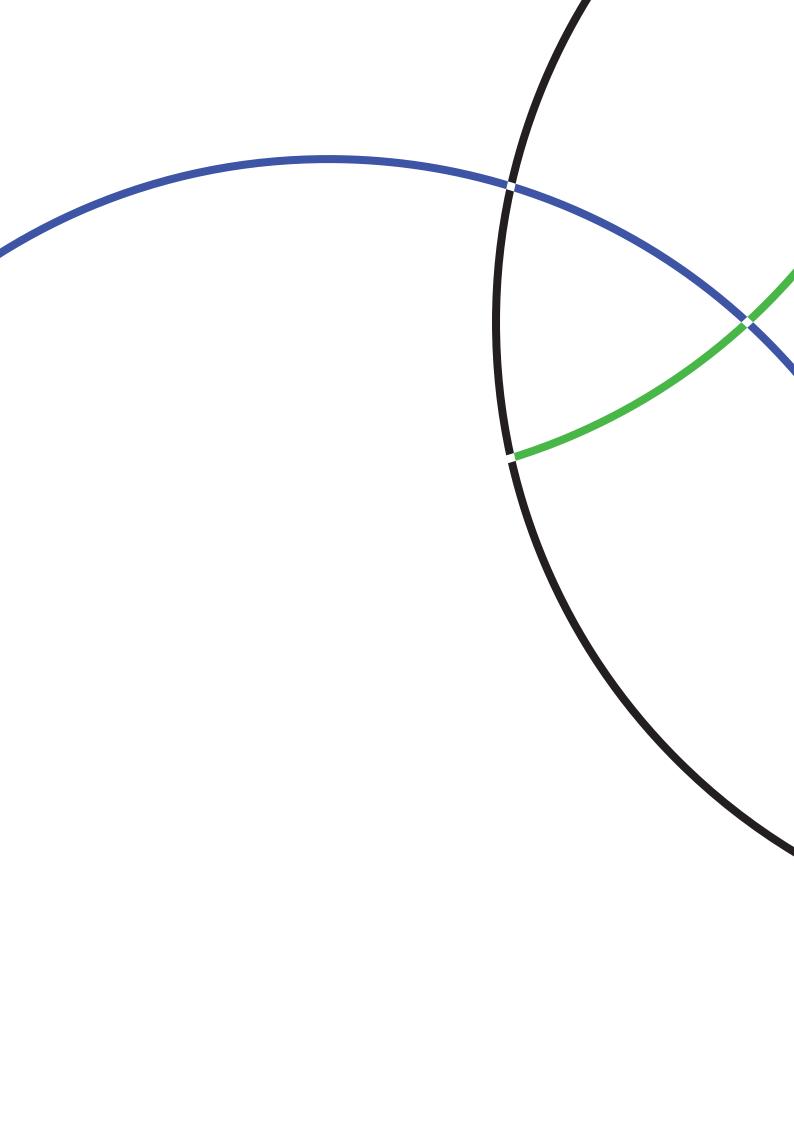


# 2016 Top 100 Global Innovators Report







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# Message from David Brown

With progress comes change. As businesses journey toward the future, they evolve and grow, and ours is no different. Following the sale to Onex Corporate and Baring Private Equity Asia, we are now Clarivate Analytics; formerly the Intellectual Property (IP) & Science business of Thomson Reuters. We believe in the power of innovation as the fundamental driver of economic well-being, competitive advantage and success. Our mission at Clarivate Analytics is to accelerate its pace.

Pinning down the specifics of how to quantify innovation often feels like a moving target. With the Top 100 Global Innovators program, now in its sixth year, we look to eliminate any ambiguity as to what makes an organization innovative and celebrate those who have made meaningful gains to usher in the next era of global innovation. The Top 100 Global Innovators methodology centers on patent volume, application-to-grant success, globalization and citation influence. It's an objective formula that identifies the companies around the world that are active in innovation through research and development (R&D), IP protection and commercialization.

The need for these metrics is paramount as the competitive landscape becomes ever more intense and organizations have an increasing need for the evidence that demonstrates a return on their investment in R&D. As the world experiences geopolitical shifts and significant economic change, the one constant that enables leaders to weather volatility is a laser focus on innovation. It helps develop competitive advantage, leading to the creation of sustainable economies that make possible societal improvements and the enhanced well-being of citizens.

The Top 100 Global Innovators spent more than \$227 billion on R&D and generated more than \$4 trillion in revenue in 2015. This is a clear example of activity that drives economic well-being and competitive advantage.

There are number of noteworthy economic and industry shifts in the Top 100 Global Innovators list and accompanying report. Whether new to the list or not, we congratulate all of the organizations that can count themselves among the 2016 Top 100 Global Innovators. Their continued commitment to innovation is certain to ensure their future success.

#### **David Brown**

Executive Vice President Clarivate Analytics



# Methodology

Patents are considered a key measure of innovation; governments, academia and industry use them to inform policy decisions, track trends and for technological and commercial intelligence purposes. However, the straight counting of the number of patents, although useful, is only part of the picture.

For a patented invention to be valuable, it must be of good quality, have a wide market and lay the foundations for further development and refinement. Therefore, in addition to counting the volume of inventions, the quality, globalization and impact of inventions should also be assessed.

The Clarivate Analytics Top 100 Global Innovators methodology analyzes patent and citation data across four main criteria: volume; success; globalization and influence. This is done using Clarivate Analytics solutions including <u>Derwent World Patents Index</u> (DWPI), <u>Thomson Innovation</u> and <u>Derwent Patent Citations Index</u> (PCI).

For a patented invention to be valuable, it must be of good quality, have a wide market and lay the foundations for further development and refinement.

Although our methodology is focused on patents, the report also provides some insight into the scientific research on which innovation is based, through the Web of Science. It also considers the additional insight available for the pharmaceutical industry with an analysis of clinical trials information from Cortellis.

#### 1. Volume

All organizations with 100 or more patented new inventions from the most recent five years are included in our analysis. A new invention is defined as the first publication of a patent document claiming a technology, drug, business process, and so forth, not previously described in prior art. In DWPI; these are called "basics." DWPI provides a record of patents published by 50 patent—issuing authorities worldwide to enable a comprehensive picture of the innovation landscape. Subsequent filings for the same invention are recorded as "equivalents" in DWPI and collated in "patent families." The analysis counts these patent families rather than individual patent documents, thereby counting unique inventions only and avoiding duplicate counts of patents that describe the same invention.

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

#### 2. Success

Not all patent applications passing through the examination process are granted. The success metric assesses the quality of innovation by measuring 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.

#### 3. Global

Protecting an invention in major world markets is an indication of the significant value a company places on its innovation and its intellectual property. The number of basic inventions that have quadrilateral patents in their patent families, according to the Clarivate Analytics Quadrilateral Patent Index, is calculated to create a ratio that shows which companies place a high value on their portfolios in major world markets. The quadrilateral patent authorities comprise the Chinese Patent Office, the European Patent Office, the Japanese Patent Office and the United States Patent & Trademark Office.

#### 4. Influence

The impact of an invention "downstream" can be determined by looking at how often it is subsequently cited by other companies in the patenting of their inventions. Through 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 Clarivate Analytics Top 100 Global Innovators list.

# **Key Findings**

The 2016 Clarivate Analytics Top 100 Global Innovators occupy the sweet spot of innovation, where pure R&D meets corporate strategy for protecting intellectual property and producing outsized growth. Together, the firms on the list generated more than \$4 trillion in revenue in 2015. That massive figure is supported by more than \$227 billion spent on R&D. Take, as examples, Samsung, that spent \$13.2 billion USD on R&D in 2015; Novartis, that spent \$9.1 billion USD; and Toyota: \$9.2 billion USD. On average, the 2016 Global Innovators invest 9.1 percent more in R&D than companies in the S&P 100 index.

Together, the firms on the list generated more than \$4 trillion in revenue in 2015. That massive figure is supported by more than \$227 billion spent on R&D.

