Clarivate Analytics

GLOBAL INNOVATORS REPORT 2017

2017

TOP 100 GLOBAL INNOVATORS

In the modern global economy, innovation increasingly serves as the driver of economic development and prosperity. Across industries and geographies around the world, the speed, magnitude, and complexity of innovative output has never been greater. As we embark upon the fourth industrial revolution, and as markets everywhere become increasingly competitive, the most successful organizations are those that can bring a steady stream of innovation to their customers and stakeholders.

Yet innovation cannot thrive without effective legal protection of the investments that make it happen. The investment of time and resources in the research and development needed to make inventions, and to turn them into products or services, is a risky proposition. The costs can be high, success uncertain, and any payoff, if it comes at all, may be years away. Patents help make these investments happen.

For 3M, patents foster sustainable growth based on 3M's innovation engine. They enable 3M science to be applied to life and to impact the world around us in real ways every day. That is why 3M is so pleased to be recognized by Clarivate Analytics as a Top 100 Global Innovator and expresses its gratitude to Clarivate Analytics for this recognition.

3M congratulates each of the other Top 100 Global Innovators. Their continuing commitment to investments in the research and development needed to bring inventions to life, and to patent rights that protect those investments, will ensure that they continue to create the innovations that are so essential to their growth and long-term success, and to prosperity around the globe.

KEVIN RHODES
CHIEF INTELLECTUAL PROPERTY COUNSEL, PRESIDENT
3M INNOVATIVE PROPERTIES COMPANY

KEY FINDINGS

The 2017 Top 100 Global Innovators report is the latest in an annual series that stretches back to 2011. In these reports, we seek to identify the most innovative organizations around the globe and to recognize and celebrate their contributions to providing new solutions to existing and unmet future challenges for the betterment of individual lives and society as a whole.

The report is based on findings from patent data driven analysis using Clarivate Analytics proprietary data and analysis tools, including Derwent Innovation and Derwent World Patents Index (DWPI), to execute a tried and trusted methodology which has been verified through market validation over the years. The methodology examines the portfolio strength and quality of each organization through assessing not just volume of patenting, but success in obtaining granted patents, breadth of filing of inventions and external citations to the portfolio to arrive at a combined indicator score which is used to identify the Top 100 most innovative organizations globally.

This year's findings show that the Top 100 Global Innovators are truly an exclusive group which is at the cutting edge, with innovation of better quality and more global commercial potential and with more impact and influence in ongoing innovation than those organizations outside the club.

HOW DO WE ASSESS INNOVATION?

FULL DETAILS OF THE METHODOLOGY ARE GIVEN AT THE END OF THE REPORT

VOLUME All organizations with 100 or more patent families containing a granted patent are taken forward for assessment of three further factors.

SUCCESS The conversion rate of patent applications to granted patents is assessed as a measure of innovation quality.

GLOBALIZATION The breadth of filing of inventions is measured to determine the perceived global market value of innovation.

INFLUENCE Citations to patents are counted to assess the impact of foundational innovation on which later inventions are built.

QUALITY OVER VOLUME

The 100 organizations that make up the 2017 Top 100 Global Innovators continue to show characteristics that separate them from the crowd and demonstrate the true value of investing in innovation as a means to build sustainable development.

Looking globally, there has been an increase of 11.9 percent in the volume of new inventions published over the previous five years this year compared to last year. However, for the Top 100, that increase was only 2.4 percent. Top 100 innovators are filing less.

> "IT'S NOT HOW MUCH YOU PATENT, IT'S HOW GOOD THE INNOVATION IS."

Comparing the number of inventions containing granted patents over the same period shows that, globally, there has been only a 3.4 percent increase from last year to this year. By contrast, for the Top 100, that increase is 5.7 percent. The Top 100 Global Innovators have been more successful in obtaining full patent rights to their innovation than others. This could be due to a number of factors including drafting of higher quality applications, investing more in pre-filing searches or working harder to demonstrate the value of the innovation during the grant process.

At any rate, improved success in obtaining granted patents is linked to higher quality innovation and shows that the quality of innovation coming from the innovation leaders is higher than the rest. It's not how much you patent, it's how good the innovation is. That comes from investing in the tools and processes that enable those filings to stand on their own.

BEING GLOBAL MATTERS

Not only are the Top 100 more focused on quality of innovation, they also demonstrate enhanced global commercialization value of that innovation. For the most important inventions that have global appeal, an organization is likely to seek wide protection in many territories.

Determining the number of inventions that are filed in the key global markets of US, Europe, Japan and China, or "quadrilateral" patent families, provides a measure of the value and importance of the portfolio of an organization.

For the 2017 Top 100 Global Innovators, the value of that measure has increased by 3.7 percent this year compared to last. If we also compare the average number of quadrilateral families in the patent portfolios for the Top 100 compared to other organizations globally, the contrast is stark; Top 100 innovators have 5.3 times as many quadrilateral families in their portfolio compared to the global average.

Clearly, the 2017 Top 100 Global Innovators are more successful in developing innovation with global market potential than those outside the Top 100.

STANDING ON THE SHOULDERS OF GIANTS

If imitation is the sincerest form of flattery, then citation is the truest form of acknowledgement. Innovation that builds on previous work will refer back to that original work through the citations listed either by the applicant or the examiner's search report. The greater the number of citations to an original piece of work, the more likely it is to be an important development which has attracted the attention of many others seeking to improve upon it.

By tracking citations in later published inventions, an independent external measure of the value of an organization's innovation may be made. That measure for the 2017 Top 100 Global Innovators again shows clear water between them and the rest.

As a whole, the Top 100 have shown an increase of 2.8 percent in the ratio of citations (excluding self-cites) to inventions during the previous five years for this year compared to last. The Top 100 continue to demonstrate that their innovation is not just better quality with more global commercial potential, but that it also has more impact and influence in ongoing innovation.

INNOVATION HEADS EAST

There is a clear shift in the epicenter of innovation back from West to East. After a brief lapse into second place last year behind the US, the number of Top 100 Innovators from Asia has risen over 13 percent from 39 to 45 this year, again taking it above North America with 36 organizations.

Asian Top 100 companies have out-performed the Top 100 as a whole (excluding Asia) on all metrics which indicates they are producing higher quality innovation, seeking to commercialize that innovation more globally and creating more impactful innovation than both the remaining Top 100 Global Innovators and other organizations outside the Top 100.

INTRODUCING THE CLARIVATE ANALYTICS 2017 TOP


00
GLOBAL INNOVATORS

A-Z LIST

#

3M Company USA

Chemicals & Cosmetics

2011 2012 2013 2014 2015 2016

A

Abbott Laboratories USA

Pharmaceuticals

2013 2014 2015 2016

Advanced Micro Devices USA

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Aisin Seiki JPN

Automotive

2014 2015 2016

Alstom FRA

Manufacturing & Medical

2015 2016

Amazon USA

Software

2015 2016

Analog Devices USA

Hardware & Electronics

2011 2012 2013 2015 2016

Apple USA

Telecommunications

2011 2012 2013 2014 2015 2016

Arkema FRA

Chemicals & Cosmetics

2011 2012 2013 2014 2015 2016

Asahi Glass JPN

Chemicals & Cosmetics

2013 2014

B

BASF DEU

Chemicals & Cosmetics

2011 2014 2015 2016

Bayer DEU

Pharmaceuticals

2011 2015 2016

Becton Dickinson USA

Manufacturing & Medical

2015 2016

Boeing USA

Aerospace & Defense

2011 2012 2013 2014 2015 2016

Boston Scientific USA

Manufacturing & Medical

2016

Bridgestone JPN

Automotive

2015 2016

Broadcom USA

Hardware & Electronics

2011 2012 2013 2014 2015 2016

C

Canon — JPN
Hardware & Electronics
2011 2012 2013 2014 2015 2016

Casio — JPN
Hardware & Electronics
2014 2015

Commissariat à l'Energie Atomique — FRA
Institution & Government Research
2011 2012 2013 2014 2015 2016

