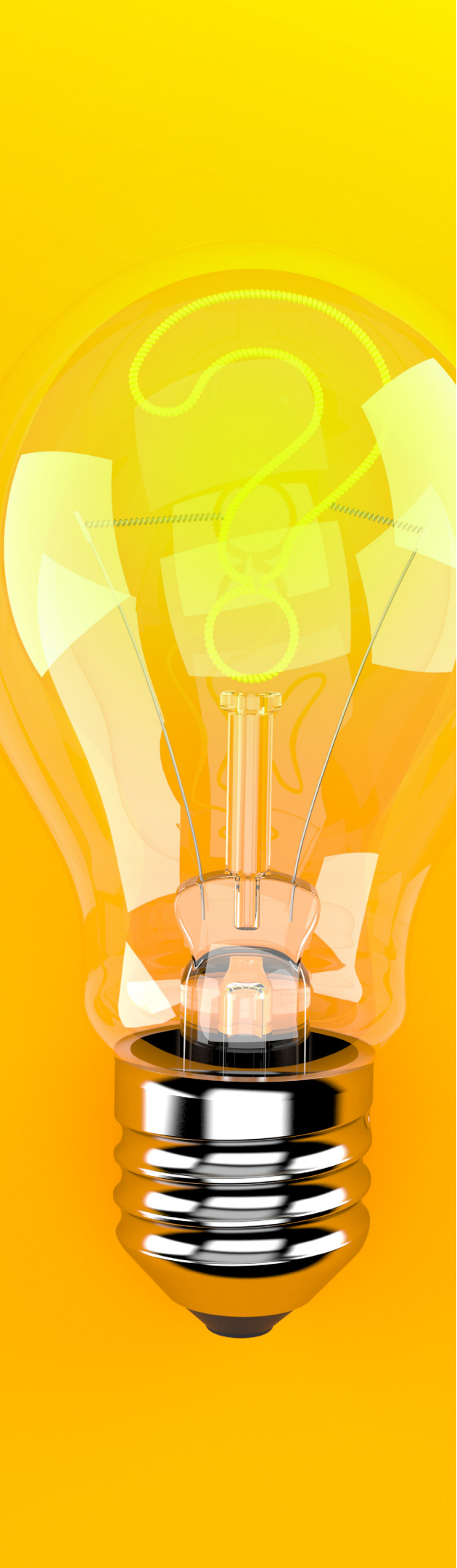




Industry-Focused Patenting Trends





Introduction

American businesses face growing competition in an increasingly globalized economy. Innovation can be defined as the process by which new ideas are generated and put into commercial practice in the form of new products and services. Patent protection of innovation has always been key to American economic strength and a driving factor in U.S. businesses' ability to successfully dominate domestic markets.¹

Winning in the new global economy requires an environment that supports and encourages innovation.² One important way to foster such an environment is through robust protection of intellectual property ("IP"), a strategy even appreciated by the Founding Fathers. The value of innovation and the importance of protecting it through the grant of IP rights is recognized in the U.S. Constitution: Congress is granted the power to "promote the Progress of Science and useful Arts by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."³ Those innovators who "reach for the stars" are rewarded with exclusivity for a limited time so that they can reap the rewards from their invention.

In many ways, patents are the carrot to capitalism that encourages the creative class to invest in a road less traveled. A strong climate of IP protection generates multiple benefits, including greater R&D activity, employment of high-skill and high-pay workers, adoption of sophisticated, cutting-edge technologies, and export of valuable, knowledge-intensive products.⁴ Protecting innovation through patents is especially critical for startups. "[P]atent approvals help startups create jobs, grow their sales, innovate, and reward their investors... patents act as a catalyst that sets startups on a growth path by facilitating their access to capital."⁵

¹ Economics and Statistics Administration and United States Patent and Trademark Office, Intellectual Property and the U.S. Economy: Industries in Focus. March 2012, http://www.uspto.gov/sites/default/files/news/publications/IP_Report_March_2012.pdf

² Id.

³ U.S. Const. art. I, § 8, cl. 8.

⁴ Meir Pugatch & David Torstensson, Inspiring Tomorrow (U.S. Chamber International IP Index, 7th Ed. February 2019) https://www.theglobalipcenter.com/wp-content/uploads/2019/02/023593_GIPC_IP_Index_2019_Full_03.pdf.

⁵ Joan Farre-Mensa, Deepak Hegde & Alexander Ljungqvist, The Bright Side of Patents (USPTO Economic Working Paper No. 2015-5, 2015), Abstract, <https://www.uspto.gov/sites/default/files/documents/Patents%20030216%20USPTO%20Cover.pdf>.