But where and how that money was spent is at the crux of this year's report. Companies are starting to realize, some after countless litigation battles, that the quality of one's intellectual property is often the cornerstone of a successful strategy. That, along with the evolving landscape of patent legislation around the world, has led to some distinct trends outlined in our 2016 report.

#### The Shift from Quantity to Quality

Against a backdrop of increasing volume of inventions being patented over the last five years globally, the trend for many of the Top 100 Global Innovators organizations is to file fewer inventions this year.

Although patent filing has gone down across the Top 100, the patent grant rate has increased, implying that companies are seeing a correlation between the strength of their filings and the success of a grant. That's supported by an observed increase in the aggregated success metric for the Top 100 this year.

With a focus on more innovation with greater impact, driving higher citation counts, companies are beginning to realize that it's not just about having strength in numbers, but investing in the tools and processes that make those filings stand on their own.

#### **Technology Diversification**

Many of the Top 100 Global Innovators are not satisfied to limit their innovative gains strictly to their core areas of operations. We have observed a significant trend in diversification in both our winners' R&D spending and technological filing categories.

An analysis of patents published globally this year shows that the four main areas of technology innovation are as follows:

- Semiconductors & Batteries
- Transmission of Information (including wireless, television and telecommunications)
- Data Processing including Cloud Computing and E-Commerce
- Medical Devices or Preparations

Mapping the portfolios of the Top 100 Global Innovators to these technology areas shows that a significant number are involved across multiple areas. Whether it's Canon, General Electric and Hitachi investing significantly in Medical Devices patents; Google developing a self-driving car, or Amazon being actively involved in drone technology, the path to innovation for our Top 100 Global Innovators is anything but a straight line.

With the emergence of the Internet of Things (IoT), there are no longer hard and fast rules to where companies' products can play. No longer is a watch just a watch. It can be a fitness tracker, a GPS, a communicative device and more. So although the firms continue to invest with heavy R&D expenditures, it's clear that they are aware that broadening their range of protected technology could come in handy at present and in the future.

#### **Investment in Innovation**

Speaking of R&D spend, there is a positive correlation between R&D spend and those firms listed within the Top 100. The 2016 Global Innovators invest, on average, 9.1 percent more in R&D than organizations on the S&P 100 list. These firms totaled a massive \$4 trillion revenue. It's a logical finding at its core. Companies with more cutting edge, innovative products often generate more sales. But for whatever reason, some firms around the globe have not been able to make the connection, instead choosing to rest on their laurels and under-deliver for their stakeholders. Not the companies on the Top 100 Global Innovators list, that are among some of the bigger global successes the world has to offer.



Eight organizations appear on the roster for the first time this year, including some notable examples.

Nokia defined the mobile industry for nearly a decade, and their signature ring-tone still evokes memories. This was just before the smartphone revolution. The company took too long to embrace the smartphone trend and made errors in strategy. Their appearance on the Top 100 list this year shows how they are now embracing innovation to secure the future for their company.

The University of California is the world's leading public research university system. As a newly recognized Top 100 Global Innovator with more than 3,000 patented inventions 2011-2015, this is testament to the power of innovation in translating research into developing practical solutions to existing problems.

#### Globalization

Never before has the global innovation landscape been more interconnected. For example, while the United States recently began to feel a meaningful impact of the America Invents Act — patent legislation written into law under President Barack Obama's administration, which changed the US patenting rules to a first-to-file system

— the standing of the US on this list has increased. Meanwhile, the UK government has confirmed it will proceed with preparations to ratify the European Unified Patent Court Agreement and continue with preparations to establish the Unitary Patent and Unified Patent Court (UPC) even after the country's vote that led to their 'Brexit' from the EU. Under the new system, businesses will be able to protect and enforce their patent rights across Europe in a more streamlined way, lending credence to a potential innovative shift, eventually making its way back across the Atlantic.

It's a point of great intrigue as we move into 2017. With the EU still feeling the ripples of an expected Brexit, and the plans of the 45th US President becoming clearer, the sweeping implications of 2016 have yet to be fully felt. What is clear, though, is that what affects one country will affect the other, as the world of innovation has never been smaller.



# 2016 Top 100 Global Innovators Alphabetical List

Organization	Country	Industry	Previous Winners
3M Company	USA	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Abbott Laboratories	USA	Pharmaceuticals	2013, 2014, 2015
Advanced Micro Devices	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Air Products	USA	Chemicals & Cosmetics	2013, 2015
Aisin Seiki	Japan	Automotive	2014, 2015
Alstom	France	Oil, Gas & Energy	2015
Amazon	USA	Software	2015
Analog Devices	USA	Hardware & Electronics	2011, 2012, 2013, 2015
Apple	USA	Telecommunications	2011, 2012, 2013, 2014, 2015
Arkema	France	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
BASF	Germany	Chemicals & Cosmetics	2011, 2014, 2015
Bayer	Germany	Pharmaceuticals	2011, 2015
Becton Dickinson	USA	Manufacturing & Medical	2015
Boeing	USA	Aerospace & Defense	2011, 2012, 2013, 2014, 2015
Boston Scientific	USA	Manufacturing & Medical	
Bridgestone	Japan	Automotive	2015
Bristol-Myers Squibb	USA	Pharmaceuticals	2011, 2015
Broadcom (previously Avago Technologies)	USA	Hardware & Electronics	2011,2012, 2013, 2014, 2015
Canon	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Chevron	USA	Oil, Gas & Energy	2011, 2012, 2013, 2015
CNRS, The French National Center for Scientific Research	France	Institution & Government Research	2011, 2012, 2013, 2014, 2015

Organization	Country	Industry	Previous Winners
Commissariat à l'Energie Atomique	France	Institution & Government Research	2011, 2012, 2013, 2014, 2015
Corning	USA	Hardware & Electronics	2011, 2012, 2013, 2014
Daikin Industries	Japan	Manufacturing & Medical	2011, 2014, 2015
Delphi	USA	Automotive	2013, 2012
Dolby Laboratories	USA	Hardware & Electronics	
Dow Chemical Company	USA	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
DuPont	USA	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Emerson Electric	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Ericsson	Sweden	Telecommunications	2011, 2012, 2013, 2014, 2015
Exxon Mobil	USA	Oil, Gas & Energy	2011, 2012, 2013, 2015
Fraunhofer	Germany	Institution & Government Research	2013, 2014, 2015
Fujifilm	Japan	Hardware & Electronics	2012, 2013, 2014, 2015
Fujitsu	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
General Electric	USA	Household Goods	2011, 2012, 2013, 2014, 2015
Google (now Alphabet Inc.)	USA	Software	2012, 2013, 2014, 2015
Hitachi	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Honda Motor	Japan	Automotive	2011, 2012, 2013, 2014, 2015
Honeywell International	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Huawei	China	Telecommunications	2014
IFP Energies Nouvelles	France	Institution & Government Research	2011, 2012, 2013, 2014, 2015
Intel	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015

Organization	Country	Industry	Previous Winners
InterDigital	USA	Telecommunications	2015
Johnson & Johnson	USA	Pharmaceuticals	2013, 2014, 2015
Johnson Controls	USA	Manufacturing & Medical	2015
JTEKT	Japan	Automotive	2015
Kawasaki Heavy Industries	Japan	Manufacturing & Medical	2015
Kobe Steel	Japan	Manufacturing & Medical	2014, 2015
Komatsu	Japan	Manufacturing & Medical	2014, 2015
Kyocera	Japan	Hardware & Electronics	2014, 2015
LG Electronics	S Korea	Household Goods	2011, 2012, 2013, 2014, 2015
Lockheed Martin	USA	Aerospace & Defense	2012, 2013, 2014, 2015
LSIS	S Korea	Oil, Gas & Energy	2011, 2012, 2013, 2014, 2015
Makita Corporation	Japan	Manufacturing & Medical	2015
Marvell	USA	Hardware & Electronics	2012, 2013, 2014, 2015
MediaTek	Taiwan	Hardware & Electronics	2014, 2015
Medtronic	Ireland	Manufacturing & Medical	2014, 2015
Merck	Germany	Pharmaceuticals	
Micron	USA	Hardware & Electronics	2012, 2013, 2014, 2015
Microsoft	USA	Software	2011, 2012, 2013, 2014, 2015
Mitsubishi Heavy Industries	Japan	Manufacturing & Medical	2012, 2013, 2014, 2015
NEC	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Nike	USA	Household Goods	2012, 2013, 2014, 2015
Nippon Steel & Sumitomo Metal	Japan	Manufacturing & Medical	2012, 2013, 2014, 2015
Nissan Motor	Japan	Automotive	2013, 2014, 2015

