



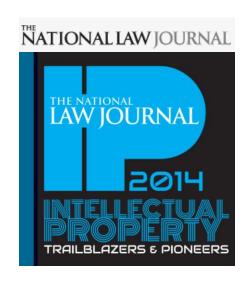
David Brown: IP Expert

BA, History & Computer Science



- Master's of Business Administration
- Trained Patent Examiner
- 2014-2015 National Law Journal Top 50 IP Trailblazer & Pioneer
- 27-year information industry veteran







Innovation and Intellectual Property Are the Underpinnings of Economic Success

The Importance of Innovation & IP



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

> German Chancellor Angela Merkel G8 World Economic Summit 2007



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

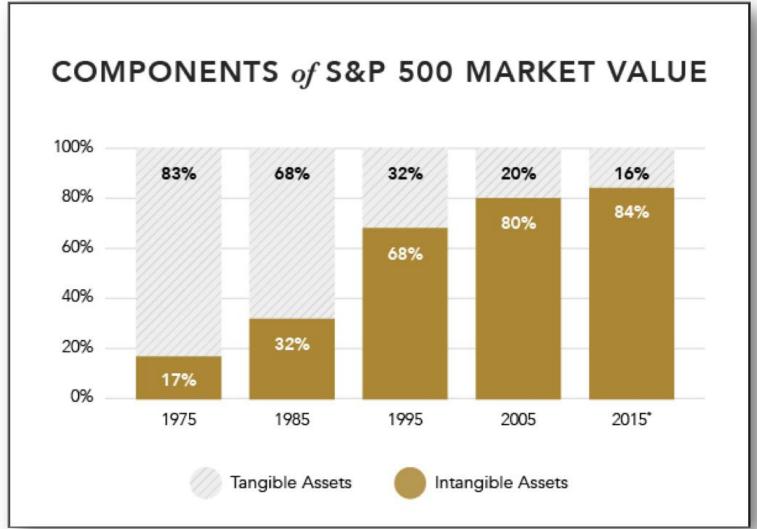
U.S. Vice President Joseph Biden
U.S. – India Bilateral Investment Treaty Meeting
July 2015



"To protect intellectual property rights serves the interest of all countries and complies with China's efforts of opening wider to the outside world..."



Balance Sheet Value: Tangibles v. Intangibles





Economic Impact

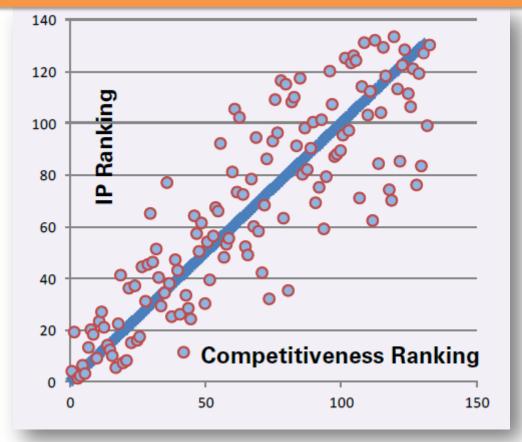
- Foreign Direct Investment (FDI): 1% increase in patent protection results in 2.8% increase in FDI⁴
- Investment: Larger patent portfolios result in up to \$12 million more in funding for the average U.S. startup³
- Wages: R&D intensive workers earn 30% more than non-R&D intensive employees¹
- **Job Creation**: R&D intensive industries created **40 million jobs**²
- **Economic Output**: IP intensive industries generate **\$5 trillion** in economic activity²