D

Daikin Industries — JPN
Manufacturing & Medical
2011 2014 2015 2016

Delphi — USA
Automotive
2012 2013 2016

Dolby Laboratories — USA
Hardware & Electronics
2016

Dow Chemical Company — USA
Chemicals & Cosmetics
2011 2012 2013 2014 2015 2016

DuPont — USA
Chemicals & Cosmetics
2011 2012 2013 2014 2015 2016

E

Emerson — USA
Hardware & Electronics
2011 2012 2013 2014 2015 2016

Ericsson — SWE
Telecommunications
2011 2012 2013 2014 2015 2016

ExxonMobil — USA
Oil, Gas & Energy
2011 2012 2013 2015 2016

F

Facebook — USA
Software
NEW FOR 2017

Fraunhofer — DEU
Institution & Government Research
2013 2014 2015 2016

Fuji Electric — JPN
Oil, Gas & Energy
NEW FOR 2017

FUJIFILM — JPN
Hardware & Electronics
2012 2013 2014 2015 2016

Fujitsu — JPN
Hardware & Electronics
2011 2012 2013 2014 2015 2016

Furukawa Electric — JPN
Hardware & Electronics
2014 2015

G

General Electric — USA
Household Goods
2011 2012 2013 2014 2015 2016

Google USA

Software

2012 2013 2014 2015 2016

H

Hitachi JPN

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Hon Hai TWN

Hardware & Electronics

NEW FOR 2017

Honda Motor JPN

Automotive

2011 2012 2013 2014 2015 2016

Honeywell International USA

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Huawei CHN

Telecommunications

2014 2016

I

Intel USA

Hardware & Electronics

2011 2012 2013 2014 2015 2016

ITRI TWN

Institution & Government Research

2014

J

Johnson & Johnson USA

Pharmaceuticals

2013 2014 2015 2016

Johnson Controls USA

Manufacturing & Medical

2015 2016

JTEKT JPN

Automotive

2015 2016

K

Kawasaki Heavy Industries JPN

Manufacturing & Medical

2015 2016

Kobe Steel JPN

Manufacturing & Medical

2014 2015 2016

Komatsu JPN

Manufacturing & Medical

2014 2015 2016

Kyocera JPN

Hardware & Electronics

2014 2015 2016

L

LG Electronics KOR

Household Goods

2011 2012 2013 2014 2015 2016

LSIS KOR

Oil, Gas & Energy

2011 2012 2013 2014 2015 2016

M

Marvell USA

Hardware & Electronics

2012 2013 2014 2015 2016

Medtronic IRL

Manufacturing & Medical

2014 2015 2016

Merck DEU

Pharmaceuticals

2016

Micron USA

Hardware & Electronics

2012 2013 2014 2015 2016

Microsoft USA

Software

2011 2012 2013 2014 2015 2016

Mitsubishi Electric JPN

Household Goods

2011 2012 2013 2014 2015

Mitsubishi Heavy Industries JPN

Manufacturing & Medical

2012 2013 2014 2015 2016

Mitsui Chemical JPN

Chemicals & Cosmetics

2015

Molex USA

Hardware & Electronics

NEW FOR 2017

N

NEC JPN

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Nichia JPN

Chemicals & Cosmetics

NEW FOR 2017

Nike USA

Household Goods

2012 2013 2014 2015 2016

Nippon Steel & Sumitomo Metal JPN

Manufacturing & Medical

2012 2013 2014 2015 2016

Nissan Motor JPN

Automotive

2013 2014 2015 2016

Nitto Denko JPN

Chemicals & Cosmetics

2011 2012 2013 2014 2015 2016

Nokia FIN

Telecommunications

2016

Novartis CHE

Pharmaceuticals

2014 2015 2016

NTT JPN

Telecommunications

2011 2012 2013 2014 2015 2016

NXP Semiconductors NLD

Hardware & Electronics

2016

O

Olympus JPN

Manufacturing & Medical

2011 2012 2013 2014 2015 2016

Omron JPN

Hardware & Electronics

2013 2016

Oracle USA

Software

2013 2014 2015 2016

P

Panasonic JPN

Household Goods

2011 2012 2013 2014 2015 2016

Philips NLD

Hardware & Electronics

2011 2013 2014 2015 2016

Q

Qualcomm USA

Hardware & Electronics

2011 2012 2013 2014 2015 2016

R

Renesas JPN

Hardware & Electronics

2016

Roche CHE

Pharmaceuticals

2011 2012 2013 2014 2015 2016

S

Safran FRA

Aerospace & Defense

2011 2012 2013 2014 2015 2016

Saint-Gobain FRA

Manufacturing & Medical

2011 2012 2013 2014 2015 2016

Samsung Electronics KOR

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Seagate USA

Hardware & Electronics

2012 2013 2014 2015 2016

Seiko Epson JPN

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Shin-Etsu Chemical JPN

Chemicals & Cosmetics

2011 2012 2013 2014 2015 2016

Showa Denko JPN

Chemicals & Cosmetics

2015 2016

Sony JPN

Household Goods

2011 2012 2013 2014 2015 2016

Symantec USA

Software

2011 2012 2013 2014 2015 2016

Toshiba JPN

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Xilinx USA

Hardware & Electronics

2012 2013 2014 2015 2016

T

TDK JPN

Hardware & Electronics

2012 2013 2014

TE Connectivity CHE

Hardware & Electronics

2011 2012 2013 2014 2015 2016

Texas Instruments USA

Hardware & Electronics

2012 2013 2014

Thales FRA

Aerospace & Defense

2012 2013 2015 2016

Toray JPN

Chemicals & Cosmetics

2015

Total S.A. FRA

Oil, Gas & Energy

2016

Toyota Motor JPN

Automotive

2011 2012 2013 2014 2015 2016

W

Western Digital USA

Hardware & Electronics

NEW FOR 2017

X

Xerox USA

Hardware & Electronics

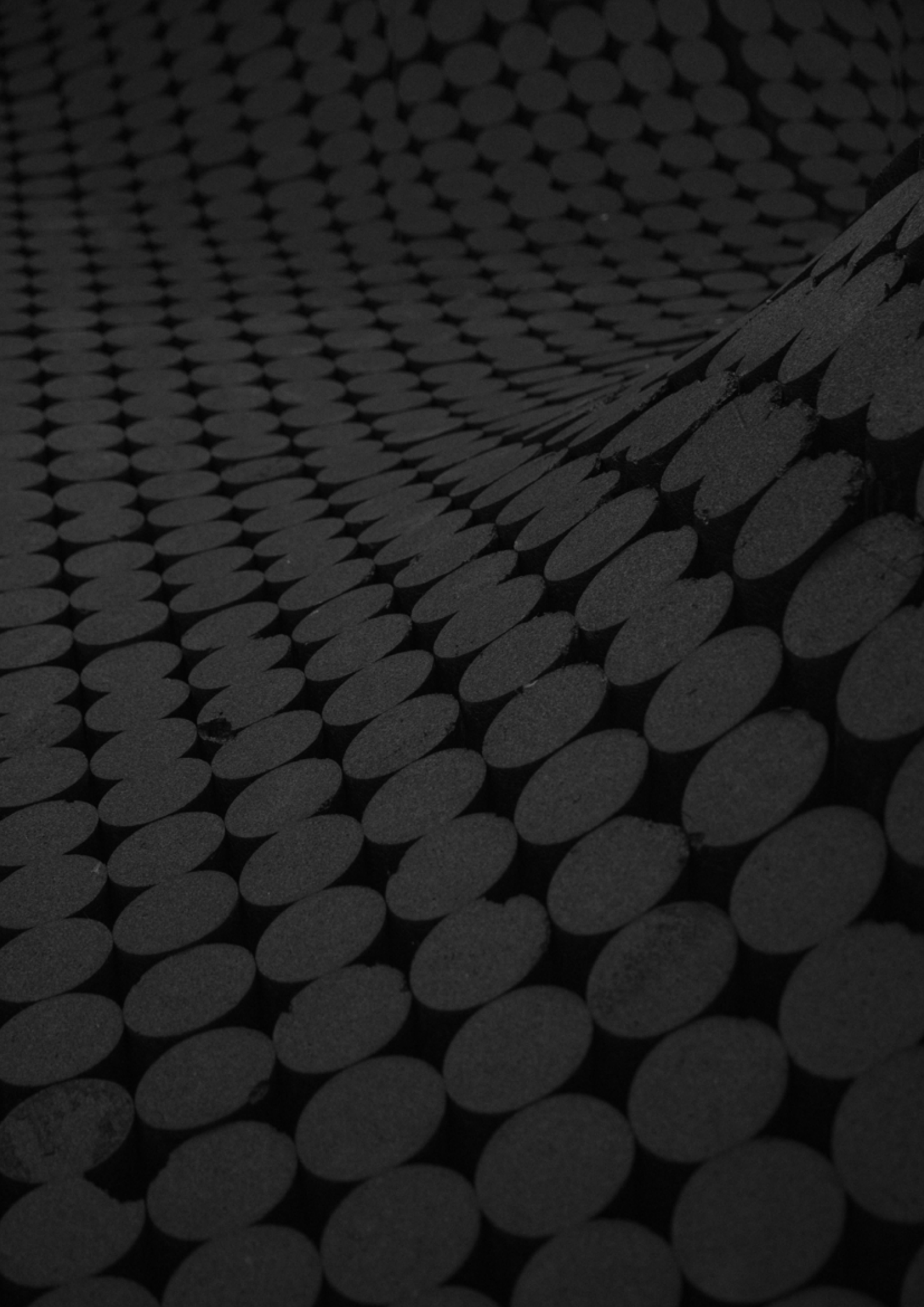
2011 2012 2013 2014 2016

Y

YASKAWA Electric JPN

Manufacturing & Medical

2015 2016



SECTOR LIST

AEROSPACE & DEFENSE

Boeing USA

2011 2012 2013 2014 2015 2016

Safran FRA

2011 2012 2013 2014 2015 2016

Thales FRA

2012 2013 2015 2016

AUTOMOTIVE

Aisin Seiki JPN

2014 2015 2016

Bridgestone JPN

2015 2016

Delphi USA

2012 2013 2016

Honda Motor JPN

2011 2012 2013 2014 2015 2016

JTEKT JPN

2015 2016

Nissan Motor JPN

2013 2014 2015 2016

Toyota Motor JPN

2011 2012 2013 2014 2015 2016

CHEMICALS & COSMETICS

3M Company USA

2011 2012 2013 2014 2015 2016

Arkema FRA

2011 2012 2013 2014 2015 2016

Asahi Glass JPN

2013 2014

BASF DEU

2011 2014 2015 2016

Dow Chemical Company USA

2011 2012 2013 2014 2015 2016

DuPont USA

2011 2012 2013 2014 2015 2016

Mitsui Chemical JPN

2015

Nichia JPN

NEW FOR 2017

Nitto Denko JPN

2011 2012 2013 2014 2015 2016

Shin-Etsu Chemical JPN

2011 2012 2013 2014 2015 2016

Showa Denko JPN

2015 2016

Toray JPN

2015

HARDWARE & ELECTRONICS

Advanced Micro Devices USA

2011 2012 2013 2014 2015 2016

Analog Devices USA

2011 2012 2013 2015 2016

Broadcom USA

2011 2012 2013 2014 2015 2016

Canon JPN

2011 2012 2013 2014 2015 2016

Casio JPN

2014 2015

Dolby Laboratories USA

2016

Emerson USA

2011 2012 2013 2014 2015 2016

FUJIFILM JPN

2012 2013 2014 2015 2016

Fujitsu JPN

2011 2012 2013 2014 2015 2016

Furukawa Electric JPN

2014 2015

Hitachi JPN

2011 2012 2013 2014 2015 2016

Hon Hai TWN

NEW FOR 2017

Honeywell International USA

2011 2012 2013 2014 2015 2016

Intel USA

2011 2012 2013 2014 2015 2016

Kyocera JPN

2014 2015 2016

Marvell USA

2012 2013 2014 2015 2016

Micron USA

2012 2013 2014 2015 2016

Molex USA

NEW FOR 2017

NEC JPN

2011 2012 2013 2014 2015 2016

NXP Semiconductors NLD

2016

Omron JPN
2013 2016

Philips NLD
2011 2013 2014 2015 2016

Qualcomm USA
2011 2012 2013 2014 2015 2016

Renesas JPN
2016

Samsung Electronics KOR
2011 2012 2013 2014 2015 2016

Seagate USA
2012 2013 2014 2015 2016

Seiko Epson JPN
2011 2012 2013 2014 2015 2016

TDK JPN
2012 2013 2014

TE Connectivity CHE
2011 2012 2013 2014 2015 2016

Texas Instruments USA
2012 2013 2014

Toshiba JPN
2011 2012 2013 2014 2015 2016

Western Digital USA

NEW FOR 2017

Xerox USA
2011 2012 2013 2014 2016

Xilinx USA
2012 2013 2014 2015 2016

HOUSEHOLD GOODS

General Electric USA
2011 2012 2013 2014 2015 2016

LG Electronics KOR
2011 2012 2013 2014 2015 2016

Mitsubishi Electric JPN
2011 2012 2013 2014 2015

Nike USA
2012 2013 2014 2015 2016

Panasonic JPN
2011 2012 2013 2014 2015 2016

Sony JPN
2011 2012 2013 2014 2015 2016

INSTITUTION & GOVERNMENT RESEARCH

Commissariat à l'Energie Atomique FRA
2011 2012 2013 2014 2015 2016

Fraunhofer DEU
2013 2014 2015 2016

ITRI TWN

2014

MANUFACTURING & MEDICAL

Alstom FRA

2015 2016

Becton Dickinson USA

2015 2016

Boston Scientific USA

2016

Daikin Industries JPN

2011 2014 2015 2016

Johnson Controls USA

2015 2016

Kawasaki Heavy Industries JPN

2015 2016

Kobe Steel JPN

2014 2015 2016

Komatsu JPN

2014 2015 2016

Medtronic IRL

2014 2015 2016

Mitsubishi Heavy Industries JPN

2012 2013 2014 2015 2016

Nippon Steel & Sumitomo Metal JPN

2012 2013 2014 2015 2016

Olympus JPN

2011 2012 2013 2014 2015 2016

Saint-Gobain FRA

2011 2012 2013 2014 2015 2016

YASKAWA Electric JPN

2015 2016

OIL, GAS & ENERGY

ExxonMobil USA

2011 2012 2013 2015 2016

Fuji Electric JPN

NEW FOR 2017

LSIS KOR

2011 2012 2013 2014 2015 2016

Total S.A. FRA

2016

PHARMACEUTICALS

Abbott Laboratories USA

2013 2014 2015 2016

Bayer DEU

2011 2015 2016

Johnson & Johnson USA

2013 2014 2015 2016

Merck DEU

2016

Novartis CHE

2014 2015 2016

Roche CHE

2011 2012 2013 2014 2015 2016

SOFTWARE

Amazon USA

2015 2016

Facebook USA

NEW FOR 2017

Google USA

Software

2012 2013 2014 2015 2016

Microsoft USA

2011 2012 2013 2014 2015 2016

Oracle USA

2013 2014 2015 2016

Symantec USA

2011 2012 2013 2014 2015 2016

TELECOMMUNICATIONS

Apple USA

2011 2012 2013 2014 2015 2016

Ericsson SWE

2011 2012 2013 2014 2015 2016

Huawei CHN

2014 2016

Nokia FIN

2016

NTT JPN

2011 2012 2013 2014 2015 2016

ON THE RISE

SIX COMPANIES ARE NEW HONOREES OF THE TOP 100 GLOBAL INNOVATORS LIST APPEARING FOR THE FIRST TIME SINCE THE PROGRAM BEGAN

FACEBOOK

Facebook showed a marked improvement in impact this year with a 44 percent increase in this metric over 2016. Average citations per invention over the last five years also rose 28 percent from 0.66 last year to 0.84 this year. Developments in full-screen, 360-degree video, and interactive ads for mobile and in e-commerce that allow users to complete transactions without leaving the platform have helped propel Facebook as one of the most innovative companies this year.

FUJI ELECTRIC

Fuji Electric has shown steady progress and growth in performance over the last seven years and has achieved sufficient growth, particularly in success and globalization metrics, to break through into the Top 100 for the first time this year. This is a tangible result of its open innovation program working with several Japanese Universities to promote joint research programs and internationally with the founding of research institutes in China, USA and Europe.

HON HAI

Hon Hai makes the list for the first time through improvements in both globalization and influence which indicates that it has been producing more impactful innovation over the last five years and is looking more internationally to protect its innovation in order to commercialize this more broadly. This is in line with its long-term research direction in key growth areas across the information technology sector, including telecommunications, consumer electronics, robotics and automation, optoelectronics and precision machinery, among others.

MOLEX

Molex extended the reach of its innovation this year as evidenced by a 45 percent growth in globalization this year compared to last year which sees it make the Top 100 for the first time. Recent innovation developments in the area of high-speed networking solutions such as its connected vehicle technology ecosystem with a new 10 Gbps automotive Ethernet backbone have borne fruit in Molex's inclusion in the Top 100 list this year.

NICHIA

Nichia has consistently filed its innovation widely and been highly cited by others working in light-emitting-diode technology, but this year has seen an uptick in Nichia's success in obtaining granted patent protection for its inventions resulting in its appearance in the list for the first time this year.

WESTERN DIGITAL

Western Digital has shown year on year growth in both globalization and impact to see it onto this year's list. Western Digital's investment in innovation has manifested itself this year in the recent announcement of the world's first microwave-assisted magnetic recording (MAMR) HDD and advancements in micro actuation and Damascene recording head technology.

"85 ORGANIZATIONS HAVE SUSTAINED THEIR INNOVATION AT SUFFICIENTLY CONSISTENT LEVELS."

TABLE 1: CHANGE IN REPRESENTATION OF THE 2017 TOP 100 GLOBAL INNOVATORS

NEW 2017	COUNTRY / REGION	INDUSTRY
Asahi Glass	Japan	Chemicals & Cosmetics
Casio	Japan	Hardware & Electronics
Facebook*	USA	Software
Fuji Electric*	Japan	Oil, Gas & Energy
Furukawa Electric	Japan	Hardware & Electronics
Hon Hai*	Taiwan	Hardware & Electronics
ITRI	Taiwan	Institution & Govt Research
Mitsubishi Electric	Japan	Household Goods
Mitsui Chemical	Japan	Chemicals & Cosmetics
Molex*	USA	Hardware & Electronics
Nichia*	Japan	Chemicals & Cosmetics
TDK	Japan	Hardware & Electronics
Texas Instruments	USA	Hardware & Electronics
Toray	Japan	Chemicals & Cosmetics
Western Digital*	USA	Hardware & Electronics

The large majority of organizations named in last year's Top 100 Global Innovators report are again recognized this year. 85 organizations have sustained their innovation at sufficiently consistent levels to justify inclusion again in this year's Top 100. These are joined by 15 newly honored Top 100 innovators in 2017 (Table 1).

*FIRST TIME HONOREES IN 2017. THE 15 ORGANIZATIONS RECOGNIZED LAST YEAR THAT DID NOT MAKE IT TO THE LIST THIS YEAR HAVE GENERALLY PERFORMED LESS WELL ACROSS THE MIX OF FACTORS MEASURED.

SEVEN-TIME CHAMPIONS

THIRTY EIGHT OF THIS YEAR'S TOP 100 GLOBAL INNOVATORS HAVE CONSISTENTLY ACHIEVED RECOGNITION IN ALL SEVEN YEARS OF THE PROGRAM

"THESE ARE THE BEST OF THE BEST AND EXHIBIT CONSISTENTLY STRONG PERFORMANCE."

These are the best of the best and exhibit consistently strong performance in successfully obtaining rights to their innovation, seeking wide protection and global markets for potential products and services based on that innovation and are recognized by their peers as creating leading innovation for others to build on.

Eighteen out of 38 of the seven-time champions are from USA. However, Japan dominates the charts with 14 champions representing the country. From an industry perspective, Hardware & Electronics are leading the way with 14 out of 38 making the cut and Chemicals & Cosmestics (6) trying to catch up closely behind.

ORGANIZATION	COUNTRY / REGION	INDUSTRY	AREA
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
Broadcom	USA	Hardware & Electronics	North America
Canon	Japan	Hardware & Electronics	Asia
Commissariat à l'Energie Atomique	France	Institution & Govt 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
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
Nitto Denko	Japan	Manufacturing & Medical	Asia
NTT	Japan	Telecommunications	Asia
Olympus	Japan	Telecommunications	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

“THIS YEAR’S FINDINGS SHOW THAT THE TOP 100 GLOBAL INNOVATORS ARE TRULY AN EXCLUSIVE GROUP WHICH IS AT THE CUTTING EDGE. THEY POSSESS BETTER QUALITY INNOVATION, MORE GLOBAL COMMERCIAL POTENTIAL AND MORE INFLUENCE ON ONGOING INNOVATION.”

GOING GLOBAL

THE 2017 TOP 100 SAW A BURST OF INNOVATION WORLDWIDE, WITH ORGANIZATIONS FROM 11 DIFFERENT MARKETS

GLOBAL

The 2017 Top 100 Global Innovators are from three continents and originate from eleven countries & regions. Just two account for 75 percent of the organizations on the list: Japan and the US, making them the major innovation hubs of the world. Six of the others have been present on the list since the inception of the report series in 2011: France, Germany, Netherlands, South Korea, Sweden and Switzerland. These are joined by Taiwan for the fifth year in a row, China for the third time and Ireland and Finland again for the second year running.

FIGURE 1: COMPOSITION OF THE 2017 TOP 100 GLOBAL INNOVATORS

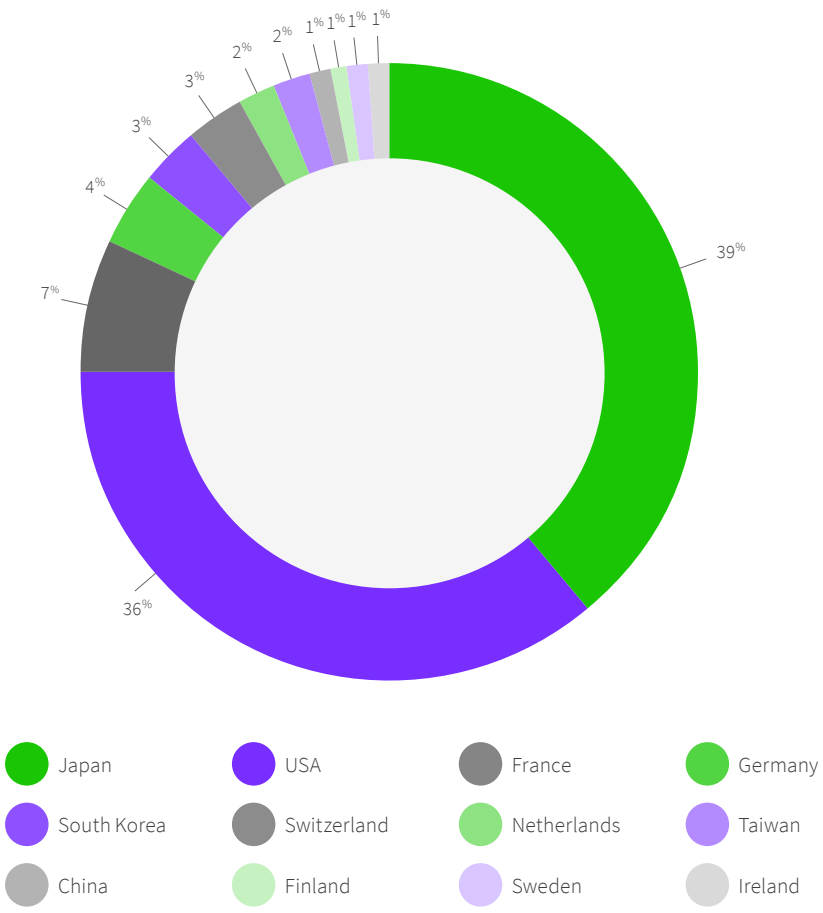
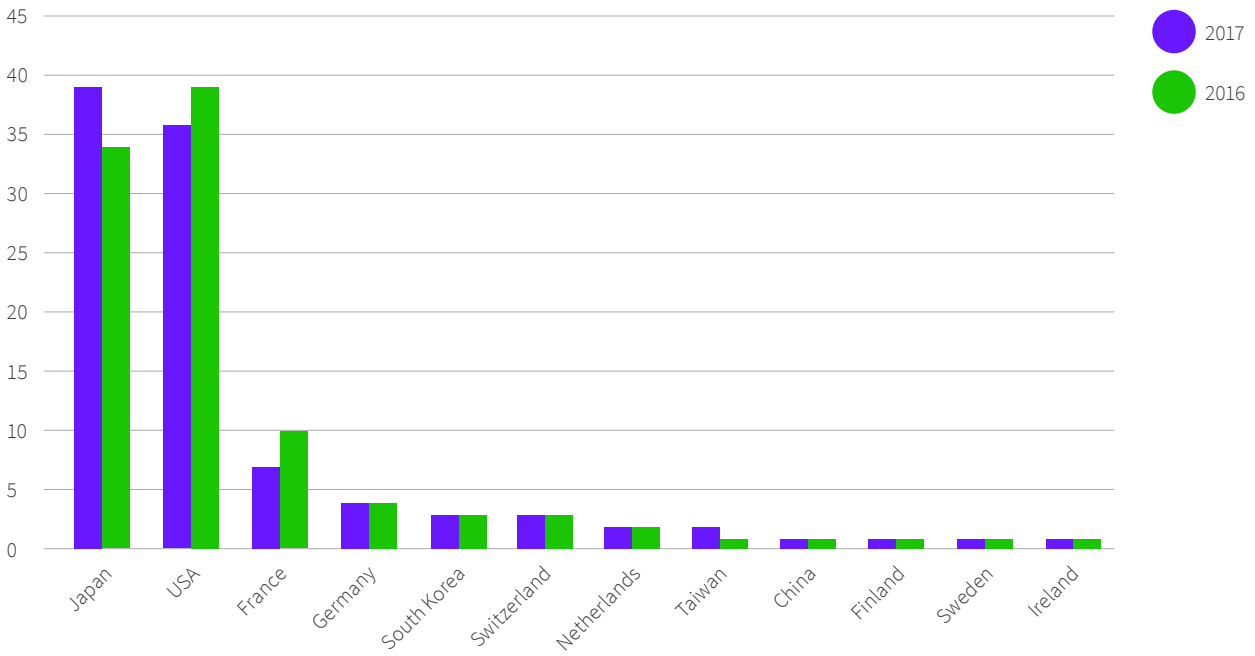


FIGURE 2: 2017 VS 2016 TOP 100 GLOBAL INNOVATORS – REPRESENTATION BY COUNTRY / REGION



Source: Derwent World Patents Index

There is a significant shift towards Asia with 45 organizations from that region in the Top 100 this year compared to 39 last year, a 15% increase over last year. France maintains leadership again in Europe, although this has dropped from 10 organizations last year. China again appears on the list with a repeat honoree from last year, the telecoms multi-national, Huawei.