Organization	Country	Industry	Previous Winners
Nitto Denko	Japan	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Nokia	Finland	Telecommunications	
Novartis	Switzerland	Pharmaceuticals	2014, 2015
NTT	Japan	Telecommunications	2011, 2012, 2013, 2014, 2015
NXP Semiconductors	Netherlands	Hardware & Electronics	
Olympus	Japan	Manufacturing & Medical	2011, 2012, 2013, 2014, 2015
Omron	Japan	Hardware & Electronics	2013
Oracle	USA	Software	2013, 2014, 2015
Panasonic	Japan	Household Goods	2011, 2012, 2013, 2014, 2015
Philips	Netherlands	Hardware & Electronics	2011, 2013, 2014, 2015
Qualcomm	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Renesas	Japan	Hardware & Electronics	
Roche	Switzerland	Pharmaceuticals	2011,2012,2013, 2014, 2015
Safran	France	Aerospace & Defense	2013, 2014, 2015
Saint-Gobain	France	Manufacturing & Medical	2011, 2012, 2013, 2014, 2015
Samsung Electronics	S Korea	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Seagate	USA	Hardware & Electronics	2012, 2013, 2014, 2015
Seiko Epson	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Shin-Etsu Chemical	Japan	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Showa Denko	Japan	Chemicals & Cosmetics	2015
Sony	Japan	Household Goods	2011, 2012, 2013, 2014, 2015

Organization	Country	Industry	Previous Winners
Sumitomo Electric	Japan	Manufacturing & Medical	2011, 2013, 2014, 2015
Symantec	USA	Software	2011, 2012, 2013, 2014, 2015
TE Connectivity	Switzerland	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Thales	France	Aerospace & Defense	2012, 2013, 2015
Toshiba	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Total S.A.	France	Oil, Gas & Energy	
Toyota Motor	Japan	Automotive	2011, 2012, 2013, 2014, 2015
University of California	USA	Institution & Government Research	
Valeo	France	Automotive	2012, 2013, 2015
Xerox	USA	Hardware & Electronics	2011, 2012, 2013, 2014
Xilinx	USA	Hardware & Electronics	2012, 2013, 2014, 2015
Yamaha	Japan	Household Goods	2011, 2014, 2015
Yaskawa Electric	Japan	Manufacturing & Medical	2015
Yazaki	Japan	Automotive	2015

# 2016 Top 100 Global Innovators Sorted by Sector

Organization	Country	Industry	Previous Winners
Boeing	USA	Aerospace & Defense	2011, 2012, 2013, 2014, 2015
Lockheed Martin	USA	Aerospace & Defense	2012, 2013, 2014, 2015
Safran	France	Aerospace & Defense	2013, 2014, 2015
Thales	France	Aerospace & Defense	2012, 2013, 2015
Aisin Seiki	Japan	Automotive	2014, 2015
Bridgestone	Japan	Automotive	2015
Delphi	USA	Automotive	2013, 2012
Honda Motor	Japan	Automotive	2011, 2012, 2013, 2014, 2015
JTEKT	Japan	Automotive	2015
Nissan Motor	Japan	Automotive	2013, 2014, 2015
Toyota Motor	Japan	Automotive	2011, 2012, 2013, 2014, 2015
Valeo	France	Automotive	2012, 2013, 2015
Yazaki	Japan	Automotive	2015
3M Company	USA	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Air Products	USA	Chemicals & Cosmetics	2013, 2015
Arkema	France	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
BASF	Germany	Chemicals & Cosmetics	2011, 2014, 2015
Dow Chemical Company	USA	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
DuPont	USA	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Nitto Denko	Japan	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015
Shin-Etsu Chemical	Japan	Chemicals & Cosmetics	2011, 2012, 2013, 2014, 2015

Organization	Country	Industry	Previous Winners
Showa Denko	Japan	Chemicals & Cosmetics	2015
Advanced Micro Devices	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Analog Devices	USA	Hardware & Electronics	2011, 2012, 2013, 2015
Broadcom (formerly Avago Technologies)	USA	Hardware & Electronics	2011,2012, 2013, 2014, 2015
Canon	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Corning	USA	Hardware & Electronics	2011, 2012, 2013, 2014
Dolby Laboratories	USA	Hardware & Electronics	
Emerson Electric	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Fujifilm	Japan	Hardware & Electronics	2012, 2013, 2014, 2015
Fujitsu	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Hitachi	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Honeywell International	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Intel	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Kyocera	Japan	Hardware & Electronics	2014, 2015
Marvell	USA	Hardware & Electronics	2012, 2013, 2014, 2015
MediaTek	Taiwan	Hardware & Electronics	2014, 2015
Micron	USA	Hardware & Electronics	2012, 2013, 2014, 2015
NEC	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
NXP Semiconductors	Netherlands	Hardware & Electronics	
Omron	Japan	Hardware & Electronics	2013

Organization	Country	Industry	Previous Winners
Philips	Netherlands	Hardware & Electronics	2011, 2013, 2014, 2015
Qualcomm	USA	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Renesas	Japan	Hardware & Electronics	
Samsung Electronics	S Korea	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Seagate	USA	Hardware & Electronics	2012, 2013, 2014, 2015
Seiko Epson	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
TE Connectivity	Switzerland	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Toshiba	Japan	Hardware & Electronics	2011, 2012, 2013, 2014, 2015
Xerox	USA	Hardware & Electronics	2011, 2012, 2013, 2014
Xilinx	USA	Hardware & Electronics	2012, 2013, 2014, 2015
General Electric	USA	Household Goods	2011, 2012, 2013, 2014, 2015
LG Electronics	S Korea	Household Goods	2011, 2012, 2013, 2014, 2015
Nike	USA	Household Goods	2012, 2013, 2014, 2015
Panasonic	Japan	Household Goods	2011, 2012, 2013, 2014, 2015
Sony	Japan	Household Goods	2011, 2012, 2013, 2014, 2015
Yamaha	Japan	Household Goods	2011, 2014, 2015
CNRS, The French National Center for Scientific Research	France	Institution & Government Research	2011, 2012, 2013, 2014, 2015
Commissariat à l'Energie Atomique	France	Institution & Government Research	2011, 2012, 2013, 2014, 2015
Fraunhofer	Germany	Institution & Government Research	2013, 2014, 2015
IFP Energies Nouvelles	France	Institution & Government Research	2011, 2012, 2013, 2014, 2015

Organization	Country	Industry	Previous Winners
University of California	USA	Institution & Government Research	
Becton Dickinson	USA	Manufacturing & Medical	2015
Boston Scientific	USA	Manufacturing & Medical	
Daikin Industries	Japan	Manufacturing & Medical	2011, 2014, 2015
Johnson Controls	USA	Manufacturing & Medical	2015
Kawasaki Heavy Industries	Japan	Manufacturing & Medical	2015
Kobe Steel	Japan	Manufacturing & Medical	2014, 2015
Komatsu	Japan	Manufacturing & Medical	2014, 2015
Makita Corporation	Japan	Manufacturing & Medical	2015
Medtronic	Ireland	Manufacturing & Medical	2014, 2015
Mitsubishi Heavy Industries	Japan	Manufacturing & Medical	2012, 2013, 2014, 2015
Nippon Steel & Sumitomo Metal	Japan	Manufacturing & Medical	2012, 2013, 2014, 2015
Olympus	Japan	Manufacturing & Medical	2011, 2012, 2013, 2014, 2015
Saint-Gobain	France	Manufacturing & Medical	2011, 2012, 2013, 2014, 2015
Sumitomo Electric	Japan	Manufacturing & Medical	2011, 2013, 2014, 2015
Yaskawa Electric	Japan	Manufacturing & Medical	2015
Alstom	France	Oil, Gas & Energy	2015
Chevron	USA	Oil, Gas & Energy	2011, 2012, 2013, 2015
Exxon Mobil	USA	Oil, Gas & Energy	2011, 2012, 2013, 2015
LSIS	S Korea	Oil, Gas & Energy	2011, 2012, 2013, 2014, 2015
Total S.A.	France	Oil, Gas & Energy	
Abbott Laboratories	USA	Pharmaceuticals	2013, 2014, 2015
Bayer	Germany	Pharmaceuticals	2011, 2015

