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Courtney Stopp
Office of Policy and International Affairs
United States Patent and Trademark Office
600 Dulany Street
Alexandria, VA 22314
Courtney.Stopp@uspto.gov
(571) 272-9300

VIA ONLINE SUBMISSION

Re: Response of Engine Advocacy Regarding *Patent Eligibility Jurisprudence Study*, Docket No. PTO-P-2021-0032

Dear Ms. Stopp,

Current patent eligibility jurisprudence has contributed to a drop in frivolous patent litigation and abusive patent assertion. At the same time, startup activity, research and development (R&D), and investment in emerging technologies has grown over the past decade—as courts and patent examiners have continued to apply current jurisprudence to reject or weed-out abstract idea patents.

Engine is a non-profit technology policy, research, and advocacy organization that bridges the gap between policymakers and startups. Engine works with government and a community of thousands of high-technology, growth-oriented startups across the nation to support the development of technology entrepreneurship through economic research, policy analysis, and advocacy on local and national issues. As a non-profit advocacy group that conducts independent research, we represent the interests of startup innovators across the country—many are patent owners and many (sometimes simultaneously) are accused of patent infringement. Engine also seeks to support the growth and success of nascent companies and future startups that have not yet intersected directly with the patent system, but may in the future and still depend on innovation- and startup-friendly patent policies.[1]

We appreciate the opportunity to submit this response to the U.S. Patent and Trademark Office's (PTO) request for information concerning the current state of patent eligibility jurisprudence in the country. This area of the law can be particularly important to high-tech, high-growth startups. As

[1] Among the categories listed in the *Patent Eligibility Jurisprudence Study* request for information, Engine would fall within at least the following: (9) nonprofit organizations or advocacy groups, (7) academic or research institutions, (3) entities that represent inventors or patent owners, and (5) entities that represent accused infringers.

detailed below, current patent eligibility jurisprudence promotes startup innovation and competition by preventing patents that cover abstract ideas (including when those underlying ideas are performed on generic computers, processors, etc. or described in purely functional terms)—patents that would improperly stand in the way of broad swaths of standard business activities or innovative new technologies.

Response to Topic 1

Current patent eligibility jurisprudence promotes innovation in ways that are especially relevant to high-tech, high-growth startups[2]—both because the law prevents people from trying to "own" the use of basic ideas, concepts, and business activities that should be free to all innovators and because it provides a means to curtail abusive litigation.[3]

High-quality patents, which disclose genuinely new inventions rooted in technological advances, can be valuable assets for many high-tech, high-growth startups, creating avenues for startups to enhance their reputation in the market, attract investors, secure some competitive advantage, or prevent copying that would otherwise undermine non-patent-based incentives to innovate.[4] However, low-quality patents routinely stand in the way of domestic innovators and small businesses.[5] Here—as in all areas of intellectual property policy—balance is key.[6] If companies are allowed to obtain and enforce overly-expansive patents that merely claim abstract ideas, it can make innovation more costly—and it could become so costly as to be out of reach for the nation's startups.

Against this backdrop, existing patent eligibility jurisprudence plays multiple roles:

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[2] By way of brief definition, the use of "high-tech, high-growth startups" encompasses, for example, companies developing computer-related innovations or offering new tech-enabled products or services. This would include things like, e.g., developing software, artificial intelligence, and computer security technology. The term would not encompass traditional biopharma or life sciences companies. But there are, e.g., medtech and telehealth companies that fall at an intersection of the traditional "tech sector" and health or life sciences, which would fall within the scope of high-tech, high-growth startups. Another key feature defining startups is their size and age. Startups tend to be small businesses, and many will be young and pre-revenue.

[3] Engine has articulated similar positions in the past. These responses draw from previous materials, including, e.g., *Startups & the U.S. Patent System: Prioritizing Quality and Balance to Promote Innovation*, Engine (July 2021), *available at* https://www.engine.is/news/category/prioritizing-quality-and-balance-to-promote-innovation; Letter to Members of the Subcommittee on Intellectual Property of the Senate Committee on the Judiciary from Engine (June 21, 2019), *available at* https://static1.squarespace.com/static/571681753c44d835a440c8b5/t/5d113fdcc87dec0001da5457/1561411548600/2019.06.21_Engine+Comments.pdf; *Section 101 is Working for Startups*, Engine (June 2019), https://innovatewithoutfear.engine.is/wp-content/uploads/2019/05/Section-101-is-Working-For-Startups.pdf.

[4] *See, e.g.*, Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 Berkeley Tech. L.J. 1255, 1256 (2009) (reporting on survey of entrepreneurs).

[5] *See generally Startups & the U.S. Patent System*, *supra* note 3.

[6] *See, e.g.*, Jason Wiens & Chris Jackson, *How Intellectual Property Can Help or Hinder Innovation*, Kauffman Foundation (Apr. 6, 2015), https://www.kauffman.org/resources/entrepreneurship-policy-digest/how-intellectual-property-can-help-or-hinder-innovation/ (summarizing how IP "can increase productivity and firm valuations," but also "be inefficient and hinder innovation if they are too weak or too strong," and calling for a "Goldilocks" approach to IP frameworks).

Keeping basic tools open to innovators and small businesses. First, patents directed to abstract ideas "risk disproportionately tying up the use of [] underlying ideas," "the basic tools of scientific and technological work."[7] And current jurisprudence is designed to prevent individuals or companies from asserting ownership over those basic tools of innovation and commercialization. For example, a patent holder cannot assert ownership over the ideas of collecting, analyzing, and displaying data,[8] storing and organizing it, and/or transmitting it.[9] A patent owner cannot claim the idea of screening, filtering, or distributing mail.[10] It cannot seek to own the ideas of budgeting,[11] offer-based pricing,[12] or scheduling appointments.[13]

If patent owners could claim mere abstract ideas (implemented using generic technology or described in purely functional terms), it would distort innovation and competition by permitting one patent holder—who had contributed nothing truly inventive—to prevent others from innovating or even engaging in basic operations.