Competitiveness & IP Rankings

WEF Survey 2009 - 2010

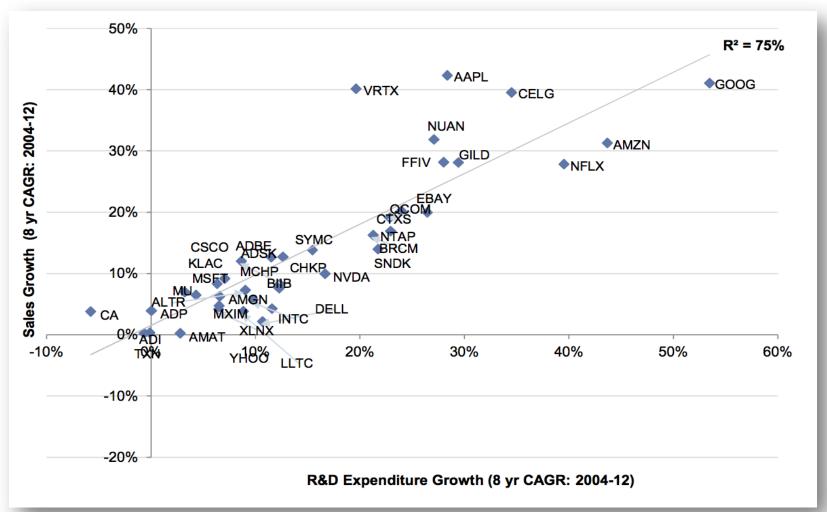
Countries perceived to have stronger IP protection are consistently among the most economically competitive; those with weaker IPR systems tend to rank much lower in terms of growth and competitiveness





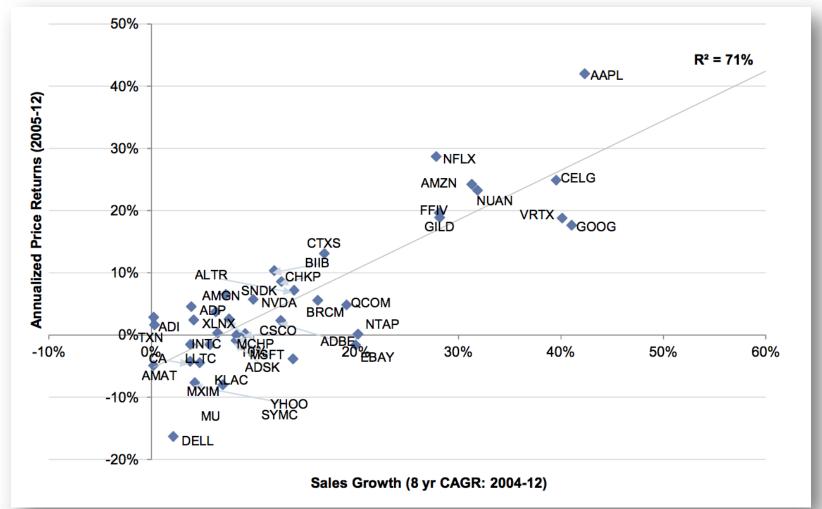
Source: WEF Global Competitiveness Report (2009 – 2010)

Proportionate Relationship: R&D and Sales Growth





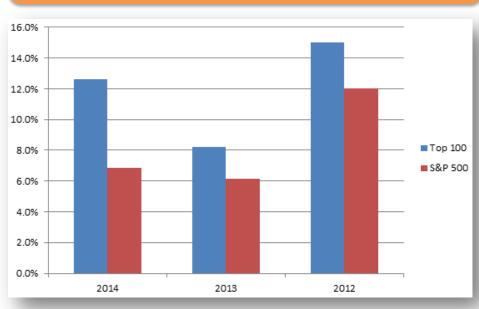
Proportionate Relationship: Sales and Stock Performance

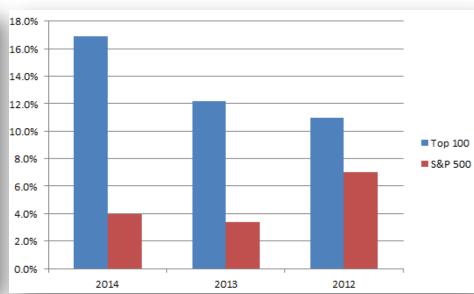




Thomson Reuters Top 100 Global Innovators Outperform the S&P 500

% RATE OF CHANGE IN YOY REVENUE GROWTH - TOP 100 vs. S&P 500 % RATE OF CHANGE IN YOY R&D SPEND - TOP 100 vs. S&P 500





Source: Thomson Reuters Derwent World Patents Index

Source: Thomson Reuters Derwent World Patents Index

Thomson Reuters Top 100 Global Innovators outperform the S&P 500 in the rate of employment growth for two years.