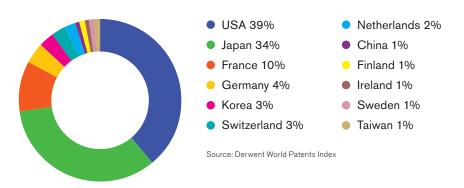
Organization	Country	Industry	Previous Winners
Bristol-Myers Squibb	USA	Pharmaceuticals	2011, 2015
Johnson & Johnson	USA	Pharmaceuticals	2013, 2014, 2015
Merck	Germany	Pharmaceuticals	
Novartis	Switzerland	Pharmaceuticals	2014, 2015
Roche	Switzerland	Pharmaceuticals	2011,2012,2013, 2014, 2015
Amazon	USA	Software	2015
Google (now Alphabet Inc.)	USA	Software	2012, 2013, 2014, 2015
Microsoft	USA	Software	2011, 2012, 2013, 2014, 2015
Oracle	USA	Software	2013, 2014, 2015
Symantec	USA	Software	2011, 2012, 2013, 2014, 2015
Apple	USA	Telecommunications	2011, 2012, 2013, 2014, 2015
Ericsson	Sweden	Telecommunications	2011, 2012, 2013, 2014, 2015
Huawei	China	Telecommunications	2014
InterDigital	USA	Telecommunications	2015
Nokia	Finland	Telecommunications	
NTT	Japan	Telecommunications	2011, 2012, 2013, 2014, 2015

# Geographic Breakout

#### Global

The 2016 Clarivate Analytics Top 100 Global Innovators are from three continents and comprise 12 countries. Just two countries account for 73 percent of the list — Japan and the US — making them the major innovation hubs of the world. The perennial countries of France, Germany, South Korea, Netherlands, Sweden, Switzerland, Ireland and Taiwan are joined this year by mainland China for the second time and Finland for the first.

Figure 1: Composition of the 2016 Top 100 Global Innovators



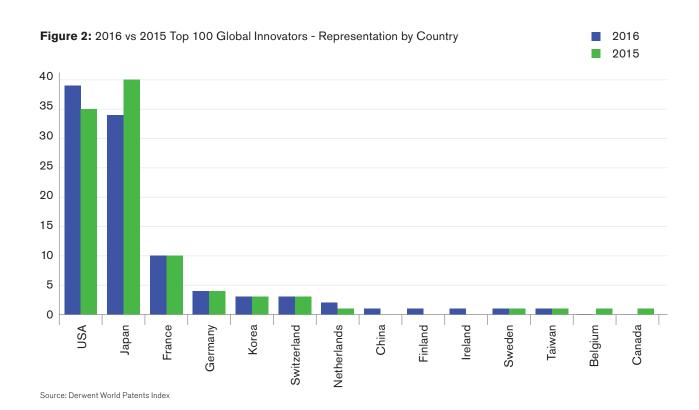


Table 1: 2016 vs 2015 Top 100 Global Innovators - Change in Representation by Country

Country	2016	2015	%Change
USA	39	35	14
Japan	34	40	-15
France	10	10	0
Germany	4	4	0
S Korea	3	3	0
Switzerland	3	3	0
Netherlands	2	1	100
China	1	0	100
Finland	1	0	100
Ireland	1	0	100
Sweden	1	1	0
Taiwan	1	1	0
Belgium	0	1	-100
Canada	0	1	-100

Just two countries account for 73 percent of the list — Japan and the US — making them the major innovation hubs of the world.

#### **North America**

This year sees a significant shift back from East to West with North America tying for top slot with Asia (39 companies apiece). North America last took the leading role in 2013.

North American representation of the 2016 Top 100 Global Innovators comprises solely US companies with the loss of the Canadian company BlackBerry from the list this year.

Thirty-four of the 39 companies from the United States remain the same, including last year's list debutantes Amazon, InterDigital and Johnson Controls. The three new entrants this year are Boston Scientific, Dolby Laboratories and University of California.

North American representation of the 2016 Top 100 Global Innovators comprises solely US companies with the loss of the Canadian company BlackBerry from the list this year.

#### **Asia**

Although Asia is no longer the regional frontrunner in terms of innovation activity, Japan is still highly represented with 34 companies on the 2016 list (compared with 40 in 2015). South Korea and Taiwan continue to feature with the same representation as last year (three firms and one firm, respectively).

Mainland China makes a reappearance this year with Huawei again making the list following its debut appearance in 2014. Huawei showed significantly improved performance in globalization, which accords with its strategy to develop a "global response to global needs."

#### **Europe**

Europe's share of the Top 100 grew one percent over 2015 with 22 representatives this year compared with 21 last year.

Its country distribution has remained quite stable with some notable exceptions. France maintained its leadership in Europe with 10 representatives again this year, whereas Germany, Switzerland, Sweden and Ireland also stayed consistent with four, three and one companies on the list, respectively.

Belgium dropped off the list with the loss of Solvay. However, the Netherlands saw a doubling of their representation with the addition of NXP Semiconductors and Finland makes its first appearance with the newly honored Nokia.

Figure 4 shows the regional contribution of each country.

 $<sup>{}^{1}\</sup>hbox{``Huawe''s Global Strategy (updated)''} available at \hbox{\ http://english.ckgsb.edu.cn/case\_content/huaweis-global-strategy-updated}$ 

Figure 3: Asian Representation Compared to Rest of World for the 2016 Top 100 Global Innovators

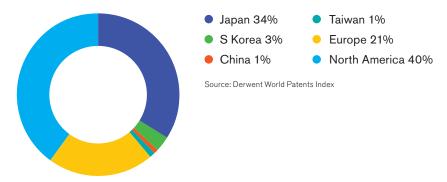
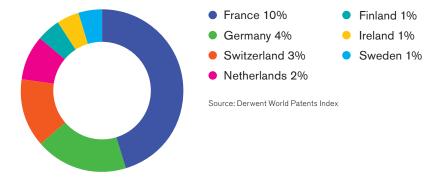


Figure 4: European Representation of the 2016 Top 100 Global Innovators



## Industry Breakout

Industry classification of the Top 100 Global Innovators has been re-drawn this year to allow broader comparison between sectors. Comparisons with previous years are based on this year's reclassification as shown in Table 2.

A strong measure of stability is seen in the industry year-on-year comparison. Hardware & Electronics saw the biggest change from 25 to 29 representatives in 2016.

The 22 Top innovators in this sector who were recognized in both 2015 and 2016 are joined this year by newcomers Corning, Dolby Laboratories, Omron, Renesas and Xerox. One organization from last year dropped off the list (Casio) due to a drop in globalization performance this year.

The remaining changes are accounted for by merger and acquisition activity. Newcomer NXP Semiconductors acquired last year's awardee Freescale Semiconductor in December 2015. Avago acquired Broadcom Corp. this year and the combined entity is now called Broadcom Ltd.

The growth in representation of the Hardware & Electronics sector reflects the ubiquitous and growing influence of semiconductors and computing hardware across wide areas of activity including automation, displays, entertainment

systems, intelligent transportation and many more besides. The fourth industrial revolution is in many ways being driven by advancements in this sector, and a computer in every device is at the heart of the developing Internet of Things.