TABLE 3: 2017 VS 2016 TOP 100 GLOBAL INNOVATORS – CHANGE IN REPRESENTATION BY COUNTRY / REGION

COUNTRY / REGION	2017	2016		% CHANGE
Japan	39	34	↑	15%
USA	36	39	↓	-8%
France	7	10	↓	-30%
Germany	4	4	→	0%
South Korea	3	3	→	0%
Switzerland	3	3	→	0%
Netherlands	2	2	→	0%
Taiwan	2	1	↑	100%
China	1	1	→	0%
Finland	1	1	→	0%
Sweden	1	1	→	0%
Ireland	1	1	→	0%

ASIA

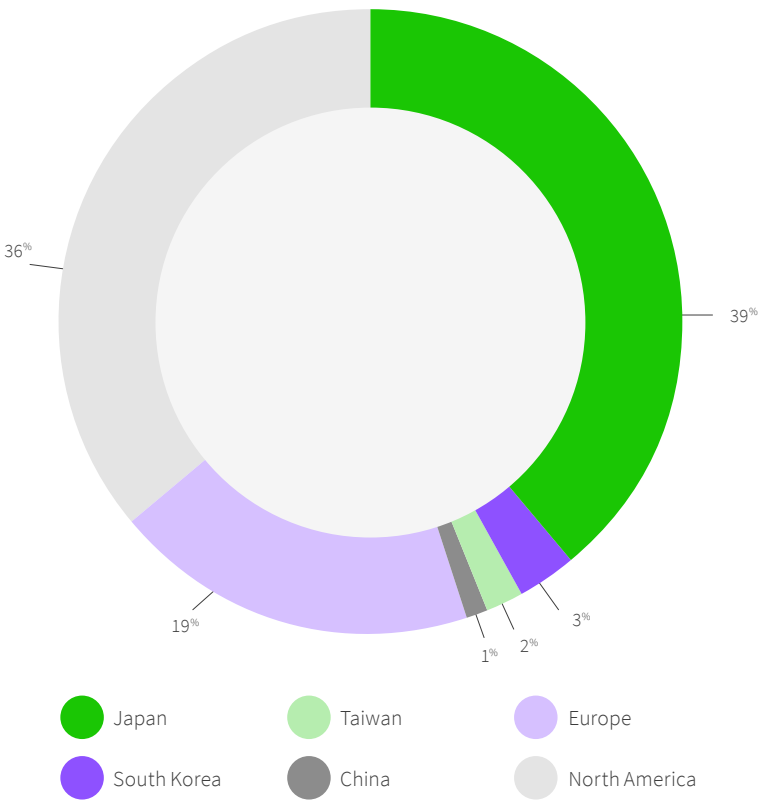
This year sees a return of the innovation hub back to the East with 45 of the Top 100 Global Innovators hailing from Asia compared to just 36 from North America and 19 from Europe. Asia has now taken the leading role in three of the last four years confirming their status as the global innovation powerhouse.

Japan is highly represented with 39 companies on the 2017 list, up from 34 in 2016. South Korea continues to feature with the same three companies as last year (LG, LSIS and Samsung). Taiwan has increased its presence this year with last year's recipient, Mediatek, being replaced by ITRI and Top 100 newcomer Hon Hai (Foxconn).

China makes a reappearance this year again with Huawei making the list following appearances in 2014 and 2016. As last year, Huawei again showed improved performance in globalization in line with its strategy to develop a "global response to global needs." [1]

Huawei's performance in impact is also improved significantly this year along with other Chinese innovators generally. Huawei is recognised as a tier 1 Chinese innovator in the recently published Clarivate Analytics 2017 Chinese Top 100 Innovators report (available here) which found that the overall combined influence metric of the Top 100 Chinese innovators grew by an impressive 60 percent over last year. This is a significant indication that the innovation being conducted in China is being picked up more widely and more often and is helping to drive innovation globally. China's performance in this area however still has some way to go to reach global standards. While China has an average ratio of 0.85 citations per patent family, the average ratio for the Top 100 Global Innovators is 1.12.

FIGURE 3: ASIAN REPRESENTATION COMPARED TO REST OF WORLD



"THIS YEAR SEES A RETURN OF THE INNOVATION HUB BACK TO THE EAST WITH 45 OF THE TOP 100 GLOBAL INNOVATORS HAILING FROM ASIA."

[1] HUAWEI'S GLOBAL STRATEGY (UPDATED) AVAILABLE AT HTTP://ENGLISH.CKGSB.EDU.CN/CASE_CONTENT/HUAWEIS-GLOBAL-STRATEGY-UPDATED

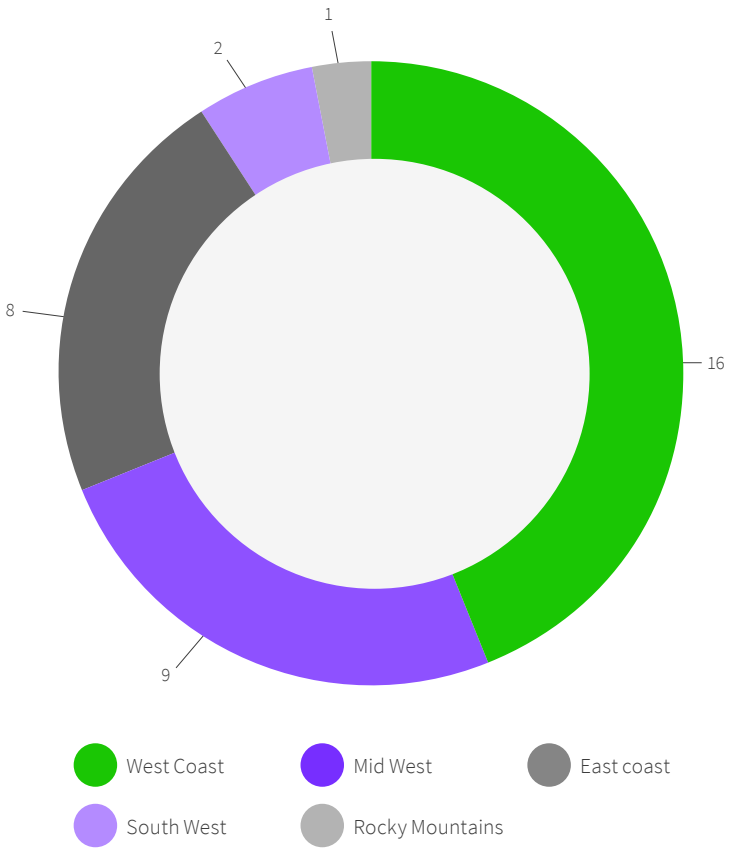
NORTH AMERICA

After leading the regions for the first three years from 2011–2013, North America has slipped to second place again this year after a brief rally last year with 36 organizations compared to 39 last year.

Thirty-one of the 36 companies from the United States remain the same including last year's newcomers to the Top 100, Boston Scientific and Dolby Laboratories. The other first timer last year, University of California, is joined by Air Products, Bristol-Myers Squibb, Chevron, Corning, Interdigital and Lockheed Martin in slipping off the list this year.

The west coast, and specifically California, represents the geographical hot bed of USA innovation in terms of the most number of Top 100 innovators' origins and is dominated by Hardware & Electronics and Software companies (eight and six companies out of a total of 16 respectively).

FIGURE 4: BREAKDOWN OF USA TOP 100 GLOBAL INNOVATORS



Silicon Valley is well represented with AMD, Apple, Broadcom, Google, Intel, Marvell, Oracle, Qualcomm, Seagate, Symantec, Xilinx and Top 100 debutantes Facebook and Western Digital all making the cut this year. The West Coast region is rounded out by Amazon, Microsoft and Nike.

Surprisingly, the Mid West pips the East Coast for second slot with nine representatives on the Top 100 this year compared to eight from the East Coast. The Mid West innovators range across more diverse industries and are 3M, Abbott, Boeing, Delphi, Dolby, Dow, Emerson Electric, Johnson Controls and Top 100 newcomer Molex.

FIGURE 5: WEST COAST INDUSTRIES

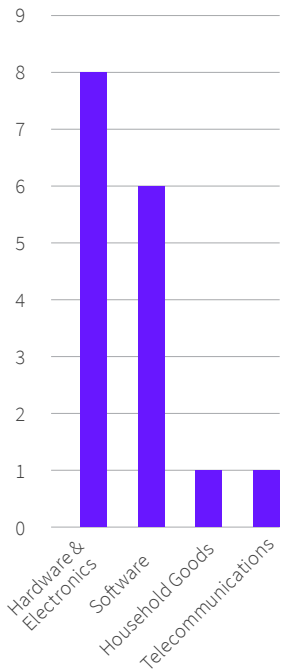
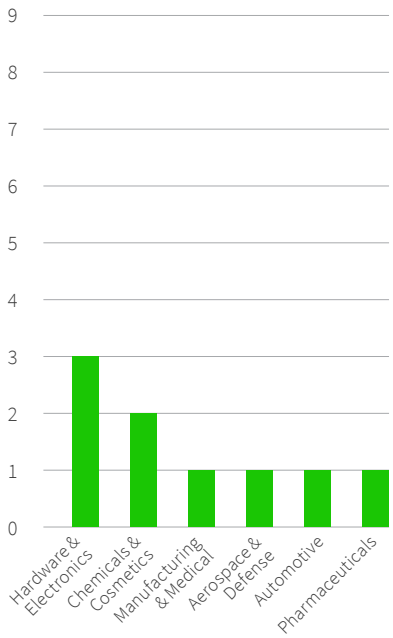
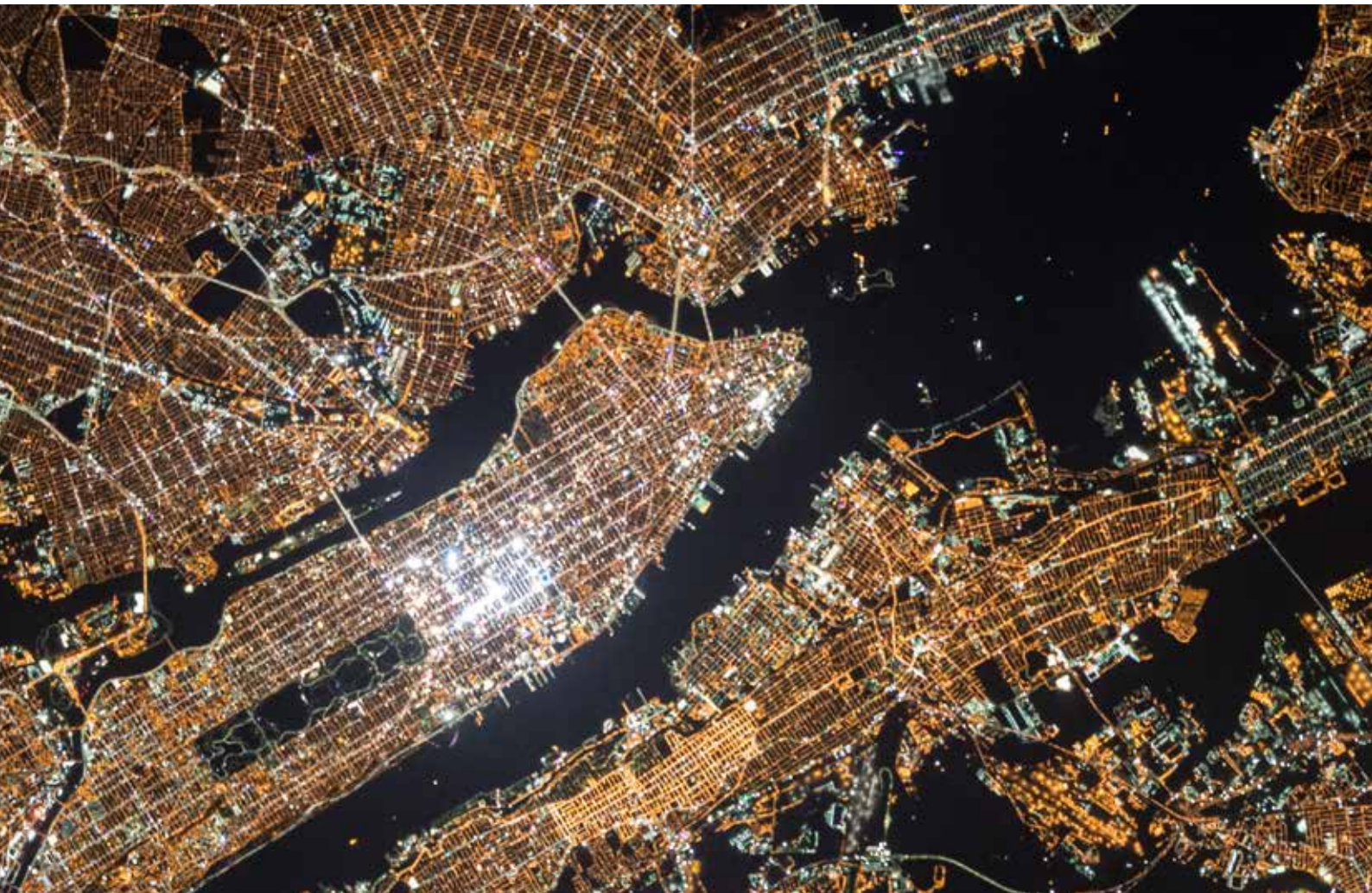


FIGURE 6: MID WEST INDUSTRIES





EUROPE

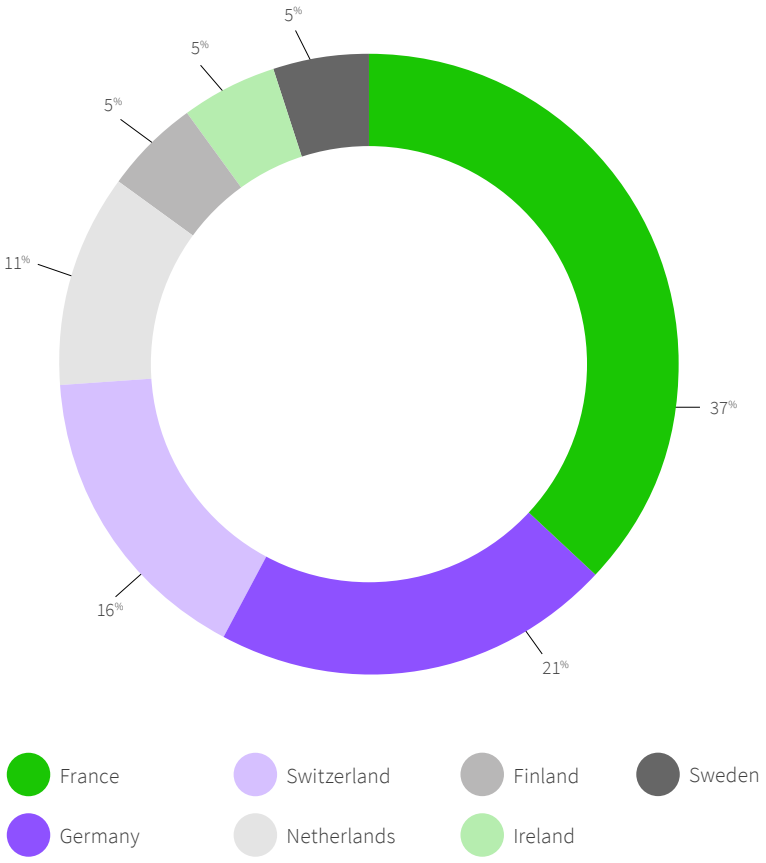
With the ascendancy of Asia this year, Europe's share of the Top 100 has dropped from 22 representatives last year to just 19 this year.