In 2019, the United States ranked second in the U.S. Chamber's annual International IP Index, which quantifies the strength of IP protection in 50 global economies by evaluating each nation's IP infrastructure on the basis of 45 essential indicators.⁶ This top ranking is a strong sign that the United States is highly hospitable to innovation and patent rights. The respect given to patent rights in the courts and at the patent office allows for a proper payoff to innovators who invent things that we as consumers love.

Other nations are also recognizing the value of patenting rights. China, for example, has made a strong push to increase patent filings, and the number of its domestically issued patents have risen over five-fold between 2009 and 2016 (even if critics doubt the inventive value of the majority of these patents).⁷ In 2017, China's patent office became the second most prolific filer of international patent applications, rapidly closing the gap with the United States⁸ and even eclipsing the number of filings at the U.S. patent office today.

Patents are valuable not only in their ability to protect innovation, but they also provide a signal that is helpful in identifying and forecasting industry trends. Because the patenting process is time-consuming and expensive, an industry's patenting investment choices can differentiate significant trends and disruptions from mere technology fads. Macroeconomic trends, legislation and legal decisions affect these trends in different ways for various industries.

Patent activity is a leading indicator for the development of new products and services. Therefore, it can forecast the focus of individual competitors within an industry, predict the entry of new players into a particular market (both technological and geographic), identify potential acquisition or joint venture targets, and flag competitors that may be gearing up for litigation by how they amass patents in a specific market segment. Patent activity is also helpful in analyzing smaller and newer entrants into the market – the very businesses for which competitive intelligence is harder to come by than it is for more established companies.

In the present study, we analyzed a proprietary dataset of patenting activity in the U.S. Patent and Trademark Office ("USPTO") to understand the impact and significance of current patenting trends for 12 important industry areas with significant investment in innovation:

- Artificial Intelligence ("A.I.")
- Automotive
- Blockchain
- Building Materials
- Cleantech / Green Tech
- Computational Biology and Bioinformatics
- FinTech
- Industrial Design
- Internet of Things ("IoT")
- Medical Devices
- Therapeutic & Diagnostic Molecules
- Wireless Phones

Our goal was to provide clear and actionable information that could help decision-makers envision the technological future of their respective industries and set their companies' strategies over the coming years and decades. Because of the rapid pace of innovation in these industries, this study, and the dataset on which it is based, will be updated annually.

⁶ Id.; <https://www.brookings.edu/research/eleven-facts-about-innovation-and-patents/>.

⁷ <https://www.bloomberg.com/news/articles/2018-09-26/china-claims-more-patents-than-any-country-most-are-worthless>

⁸ http://www.xinhuanet.com/english/2018-03/21/c_137055370.htm

To make this annual study a valuable forecasting tool, we designed it to be different from traditional patent landscape studies in several key aspects:

1. In contrast with most patent landscape studies, which break down patent trends by following the USPTO's arcane taxonomy of Technology Centers, International Patent Classification and Art Units, the patents in this study are clustered into industry categories. By taking into account the range of technologies within each industry, this study provides a fuller picture of patenting trends in complex, modern industries and of the patenting strategies and technological advantages pursued by competitors within an industry.

The industry focus of this study is also helpful for prioritizing patenting decisions. By providing insight into the patenting strategies of competitors across technologies and calculating the chances of a patent being granted in a given technology, the study gives decision-makers the information they need to better allocate their patenting resources.

2. Unlike other patent datasets, which have no information about patent applications for the first 18 months after their filing until they publish, our proprietary dataset is the first to include patent filing data within that previously opaque window of time. This data allows our study to provide up-to-date information about patent filing trends. The timeliness of this information is especially important for fast-innovating industries where a lag of 18 months can render information stale and irrelevant.

3. Patents are notoriously cryptic as the vernacular for new technology takes time to coalesce into agreed-upon terminology and meanings. Our dataset was populated not solely by automated search but instead relied upon human review for characterization. Through this process, we were able to effectively and precisely map patents to their relevant industries according to the terminology used in each industry. This process also enabled us to create and populate meaningful industry subcategories that would be relevant to how industry insiders view the segmentation of their industry. Moreover, this process made possible the identification of early patents relating to technologies that predate the terminology now in common usage. For example, the dataset includes a number of patents relating to what has become known as "cryptocurrency" but in which the word "cryptocurrency" is absent. A fully automated keyword search would have missed these patents.