Longer term, Hardware & Electronics showed strong growth peaking in 2014 at 39 percent, but dropping back in 2015 to its lowest level of 25 percent.

This year sees a recovery to near former levels.

Pharmaceuticals, Automotive and Oil, Gas & Energy sectors have shown steady growth in representation on the Top 100 Global Innovators list over time. This is consistent with developments in ever more sophisticated automobiles, the focus on innovation as a means to address the challenges in the Pharmaceutical sector, and improvements in solutions to address global energy needs.

Figure 5: Industry Representation of Top 100 Global Innovators

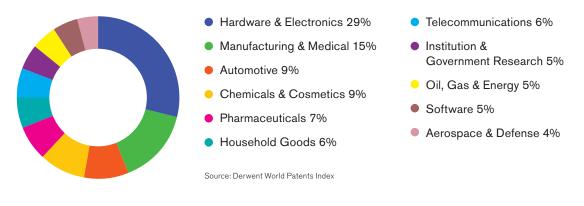


Table 2: 2016 vs 2015 Industry Comparison of Top 100 Global Innovators

Industry	2016	2015	%Change
Hardware & Electronics	29	25	16
Manufacturing & Medical	15	15	0
Automotive	9	9	0
Chemicals & Cosmetics	9	12	-25
Pharmaceuticals	7	7	0
Household Goods	6	7	-14
Telecommunications	6	6	0
Institution & Government Research	5	5	0
Oil, Gas & Energy	5	5	0
Software	5	5	0
Aerospace & Defense	4	4	0

Source: Derwent World Patents Index

 Table 3: Top 100 Global Innovators Industry Representation Comparison (2011–2016)

Industry	2016%	2015%	2014%	2013%	2012%	2011%
Aerospace & Defense	4	4	4	6	9	8
Automotive	9	9	6	8	6	3
Chemicals & Cosmetics	9	12	6	6	8	13
Hardware & Electronics	29	25	39	38	37	31
Household Goods	6	7	7	7	6	9
Institution & Government Research	5	5	6	4	9	3
Manufacturing & Medical	15	15	17	15	14	18
Oil, Gas & Energy	5	5	0	2	1	2
Pharmaceuticals	7	7	4	3	1	2
Software	5	5	4	4	2	4
Telecommunications	6	6	7	7	7	7
	100	100	100	100	100	100



# Pharmaceutical Industry

The pharmaceutical industry has been faced with significant challenges over the last few decades with declining revenues, increased price pressures and constant regulatory changes. These challenges have led companies in this sector to look increasingly to innovation as a means to improve productivity and commercial returns.

The success of this approach can be seen when we look at the representation of the Pharmaceutical sector in the Top 100 Global Innovators list over the last six years.

We see a steady climb in numbers from one or two percent to seven percent this year and last. This reflects the increasing innovation and productivity shown by the industry in recent years.

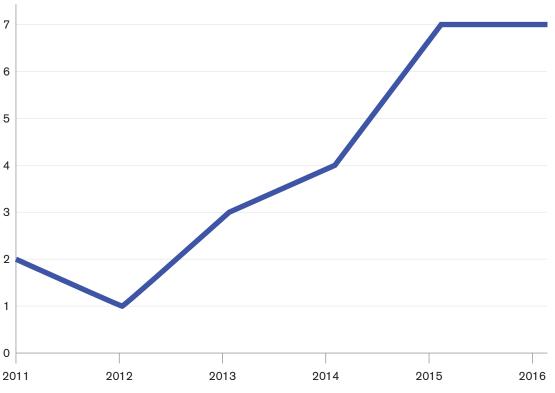
Challenges have led companies in this sector to look increasingly to innovation as a means to improve productivity and commercial returns.

Table 4: Pharmaceutical sector organizations

Country	Region
USA	North America
Germany	Europe
USA	North America
USA	North America
Germany	Europe
Switzerland	Europe
Switzerland	Europe
	USA Germany USA USA Germany Switzerland

Source: Derwent World Patents Index

Figure 6: Pharmaceuticals sector as a proportion of the Top 100 Global Innovators



Source: Derwent World Patents Index

Analysis by therapeutic indication of their recent inventions first published in 2016 shows an emphasis on cancer, followed by Central Nervous System (CNS) and Inflammation:

Merck, Roche and Novartis account for 50% of inventions relating to cancer treatment in 2016.

Patent activity is an integral part of the Drug Discovery process and protects innovative companies by allowing them a chance to recoup their investment in the research and development of innovative medicine, which can cost over \$3 billion USD for each drug launch.

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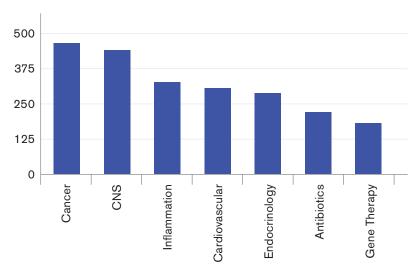
Measuring patent activity as a surrogate for innovation highlights the creative and fascinating research being performed by large pharma companies. Generally, protection for all newly developed treatments will be sought with patents. However, only the most promising candidates will go forward to clinical trials. By considering additional indicators specific to the Pharma sector like the status of active clinical trials, we may gain insight into how patented innovation is translating to the treatments of tomorrow for the diseases of today.

Table 5 shows the number of ongoing clinical trials for oncology for the Top 100 Global Innovators Pharma companies. Three of these (Novartis, Roche and BMS) are in the Top 10 of all pharma companies with active clinical trials in oncology. The two major companies (Merck and BMS) generating the most exciting news in arguably the most innovative field of immuno-oncology are also in the list of Top Innovators in Pharmaceuticals.

Examples of new approaches to combating cancer being developed by the companies representing the pharmaceutical sector include:

- Abbott Labs: Method to induce tumorspecific immunological memory in cancer by administering anti-cytotoxic T-lymphocyte antigen 4 inhibitor and ibrutinib (WO2016161347)
- Bayer: Development of new substituted aminoisoxazole-carboxylic acid amide compounds which act as mitotic checkpoint serine/threonineprotein kinase inhibitors to treat uncontrolled cell growth, proliferation and/or survival, and hematological tumor (EP2977377)
- Bristol-Myers Squibb: New isolated antibody that competes for binding to human T cell immunoreceptor with immunoglobulin (Ig) and ITIM domains (TIGIT) for treating cancer (US20160176963)
- Johnson & Johnson: Method for treating acute myeloid leukemia (AML) by administering anti-cluster of differentiation (CD)-38 antibody (WO2016089960)
- Merck: Treatment of colorectal cancer and/or metastases in subject involves administering subject with at least one pan alpha-v integrin inhibitor, where subject is characterized by high levels of one or more proteins in body fluid of subject (WO2016041614A1). The treatment is described as a new strategy applicable to systemic treatment, and should lower the dose and/or increase the efficiency of the cancer therapeutic agents to be applied.
- Novartis: New substituted 3-amino-N-(3-(4-amino-4-(methoxymethyl)piperidin-1-yl)pyridin-2-yl)-6-substituted-pyrazine-2-carboxamide compounds used to treat disease or disorder associated with protein kinase C (PKC) such as uveal melanoma or diffuse large B-cell lymphoma (DLBCL) (WO2016020864). The compounds are described as having improved efficacy at lower dosage amounts to achieve tumor regression, improved potency, pharmacokinetic profile, absorption, gastrointestinal tolerance and kinase selectivity.
- Roche: New composition containing estrogen receptor (ER) modulator compound, for treating ER-related disease or disorder, such as breast cancer, lung cancer, ovarian cancer, endometrial cancer, and prostate cancer (US20160304450). The ER modulator compounds may offer improved therapeutic activity characterized by complete or longer-lasting tumor regression, a lower incidence or rate of development of resistance to treatment, and/or a reduction in tumor invasiveness.