Its country distribution has remained stable with one notable exception. France maintains its leadership in Europe, but with just seven representatives this year compared to 10 last year, all of Europe's losses are from there.

The three organizations missing this year are two research institutes, IFP Energies Nouvelles and CNRS, and the automotive supplier Valeo.

The loss of 66 percent of the three French research institutes named as a Top 100 innovator in 2016 may in part be a consequence of years of cuts in French research funding. In the first budget under President Macron, proposals to increase that funding by six percent in 2018 indicate an understanding of the long term consequences of underfunding of universities and research agencies.[2]

FIGURE 7: EUROPEAN REPRESENTATION OF THE 2017 TOP 100 GLOBAL INNOVATORS



[2] FRENCH GOVERNMENT PROPOSES BIG SCIENCE-SPENDING BOOST", BARBARA CASASSUS, NATURE, 29 SEPTEMBER 2017, HTTPS://WWW.NATURE.COM/NEWS/FRENCH-GOVERNMENT-PROPOSES-BIG-SCIENCE-SPENDING-BOOST-1.22733

INDUSTRY BREAKOUT

Hardware & Electronics takes top spot with 34 companies this year and also shows the largest increase in number of representatives up from 29 organizations last year as shown in Table 4. The companies listed in this sector include three of this year's six Top 100 debutantes, Molex, Western Digital and Hon Hai. These top innovators are joined by the 27 companies from last year who are again recognized in 2017 and four previously recognized Top 100 innovators (Casio [2014, 2015], Furukawa Electric [2014, 2015], Texas Instruments [2012, 2013, 2014] and TDK [2012, 2013, 2014]). Two organizations from last year dropped off the list (Corning and MediaTek) due to, respectively, drops in impact and globalization performance this year.

That Hardware & Electronics heads the list of industry sectors again this year is evidence of the growing importance and ubiquity of computing devices and infrastructure that pervades today's world. From the internet of things (IoT), through cloud computing to the developments in Industry 4.0, much of the development in modern technology is computer hardware and electronics dependent.

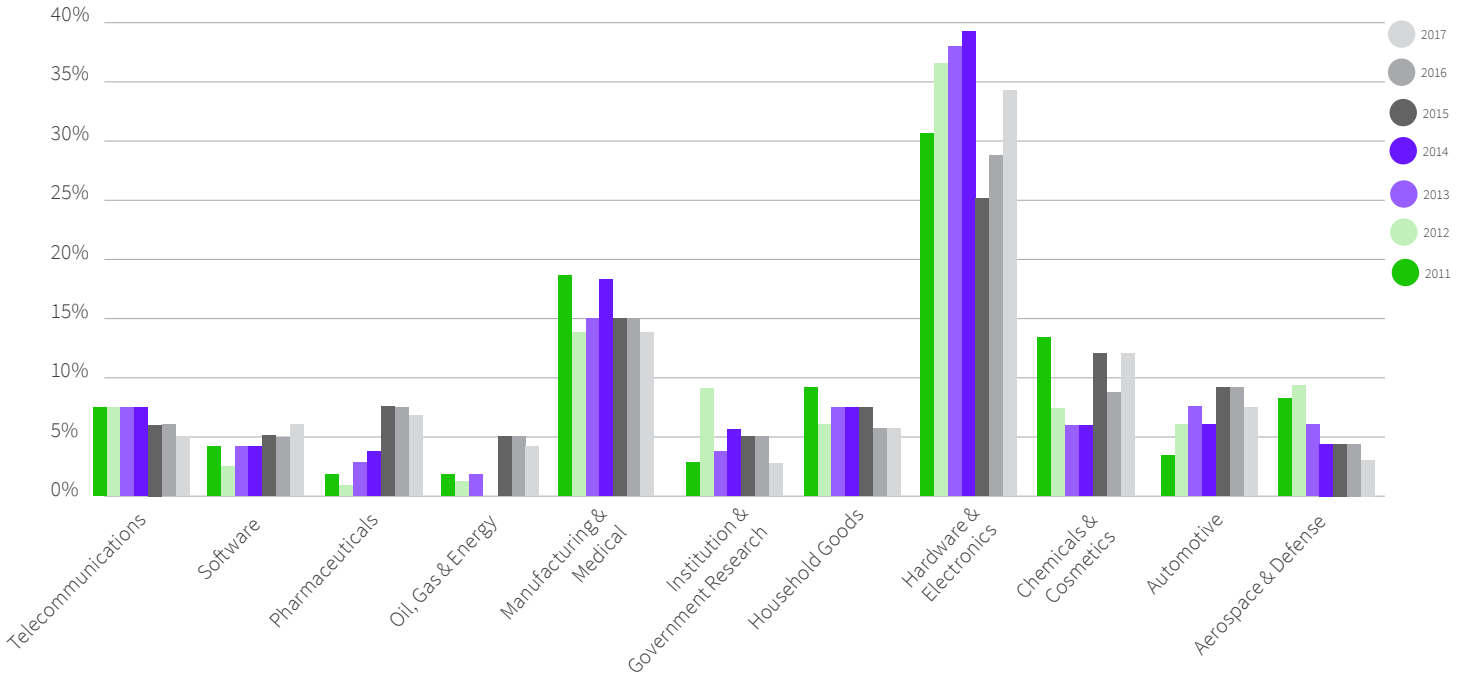
Other sectors with increased representation this year are Chemicals & Cosmetics going from nine firms last year to 12 this year and Software rising from five to six. In Chemicals & Cosmetics, half the companies (3M, Arkema, Dow, DuPont [3], Nitto Denko and Shin-Etsu) have consistently been recognized as Top 100 Global Innovators in each of the last seven years. These are joined by two firms from 2016 (BASF and Showa Denko) and four new organizations for 2017 (Asahi Glass [previously recognized in 2013 and 2014], Mitsui Chem [2015], Nichia [newcomer in 2017] and Toray [2015]).

Remaining sectors showed small downturns in representation, the largest being Automotive (from nine to seven firms) and Institution & Government Research dropping 40 percent from five organizations last year to just three this year.

TABLE 4: 2017 VS 2016 INDUSTRY COMPARISON OF TOP 100 INNOVATORS

INDUSTRY	2017	2016	% CHANGE
Hardware & Electronics	34	29	17%
Manufacturing & Medical	14	15	-7%
Chemicals & Cosmetics	12	9	33%
Automotive	7	9	-22%
Household Goods	6	6	0%
Pharmaceuticals	6	7	-14%
Software	6	5	20%
Telecommunications	5	6	-17%
Oil, Gas & Energy	4	5	-20%
Aerospace & Defense	3	4	-25%
Institution & Government Research	3	5	-40%

FIGURE 8: INDUSTRY REPRESENTATION OF TOP 100 INNOVATORS 2011–2017



Over the long term, Hardware & Electronics has historically been the largest sector followed by Manufacturing & Medical and Chemicals & Cosmetics as shown in Figure 8. Software, Automotive and Pharmaceuticals sectors have shown steady growth in representation consistent with increasingly smart technology in general, smart cars in particular and, amongst other developments, the rise in personal medicine. Telecommunications and Aerospace & Defense have shown long term contraction in the number of Top 100 Innovators over time which may indicate maturation and exploitation of existing innovation in these sectors.

"HARDWARE & ELECTRONICS TAKES TOP SPOT, WITH 34 COMPANIES THIS YEAR. THIS RISE SHOWS THE GROWING IMPORTANCE OF COMPUTING DEVICES AND INFRASTRUCTURE THAT PERVADES TODAY'S WORLD."

[3] THE RECENT COMPLETION OF THE MERGER OF EQUALS BETWEEN DOW AND DUPONT TOOK PLACE AFTER THE PERIOD OF ANALYSIS FOR THIS YEAR'S REPORT (2012–2016), BUT THE NEWLY FORMED DOWDUPONT WILL BE TREATED AS ONE COMPANY IN NEXT YEAR'S ANALYSIS.

MEDICAL MARVELS

THE PHARMACEUTICAL INDUSTRY IS DRIVE BY INVENTION AND INNOVATION. IT IS ONE OF THE FEW SECTORS WHERE R&D IS CENTRAL TO SUCCESS AND ATTRACTING TALENT IS AS CRUCIAL AS THE PATENTS THEY DISCOVER.

Innovation in the pharmaceutical industry, more than most, is about long-term investment and patience in realizing returns on that investment. It is perhaps therefore no surprise that six of last year's Top 100 honorees in the pharmaceutical sector remain on the list this year with the loss only of Bristol Myers Squibb.

Innovation means different things to different companies depending on their field(s) of activity. Indigenous R&D to develop unique approaches for disease treatment can take different forms from creating entirely new APIs to developing new formulations, combinations or uses. But for all six representatives from the pharmaceuticals sector of the Top 100, collaboration plays a significant part either through research funding of smaller enterprises or licensing deals to commercialize promising new therapies.

"INNOVATION IN THE PHARMACEUTICAL INDUSTRY, IS ABOUT LONG-TERM INVESTMENT AND PATIENCE IN REALIZING RETURNS ON THAT INVESTMENT."

6

NUMBER OF TOP 100 HONOREES IN THE PHARMACEUTICAL INDUSTRY PRESENT ON BOTH LAST YEAR'S AND THIS YEAR'S LIST

THE ONES TO WATCH

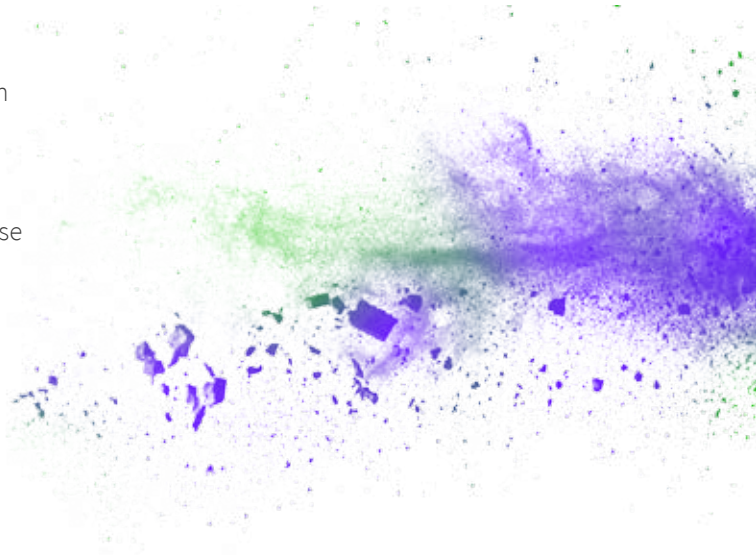
ABBOTT

Since its spin-out of Abbvie, Abbott is focused on breakthrough products in diagnostics, medical devices, nutrition and established pharmaceuticals outside of the U.S. Its patenting reflects this balance, which includes diabetes care, cardiovascular and neuromodulation within its medical devices business.

The highest numbers of patents were unsurprisingly for either new formulations or diagnostics, with new delivery devices also showing well, as would be expected due to both the Cardio and Diabetes divisions. Amongst the diagnostics, one PCT application unveiled by Abbott in August 2017 appears to protect a new troponin test designed to identify heart attacks earlier in women. A study in The Lancet showed that the ARCHITECT STAT High Sensitive Troponin-I test successfully aided doctors in identifying people at risk for heart attack and helped physicians make treatment decisions about which people should stay in hospital. The test may greatly benefit women since their peak troponin levels are more difficult to detect. WO2017075268, jointly filed by Abbott, Emory University and Cardiorisk LLC is entitled “Troponin I and soluble urokinase receptor detection for determining the risk of cardiovascular disease”.

MERCK

For Merck KGaA and its subsidiaries, innovation this year was divided between new products and new formulations, combinations or uses, with the new compound patents being predominantly for small molecule entities. Acknowledging that innovation is a global reality and that a good portion of the future lies in Asia, Merck opened its first full-fledged drug development center in Asia in September, in Shanghai. Deal-making also formed an important part of activities. June this year saw an agreement to deepen relationships with F-Star Biotechnology to provide up-front research and development funding and which includes options to acquire five further programs.



“INNOVATION MEANS DIFFERENT THINGS TO DIFFERENT COMPANIES DEPENDING ON THEIR FIELDS OF ACTIVITY.”

BAYER

In the case of Bayer, the company is diversified into Animal Health, CropScience, and Chemicals as well as pharmaceuticals. The company is showing results of the refocus on pharmaceuticals with recent investments into research and development with a return to the Top 100 Global Innovators from 2015 onwards. More than a third of its published patent applications in 2017 were for new chemical entities. Only one of these was for a biological, unlike many other large pharma companies, with WO2017087391 claiming a mAb acting as a coagulation stimulator for use in treating hemophilia or other bleeding diseases. Bayer entered into a potential $1.11 billion deal in November with Peptidream hoping the latter's popular therapeutic peptide discovery platform will help it discover novel lead structures in areas such as cancer and cardiology. Earlier in November, Bayer inked a potential $1.55 billion deal with Loxo Oncology Inc., securing rights to two small-molecule candidates for the treatment of genetically defined cancers. Bayer will have the right to develop and commercialize all compounds resulting from the collaboration.

> "ONE PCT APPLICATION UNVEILED BY ABBOTT APPEARS TO PROTECT A NEW TROPONIN TEST DESIGNED TO IDENTIFY HEART ATTACKS EARLIER IN WOMEN."

“COLLABORATION PLAYS A SIGNIFICANT PART THROUGH RESEARCH FUNDING OF SMALLER ENTERPRISES OR LICENSING DEALS.”

NOVARTIS

Novartis, as well as having a focus on the discovery and development of new drugs, also includes its Sandoz group of companies focusing on generics and biosimilars. This means that innovation is happening in different ways in the two parts of the company. For Sandoz, its patent focus is almost equally on new formulations and new crystal forms or salts of an originator product and on biosimilars with novel processes running a close third – with all patent publications being linked to a known drug product. This is much as one would expect from a generics/biosimilar company.

The company is obviously looking well into the future however, as one PCT application published this year claims a formulation of selexipag, developed by Actelion for the treatment of pulmonary arterial hypertension, which was acquired by J&J in 2017. Patent protection for selexipag is not due to expire for at least another 10 years, whilst the USA Orange book reports that selexipag has NCE and Orphan exclusivities until December 2020 and 2022, respectively. This could be an indication however that Sandoz intends to challenge some of the patents once the NCE and Orphan exclusivities have expired.

In a bold move, Novartis proposed in October 2017 buying radiopharmaceuticals specialist Advanced Accelerator

Applications SA (AAA) in a deal valuing the company at $3.9 billion. The transaction would add the EU-approved neuroendocrine tumor therapy Lutathera (lutetium [177Lu] oxodotreotide) to the company's portfolio, as well as a new technology platform that Novartis said has potential applications across a number of early oncology development programs.

With a pair of drugs devoted to what Ionis Pharmaceuticals Inc. CEO Stanley Crooke called "systematically knocking off the remaining lipid risk factors" for patients facing cardiovascular (CV) trouble, the company and its subsidiary, Akcea Therapeutics, closed their potential $1.6 billion deal [in February] with Novartis.

