessera Inc.	Semiconductors & Electronic Components	San Jose
Theravance Inc.	Pharmaceuticals	South San Francisco
TiVo Inc.	Computer Hardware	Alviso
University of California	University	Oakland
Varian Medical Systems Inc.	Medical Devices	Palo Alto
Virage Inc.	Computer Software	San Francisco
Visa U.S.A. Inc.	Electronic Payments	San Francisco
VMware Inc.	Computer Software	Palo Alto
Wells Fargo Bank N.A.	Banking & Financial Services	San Francisco
Xicato Inc.	LED Lighting Technologies	San Jose
Xilinx Inc.	Semiconductors & Electronic Components	San Jose
XOMA Technology Ltd.	Biotechnology	Berkeley
Yahoo Inc.	Media Internet Search & Navigation Systems	Sunnyvale


REUTERS/PHILLIPPE WOJAZER

Conclusion

There's no disputing it. Innovation is a driver of economic success and patents are a proxy for innovation. Inventions can't be successfully commercialized without protecting them with patenting rights. This is why, when looking at ways to measure innovation, Thomson Reuters deemed it essential to start by looking at patent data, the foundation of the Top 100 Global Innovator methodology.

That patents drive economic success can be found in the five consecutive years the Top 100 Global Innovators have outperformed leading financial indices. Using data and analytic capabilities from the Thomson Reuters Eikon platform, analysts confirmed that the 100 leading organizations outperform the MSCI World Index in year-over-year revenue and employment figures by 6.01 and 4.09 percentage points, respectively, and in market-cap-weighted R&D spend by 1.86 percentage points. The MSCI Index is a global benchmark that comprises 23 developed-markets countries representing large and mid-cap equity performance.

Knowing the important role intellectual property (IP) rights play across the Lifecycle of Innovation, from discovery to protection and commercialization of an idea, it's no surprise that countries with stable IP infrastructures and supporting legislation are more economically successful and advanced than those without such measures. A driving force in the transition of a country from a developing nation to a knowledge economy is a strong IP system, to protect ideas generated in the region so they can be commercialized and licensed, nationally and around the world.

The juxtaposition of the Top 100 Global Innovators against the Top Bay Area Innovators in this year's analysis is additional evidence of the importance of innovation and patent protection. Not only is the Bay Area home to some of the US's and world's top technology companies and leading universities, but it also has the highest GDP per capita in America, at $74,815, ranking ahead of London at $56,997 and Singapore at $43,867.[6] San Jose, California, a Silicon Valley city, has the third highest GDP per capita in the world, at $77,440, behind only Zurich, Switzerland, and Oslo, Norway.[7]

It is no wonder that Prime Minister Shinzo Abe wants to bring the magic and mystique of the Valley back to Japan. Imagine the possibilities for his nation, already a frontrunner in Top 100 Global Innovator representation, with the additional insight and applied lessons from the Bay Area.

As 2015 draws to a close, the Top 100 Global Innovators provide a snapshot of the state of the world's innovation performance. Notable increases in chemical and pharmaceutical innovation support the growing use of chemicals and pharmaceuticals in adjacent industries, such as with cosmeceuticals in the cosmetics space, as well as the increasing dependence on prescription medication. People may be living longer, but not without various support measures that extend and improve the quality of life.

Also noteworthy is the emergence of leading, global innovators championing in new sources of energy and power for our planet. The emergence of Electrical Power companies is a first for the list, as is the evidence of Oil & Gas companies innovating outside of traditional areas on alternative fuel sources.

As we move through this century, unparalleled in its opportunities for technological advancement and breakthrough discoveries, it is essential that we take a moment to recognize and honor the organizations that are shepherding us into this fascinating time in history. Innovation knows no boundaries, it just requires a passion for "finding a better way" (as Thomas Edison would say) and the intellectual fortitude to protect inventions with the proper IP rights.

Congratulations to the Thomson Reuters 2015 Top 100 Global Innovators and the Top Bay Area Innovators! Keep on innovating!

Basil Moftah
President
Thomson Reuters IP & Science

[6] *http://www.bayareaeconomy.org/bay-area-fast-facts/*
[7] *http://www.brookings.edu/~/media/Research/Files/Reports/2015/01/22%20global%20metro%20monitor/bmpp_GMM_final.pdf*

Who We Are

The IP & Science business of Thomson Reuters is a team of 4,000 people passionate about science, innovation and improving our planet. Our detailed knowledge of intellectual property, life sciences and scholarly research, coupled with deep vertical-industry expertise, feed our genuine interest in helping our customers achieve their goals and make our world better.