Figure 7: Pharmaceutical sector volume of inventions in 2016 by indication



Source: Derwent World Patents Index

Figure 8: Volume of inventions in 2016 relating to cancer treatment

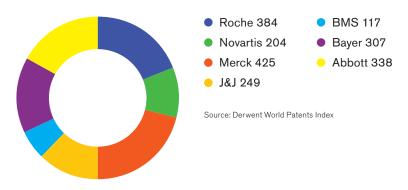
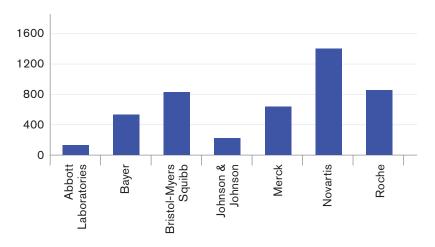


Table 5: Ongoing Clinical Trials numbers for Pharmaceutical sector organizations



Source: Cortellis for Clinical Trials Intelligence (CTI) Clarivate Analytics

### Automotive

The automotive sector has nine representatives from the Top 100. Of these, the majority are from Asia (7), with the remaining two from North America and Europe (one each). Delphi makes a re-appearance for the first time this year since 2013. Both Honda and Toyota have now appeared in the Top 100 for six years running. Toyota holds the largest portfolio with more than 36,000 inventions published 2011-2015 followed by Honda (15,200) and Nissan (8,000).

Activity from the Top 100 Automotive sector grew steadily from around 16,500 inventions per year in 2011 to more than 18,300 in 2014, but dropped back to around 15,100 in 2015.

Strongest growth was seen from Nissan for 2011–2015, growing from just over 1,000 inventions in 2011 to 1,800 in 2015. Toyota and Honda both dropped over the same period from 7,500 in 2011 to 6,400 in 2015 and from 3,600 in 2011 to 2,600 in 2015 respectively.

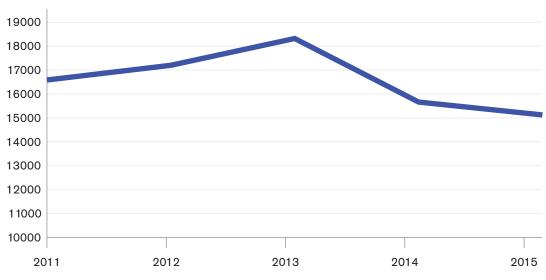
Activity from the Top 100
Automotive sector grew
steadily from around 16,500
inventions per year in 2011 to more
than 18,300 in 2014, but dropped
back to around 15,100 in 2015.

Table 6: Automotive sector organizations

Company	Country	Region
Aisin Seiki	Japan	Asia
Bridgestone	Japan	Asia
Delphi	USA	North America
Honda Motor	Japan	Asia
JTEKT	Japan	Asia
Nissan Motor	Japan	Asia
Toyota Motor	Japan	Asia
Valeo	France	Europe
Yazaki	Japan	Asia

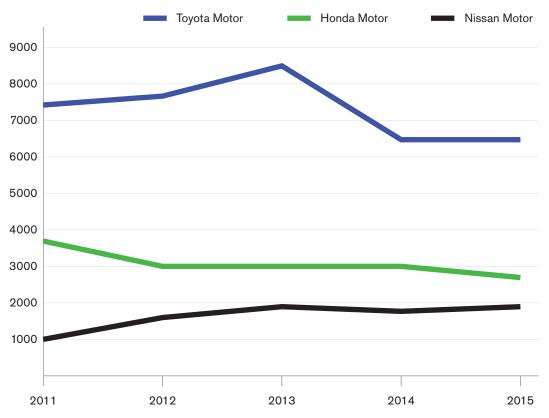
Source: Derwent World Patents Index

Figure 9: Total number of inventions by Top 100 automotive sector representatives 2011-2015



Source: Derwent World Patents Index

Figure 10: Volume of inventions from motor manufacturers 2011-2015



Source: Derwent World Patents Index

Computing and transistors play a role in the portfolios of the three major motor manufacturers in the Top 100, which is in line with increasing emphasis on the use of these technologies in vehicles. Examples include:

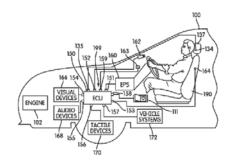
- Honda: Method of controlling vehicle system such as antilock brake system, which involves modifying control of several vehicle systems according to level of driver drowsiness (US20120212353)
- Nissan: Vehicle user interface system, which controls availability of system operations for performance by user-interface system based on selected policy setting (US20120109451).
   This is cited by 27 later published inventions.
- Toyota: Method of updating the electronic control unit (ECU) of a vehicle which involves sending update information from an update server to data communication module of the vehicle through a cellular network (US20110320089)

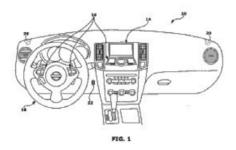
The geographical coverage of patents intended to protect the innovation of the Top 100 companies in the automotive sector reflects the global nature of the industry.

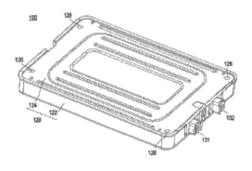
Patent documents for a single invention from around the world are gathered together into the patent family. The size of the patent family indicates the value and global reach of an invention. The geographical coverage of patents intended to protect the innovation of the Top 100 companies in the automotive sector reflects the global nature of the industry. JTEKT heads with an average family size of 5.7 patent publications per invention, followed by Nissan and Honda (3.0 each)

Nissan holds the largest individual patent family with 31 members, followed by Honda with 29 members.

The Nissan invention with 31 members is for a lithium ion secondary battery where the electrolytic solution in the stacked electrode assembly is replenished easily, and fractures are prevented so the performance of the battery is maintained effectively (WO2012066863).









## Institution & Government Research

There is a growing recognition by governments of the power of innovation to drive economies. At the same time, within academia, there are growing pressures on funding and an increased need to realize commercial returns on investment in knowledge and innovation.

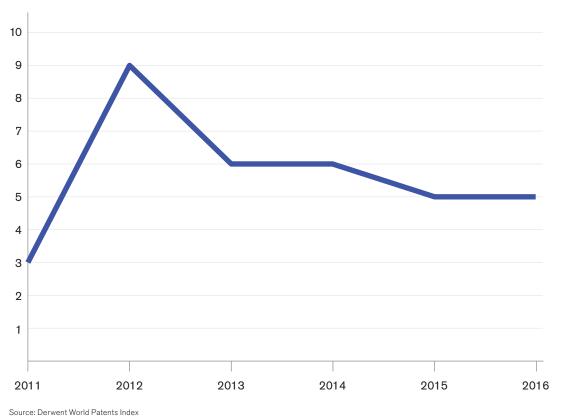
More and more this means aligning activities to address unsolved problems and develop innovative solutions to unmet needs. This in turn means extending the reach of the institute across the lifecycle of innovation to move beyond just discovery to increasing involvement in protection and commercialization phases.

These factors are behind the enduring presence of government and academic institutes in the Top 100 Global Innovators list over the last six years:

Representation of the Top 100 by the Institution & Government Research sector has stabilized at 5 to 6 percent following a peak of 9 percent in 2012.

There is a growing recognition by governments of the power of innovation to drive economies.

Figure 11: Institution & Government Research sector as a proportion of the Top 100 Global Innovators



Source. Derwent Wond Fatents index

Table 7: Institution & Government research sector organizations

Company	Country	Region	
CEA	France	Europe	
CNRS	France	Europe	
Fraunhofer	Germany	Europe	
IFP	France	Europe	
University of California	USA	North America	

CEA holds the largest portfolio with 3,398 inventions published 2011-2015, followed by the University of California (3,056), CNRS (3,041), Fraunhofer (2,864) and IFP (908).

Activity from the Top 5 Global Innovators Institution & Government Research grew steadily from 2,500 inventions per year in 2011 to more than 2,800 in 2014, but dropped back to around 2,750 in 2015.

All institutes showed growth from 2011–2015, except the University of California which dropped off from more than 700 inventions in 2014 to just over 550 inventions in 2015.