ROCHE

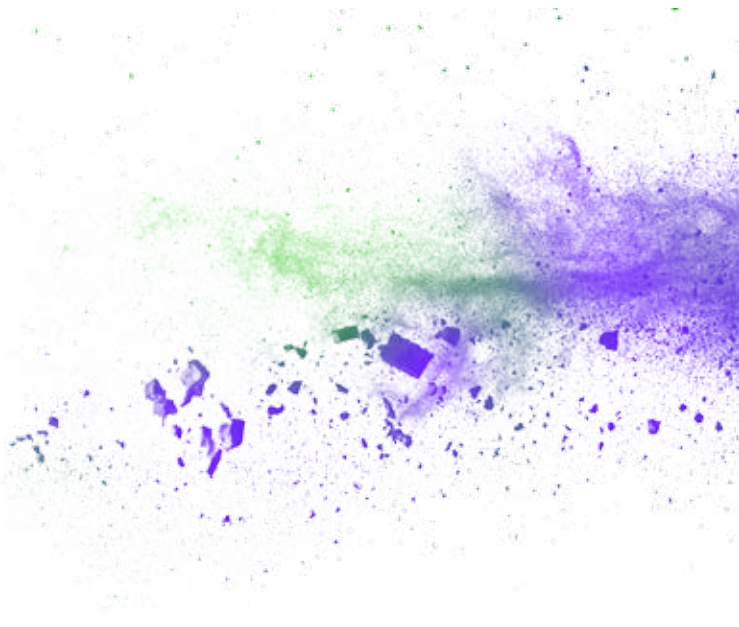
The Roche group is mainly focused on new drugs and, at least in part due to its Genentech subsidiary, there is a strong focus on Biological, especially antibody, products. Its IP portfolio reflects that focus with an almost even split between patents claiming new small molecules and new biological (macromolecular) entities. However, reflecting the need to more precisely target new drugs to subsets of an indication or to patients most likely to respond to the treatment, the number of diagnostic patents or applications published matches, if not exceeds, the number of "product" type patents.

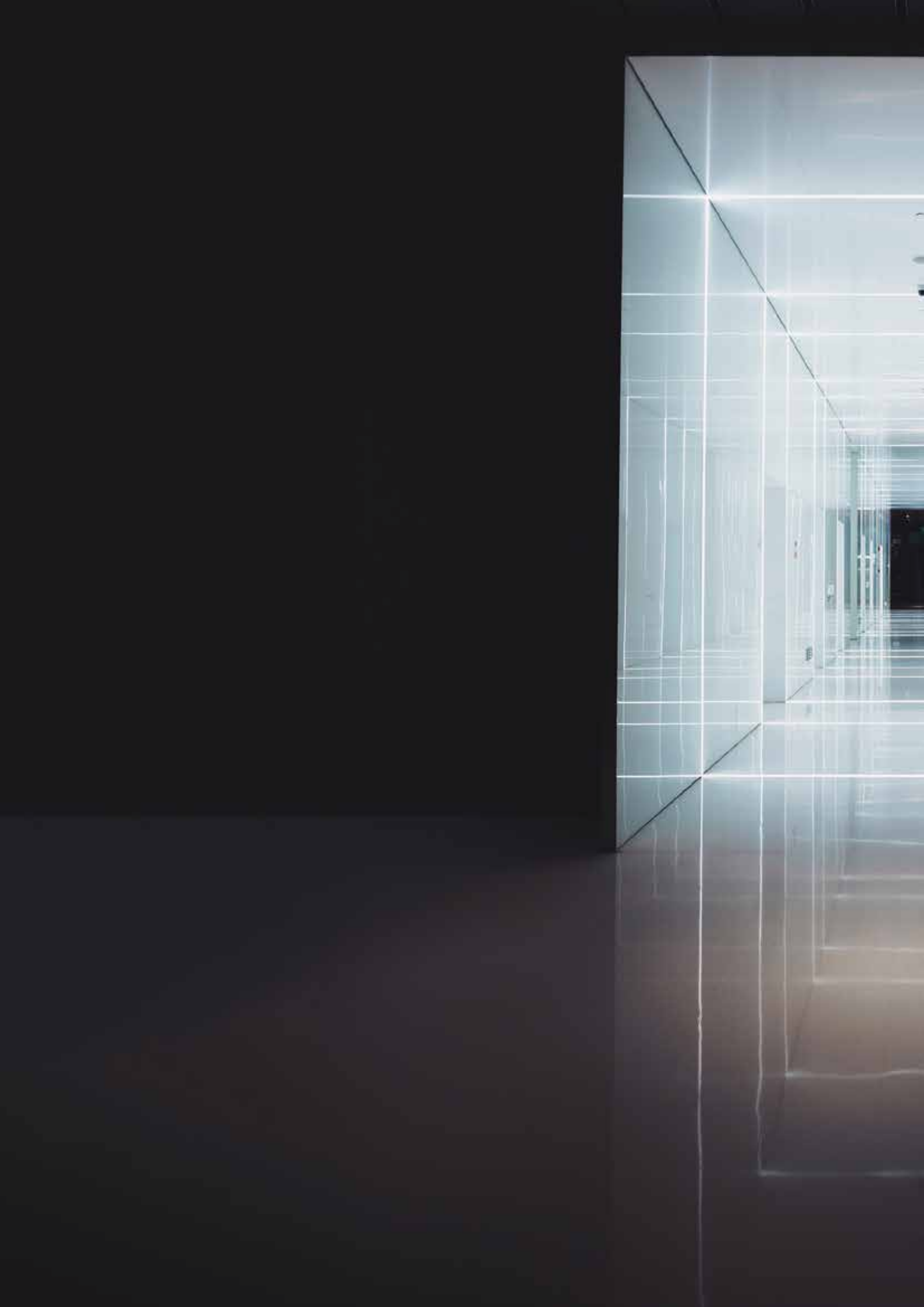
An example is Roche's atezolizumab, approved in the USA in 2016 and in Europe during 2017 and marketed as Tecentriq®, for which nine patent families were published in the last year. Of these one claims the drug product, whilst five of the others include diagnostic claims and five include combination claims (some having both types of claims). WO2017151502, for example, provides methods of treating bladder cancer and methods of determining whether a patient suffering from bladder cancer is likely to respond to treatment comprising a PD-L1 axis binding antagonist (e.g. atezolizumab or durvalumab).

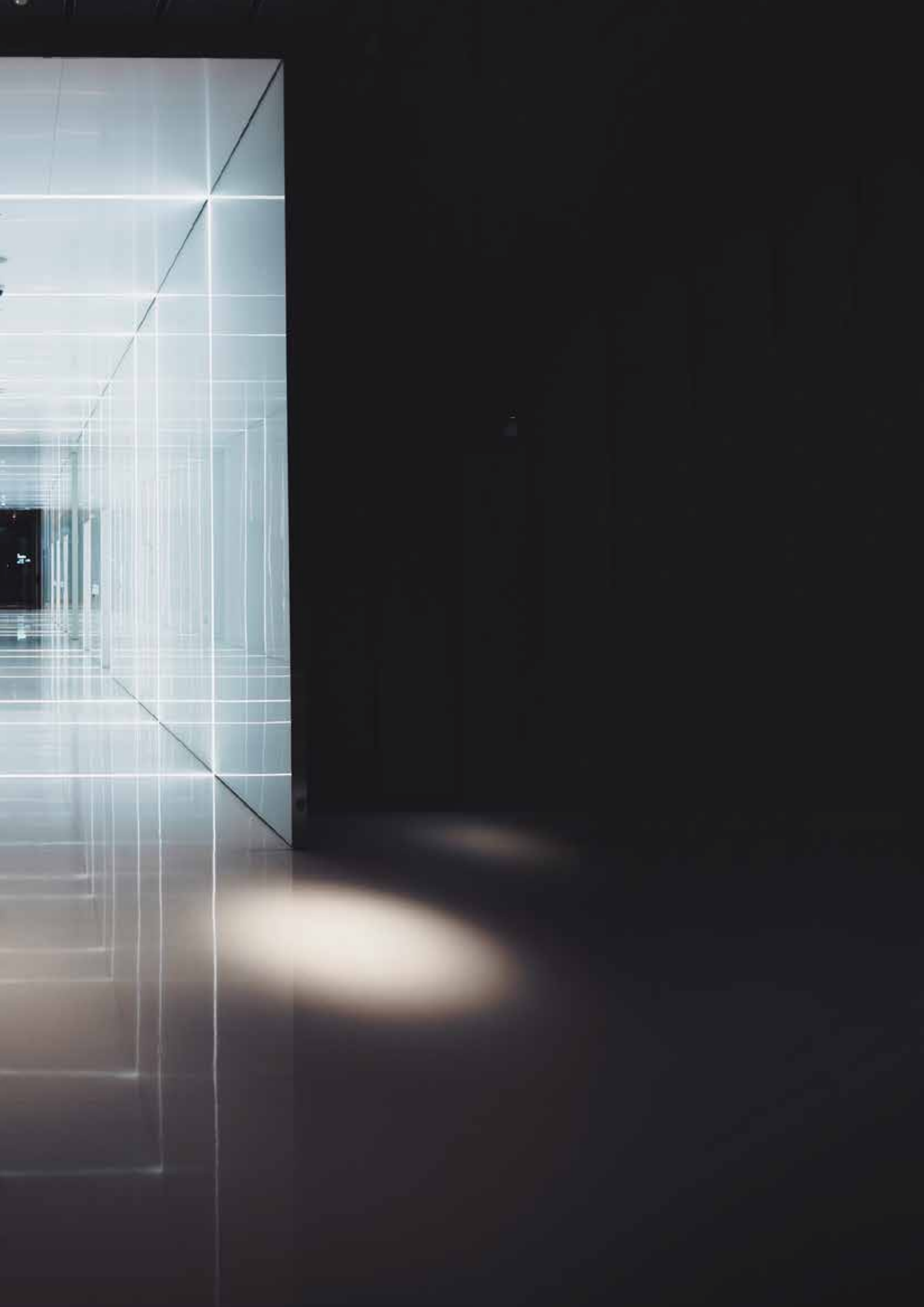
JOHNSON & JOHNSON

In addition to inhouse development, Johnson & Johnson's patenting this year shows how larger pharmaceutical companies are handling their innovation in today's climate. Eight of the company's published patent applications that claimed new entities were filed by Actelion, the Swiss company acquired by J&J during 2017. Overall, new entity patenting for small molecules and biologics accounted for the biggest proportion of the patents published in 2017, although new formulations, new uses and combinations were also well represented. This included patenting for products that were in-licensed or co-developed by J&J, such as canagliflozin, and daratumumab and for which initial product patents would have been filed by the originator companies, indicating that innovation doesn't end with the discovery of the new entity and its initial use.

> "INNOVATION DOESN'T END WITH THE DISCOVERY OF THE NEW ENTITY AND ITS INITIAL USE."







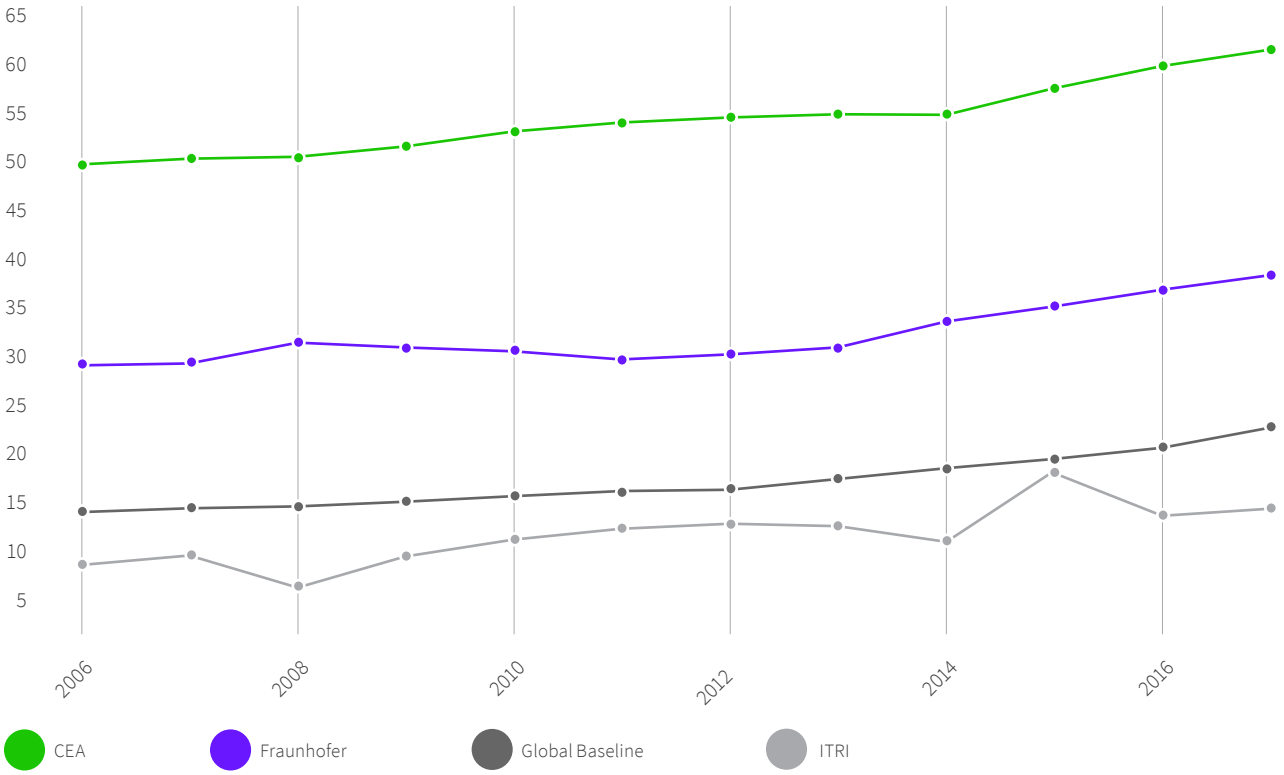
SCIENCE AND SYNERGY

COLLABORATION OF INSTITUTION AND GOVERNMENT RESEARCH IS ON THE RISE

This sector in the Top 100 Global Innovators has dropped from five organizations to three this year. The two organizations missing are French research institutes, IFP Energies Nouvelles and CNRS. These organizations have both seen a drop-off in success and impact metrics which have seen them miss out of the Top 100 for the first time in seven years.

Institution and Government research has become increasingly collaborative in recent years. For the three representatives of the Institution and Government research sector on the 2017 Top 100 Global Innovators list this year, this approach is reflected in the number of scientific papers which are internationally co-authored with other organizations. (Figure 9.)

FIGURE 9: INTERNATIONALLY CO-AUTHORED PAPERS BY GOVERNMENT & INSTITUTION ORGANIZATIONS
SOURCE: INCITES/WEB OF SCIENCE



Both CEA and Fraunhofer exceed the global baseline by some margin. Over the period from 2006–2017, 17.3 percent of papers globally are co-authored internationally; for CEA and Fraunhofer, that figure is 54.5 percent and 32.4 percent respectively. ITRI collaborates slightly less than the global average with 11.5 percent of papers published jointly during 2006–2017.

The major areas of research focus by scientific discipline are shown in Figure 10.

In addition, CEA specialises in a number of unique research areas not prominent at Fraunhofer or ITRI as shown below:

FOCUS RESEARCH AREAS UNIQUE TO CEA

SCIENTIFIC DISCIPLINE	# PAPERS 2006–2017
Astronomy & Astrophysics	7530
Physics, Particles & Fields	5229
Nuclear Science & Technology	4469
Physics, Nuclear	4061
Physics, Fluids & Plasmas	2261

17.3%

OF PAPERS GLOBALLY ARE CO-AUTHORED INTERNATIONALLY

Looking at the technology areas of most patenting activity within the Institution & Government research sector, we see in Figure 11 that the portfolios of CEA, Fraunhofer and ITRI are somewhat different. ITRI leads in digital computing, telephone and data transmission systems and memories, film and hybrid circuits; CEA shows strength in electro-(in) organics, semiconductors, scientific instrumentation and electrochemical storage; and Fraunhofer is focused on audio/video recording systems with some strength also in digital computing, scientific instrumentation and electro-(in)organics.