Current law, on the other hand, frees up space for innovators to develop new technology, offer new services, or launch new business models. Collecting and analyzing data, using standard email filtering to weed-out malicious content, and transmitting and organizing digital images are routine functions in nearly every modern-day business, so patents on those basic functions (without significantly more, without some technical advance or inventive feature) would mean every business risks litigation and may have to pay for numerous "licenses" just to continue basic operations. Importantly, such patents would also stand in the way of innovators with new, improved ideas for better technology to analyze data, filter emails, store images, etc.

Stemming abusive litigation. Second, current patent eligibility jurisprudence helps to reduce the costs and stem the tide of abusive patent litigation.[14] As the subject of Topics 2 and 9, this point is addressed in more detail below.

Not only does current law reduce the cost and burden of actual litigation, it also plays a critical role weeding-out the type of low-quality patents that are routinely asserted against many startups and small businesses. Broad, preemptive patents that are directed to abstract ideas (and appropriately ineligible under current law) can be asserted against numerous accused infringers.[15] As such, when ineligible patent claims are successfully challenged, it can save other startups, innovators, and small businesses from being accused of infringing the same ineligible claims.

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[7] *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 216-17 (2014).
[8] *E.g.*, *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016).
[9] *E.g.*, *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass'n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014); In re *TLI Commc'ns LLC Patent Litig.*, 823 F.3d 607, 613 (Fed. Cir. 2016).
[10] *E.g.*, *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1313, 1316 (Fed. Cir. 2016).
[11] *E.g.*, *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363 (Fed. Cir. 2015).
[12] *E.g.*, *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359 (Fed. Cir. 2015).
[13] *E.g.*, *Am. Well Corp. v. Teladoc, Inc.*, 191 F. Supp. 3d 135 (D. Mass. 2016).
[14] *Infra* Resp. to Topics 2, 9.
[15] *Id.*

Third, and relatedly, questions of patent eligibility can be, and are appropriately, assessed by the PTO and the courts. The PTO is tasked with reviewing applications and rejecting those that claim abstract ideas without significantly more. But the life of a patent (and arguments about its scope and meaning) extends well past examination. An application's claims may initially seem to be eligible and targeted to a specific technical advance when the PTO issues a patent. But those same claims are subject to interpretation and arguments during patent assertion or litigation that can expand their scope—sometimes expanding a claim so far that it becomes impermissibly directed to an abstract idea.[16] So the courts have an important role to play in assessing eligibility (or refusing to adopt overly-broad claim constructions that would render a claim ineligible).[17] Current patent eligibility jurisprudence helps combat patent owners engaging in such over-broad constructions and asserting actually-narrow patents in improper ways against non-infringers. Likewise, current jurisprudence prevents parties from arguing narrow constructions early in a case to survive an eligibility challenge, then later in a case reversing course and seeking expansive constructions to show infringement.[18]

This is particularly relevant to startups. Fourth, the current prohibition on patenting abstract ideas is vital to startups and small businesses. For one, because startups have limited capital and will be more inclined to avoid any potential future litigation, startups are more likely to forgo R&D in areas that are improperly covered by (invalid) patents.[19]

Startups are also more vulnerable to abusive patent demands or litigation where ineligible patent claims are asserted. Likewise, just like invalid patents, ineligible patents can "create unacceptable litigation risks for potential entrants, raise entry costs, delay entry, deter customers and business partners from contracting with new entrants, and impose inefficiencies," by barring others from the space improperly covered by that patent.[20] For small companies operating on thin margins, even a meritless case could cause substantial operational impacts, leading to reductions in hiring, changing or abandoning business strategies, or decreased valuation.[21] Current patent eligibility jurisprudence provides earlier opportunities for startups to resolve these sorts of cases, putting patent challenges within reach for smaller companies and leveling the playing field in abusive patent assertion.

Finally, investors care about whether startups are involved in litigation as well. Investors review a constellation of different factors when deciding whether to invest in a company, and although their

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[16] *Cf.* Jason Rantanen, *The Malleability of Patent Rights*, 2015 Mich. St. L. Rev. 895 (2015) (discussing how, due to doctrines as common as claim construction, "actors operating within the patent system [have] the ability to change the very contours of individual patents").

[17] *See, e.g.*, *Microsoft Corp. v. GeoTag, Inc.*, 817 F.3d 1305, 1315 (Fed. Cir. 2016) (declining to adopt patent owner's argument, as it "would read the dynamic replication limitation out of the '474 patent's claims and expand the scope of the claims to cover virtually every instance of searching within a geographically organized database").

[18] *See, e.g.*, *Data Engine Techs. LLC v. Google LLC*, 10 F.4th 1375, 1381 (Fed. Cir. 2021) (rejecting patentee's assertion that preamble term is not limiting, because it was "effectively seek[ing] to obtain a different claim construction for purposes of infringement than [the court] applied, at [patentee's] insistence, in holding the asserted claims [] eligible under § 101").

[19] *See, e.g.*, Jean O. Lanjouw & Mark Schankerman, *Enforcement of Patent Rights in the United States*, *in Patents in the Knowledge-Based Economy* 145, 146 (Wesley M. Cohen & Stephen A. Merrill eds., 2003); Fed. Trade Comm'n, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* 5 (2003).