4. Our dataset enables us to analyze trends on many topographical levels, from an overview of an entire industry, to comparisons of sectors within the industry, to the patenting behaviors of individual competitors. We are also able to compare the actions of different USPTO Art Units in which patents relating to the various technologies in a given industry are examined. This flexibility allows us to zero in on trends that would have been invisible if these different topographical layers were not available for analysis. For example, we have 3G, 4G and 5G sectors broken out within the Wireless Phone industry.

5. The study highlights the geographical distribution of innovation because it parses the data by (1) the originating country for filed patent applications, and (2) the U.S. state for American applicants. The ability to study patent trends with respect to both geography and industry helps refine our understanding of where innovation hot spots are located for specific industries.

Building the Proprietary Dataset

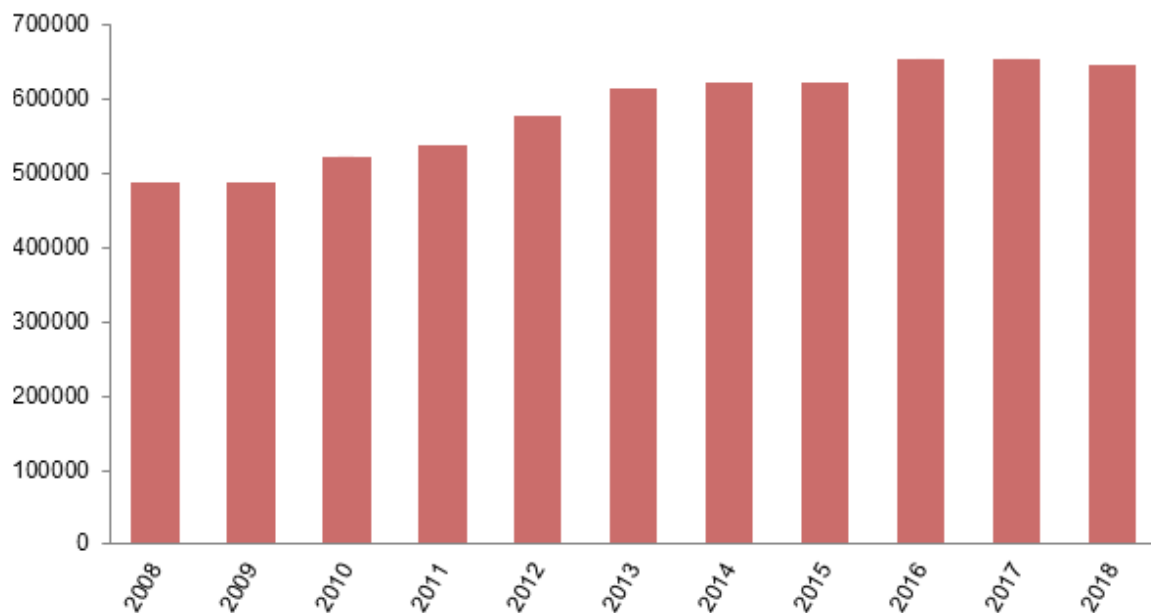
The dataset was built through a collaboration between Kilpatrick Townsend & Stockton LLP, a premier patent law firm, and GreyB Services Pte. Ltd., a leading technology research and intelligence firm. The process included the use of data science and categorization technology, followed by semi-automated filtering, and by data excavation to predict any gaps in the trends. We then populated the database and assigned the entries according to a defined topology of predetermined patent-applications focuses.

General Trends

Patent filings have risen to a record level

While most industries saw a significant downturn in the number of patent applications filed in the wake of the capital crisis of 2008 (with the notable exception of Cleantech), filings have rebounded with a subsequent seven-year period of rapid growth. The last three years have seen the overall number of applications filed in the USPTO hold steady at record levels, with approximately 650,000 applications filed per year.⁹ However, patent filing trends vary dramatically across industries and within different sectors of individual industries (see chart on page 8).

Patent Applications Filed Per Year in USPTO



These numbers indicate that businesses continue to see patenting as a worthwhile investment. Despite factors such as the strengthening of protections for trade secrets through the passage of the Defend Trade Secrets Act in 2016, and a significant narrowing of patent eligibility of computer-implemented inventions in 2014,¹⁰ the hypothesized shift to businesses favoring fewer patent applications is not evident in the data.