FIGURE 10: MAJOR AREAS OF RESEARCH FOCUS BY SCIENTIFIC DISCIPLINE. **SOURCE:** WEB OF SCIENCE

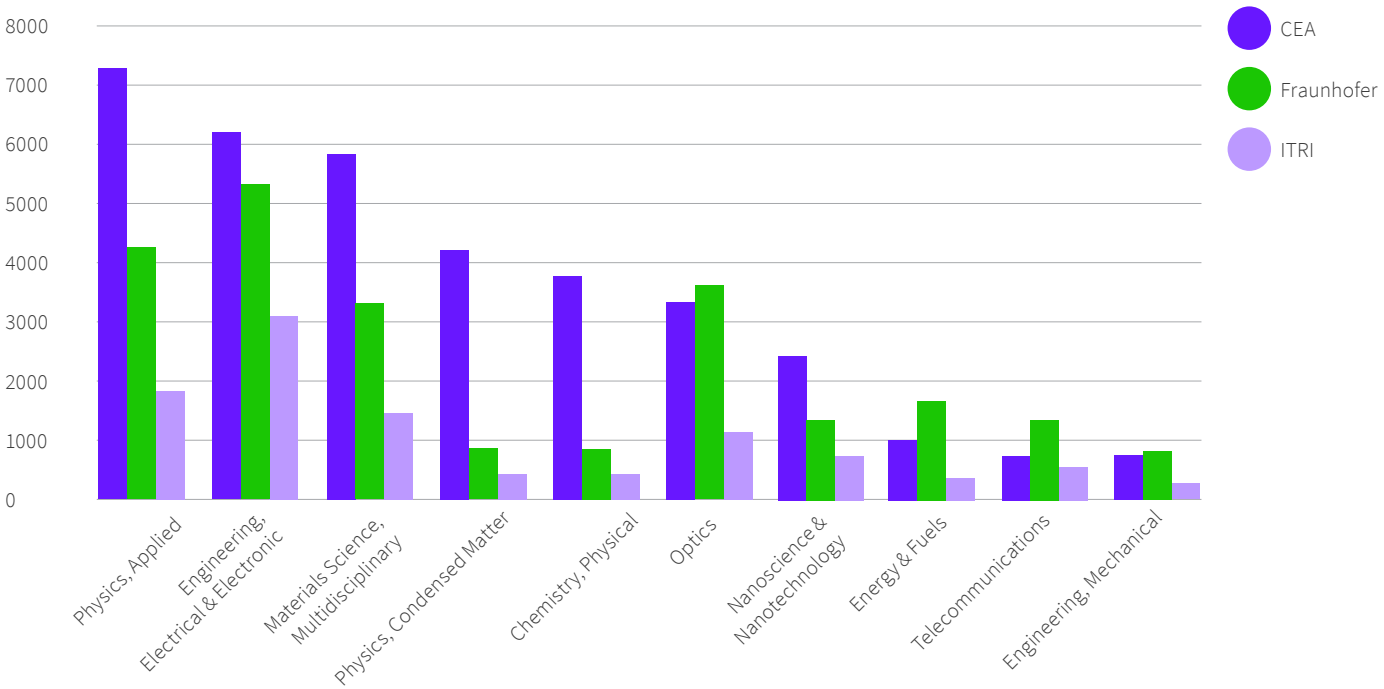
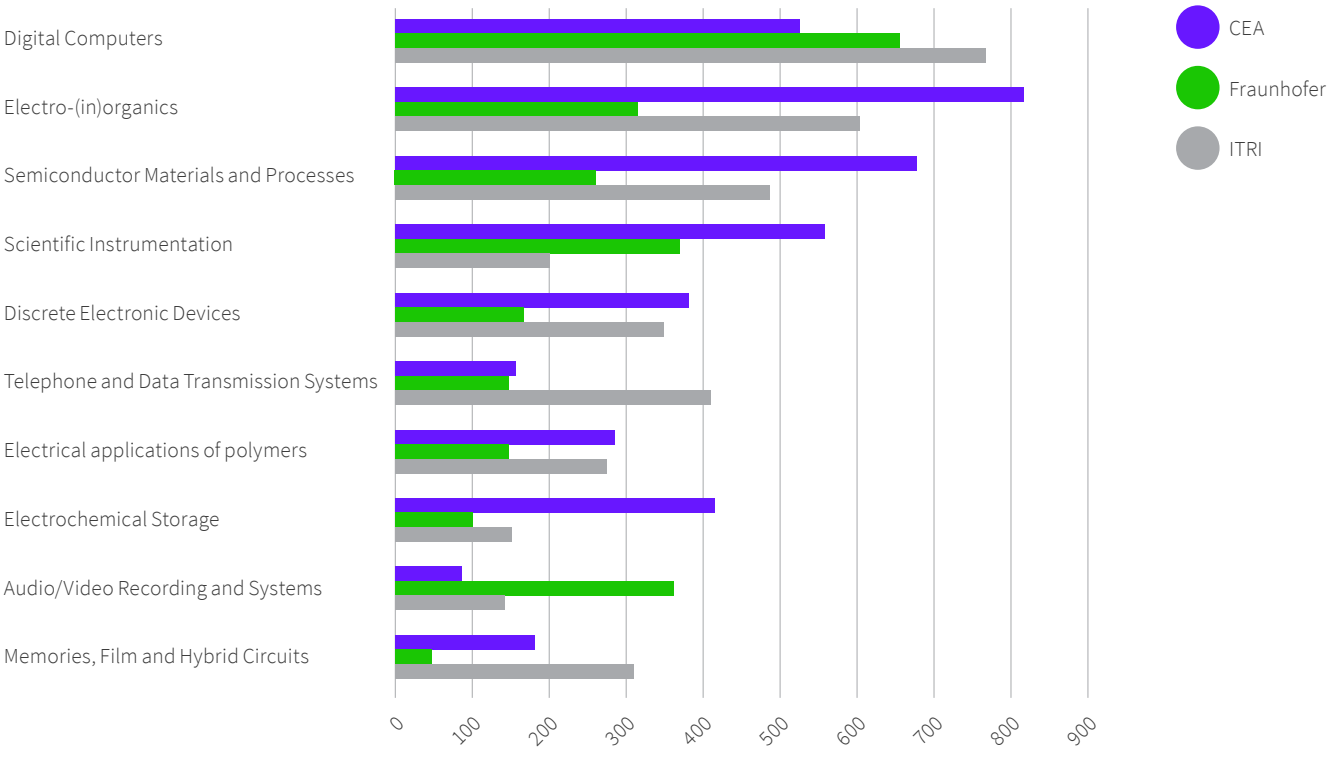


FIGURE 11: GOVERNMENT & INSTITUTION PATENT PORTFOLIO MIX FOR NEW INVENTIONS 2012–2016.
SOURCE: DERWENT WORLD PATENTS INDEX



LAW FIRMS

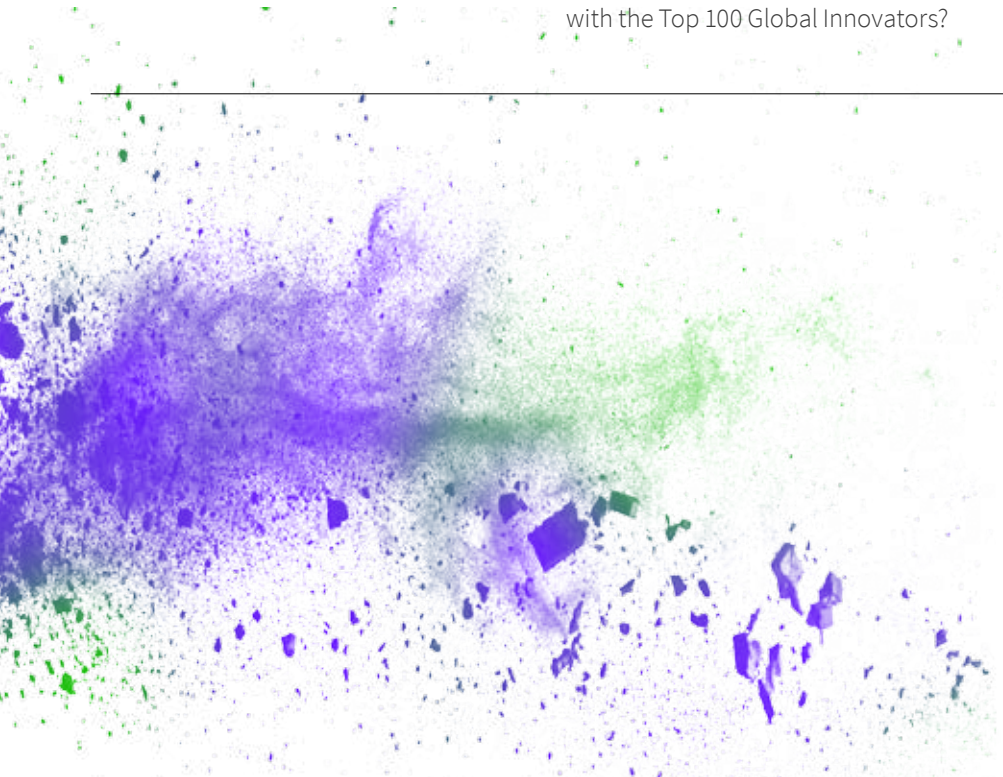
THE ECOSYSTEM THAT INNOVATORS RELY UPON INCLUDES THE IMPORTANT ROLE THAT LAW FIRMS PLAY IN HOW INNOVATORS SECURE IP RIGHTS TO PROTECT THEIR INVESTMENTS

The innovation lifecycle is built on discovery and the Top 100 Global Innovators in this report have a deep commitment to investment in research & development to ensure a continual flow of new ideas which can then be protected with patents and commercialized through associated products and services. Although many of these organizations have their own IP groups, law firms play a major part in supporting the protection and commercialization of those ideas and helping innovators realize the full return on their investment.

So who are the law firms that partner with the Top 100 Global Innovators?

To answer that question, we took a look at the Top 100 companies and reviewed their patents to identify the major law firms working with these top innovators.

Using Derwent Innovation, for each Top 100 company, we identified the law firms working as the agent for their portfolio of patent families published over the five years from 2012–2016 [4] and totaled up the volumes for each law firm to give the overall count of patents assigned to Top 100 companies that each law firm handled. The Top 25 law firms representing the 2017 Top 100 Global Innovators are reported here for each geographic region.



> “LAW FIRMS PLAY A MAJOR PART IN SUPPORTING THE PROTECTION AND COMMERCIALIZATION OF IDEAS AND HELPING INNOVATORS REALIZE THE FULL RETURN ON THEIR INVESTMENT.”

[4] DATA WERE DRAWN FROM ALL PATENT DOCUMENTS MENTIONING A PATENT ATTORNEY IN THE DERWENT INNOVATION FULL TEXT COLLECTION OF OVER 111 MILLION RECORDS. NOT ALL RECORDS FOR ALL AUTHORITIES CARRY ATTORNEY DATA – FOR EXAMPLE, AROUND 70% ONLY OF PCT APPLICATIONS CONTAIN ATTORNEY DATA. DATA WERE NORMALISED BY LAW FIRM AND CORPORATE LAW DEPARTMENTS WERE EXCLUDED.

NORTH AMERICAN LAW FIRMS

Borden Ladner Gervais LLP	Canada
Craig Wilson & Company	Canada
Gowling WLG	Canada
Smart & Biggar/Fetherstonhaugh	Canada
Altis Law Group, Inc.	USA
Birch Stewart Kolasch Birch LLP	USA
Blakely Sokoloff Taylor Zafman LLP (now Womble Bond Dickinson)	USA
Dentons	USA
Fish & Richardson P.C.	USA
Fitzpatrick, Cella, Harper & Scinto	USA
Foley & Lardner LLP	USA
Global IP Counselors	USA
Harness, Dickey & Pierce	USA
Kilpatrick Townsend & Stockton LLP	USA
Knobbe Martens Olson & Bear LLP	USA
Lee & Morse P.C.	USA
Lee, Hong, Degerman, Kang & Waimey	USA
McDermott Will & Emery	USA
Novak Druce Connolly Bove + Quigg LLP	USA
Oblon, McClelland, Maier & Neustadt LLP	USA
Oliff PLC	USA
Schwegman Lundberg & Woessner P.A	USA
Staas & Halsey LLP	USA
Sughrue Mion PLLC	USA
Wenderoth Lind & Ponack	USA

ASIAN LAW FIRMS

Beijing Sanyou Intellectual Property Agency Ltd.	China
CCPIT Patent And Trademark Law Office	China
China Patent Agent (HK) Ltd.	China
China Science Patent & Trademark Agent Ltd.	China
China Sinda Intellectual Property	China
King & Wood Mallesons	China
Leader Patent & Trademark Firm	China
Linda Liu & Partners	China
Liu Shen & Associates	China
NTD Patent & Trademark Agency Ltd.	China
Shanghai Patent & Trademark Law Office LLC	China
Unitalen Attorneys At Law	China
Zhongzi Law Office	China
C&S Patent and Law Office	South Korea
FirstLaw P.C.	South Korea
Koreana Patent Firm	South Korea
NAM & NAM World Patent & Law Firm	South Korea
PanKorea Patent & Law Firm	South Korea
ROYAL Patent & Law Office	South Korea
Y.P. Lee, Mock & Partners	South Korea
Eikoh Patent Firm P.C.	Japan
Fukami Patent Office P.C.	Japan
Sakai International Patent Office	Japan
Shinjyu GLOBAL IP	Japan
Taiyo Nakajima & Kato	Japan

EUROPEAN LAW FIRMS

Brevalex	France
CABINET PLASSERAUD	France
Epping Hermann Fischer	Germany
Grünecker Patent- und Rechtsanwälte, PartG mbB	Germany
Herzog Fiesser & Partner	Germany
Hoefer & Partner Patentanwälte mbB	Germany
Kuhnen & Wacker Patent- und Rechtsanwaltsbüro	Germany
Maiwald Patentanwalts GmbH	Germany
MERH-IP, Matias Erny Reichl Hoffmann	Germany
Müller-Boré & Partner Patentanwälte PartG mbB	Germany
Pfenning, Meinig & Partner mbB	Germany
TBK	Germany
Ter Meer Steinmeister & Partner	Germany
Viering, Jentschura & Partner mbB	Germany
Vossius & Partner	Germany
Winter, Brandl, Fürniss, Hübner, Röss, Kaiser, Polte	Germany
WITTEWELLER Patentanwälte	Germany
N.V. Nederlandsch Octrooibureau	Netherlands
Appleyard Lees IP LLP	UK
Boult Wade Tennant	UK
D Young & Co LLP	UK
Gill Jennings & Every LLP	UK
HGF Limited	UK
Hoffmann Eitle	UK
Marks & Clerk	UK

REST OF THE WORLD LAW FIRMS

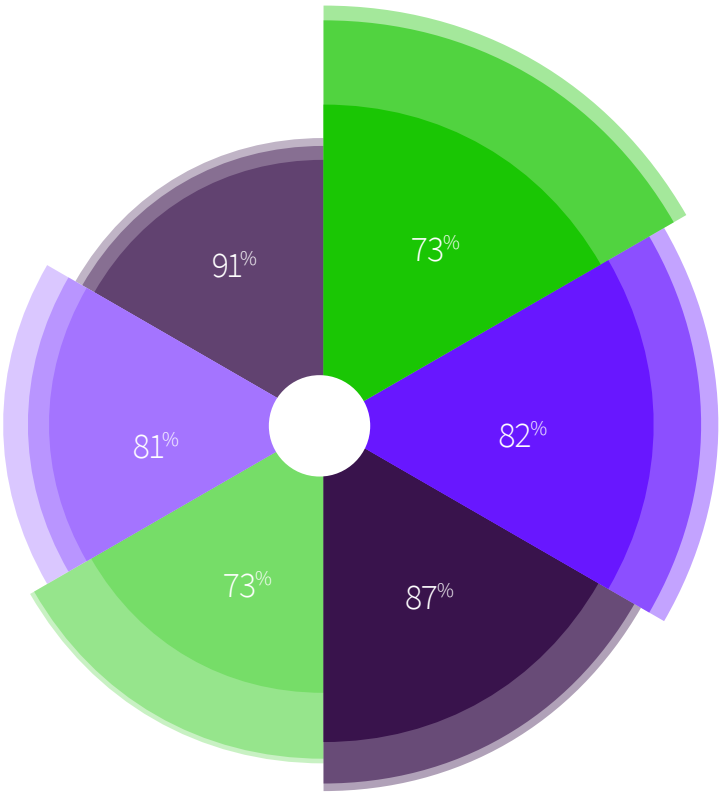
Davies Collison Cave	Australia
FB Rice	Australia
FPA Patent Attorneys	Australia
Griffith Hack	Australia
Phillips Ormonde Fitzpatrick	Australia
Pizzeys Patent and Trade Mark Attorneys Pty Ltd	Australia
Watermark	Australia
Dannemann Siemsen Bigler & Ipanema Moreira	Brazil
AMICA LAW LLC	Singapore
Drew & Napier LLC	Singapore
Spruson & Ferguson (Asia)	Singapore

“LAW FIRMS PLAY A MAJOR PART IN SUPPORTING THE PROTECTION AND COMMERCIALIZATION OF IDEAS AND HELPING INNOVATORS REALIZE THE FULL RETURN ON THEIR INVESTMENT.”