[20] *Cf.* Christopher R. Leslie, *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 Minn. L. Rev. 101, 113-14 (2006).

[21] *E.g.*, Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. Rev. 1571, 1587–89 (2009).

standards vary—many of them keep things like the team, the market size and opportunity, the product-market fit, traction, and exit opportunities top of mind.[22] But the existence of a patent demand is always a very notable deterrent.[23]

Response to Topic 2

Current patent eligibility jurisprudence has contributed to a decline in patent litigation, abusive patent assertion, and the associated costs, especially in technology-based sectors. During the same time, the country's startup growth and success has increased, the software industry is making substantial contributions to the U.S. economy,[24] and domestic R&D continues to grow.[25] Aggregate data and individual experiences convey how high-tech, high-growth startups have benefitted when abusive assertion and abstract idea patents do not stand in their way. And at the same time, the number of patents issued to U.S. inventors has steadily risen since 2014—from 144,621 patents in 2014 to 164,572 in 2020.[26]

Reductions in litigation and expense. Since the Supreme Court decided *Alice*, there has been less patent litigation and a reduction in the costs of patent cases—this is particularly apparent in areas where high-tech, high-growth startups operate. Patent litigation in this country reached an all-time high of 6,024 cases filed in 2013, and the number of new cases filed each year has tended to decline, with only 3,516 cases filed in 2019.[27] Looking at patent accusations (counting the number of patents asserted against the number of defendants) shows a similar decline, from a high of approximately 40,000 accusations in 2011 to 26,000 in 2019.[28]

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[22] *E.g.*, Robbie Richards, *What Investors Look for in a Startup*, MassChallenge (July 20, 2021), https://masschallenge.org/article/what-investors-look-for-in-startups; Alejandro Cremades, *Here is What Startup Investors Look for in Entrepreneurs Before Investing*, Forbes (Jan. 31, 2019), https://www.forbes.com/sites/alejandrocremades/2019/01/31/here-is-what-startup-investors-look-for-in-entrepreneurs-before-investing/?sh=b21e3a77eb85; Arie Abecassis, *5 Things Startup Investors Look for Before Investing*, Entrepreneur (Sept. 13, 2016), https://www.entrepreneur.com/article/281173; Richard Harroch, *What Angel Investors Want to Know Before Investing in Your Startup*, Forbes (Dec. 13,2 020), https://www.forbes.com/sites/allbusiness/2020/12/13/what-angel-investors-want-to-know-before-investing-in-your-startup/?sh=4c31dea51a11; Jamie Novoa, *What are Investors Looking for in Startups? 4 Unmissable Startup Investors Criteria*, Startup Explore, https://startupxplore.com/en/blog/startup-investors-criteria/ (last visited Aug. 27, 2021).

[23] Robin Feldman, *Patent Demands & Startup Companies: The View from the Venture Capital Community*, 16 Yale J. Law & Tech. 236 (2014) (100% of investors surveyed indicated patent demand could be a deterrent to investment).

[24] *See, e.g.*, *Software: Supporting US Through COVID*, BSA Foundation, https://software.org/reports/software-supporting-us-through-covid-2021/ (last visited Oct. 15, 2021); Makada Henry-Nickie et al., *Trends in the Information Technology Sector*, Brookings (Mar. 29, 2019), https://www.brookings.edu/research/trends-in-the-information-technology-sector/.

[25] These reductions in litigation, growth in the tech sector, and startup success cannot be solely attributed to patent eligibility jurisprudence. Other developments, within and outside patent law, have also contributed to these positive effects. But policymakers should not now chip away at current patent eligibility jurisprudence which has been a valuable component.

[26] Data compiled from *Calendar Year Patent Statistics (January 1 to December 31)*, U.S. Patent and Trademark Office, https://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports_stco.htm (last visited Oct. 12, 2021).

[27] *2019 Year in Review*, Docket Navigator, 6, *available at* https://brochure.docketnavigator.com/2019-year-in-review/.

[28] *Id.* at 7.

Table 1. Reduction in patent litigation and accusations.

Year	2013	2019	% change
Patent cases filed	6,024	3,516	-47.61%
Patent accusations filed	~31,000	~26,000	-16.13%

The numbers are even more pronounced in the tech sector, where patent cases have dropped from a high of 3,634 in 2013 to 1,380 in 2018, and patent accusations have dropped from the 2011 high of 22,056 to 6,019 in 2018.[29] By contrast, the number of patent cases filed involving life sciences or other types of patents has remained mostly consistent over the same time period.[30]

Table 2. Reduction in patent litigation and accusations involving patents with technology classifications.

Year	2013	2018	% change
Patent cases filed	3,634	1,380	-62.03%
Patent accusations filed	16,241	6,019	-62.94%

These sector-based differences make sense, considering the number of tech-related patent eligibility challenges is higher, by an order of magnitude, than for the life sciences or other patent classifications. Out of 1,274 patents challenged in the tech space, 768 eligibility challenges were successful (compared to 90 successful life sciences challenges out of 136 patents, and 63 successful challenges in other categories out of a total of 112 patents).[31]

In sum, current patent eligibility jurisprudence has made more substantial, positive contributions in the areas high-tech, high-growth startups work in, while having a more limited impact on litigation in other areas of innovation and invention. Similarly, over 300 of these patent eligibility decisions cleared out ineligible claims that amounted to abstract ideas implemented on generic computers.[32] So, while patent eligibility is only raised as a defense in a relatively small number of cases (803 eligibility decisions out of 25,000 patent proceedings),[33] the ability of these challenges to deter abusive assertion is apparent in the broader trends.