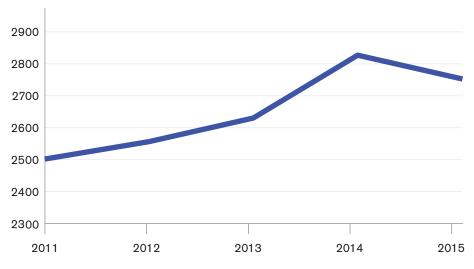
However, this did not prevent University of California making it into the Top 100 for the first time since the inception of the program. This is because, although at a lower level, University of California's innovation has been significantly more successful and global than in previous years (success metric is 9.4 percent higher and globalization metric is 6.6 percent higher than last year).

One of the key ways of realizing a commercial return on scientific discovery is through collaboration with partners who can bring complementary skills and experience to the table to help develop practical applications for new ideas. As shown in Figure 13, which looks at internationally co-authored scientific papers, the University of California has been steadily increasing its degree of international collaboration over time. The rewards of this approach are evident in the recognition of the University of California as a 2016 Top 100 Global Innovator for the first time.

Since 1980, the University of California's annual percentage of papers reflecting international collaboration has risen steadily, surpassing both the national and global baselines.

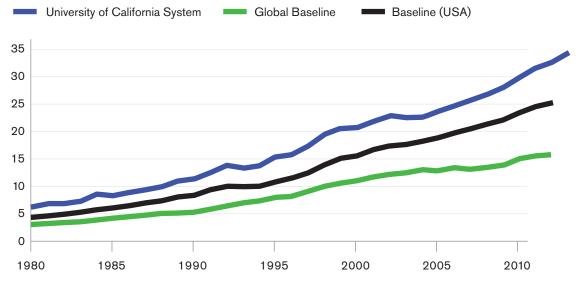
Activity from the Top 5
Global Innovators Institution
& Government Research grew
steadily from 2,500 inventions
per year in 2011 to more than
2,800 in 2014, but dropped
back to around 2,750 in 2015.

**Figure 12:** Total number of inventions by Top 100 Institution & Government research sector representatives 2011-2015



Source: Derwent World Patents Index

Figure 13: Internationally co-authored papers from University of California compared with USA and globally



Source: InCites

Looking at the technology areas of most patenting activity within the Institution & and Government research sector, we see in Figure 14 that the portfolios of CNRS and the University of California are similar with focus on Medicines, Hygiene, Vaccines and Measuring followed by Computers and Transistors. CEA and Fraunhofer form the second group of similar technology areas with focus mainly on Measuring, Transistors and Computers. IFP stand alone in its focus on Colloids and other areas of Petrochemistry such as Hydroforming and Fatty Acids.

Regarding geographical coverage of the Institution & Government research sector innovation, CEA has the largest family size on average with 5.6 patent publications per invention, followed by IFP (5.1), CNRS (5.0), Fraunhofer (4.7) and the University of California (3.4).

Despite having somewhat smaller average family size, Fraunhofer has the largest individual family by far with 66 members, nearly double that of the next largest, the University of California (37), followed by CNRS (27) and CEA and IFP (22 each).

The Fraunhofer invention with 66 members is designed for an audio-processing apparatus for processing decoded audio signal for quality enhancement (WO2012110415). This invention is also cited by nine later inventions. Fraunhofer has long been involved in audio innovation as one of the founding partners of the MP3 format. More recently, they have achieved significantly enhanced playback of stereo and surround sound on mobile devices<sup>2</sup> based on technologies such as those described in this patent.

Regarding geographical coverage of the Institution & Government research sector innovation, CEA has the largest family size on average with 5.6 patent publications per invention, followed by IFP (5.1), CNRS (5.0), Fraunhofer (4.7) and the University of California (3.4).

Measuring 30 Transistors 25 Medicines Hygiene 20 Computers **Vaccines** 15 Colloids Copolymers 10 5 0 CEA University of California CNRS Fraunhofer IFP

Figure 14: Institution & Government patent portfolio mix for new inventions 2011-2015

Source: Derwent World Patents Index



## Consistency

Of the 100 organizations on the list, only 14 are new this year compared with last year, mainly in the Hardware & Electronics space, and a significant number of whom are based in the US.

Eight companies are new inductees to the Top 100 Global Innovators list, appearing for the first time since the inception of the program. These are Boston Scientific, Dolby Laboratories, Merck, Nokia, NXP Semiconductors, Renesas, Total and the University of California.

Nokia and NXP Semiconductors appear through their acquisition of previous Top 100 awardees (Alcatel Lucent and Freescale Semiconductor, respectively; correspondingly, these companies drop off the 2016 list from last year). The remaining newcomers have universally performed better in globalization this year compared with former years.

In addition to the acquisitions noted above, LSI Corp does not appear this year, as they were acquired by Avago (who re-branded as Broadcom Inc). The remaining 2015 awardees not recognized this year have generally performed less well across the mix of factors measured. Eight companies are new inductees to the Top 100 Global Innovators list appearing for the first time since the inception of the program.

Table 8: Change in representation of the 2016 Top 100 Global Innovators

New 2016	Country 2016	Industry 2016	Dropped from 2015	Country 2015
Boston Scientific	USA	Manufacturing & Medical	Alcatel Lucent	France
Broadcom	USA	Hardware & Electronics	Blackberry	Canada
Corning	USA	Hardware & Boehringer Electronics Ingelheim		Germany
Delphi	USA	Automotive	Casio	Japan
Dolby Laboratories	USA	Hardware & Electronics	Freescale Semiconductor	USA
Huawei	China	Telecommunications	Furukawa Electric	Japan
Merck	Germany	Pharmaceuticals	Idemitsu Kosan	Japan
Nokia	Finland	Telecommunications	JST	Japan
NXP Semiconductors	Netherlands	Hardware & Electronics	LSI Corp	USA
Omron	Japan	Hardware & Electronics	Mitsubishi Electric	Japan
Renesas	Japan	Hardware & Electronics	Mitsui Chemical	Japan
Total S.A.	France	Oil, Gas & Energy	Solvay	Belgium
Univ of California	USA	Institution & Government Research	Toray	Japan
Xerox	USA	Hardware & Electronics	Yamaha Motors	Japan

Table 9: The six-time winners

Organization	Country	Industry	Region
3M Company	USA	Chemicals & Cosmetics	North America
Advanced Micro Devices	USA	Hardware & Electronics	North America
Apple	USA	Telecommunications	North America
Arkema	France	Chemicals & Cosmetics	Europe
Boeing	USA	Aerospace & Defense	North America
Canon	Japan	Hardware & Electronics	Asia
CNRS	France	Institution & Government Research	Europe
CEA	France	Institution & Government Research	Europe
Dow Chemical Company	USA	Chemicals & Cosmetics	North America
DuPont	USA	Chemicals & Cosmetics	North America
Emerson	USA	Hardware & Electronics	North America
Ericsson	Sweden	Telecommunications	Europe
Fujitsu	Japan	Hardware & Electronics	Asia
General Electric	USA	Household Goods	North America
Hitachi	Japan	Hardware & Electronics	Asia
Honda Motor	Japan	Automotive	Asia
Honeywell International	USA	Hardware & Electronics	North America
IFP Energies Nouvelles	France	Institution & Government Research	Europe
Intel	USA	Hardware & Electronics	North America
LG Electronics	S Korea	Household Goods	Asia
LSIS	S Korea	Oil, Gas & Energy	Asia
Microsoft	USA	Software	North America
NEC	Japan	Hardware & Electronics	Asia

Organization	Country	Industry	Region
Nitto Denko	Japan	Chemicals & Cosmetics	Asia
NTT	Japan	Telecommunications	Asia
Olympus	Japan	Manufacturing & Medical	Asia
Panasonic	Japan	Household Goods	Asia
Qualcomm	USA	Hardware & Electronics	North America
Roche	Switzerland	Pharmaceuticals	Europe
Safran	France	Aerospace & Defense	Europe
Saint-Gobain	France	Manufacturing & Medical	Europe
Samsung Electronics	S Korea	Hardware & Electronics	Asia
Seiko Epson	Japan	Hardware & Electronics	Asia
Shin-Etsu Chemical	Japan	Chemicals & Cosmetics	Asia
Sony	Japan	Household Goods	Asia
Symantec	USA	Software	North America
TE Connectivity	Switzerland	Hardware & Electronics	Europe
Toshiba	Japan	Hardware & Electronics	Asia
Toyota Motor	Japan	Automotive	Asia

Thirty-nine organizations put in an appearance on the list for the sixth year running, showing commitment and consistency to innovation as a driver for their businesses. These are from a mix of industries that shows success is not defined by the type of business, but rather how business innovates.