⁹ <https://www.uspto.gov/sites/default/files/documents/USPTOFY18PAR.pdf>

¹⁰ Manny Schechter, The Changing Trade Secret and Patent Equilibrium, TechCrunch, 2016, <https://techcrunch.com/2016/06/20/the-changing-trade-secret-and-patent-equilibrium/>

Long-standing technology leaders dominate the patent landscape

Despite the buzz generated by disruptors and startups, our data shows that when it comes to patents, entrenched incumbents are the dominant players in each of the industries we surveyed.

Technology	Top 5 Patent Holders (in alphabetical order)	Technology	Top 5 Patent Holders (in alphabetical order)
IoT	Ericsson IBM LG Qualcomm Samsung	Therapeutic & Diagnostic Molecules	Bayer Merck Novartis Roche University of California
A.I.	Google IBM Microsoft Samsung Siemens	Automotive	Ford General Motors Honda Hyundai
Blockchain	Bank of America Cognitive Scale IBM Intel Mastercard	Clean/Green Tech	General Electric Hyundai Samsung Siemens Toyota
FinTech	Bank of America IBM Mastercard PayPal Visa	Wireless Phones	Apple Blackberry LG Qualcomm Samsung
Medical Devices	Boston Scientific Covidien Medtronic Olympus Corporation Philips	Building Materials	BASF Dow Chemical Halliburton Schlumberger Sika Technology
Computational Biology and Bioinformatics	General Electric IBM Philips Siemens University of California	Industrial Design	Ford LG Microsoft Nike Samsung

An incumbent's patent portfolio can be a formidable barrier to entry for newer competitors, and the tactical advantages of having a solid patent portfolio is attractive to many companies (including those that may have been agnostic or even antagonistic to patents previously). Indeed, even companies committed to open-source efforts are concurrently investing heavily in obtaining patent protection for their inventions in competitive technologies.¹¹

¹¹ Tom Simonite, Despite Pledging Openness, Companies Rush to Patent AI Tech, Wired, July 31, 2018, <https://www.wired.com/story/despite-pledging-openness-companies-rush-to-patent-ai-tech/>; <https://www.kilpatricktownsend.com/-/media/Files/articles/2018/Blockchain-Patents-and-Open-Source-Software-Daily-Journal-041818.ashx>

Software-related inventions continue to face patenting challenges

Alice Corp. v. CLS Bank,¹² the Supreme Court's 2014 decision on the subject-matter-eligibility requirement of U.S. patent law (codified as 35 U.S.C. § 101) ("*Alice*"), had an immediate and severe effect on the grant rates of patents for software-related inventions. *Alice* set forth a two-part test, which asks whether patent claims (1) are directed to an abstract idea, and if so whether (2) the claims are significantly more than the abstract idea.

The USPTO's initial implementation of this test, encouraged by the Federal Circuit's early decisions interpreting *Alice*, led to a very high rejection rate of software-related patent applications.¹³ There has since been a realization that this implementation may have been too stringent and that it may impede real innovation in cutting-edge industries from FinTech to bioinformatics.

Indeed, since 2016, there has been a significant increase in issuance of patents for software-related inventions in bioinformatics and computational biology and the allowance prevalence for these fields has recovered to levels now exceeding pre-*Alice* levels.¹⁴ We expect the trend of higher issuances to continue for bioinformatics and to spread to other software-related and business-method fields such as FinTech.