The costs of litigation have also dropped due to current patent eligibility jurisprudence. As we have previously noted, while

> [t]he costs of patent litigation are staggering, [] since courts started applying the *Alice* framework those costs are coming down. Between 2015 and 2017 the median overall cost for a low stakes patent case declined 47% percent (but in 2017 that cost was still a steep $1.7 million). And the ability to file earlier motions under *Alice* and § 101

[29] *Alice Through the Looking Glass*, Docket Navigator, 5 (2018), *available at* https://brochure.docketnavigator.com/alice/.
[30] *Id.* (noting "[n]ew Patent Case filings involving other [not technology classification] patents have been mostly consistent for the past decade" and "2018 is the first year in over a decade where the number of Patent Accusations involving life sciences patents exceeded the number of Patent Accusations involving technology patents").
[31] *Id.* at 8.
[32] Mark A. Perry & Jaysen S. Chung, *Alice at Six: Patent Eligibility Comes of Age*, 20 Chi.-Kent. J. Intell. Prop. 64, 72, 87 (2021).
[33] *Id.*

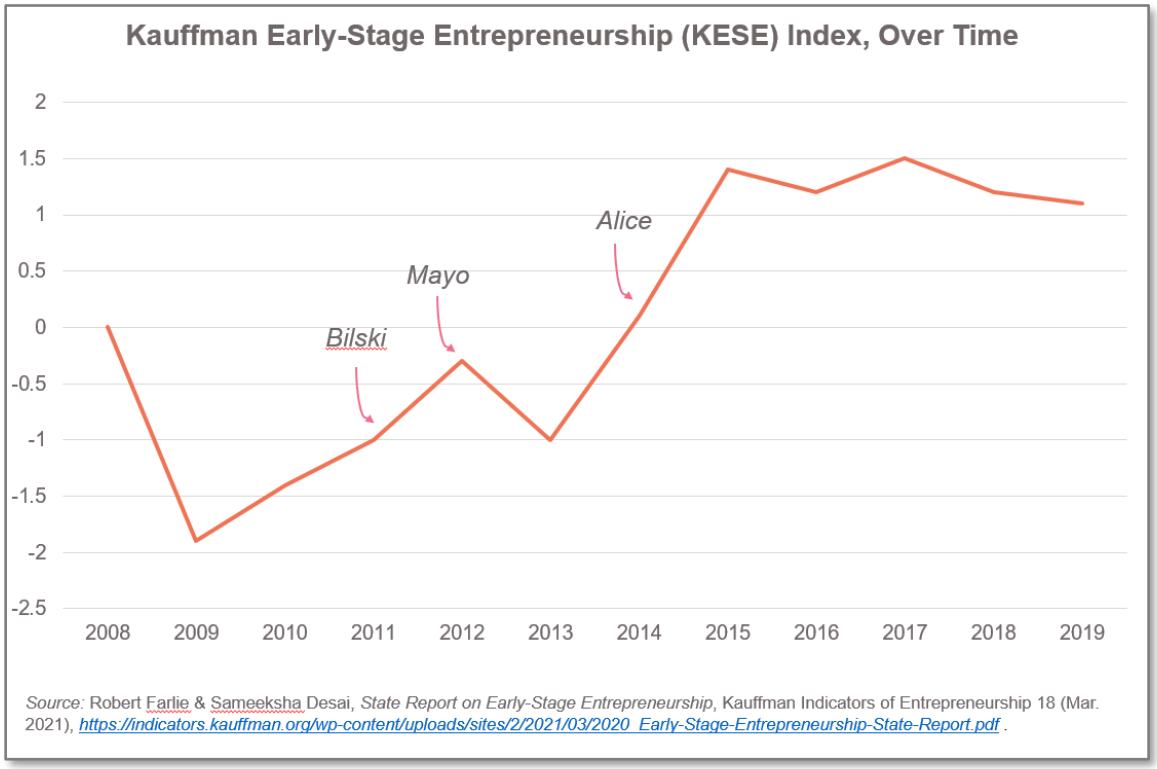
contributed to that reduction. Specifically, practitioners report that "recent U.S. Supreme Court rulings on patent issues, especially on patent eligibility, continue to influence a patent holders' decision on whether they should litigate," and §101 motions allow defendants to "nip cases in the bud and lessen litigation costs."[34]

Positive trends also emerge while innovators are not bogged down with abstract idea patents and frivolous patent assertion. While patent litigation and expense are on the decline, domestic innovators—including in the tech sector—are on the rise. In light of current patent eligibility jurisprudence, when it is being applied correctly and consistently by examiners and judges, innovators are not bogged down by abstract idea patents and associated assertion. This frees up resources for more productive activities like hiring and R&D and opens new paths for innovators to explore.

Since 2014, innovators and entrepreneurs in the U.S. have been very active and productive. The following "snapshot of early-stage entrepreneurial activity" shows overall increases, when measured by the number of new entrepreneurs, job creation, and survival rates.[35] Likewise, as detailed below, angel, seed, and venture-stage investment in U.S. startups has steadily increased over the past decade.[36]