# What it takes to be a consistently successful innovator

When it comes to developing and nurturing a strong innovation portfolio, consistency is key, and those who can harness it are rewarded for their efforts. That's why, for the first time, we're examining the companies that were able to make our Top 100 Global Innovators ranking for the six consecutive years of its publication.

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 companies with large investments in their IP infrastructures are more successful at bringing these innovations to market. These companies effectively protect, commercialize and license their technology, both nationally and around the globe.

When peering across the portfolios for the sixtime winners, there are some common traits that immediately come into focus. Patents, for example, are a proxy for innovation, and these companies all make significant investment in their patent development. With the Top 100 Global Innovators enjoying a higher grant conversion rate, it's clear these firms have beefed up their patent search areas and have invested in making sure their protected technology is truly unique and without any infringements.

The other key variable is investment. As evidenced by the huge R&D outlay made by the companies represented in the Top 100 Global Innovators list, the commitment to keep the fires of innovation burning brightly does not come cheaply. In the case of the 39 companies who have now been on our list for six straight years, this fact is made all the more poignant by the fact that our study was launched in 2011, when much of the world was still feeling the effects of the Great Recession, and many companies were loath to make the kinds of investments needed to keep their underlying IP infrastructures running at full capacity.

In hindsight, it is easy now to point to the foresight of these companies to continue investing when many others pulled back, but at the time, that type of fortitude took a great deal of commitment on the part of senior management and frontline R&D and IP professionals.

By continuing these strategies, these winners stand poised to remain on our list for many years to come.

## Conclusion

Where is the world going when it comes to the government incentives and regulatory frameworks that will govern future innovation? That is best left to the prognosticators. But what is clear is that there is a well-worn path to follow when it comes to keeping a company at the forefront of that movement, regardless of what's happening in the geopolitical and macroeconomic environment.

The Clarivate Analytics Top 100 Global Innovators have shown that, although each firm's blueprint varies to meet their individual goals, there are trends that act as a tie that binds. As corporations around the globe invest to ensure their patents are of the highest quality, that their research and development is comprehensive and extensive, and that their range of technology is diverse and adaptable, the goods and services they provide ultimately become the better for it, with us all as the beneficiaries.

Congratulations to the 2016 Top 100 Global Innovators. May their efforts truly act as a bridge to the future.

As corporations around the globe invest to ensure their patents are of the highest quality... the goods and services they provide ultimately become the better for it, with us all as the beneficiaries.



## Who We Are

Clarivate Analytics accelerates the pace of innovation by providing trusted insights and analytics to customers around the world, enabling them to discover, protect and commercialize new ideas faster. Formerly the Intellectual Property and Science business of Thomson Reuters, we own and operate a collection of leading subscription-based services focused on scientific and academic research, patent analytics and regulatory standards, pharmaceutical and biotech intelligence, trademark protection, domain brand protection and intellectual property management. Clarivate Analytics is now an independent company with over 4,000 employees, operating in more than 100 countries and owns well-known brands that include Web of Science, Cortellis, Thomson Innovation, Derwent World Patents Index, CompuMark, MarkMonitor and Techstreet, among others.

For more information, please visit us at **clarivate.com** 

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#### **Derwent World Patents Index**

Derwent World Patents Index is the world's authoritative source of patent information and is trusted by nearly 40 of the world's patent offices and global innovators for decisions on validity and infringement, identifying existing prior art, finding white space and performing competitive landscape research. Covering 50 patent-issuing authorities, English translation and editorially enhanced descriptions and value added insights enables you to accurately understand the scope of an invention without legal jargons.

#### **Derwent Patents Citation Index**

Derwent Patents Citation Index is a citation database with both patent and scholarly literature citations used for identifying potential licensing partners, possible competitive threats and ways to evolve core assets. Updated weekly, this rich content traces historical references on which an invention is built, as well as an invention's impact and future technologies that advance it.

#### **Thomson Data Analyzer**

Thomson Data Analyzer transforms large amounts of IP and scientific data into actionable reports that drive strategic IP decisions. Easily analyze technology trends, profile competitors, avoid or uncover patent infringement and identify strategic development opportunities.

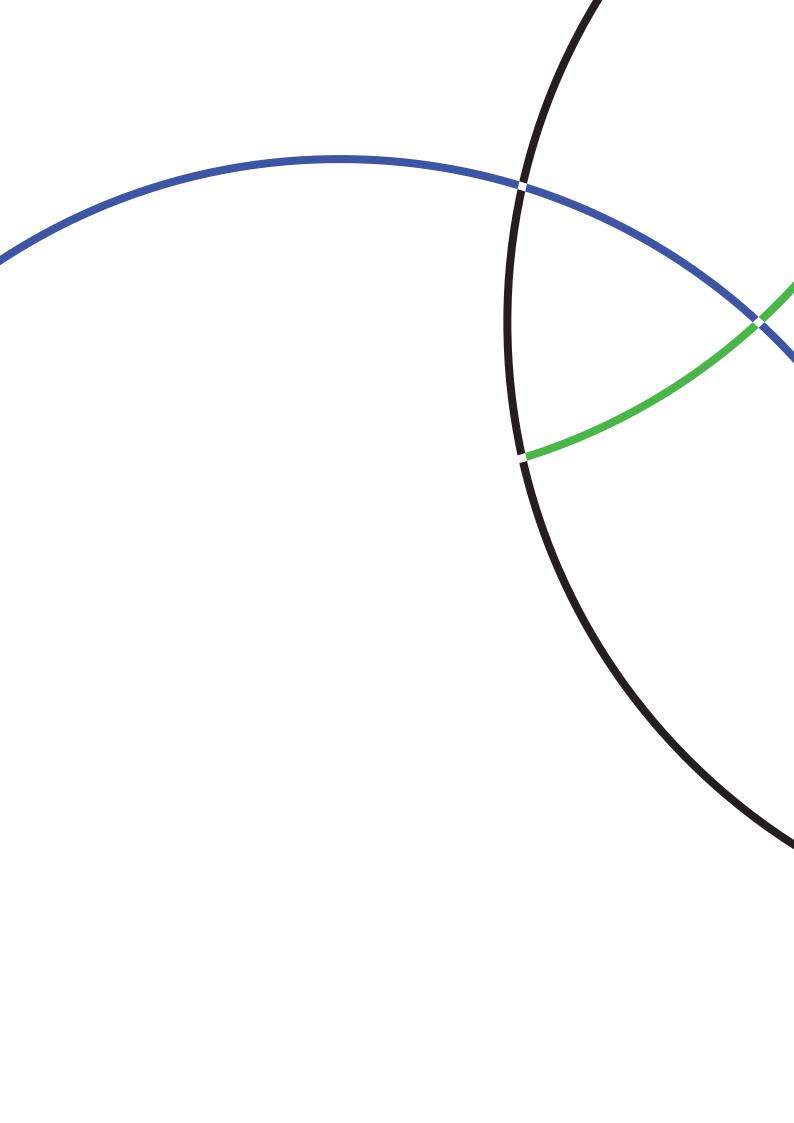
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The Cortellis suite of solutions serves the needs of life-science professionals with unmatched content, intelligent search, best-in-class analytics and insightful visualization tools. Cortellis delivers the unique insights needed to reduce risk and increase success across the drug-development lifecycle from early discovery to commercialization and beyond.

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