The share of patent filings from foreign entities is growing

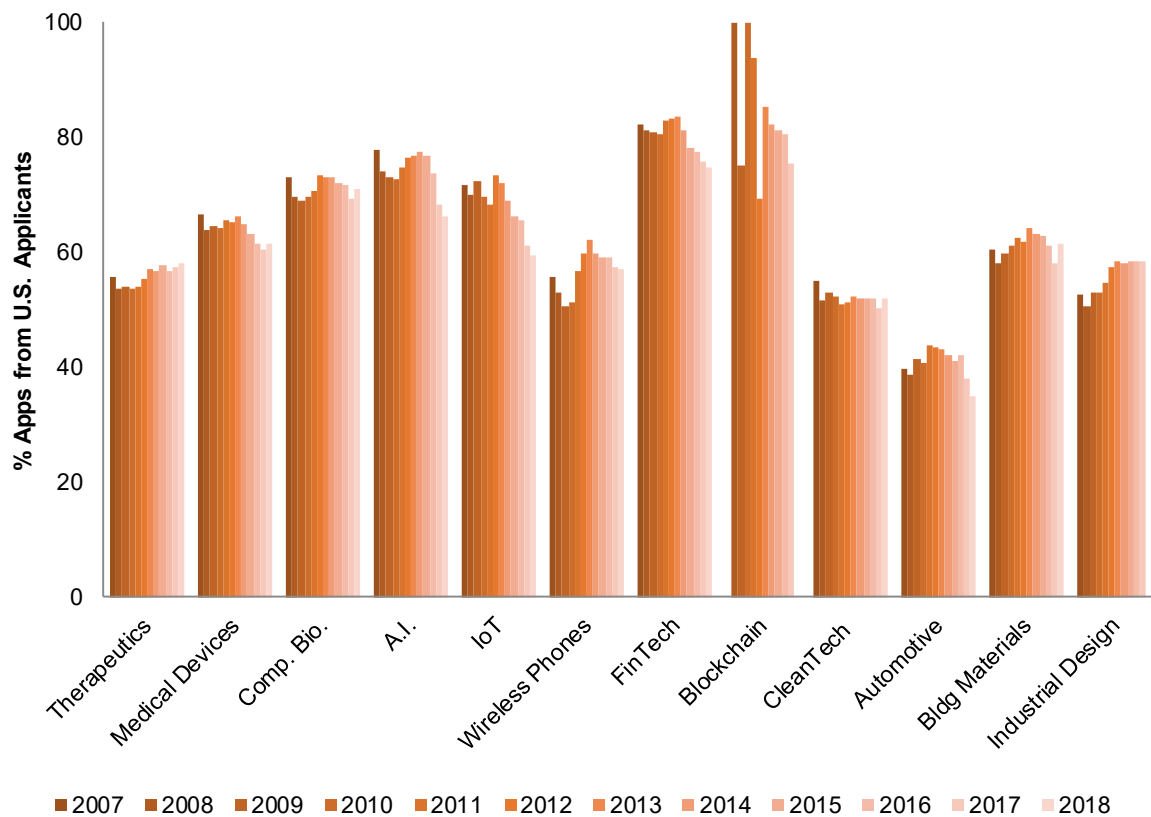
Underscoring the continuing effects of globalization, the share of patent applications from U.S. entities continues to decrease as a percentage of the total number of patent applications. The rapid rate of increase in the share of foreign applicants is particularly pronounced in A.I., IoT, FinTech, Blockchain, and Automotive. In Automotive, U.S.-based applications comprised less than 50% of applications during the entire period analyzed in our study (from 2007 to the present). The diminishing percentage of U.S.-originated applications is noteworthy because a decreasing slice of the patenting pie could result in U.S.-based innovators finding themselves locked out of the U.S. market, thereby losing any home-field advantage they may have had over foreign competitors.



¹² *Alice Corp. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014).

¹³ Kate Gaudry & Samuel Hayim, Bioinformatics Innovations Thrive Despite 101 Chaos, IP Watchdog, February 6, 2019, <https://www.ipwatchdog.com/2019/02/06/bioinformatics-innovations-thrive-despite-101-chaos/id=106020/>.

¹⁴ *Id.*



One reason for the increasing share of foreign applicants may be due to offshore outsourcing by U.S. companies of not only manufacturing but also of innovation activities, such as research, engineering, and design. A June 2018 report by MForesight: Alliance for Manufacturing Foresight, highlights the shift in offshoring from “invent here, manufacture there” to “invent there, manufacture there.”¹⁵ As the report notes, “[i]ndustry representatives recognize that many of the best ideas for manufacturing innovation come from the factory floor. Experience demonstrates in multiple industries that movement of manufacturing overseas fuels innovations in both products and processes.”¹⁶

¹⁵ Sridhar Kita & Thomas C. Mahoney, Manufacturing Prosperity: A Bold Strategy for National Wealth and Security (Report No. MF-TR-2018-0302, 2018), <https://medium.com/@MForesight/manufacturing-prosperity-a-bold-strategy-for-national-wealth-and-security-65d2a97d6d0e>.

¹⁶ Id. at 21.