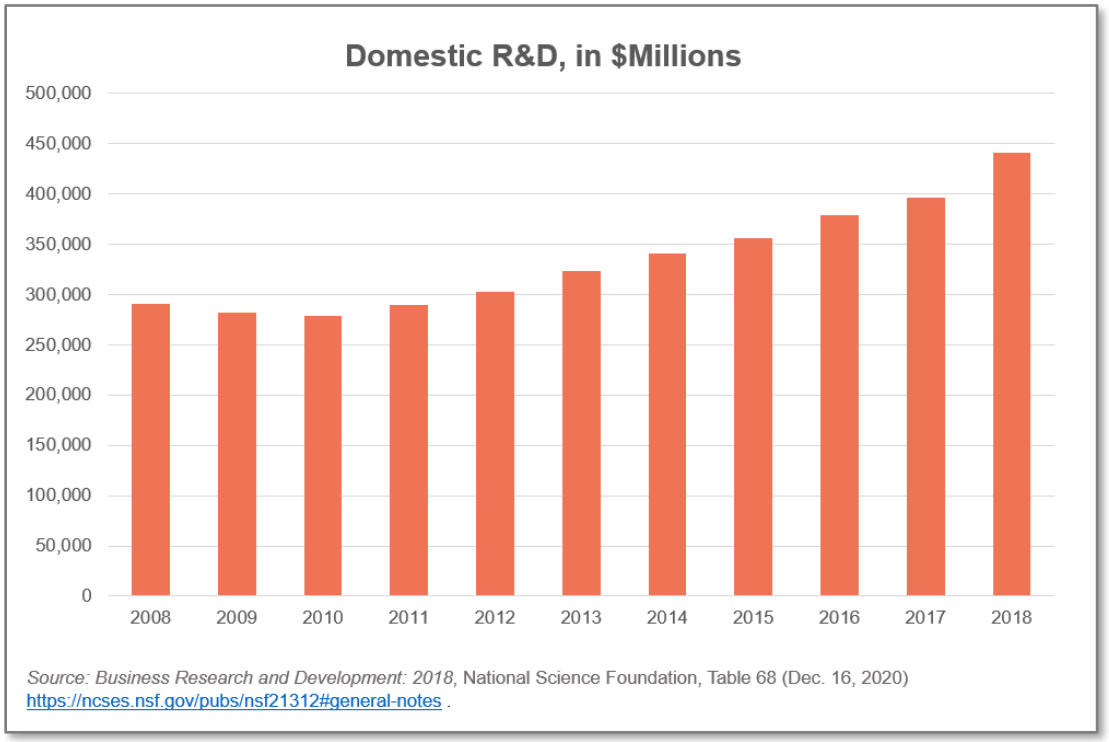
[34] Engine letter, *supra* note 3 (quoting Malathi Nayak, *Cost of Patent Infringement Litigation Falling Sharply*, Bloomberg Law (Aug. 11, 2017), https://biglawbusiness.com/cost-of-patent-infringement-litigation-falling-sharply/).
[35] Robert Farlie & Sameeksha Desai, *State Report on Early-Stage Entrepreneurship*, Kauffman Indicators of Entrepreneurship 3, 18 (Mar. 2021), https://indicators.kauffman.org/wp-content/uploads/sites/2/2021/03/2020_Early-Stage-Entrepreneurship-State-Report.pdf (defining early-stage entrepreneurship index and reporting country-level data); *see also, e.g.*, *Bloomberg U.S. Startups Barometer*, Bloomberg, https://www.bloomberg.com/quote/BSTARTUP:IND (last visited Aug. 29, 2021) (showing overall positive trends in startup health over the past five years, pre-dating COVID pandemic). Early data indicate some more recent volatility and declines in startup health as a result of the on-going pandemic, which is and will continue to be a challenge for startups across the country. *See, e.g.*, *Start-ups in the Time of COVID-19: Facing the Challenges, Seizing the Opportunities*, OECD (May 13, 2020), https://www.oecd.org/coronavirus/policy-responses/start-ups-in-the-time-of-covid-19-facing-the-challenges-seizing-the-opportunities-87219267/.
[36] *Infra* Response to Topic 3.

Chart 1. Startup health, over time.



Similarly, domestic spending on R&D has grown over the past decade, up 30 percent in 2018 compared to 2014.

Chart 2. Domestic R&D spending, per Census data

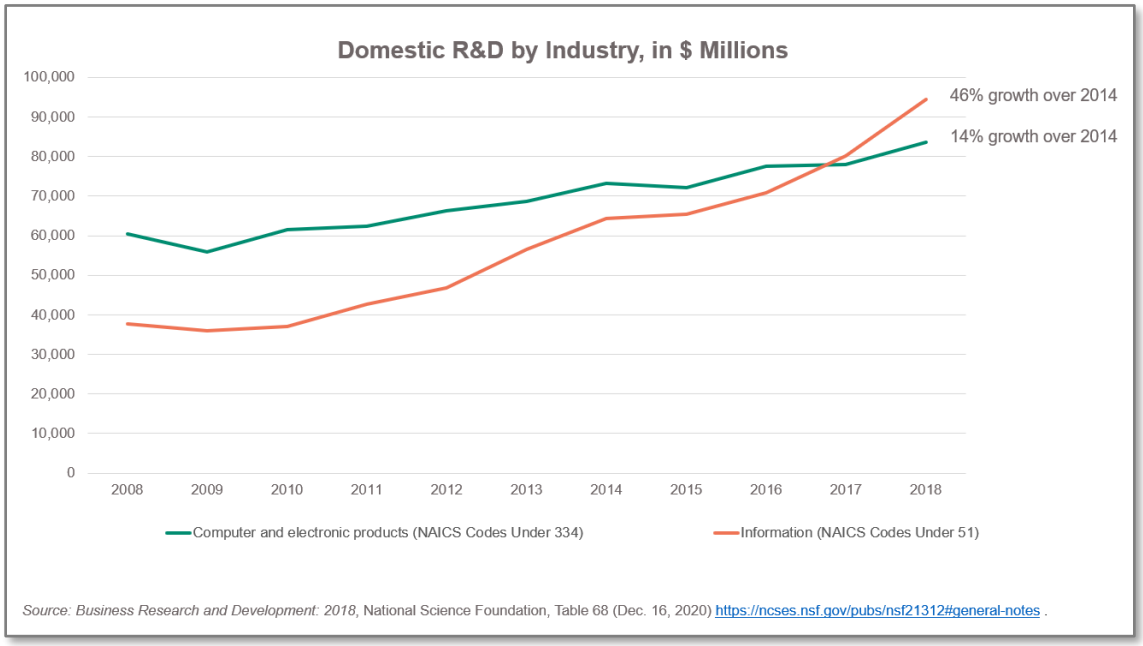


Source: Business Research and Development: 2018, National Science Foundation, Table 68 (Dec. 16, 2020) https://ncses.nsf.gov/pubs/nsf21312#general-notes .