--- MEGATRENDS Impacting the Global Economy

GLOBAL MEGATRENDS

- Exploding world population
- Energy & environmental responsibility imperative
- Computing, communication & storage everywhere
- Internet of Things
- Artificial intelligence and Big Data
- Digital trust and interconnectedness
- Digitization of matter
- 'Omics and the era of precision medicine





Potable Water





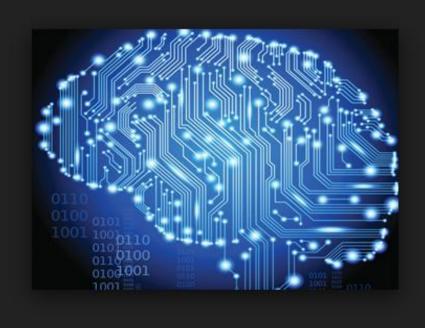
Cities of the Future



Renewable Energy

Sustainable Food Sources

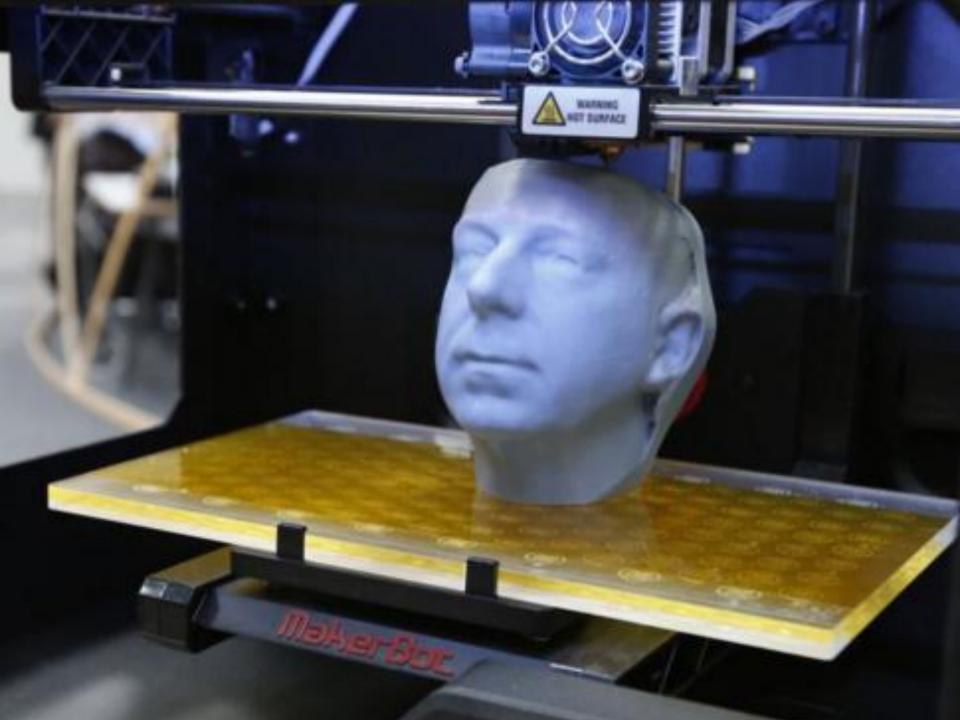


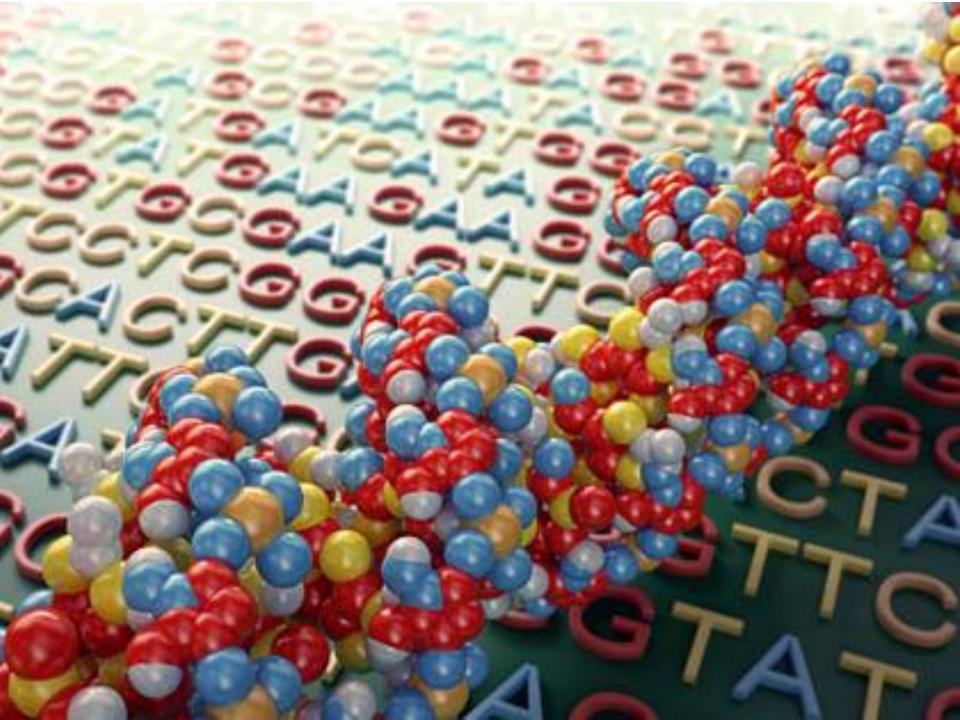


AUTONOMOUS



INTELLIGENT





TRENDS
Emerging Research
Fronts in Science

OPENING THE WORLD OF SCIENCE and the Ecosystem that Supports it

- Research
- Evaluate , Manage & Fund
- Author
- Publish

Research Front: Astronomy & Astrophysics

Of the Top 10 Research Fronts in Astronomy & Astrophysics, the theme of exploring space for celestial bodies, even in the deepest, darkest areas of space is prevalent.

Rank	Research Fronts		Citations	Mean Year of Core Papers
1	Sloan digital sky survey-III baryon oscillation spectroscopic survey		2103	2011.5
2	Detection and characterization of extra-solar planet by Kepler mission and high accuracy radial velocity planet searcher	49	4450	2011.3
3	Herschel Space Observatory performance and observational strategy	7	2122	2010.4
4	In search of high redshift galaxies with space-based and ground- based observatories	24	2704	2010.3
5	The large area telescope on Fermi gamma-ray space telescope (Fermi/LAT) performance and observational results	11	2356	2010.2
6	Neutrino and antineutrino research with different approaches		1949	2010.2
7	Galileon cosmology & Galileon field	18	1894	2010.1
8	Solar atmosphere and magnetic field researches based on the observation from Hinode (Solar-B) and solar dynamics observatory		4134	2010