Innovation hot spots are spread across the United States

Populous California (with nearly 40 million residents) continues to dominate as the top state for patent applicants, averaging over 80,000 applications per year since 2014. But innovation hot spots are spread across the country, including states with just a small fraction of California's population.¹⁷ Since 2014, residents from each of the following states have filed thousands of applications per year:

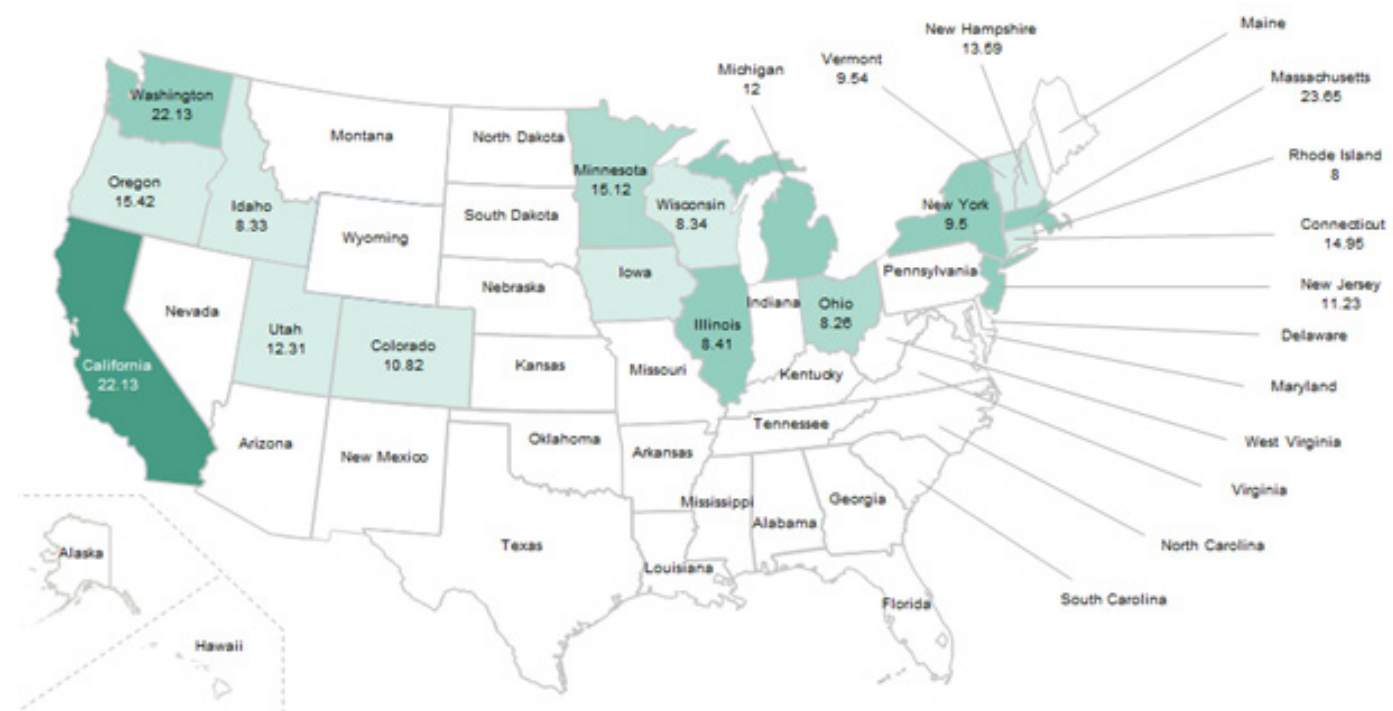
>10,000 applications/year	5,000-10,000 applications/year
Illinois	Arizona
Massachusetts	Colorado
Michigan	Connecticut
New York	Florida
Texas	Georgia
Washington	Minnesota
	New Jersey
	North Carolina
	Ohio
	Oregon
	Pennsylvania

We have also analyzed the number of patent applications per capita for each state (using 2017 numbers for patent applications and estimated state populations). Under this analysis, other states are as innovative as California, and in the case of Massachusetts, even more so. On the other hand, some populous states, including Texas and Florida, file fewer patent applications than their population size would have suggested. The following chart lists the most innovative states by this measure (with a cutoff of 8 applications per 10,000 residents).

State	Patent Applications per 10,000 residents
Massachusetts	23.65
California	22.13
Washington	22.13
Oregon	15.42
Minnesota	15.12
Connecticut	14.95
New Hampshire	13.59
Utah	12.31
Michigan	12
New Jersey	11.23
Colorado	10.82
Vermont	9.54
New York	9.5
Illinois	8.41
Wisconsin	8.34
Idaho	8.33
Ohio	8.26
Rhode Island	8

¹⁷ <https://www.uspto.gov/sites/default/files/documents/USPTOFY18PAR.pdf>

Most innovation states (Patent Applications per 10,000 residents)





About KT

We help leaders create, expand, and protect the value of their businesses and most prized assets. Our attorneys bring a balance of business savvy, technical skills, and creative thinking to the opportunities and issues our clients face daily. From the most complex challenges to the routine, we work together to make businesses better, smarter, more protected, and more successful.



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