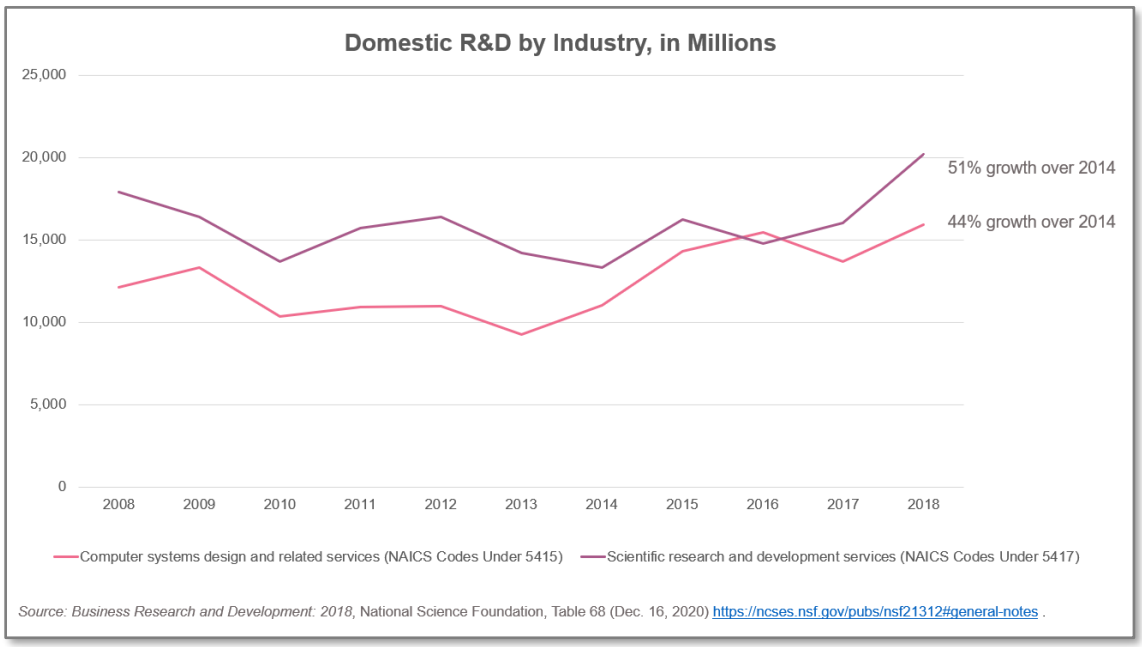
That growth is even more pronounced in high-tech industries. For example, in industries like computer and electronic products and information technology, overall domestic R&D has climbed 14 and 46 percent since 2014, respectively. Looking more granularly at industries like computer systems design (which includes fields that use AI)[37] and scientific research and development services, domestic R&D has increased 44 and 51 percent, respectively.

[37] *Artificial Intelligence: Business and Industry Applications*, Business & Economics Research Advisor, Library of Congress Business Reference Services (Sept. 10, 2018), https://www.loc.gov/rr/business/BERA/issue31/codes.html.

Charts 3, 4. Domestic R&D spending in select tech sectors, per Census data



Source: Business Research and Development: 2018, National Science Foundation, Table 68 (Dec. 16, 2020) https://ncses.nsf.gov/pubs/nsf21312#general-notes .



Source: Business Research and Development: 2018, National Science Foundation, Table 68 (Dec. 16, 2020) https://ncses.nsf.gov/pubs/nsf21312#general-notes .

Individual and company experiences corroborate data about the value of patent eligibility jurisprudence. Current patent eligibility jurisprudence has helped numerous startups, small businesses, and entrepreneurs avoid or curtail costly—even fatal—litigation. This has freed the companies up to build their businesses, hire, develop new technology, and offer services to users across the country. Merely by way of example:

- In June 2019, Rothschild Digital sued CompanyCam—a startup that grew out of a family roofing business and developed an app to support contractors. Rothschild accused

CompanyCam of infringing a patent directed to associating traditional information (like the time, date, location) with a digital photograph. (The same patent has been asserted in 46 other litigations.)[38] Within a month, CompanyCam moved to dismiss the suit, with the judge agreeing the patent was so weak, generically claiming the idea of organizing images, that it was ineligible and should not have been granted. The judge further agreed this was an exceptional case, and ordered Rothschild to pay CompanyCam $86,000 of the fees it incurred defending the suit. However, CompanyCam has not yet received those fees.[39]