9	Binary black hole and neutron star merger theory and observation	38	3786	2009.8
10	Theoretical and observational studies of star and galaxy formation (CO-H2 conversion factor dependence of the star formation rate)	29	4983	2009.3

Research Front: Astronomy & Astrophysics

Europe leads the world in core research related to the Herschel Space Observatory, by Spain, France and Germany.

Country Ranking	Country	Core Papers	Proportion	Institution Ranking	Institution	Core Papers	Proportion
1	Spain	7	100.0%	1	ESAC ESA (Spain)	6	85.7%
2	France	6	85.7%	2	INAF (Italy)	5	71.4%
2	Germany	6	85.7%	2	California Institute of Technology (USA)	5	71.4%
2	USA	6	85.7%	3	Stockholm University (Sweden)	4	57.1%
5	Canada	5	71.4%	3	Swiss Federal Institute of Technology Zurich (Switzerland)	4	57.1%
5	Italy	5	71.4%	3	Max Planck Society (Germany)	4	57.1%
5	Netherlands	5	71.4%	3	CNRS (France)	4	57.1%



Research Front: Astronomy & Astrophysics

The US and the Max Planck Society (Germany) are the most citing countries and institutions, respectively, to the Herschel Space Observatory.

Country Ranking	Country	Citing Papers	Proportion	Institution Ranking	Institution	Citing Papers	Proportion
1	USA	655	76.3%	1	Max Planck Society, Germany	391	45.6%
2	France	552	64.3%	2	Catech, USA	351	40.9%
3	Germany	516	60.1%	3	INAF, Italy	323	37.6%
4	UK	486	56.6%	4	CNRS, France	247	28.8%
5	Spain	422	49.2%	5	Cardiff University, UK	209	24.4%
6	Italy	359	41.8%	5	Leiden University, Netherlands	209	24.4%
7	Netherlands	340	39.6%	7	University of Paris Diderot – Paris VII, France	208	24.2%
8	Canada	319	37.2%	8	ESAC ESA, Spain	197	23.0%
9	Belgium	185	21.6%	9	University of Edinburgh, UK	183	21.3%
10	Chile	138	16.1%	10	NASA, USA	182	21.2%