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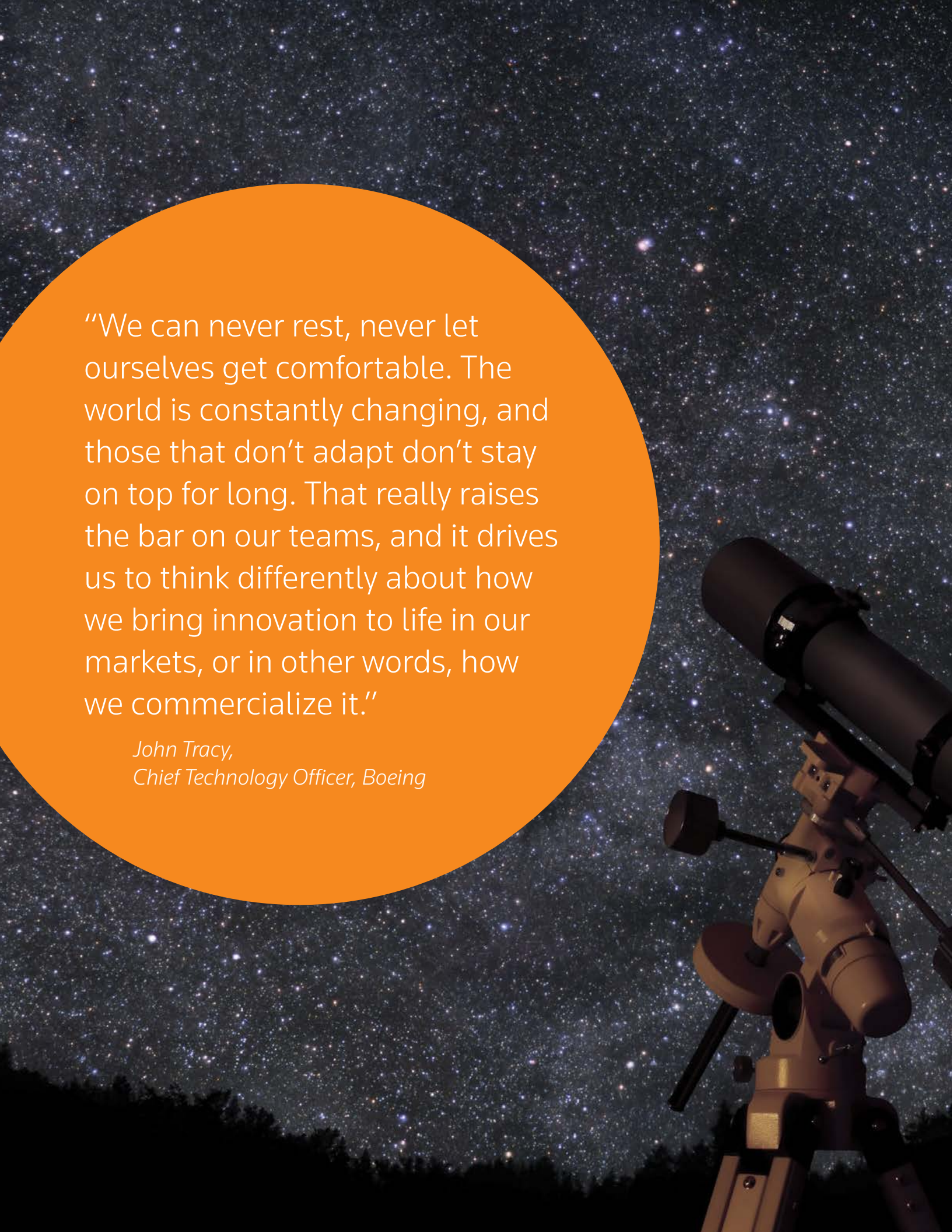
"Innovations that create groundbreaking 'value' and which can be called 'a major encounter between the market and technologies' will not come about unless the public and private sectors act in cooperation in an integrated manner."

Shinzo Abe, Prime Minister, Japan
Speech on the Growth Strategy in Japan, April 2013



"We can never rest, never let ourselves get comfortable. The world is constantly changing, and those that don't adapt don't stay on top for long. That really raises the bar on our teams, and it drives us to think differently about how we bring innovation to life in our markets, or in other words, how we commercialize it."

John Tracy,
Chief Technology Officer, Boeing

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