- Bitmovin is a startup that develops technology for solving complex video problems in the cloud. It was founded in 2013 by three computer scientists, and since then has been able to grow to a company of over 125 employees. In mid-2018, Bitmovin was sued by a patent assertion entity. Bitmovin knew that the asserted patent was weak, and that Bitmovin would be able to fight the case with an early §101 motion. The PAE knew that too, and after Bitmovin threatened to seek attorneys fees but before Bitmovin even had to argue a §101 motion, the PAE dropped its case. If Bitmovin had instead decided to settle the case, it would have paid the equivalent of one software engineer's annual salary—which was 5% of its entire engineering resources. With *Alice* in its defensive toolkit, Bitmovin had a credible pre-litigation response to the suit that saved it valuable time and money.[40]
- Kickstarter was accused of infringing a low-quality patent, with infringement alleged "on the vaguest of terms." It spent over four years defending the suit, and had to spend several millions of dollars in the process. After *Alice* was decided, the district court ruled the patent ineligible. As Kickstarter's former counsel has explained, this litigation helped establish the company as one that would credibly fight back against abusive litigation. But earlier-stage companies have to "stretch[] every dollar to build their products and their businesses," and most "do not have the same funds to stand up to" patent assertion entities.[41]
- Playsaurus avoided litigation threatened by a GPX Corp. In a game Playsaurus developed, users collect rubies and gold for their accomplishments. On that basis, GPX sought $35,000 over a patent it claimed was directed to "the acquisition and utilization of electronic tokens." Before GPX even filed suit, Playsaurus wrote a series of letters explaining that, "after *Alice*, buying and using tokens for transactions (like a kid would do at Chuck E. Cheese's), cannot be patented by simply reciting computers and the Internet."[42]
- In 2015, AlphaCap Ventures sued Gust—a company that connects other startups with investors. AlphaCap claimed to have invented the concept of online equity funding. Gust

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[38] Data compiled from Unified Patents Litigation Portal, search results available at https://portal.unifiedpatents.com/litigation/caselist?flag=DC&flag=ITC&patents=7456872&sort=-filed_date (last visited Oct. 15, 2021).

[39] *CompanyCam*, Innovate Without Fear, *available at* https://innovatewithoutfear.engine.is/ (last visited Aug. 29, 2021) (clickable map of startup stories, with information about CompanyCam's experience and links to underlying cases, available at marker on Nebraska).

[40] *Patents Spur Innovation - Bitmovin*, Innovate Without Fear, https://innovatewithoutfear.engine.is; Kenneth R. Carter, Op-Ed., *Silicon Valley: The Land of Unicorns — and Trolls*, The Hill (Nov. 10, 2018), https://thehill.com/opinion/finance/415956-silicon-valley-is-the-land-of-unicorns-and-trolls.

[41] *Intellectual Property 101: How Small Business Owners Can Utilize Intellectual Property Protections in Their Businesses: Hearing Before the H. Comm. On Small Businesses*, 115th Congress 2 (2018) (testimony of Michal Rosenn), *available at* https://docs.house.gov/meetings/SM/SM00/20180516/108350/HHRG-115-SM00-Wstate-RosennM-20180516.pdf.

[42] *No Hero Souls for Patent Trolls*, Engine Blog (Mar. 16, 2018), https://medium.com/@EngineOrg/no-hero-souls-for-patent-trolls-7c5bca30168e.

challenged that claim, arguing the abstract idea of crowdfunding was not patentable because it was being done on the Internet. A district court agreed, ruling the patent ineligible under *Alice* and forcing AlphaCap to reimburse the startup's legal fees.[43]

- Nutritionix is a startup that offers a nutrition calculator and database to restaurants so that they can offer their guests more accurate nutrition information. DietGoal sued Nutritionix for a patent allegedly directed to using menus on a computer. In 2014, days after *Alice* was decided, a district court threw out the patent, explaining that it did not add anything that transformed the abstract idea into a patent-eligible invention.[44]
- In 2017, Blackbird sued Cloudflare, a company that offers a cloud network platform and provides web optimization and security services. Blackbird accused Cloudflare of infringing a broad patent targeted to monitoring and modifying data streams. By early 2018, Cloudflare succeeded in having the case dismissed through a district court decision that relied on several recent § 101 cases finding similar claims ineligible.[45]
- In 2016, telehealth startup MyVitalz received a demand letter from an entity that claimed to own a patent covering the idea of telehealth generally. At the time, MyVitalz was a finalist in a Veterans Affairs' competition to find new products and services to improve remote medical practice, and suddenly found itself accused of infringing a patent which did not claim any technical details for how to build or run a telehealth product. But in another litigation involving the same patent, a court recommended that the patent be held ineligible—saving the startup the choice of tens of thousands in settlement fees or selling the founder's personal assets to pay a lawyer—and allowing it to refocus on launching a company.[46]

Finally, § 101 is unique in this way, because it provides a more affordable and efficient way to challenge patent accusations that are cast in broad, vague, and problematic ways. For example, in the Cloudflare case noted above, the patent owner's allegations required such a broad reading of the asserted patent that it rendered claims ineligible—because the plaintiff's theory of infringement would mean that the patent covered "any system where electronic communications are examined and redacted or modified."[47] A patent that cut that broadly—or that cuts broadly enough to accuse everyone who is merely scanning and organizing photos[48]—could be asserted against a vast number of targets. But such broad, generic patents that claim abstract ideas without significantly more also have eligibility problems under current case law.

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[43] *Gust, Inc. v. AlphaCap Ventures, LLC*, 226 F. Supp. 3d 232 (S.D.N.Y. 2016).
[44] *A Startup Runs Into a Patent on Picture Menus,* Elec. Frontier Found., https://www.eff.org/alice/startup-runs-patent-picture-menus (last visited July 16, 2021).
[45] *Less Litigation Means More Innovation - Cloudflare*, YouTube (Dec. 18, 2018), https://www.youtube.com/watch?v=xhMuQ1nkwuA&t=2s; Doug Kramer, *Winning the Blackbird Battle*, Cloudflare Blog (Feb. 14, 2019), https://blog.cloudflare.com/winning-the-blackbird-battle/.
[46] *Alice Saves Medical Startup From Death By Telehealth Patent*, Elec. Frontier Found., https://www.eff.org/alice/alice-saves-medical-startup-death-telehealth-patent (last visited Oct. 12, 2021).
[47] Kramer, *supra* note 45.
[48] *See, e.g.*, *supra* (CompanyCam experience, where same patent was asserted against several others).