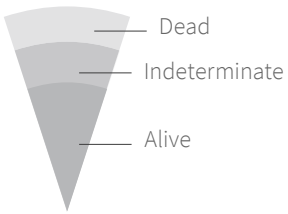
SUCCESSFUL INNOVATORS ARE THOSE THAT SUCCEED IN OBTAINING STRONG PATENT RIGHTS FOR INVENTIONS THAT LAY OUT NEW AND INFLUENTIAL WAYS OF ADDRESSING UNMET NEEDS


O SUCCESS

FIGURE 12: COMPARISON OF PORTFOLIO LEGAL STATUS FOR TOP 100 GLOBAL INNOVATORS AND NON-TOP 100 COMPANIES IN THE SOFTWARE SECTOR



TOP 100 PORTFOLIO LEGAL STATUS



Microsoft
Google
Amazon
Facebook
Oracle
Symantec

ALL PATENTS 2012–2016:
MICROSOFT 52145
GOOGLE 36786
AMAZON 10999
FACEBOOK 8578
ORACLE 8392
SYMANTEC 3649

"TOP 100 GLOBAL INNOVATORS ARE MORE COMMITTED TO MAINTAINING AND REALIZING RETURNS ON THEIR INNOVATION THROUGH IP PROTECTION THAN NON-TOP 100 COMPANIES."

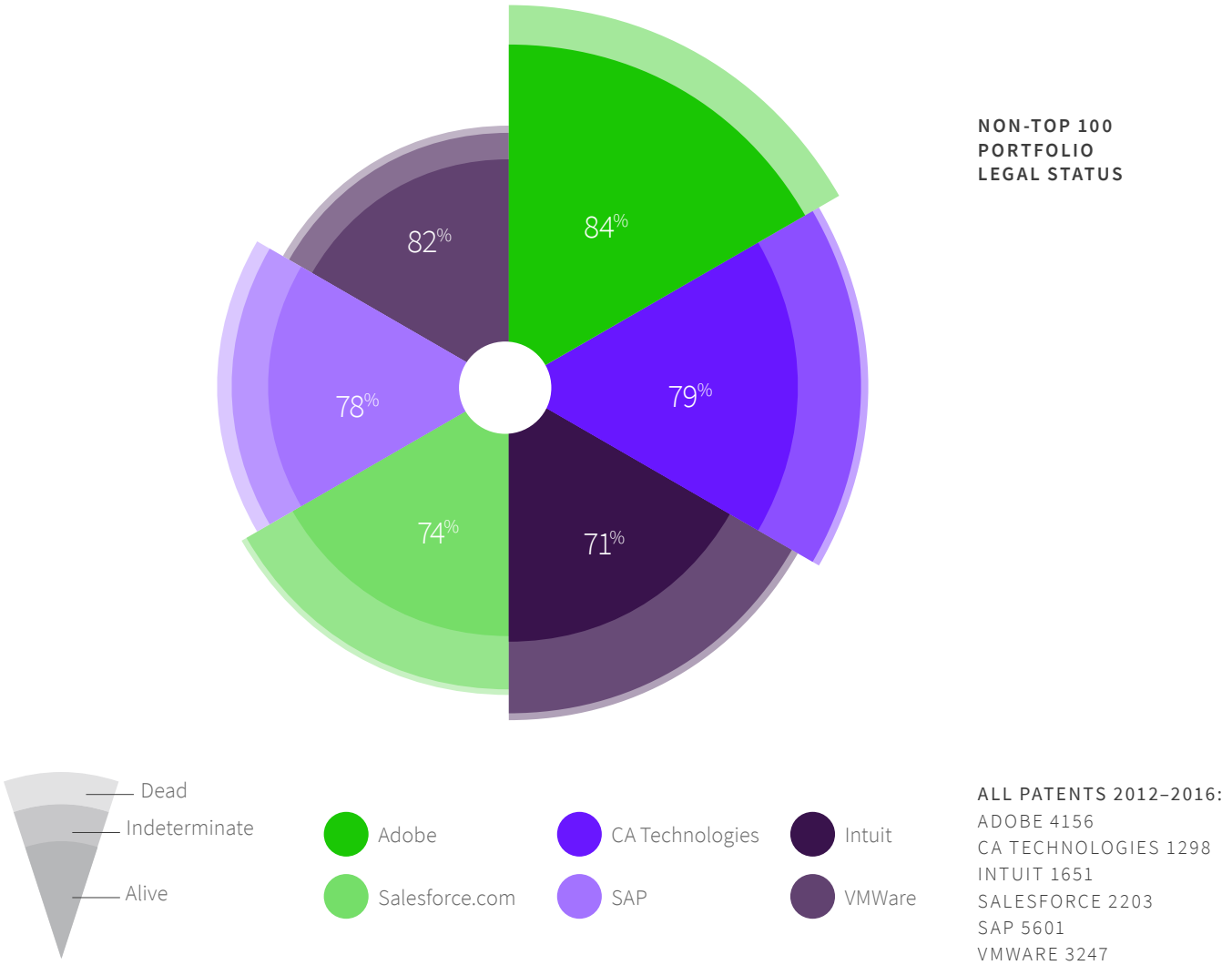
Innovation is the process of realizing value from ideas. It starts with creativity and ends with a tangible means to generate commercial return. In between, the conversion of idea to practical reality requires application, dedication and perseverance. As Thomas Edison put it, "success is ten percent inspiration and ninety percent perspiration".

It follows then that successful innovators are not just good at creating new ideas, but excel in translating them into successful products, goods and services.

At the root of that process is the protection of ideas to allow the originator to obtain reward for their creativity safe from exploitation by others. Strong protection provides the right environment for the commitment and investment necessary to develop ideas to fruition.

That protection is afforded by patents. Successful innovators are those that succeed in obtaining strong patent rights across multiple markets for inventions that lay out new and influential ways of addressing unmet needs.

FIGURE 13: COMPARISON OF PORTFOLIO LEGAL STATUS FOR TOP 100 GLOBAL INNOVATORS AND NON-TOP 100 COMPANIES IN THE SOFTWARE SECTOR



To illustrate this, a comparison of some selected 2017 Top 100 Global Innovators with those outside the group has been conducted using the insights available from Derwent Innovation. As one of the fastest growing industry sectors in this year's Top 100 analysis, the Software sector was chosen and the six Top 100 companies (Amazon, Facebook, Google, Microsoft, Oracle and Symantec) compared to an equal number of firms by size outside the Top 100 (Adobe , CA Technologies, Intuit, Salesforce.com, SAP, and VMWare).

Comparison of the portfolio legal status for Top 100 and non-Top 100 software cohorts shows that Top 100 software companies have a higher proportion of their portfolios which are still active (between 73 percent and 91 percent with an average of 81.3 percent alive) than the non-Top 100 companies (ranging from 71 percent to 84 percent with an average of 77.8 percent alive). This shows that Top 100 Global Innovators are more committed to maintaining and realizing returns on their innovation through IP protection than non-Top 100 companies.

> "INNOVATION IS THE PROCESS OF REALIZING VALUE FROM IDEAS."

Comparing the published application countries & regions for the Top 100 and non-Top 100 software groups, Top 100 software companies have 39 percent of their portfolio published in US, 17 percent as PCT patents, 13 percent as EP patents, 11 percent in China and then in 21 remaining countries & regions. Non-Top 100 companies have 80 percent of their portfolio published in US, seven percent as EP patents, three percent as PCT patents and then in 13 remaining countries & regions.

It is clear then that Top 100 software companies maintain a higher proportion of their IP rights and are seeking protection more widely in multiple jurisdictions for their inventions than the non-Top 100 companies and conform to the profile described of a successful innovator.

FIGURE 14: TOP 100 COHORT: TOTAL PATENT FAMILIES WITH BASICS PUBLISHED 2012–2016

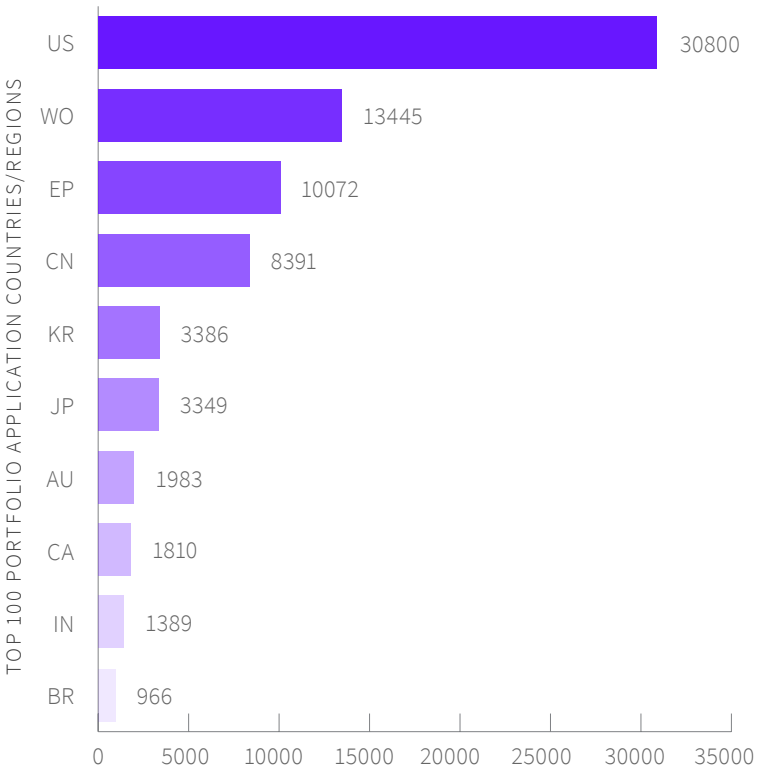
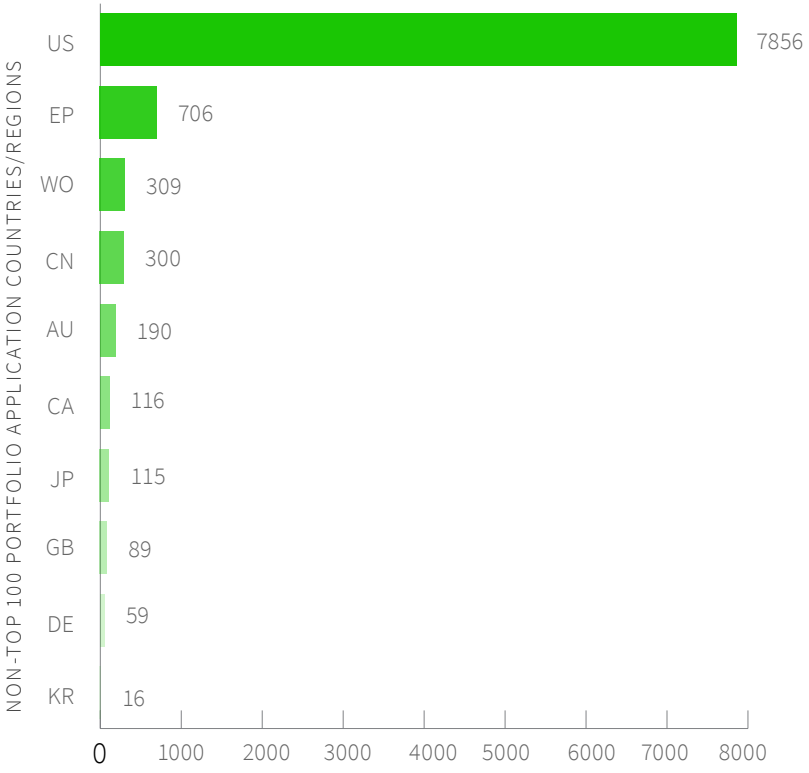
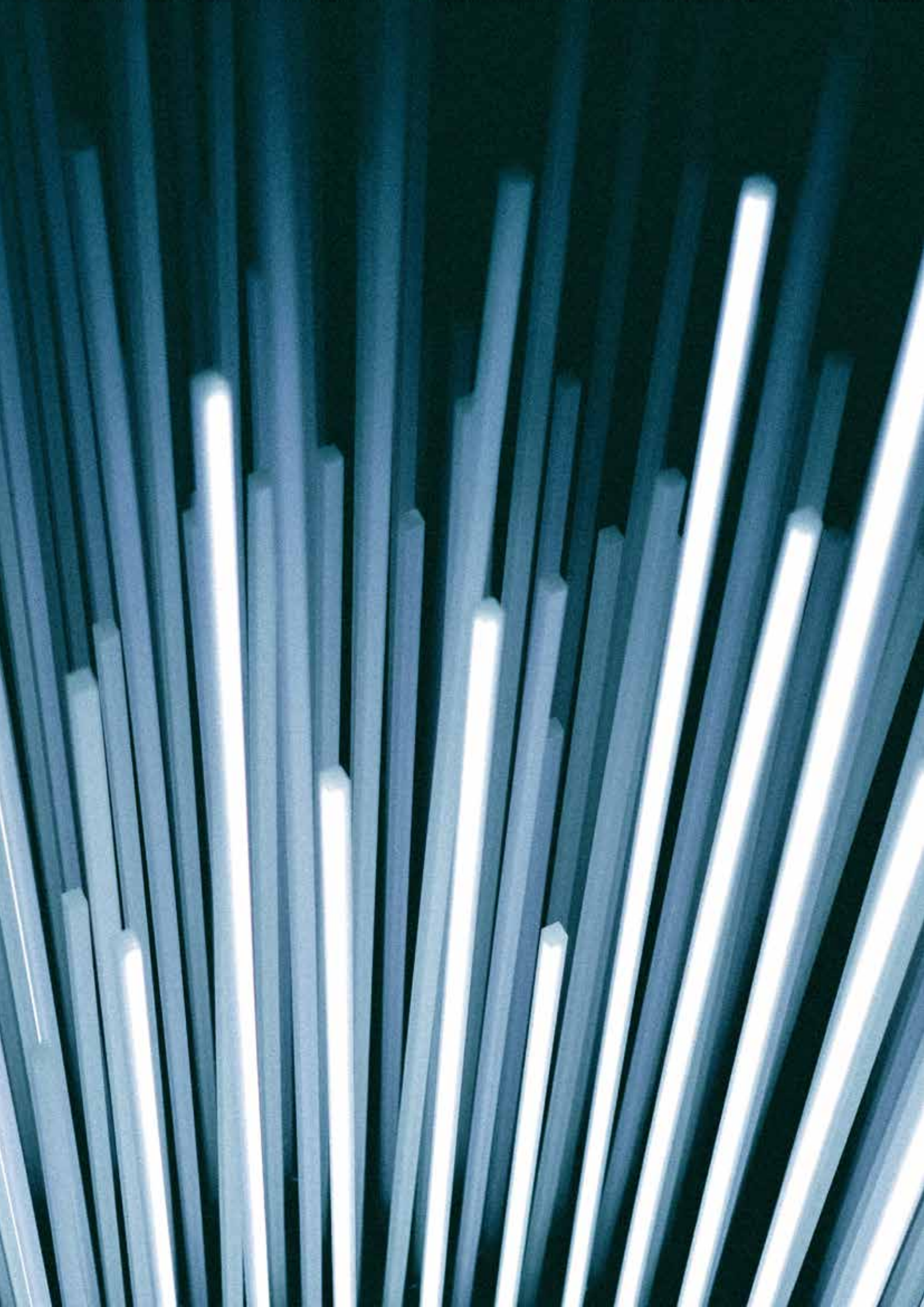
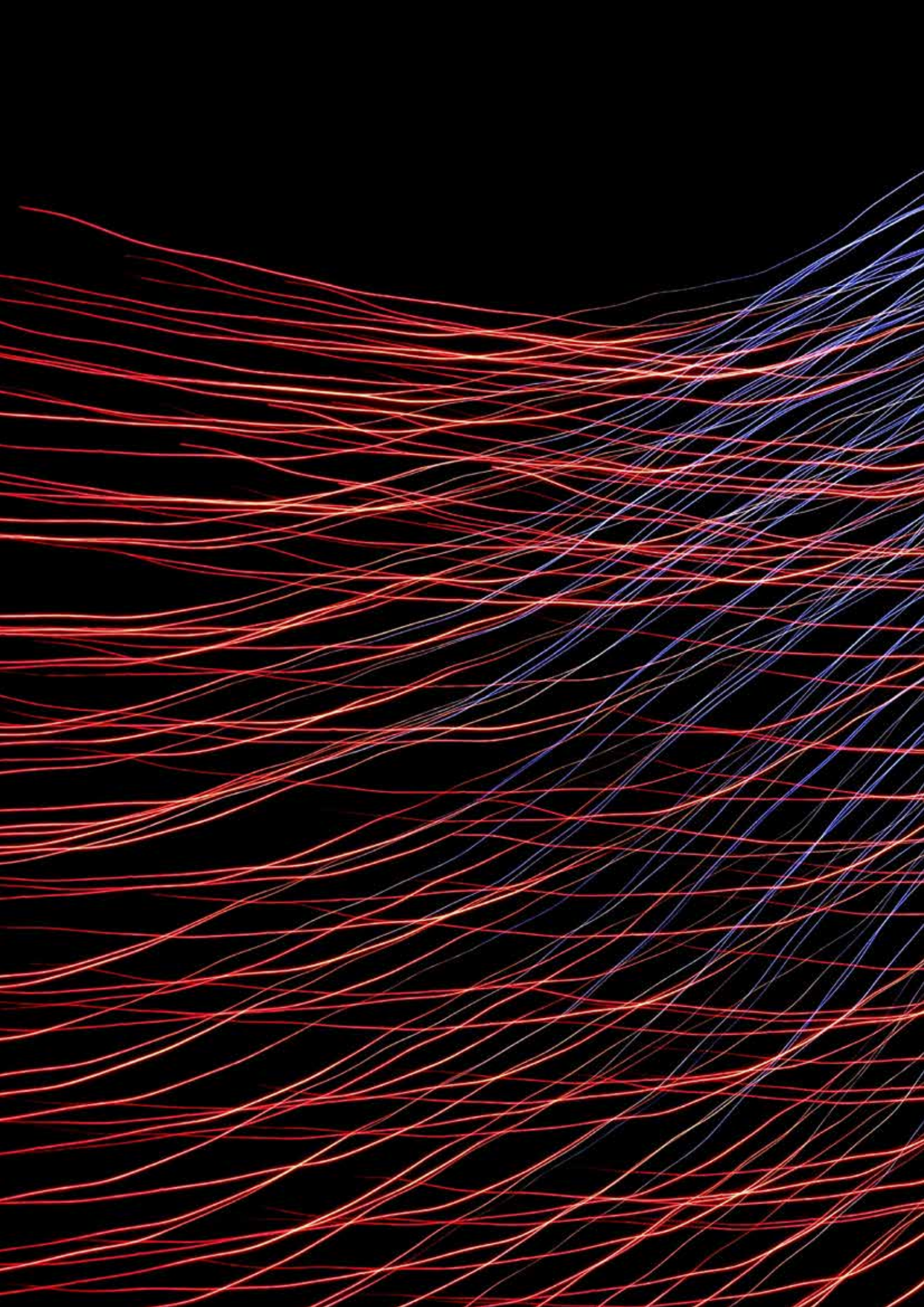