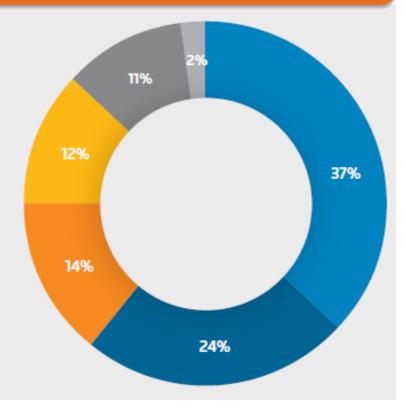


Aerospace

In terms of Aerospace innovation, YOY volume fell by 1%; the areas with the largest growth are in Instrumentation and Structures & Systems.

%	Subsectors	2014 Volume	2013 Volume	% Change
37%	Production Techniques	18,823	20,100	-6%
24%	Advanced Materials	12,233	11,660	5%
14%	Structures & Systems	7,136	5,709	25%
12%	Instrumentation	6,270	4,727	33%
11%	Propulsion Plants	5,894	4,867	21%
2%	Space Technology - Vehicles and Satellites	1,156	985	17%

Source: Thomson Reuters Derwent World Patents Index



Source: Thomson Reuters Derwent World Patents Index



Aerospace

Of the top 10 most influential scientific-research institutions in Aerospace, 80% reside in the U.S. and 20% in Europe; the University of Michigan is the most active.

Most Influential Scientific-Research Institutions in Aerospace (2004 – 2014)

Institution	Country	# of Papers (WoS)	Relative Citation Impact*
University of Michigan System	U.S.	446	1.78
University of Michigan	U.S.	445	1.77
Sapienza University	Italy	318	1.44
University of Texas Austin	U.S.	324	1.38
U.S. Department of Energy	U.S.	405	1.38
Goddard Space Flight Center	U.S.	604	1.32
Centre National de la Recherche Scientifique (CNRS)	France	504	1.32
Massachusetts Institute of Technology (MIT)	U.S.	482	1.31
Penn State University	U.S.	408	1.3
Pennsylvania Commonwealth System of Higher Education	U.S.	446	1.3

Source: Thomson Reuters Web of Science

^{*} Citation impact normalized against average for field and year of publication (n = 1.00)



Aerospace

The top two innovators in Europe and Asia are Airbus (France) and the Korean Aerospace Research Institute (S. Korea); Russia holds two of the top five spots in Europe.

Top 5 Space Technology Innovators – Europe (2010 - 2014)

Company	Country	# Inventions
Airbus	France	211
Energiya Rocket	Russia	103
Thales	France	78
Information Satellite Systems Reshetnev	Russia	52
Cent Nat Etud Spatiales	France	42

Source: Thomson Reuters Derwent World Patents Index

Top 5 Space Technology	Innovators – Asia (2010 - 2014)
Company	Country

Company	Country	# Inventions
Korea Aerospace Research Institute	S. Korea	147
Harbin Institute of Technology	China	139
Aerospace Dongfanghong Satellite	China	97
University Beijing Aeronautics & Astronautics	China	97
Beijing Institute of Control Engineering	China	84
Mitsubishi Electric	Japan	77

Source: Thomson Reuters Derwent World Patents Index

Research Front: Agriculture & Plants

2010

2009

Of these Top 10 emerging Research Fronts, drought-induced tree mortality is the most cited.

2007

700S

- Activation of plant innate immunity
- Hyperspectral imaging in food processing
- Honeybee health and causes of colony loss
- Drought-inducedtree mortality
- Systemic acquired resistance in plants
- Role of NAC transcription factors in stress tolerance
- Endoplasmic reticulum stress response in plants
- Regulation of fruit development and ripening
- Herbicide resistance
- Insect resistance to Bacillus thuringiensis (Bt) transgenic crops

2008	2009	2010	2011	2012	2013	2014
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•	•	•				

7011

2017

2013

2014



How we can help



...have internal expertise and resources but not enough data

Data

YOU

...generate/have data but don't have expertise and/or resources to interpret

Custom analytics, reports, visualization

...have clear need to outsource projects or seek for external expertise

Complex projects, consulting

THE STATE OF INNOVATION - AEROSPACE





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