FIGURE 15: NON-TOP 100 COHORT: TOTAL PATENT FAMILIES WITH BASICS PUBLISHED 2012-2016







CONCLUSION

Innovation is the process of realizing value from ideas. That value is created through investment of time, resources and money in developing good ideas that can bring tangible benefit to society. In order to sustain innovation going forward, that investment must be rewarded with sufficient monetary return.

For businesses, commercial return ensures long-term sustainability of activities; for academia, income from innovation can fund further research to sustain the innovation lifecycle; and for governments, return on innovation investment means security of job provision, economic growth, and health and welfare benefits for society.

The Top 100 Global Innovators are the organizations, commercial, institutional or governmental, that most successfully create value from ideas through mastering the innovation process. Clarivate Analytics is proud to acknowledge and celebrate their success and the contribution they make to enriching our future.

QUANTIFYING SUCCESS

AT CLARIVATE ANALYTICS, WE USE A UNIQUE METHODOLOGY TO ANALYZE PATENT AND CITATION DATA ACROSS FOUR MAIN CRITERIA

> 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."

Patents are 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 straight counting of the volume of patents, while 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 using Clarivate solutions including *Derwent World Patents Index (DWPI), Derwent Innovation* and *Derwent Patent Citations Index (DPCI).*

VOLUME

All organizations with 100 or more patented new inventions covered by a granted patent 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, etc., 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 describing the same invention.

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

GLOBALIZATION

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 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.

> "PROTECTING AN INVENTION IN MAJOR WORLD MARKETS IS AN INDICATION OF THE SIGNIFICANT VALUE A COMPANY PLACES ON ITS INNOVATION."

SUCCESS

Not all patent applications pass through the examination process and 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.

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 TOP 100 GLOBAL INNOVATORS LIST.

CLARIVATE ANALYTICS

WE ARE A GLOBAL, INFORMATION-LED COMPANY WITH A MISSION: TO DELIVER PRODUCTS AND SERVICES THAT SUPPORT EVERY PHASE OF THE INNOVATION LIFECYCLE.

Building on a heritage going back more than a century and a half, we have built some of the most trusted brands across the innovation lifecycle, including Web of Science, Cortellis, Derwent, CompuMark, MarkMonitor and Techstreet. Today, Clarivate Analytics is a new and independent company on a bold entrepreneurial mission to help our clients radically reduce the time from new ideas to life-changing innovations.

FOR MORE INFORMATION PLEASE VISIT
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THE NEED FOR SPEED

OUR PRODUCTS BELOW PROVIDE TRUSTED INSIGHTS AND ANALYTICS TO ACCELERATE THE PACE OF INNOVATION

DERWENT PATENTS CITATION INDEX

For identifying possible partners, threats and ways to evolve a technology area Derwent Patents Citation Index (DPCI) is a value-added citation database with both patent and scholarly literature citations. These trace historical references on which an invention is built, as well as an invention's impact and future technologies that advance it.

Updated weekly, there are more than 11 million patent families and unique inventions that have been editorially enhanced for following forward and backward citations. With this insight, users can identify potential licensing partners, competitive threats and ways to evolve core intangible assets.

Within Derwent Innovation, DPCI is combined with the Derwent World Patents Index (DWPI) to provide the widest perspective of an invention and its impact and influence.

DERWENT WORLD PATENTS INDEX

For validity and infringement insight, unearthing existing prior art, identifying white space and performing competitive landscape research Derwent World Patents Index (DWPI) is the world's most trusted and authoritative source of global patent information, covering 50 patent-issuing authorities. Bibliographic patent information is translated into English and editorially enhanced to bring clarity to a patent's true intentions.

A team comprising hundreds of editors, most with advanced degrees in their areas of specialization, incorporate value-added insight alongside original patent content to accurately understand the scope of an invention.

The world's first and only such patent search resource, with over 50 years of longevity and trusted by nearly 40 of the world's patent offices, DWPI is a unique and unparalleled resource for patent research.

"PROTECTING AN INVENTION IN MAJOR WORLD MARKETS IS AN INDICATION OF THE SIGNIFICANT VALUE A COMPANY PLACES ON ITS INNOVATION."

DERWENT INNOVATION

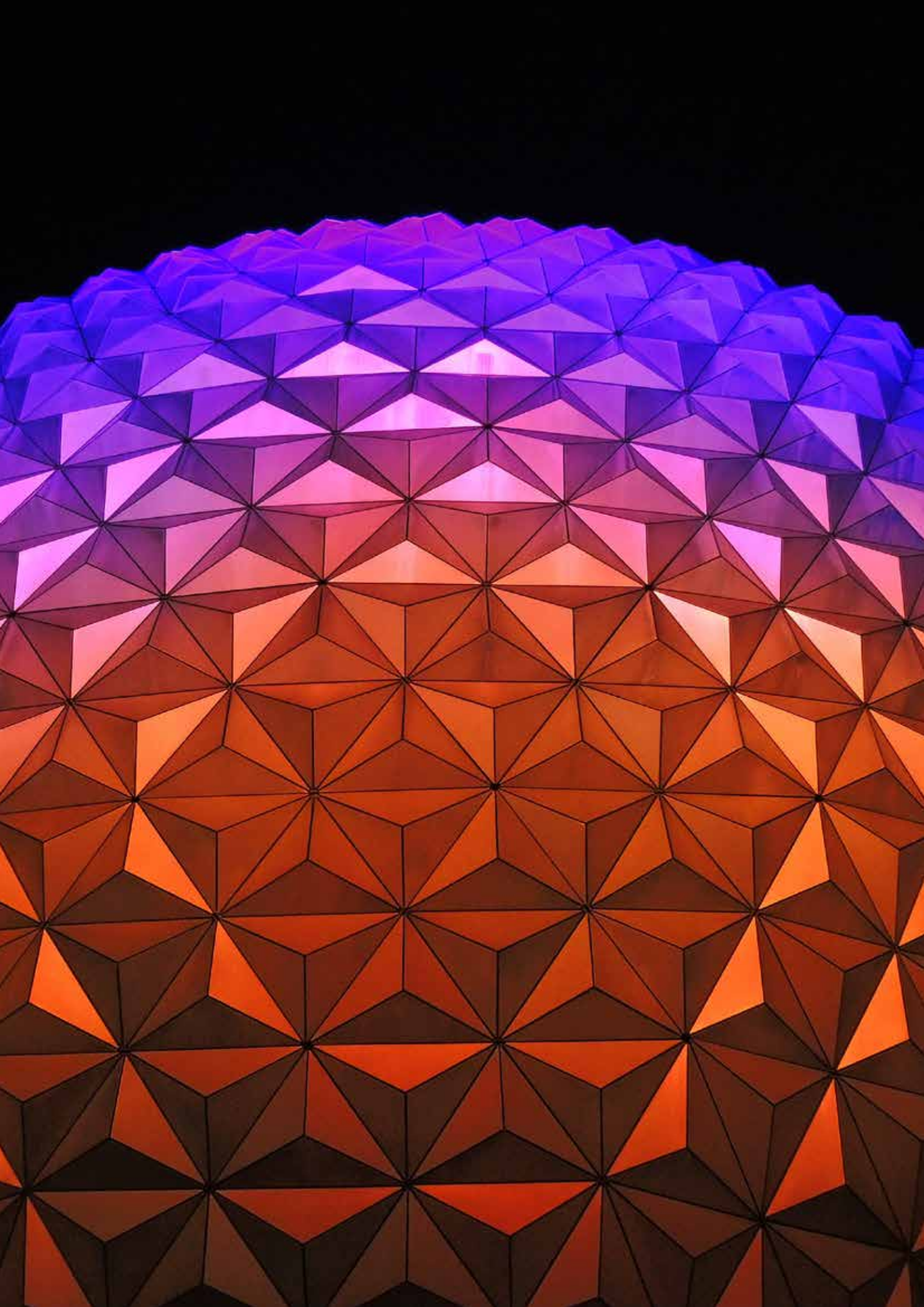
Derwent Innovation powers the IP markets. Only Derwent Innovation provides the comprehensive, relevant, reliable information you need to save time, avoid risk, and create commercial gain. Don't worry about checking multiple sources, coping with foreign languages, or dealing with incomplete records. In Derwent Innovation access the most trusted global patent data and scientific literature with powerful capabilities to perform analysis and collaborate efficiently.

As the leader in global patent intelligence and collaboration, we could have rested on our laurels. Instead we have made significant investments in Derwent Innovation to continue to deliver customer value.

DERWENT DATA ANALYZER

Derwent Data Analyzer (DDA) is the industry leading analysis tool that transforms large amounts of IP data into actionable reports allowing for more strategic IP decisions. Easily analyze trends, profile competitors, avoid or uncover patent infringement, and identify strategic development opportunities. DDA is desktop software that offers a powerful interface for managing and extracting business-critical insights from patent and scientific data within in-house or commercial databases. With its advanced analysis technology, DDA allows you to cut through masses of data to give you clear and definitive insights — at a glance.

TO LEARN MORE ABOUT DERWENT INNOVATION, DERWENT WORD PATENT INDEX AND OUR OTHER PATENT DATA SOLUTIONS TRUSTED BY MORE THAN 40 PATENT OFFICES WORLDWIDE, VISIT US AT HTTPS://CLARIVATE.COM/PRODUCTS/DERWENT-INNOVATION/CONTACT-US/



INCITES

Built on the foundation of Web of Science, InCites uses the most thorough, accurate, and objective information available. With customized citation data, global metrics, and multidimensional profiles on the leading research institutions, you'll get comprehensive insight into your performance.

WEB OF SCIENCE

The most trusted source of impactful research, Web of Science has unrivaled coverage of papers, books, conference proceedings, data sets and patents back to 1900. Using Web of Science, researchers can uncover the critical work in their field, and institutional leaders, funders and publishers can confidently measure comparative performance and develop world-class strategy using impact analytics and transparent metrics.

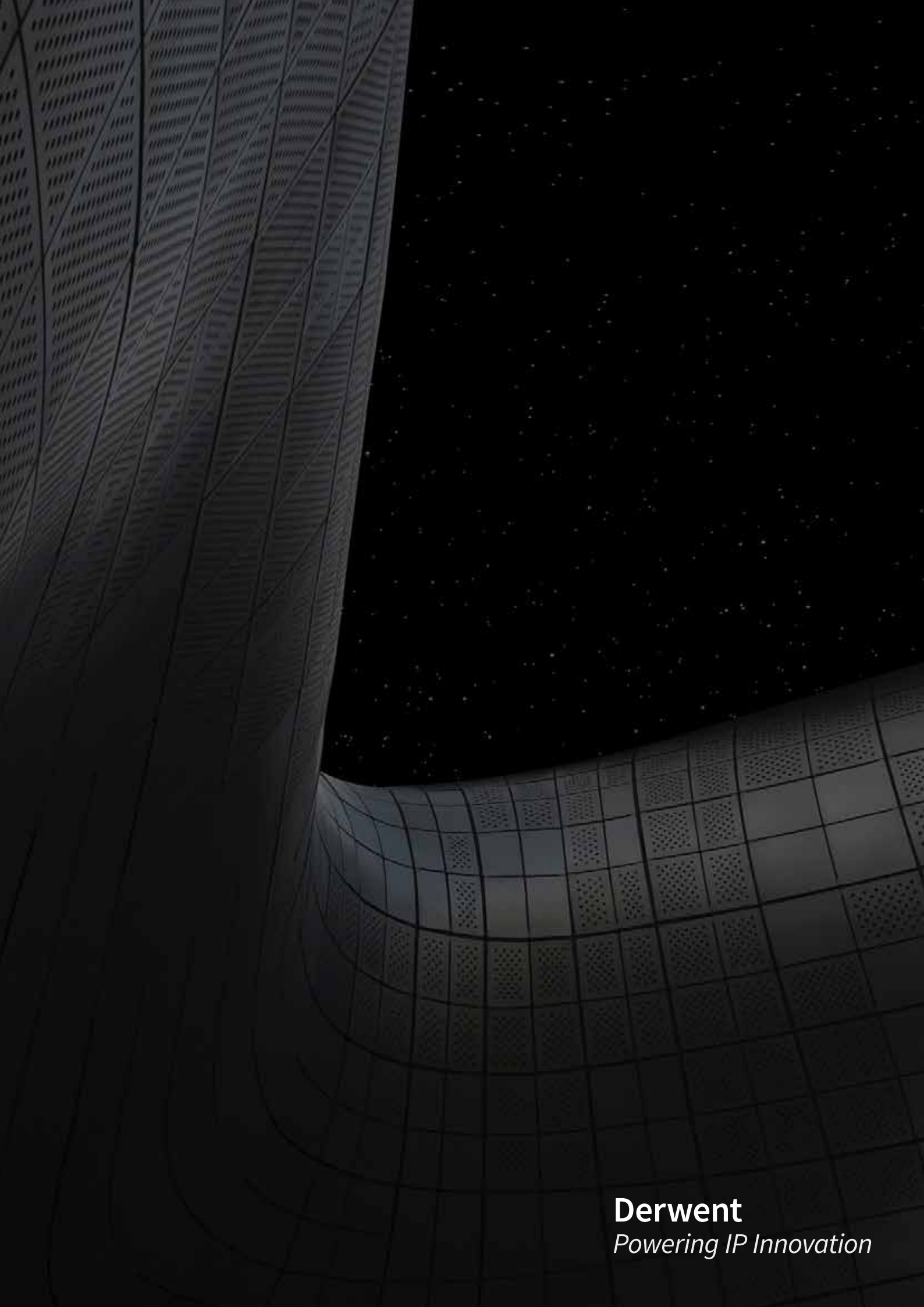
"FOR A PATENTED INVENTION TO BE VALUABLE, IT MUST BE OF GOOD QUALITY, HAVE A WIDE MARKET AND LAY THE FOUNDATIONS FOR FURTHER DEVELOPMENT AND REFINEMENT."

CORTELLIS

Cortellis is the world's most comprehensive suite of solutions for life science professionals, providing unmatched content, intelligent search, state of the art analytics and powerful visualization tools. Cortellis delivers the unique insights you need to reduce risk and increase success in innovation.

BIOWORLD

BioWorld delivers actionable intelligence on the most innovative drug development science that drives the business, which funds the means to heal disease. With writers and editors stationed around the globe, BioWorld reports the breaking news — and provides key perspective — on hundreds of medicines in development, the companies behind those therapeutic candidates, the business development transactions that evolve the market, and the regulatory hurdles that both challenge and guard the process.



Derwent
Powering IP Innovation