Response to Topic 3

Investment in U.S.-based technology and innovation startups has risen steadily over the past 15 years, a time period that encompasses the Supreme Court's *Bilski*, *Mayo*, *Myriad*, and *Alice* decisions and Federal Circuit and district court decisions applying the same law. While outside funding is a decent, but not perfect, proxy for trying to measure the health of the startup ecosystem; a positive trend is apparent across traditional funding rounds (from seed and angel funding through later series of venture capital investment) and for technology areas the PTO specifically asked about in the present request.[49] While this growth did not occur *solely because of* current patent eligibility jurisprudence (there are a constellation of factors that contribute to domestic innovation and startup achievement)—that startups can operate free from abstract idea patents and threats of frivolous litigation or abusive patent assertion contributes to this growth and success.[50]

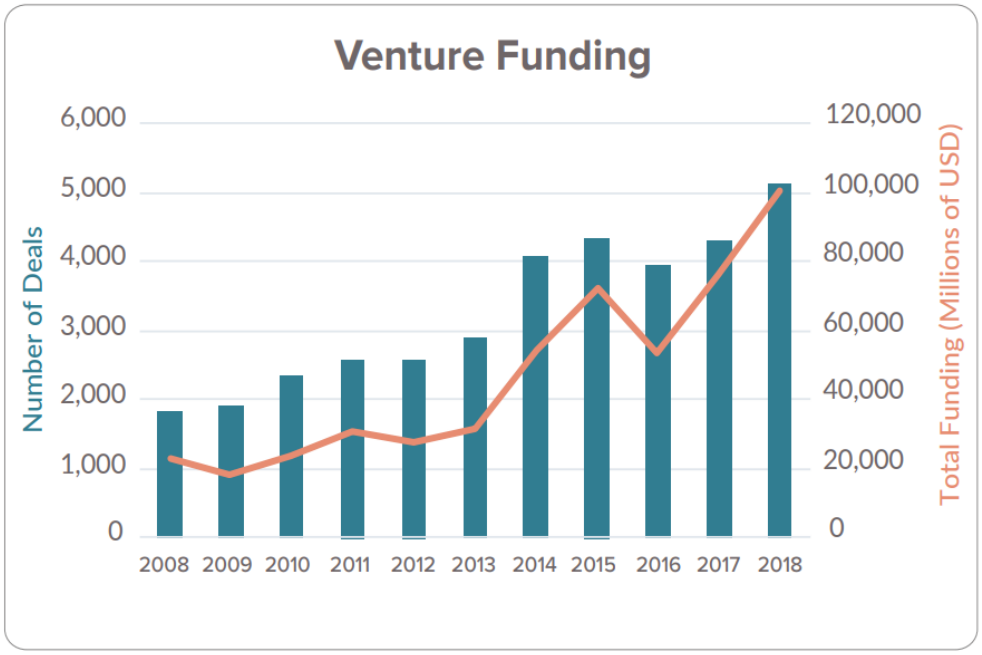
Traditional venture capital funding, overall. In general, the total amount of venture investment (including Series A, B, C, D, and so on) in U.S.-based startups rose from approximately $18 billion in 2009 to $100 billion in 2018. And the number of deals also expanded from approximately 1,900 in 2009 to more than 5,100 in 2018.[51]

[49] In April 2021, Engine published a report, together with the Charles Koch Institute and Startup Genome, on the state of the startup ecosystem (Appendix A). The report evaluates trends in startup fundraising and examines industry subsectors. That report was prepared independent of and published months before the PTO's present request. As such, the industry subsectors analyzed do not align with all of the technology areas the PTO has called out for study here. This should not be taken as an indication that investments in, e.g., quantum computing or diagnostic methods did not also increase. It is simply that Engine's previous research was not broken down along those lines, and especially under the limited time the PTO allotted for the present request, it was not feasible to conduct a new study of the technological fields the PTO specified.

[50] *Cf.* Feldman, *supra* note 23, at 236(reporting survey results showing both startups and "venture capitalists overwhelmingly believe patent demands are having a negative impact on the startup community, and all or most of the demands they experience are coming from those whose core activity involves licensing or litigating patents").

[51] Appendix A, *supra* note 49, at 9. The same positive trends in VC investment are seen in others' analyses. For example, PitchBook and the National Venture Capital Association's (NVCA) data indicate that U.S. VC activity has grown from $45.3 billion invested in 2011 to $164.3 billion invested in 2020. *Venture Monitor Q2 2021*, PitchBook 5 (July 13, 2021), *available at* https://pitchbook.com/news/reports/q2-2021-pitchbook-nvca-venture-monitor.

Chart 5. Overall VC investment in U.S.-based startups.



Looking only at earlier-stage investment, the total amount of Series A funding grew from approximately $4 billion in 2009 to nearly $23 billion in 2018—a 460 percent increase. And the number of Series A deals has also increased, from approximately 1,000 in 2009 to over 2,500 in 2018.[52]

The total amount of seed and angel investment in U.S.-based startups also rose from approximately $800 million in 2009 to $9 billion in 2018—reflecting 975 percent growth—while the number of seed and angel deals also rose steadily from approximately 1,200 deals in 2009 to more than 7,300 in 2018.[53]

Across each of these traditional funding rounds, there's an apparent dip in 2016 due to a substantial market correction in startup valuations early in the year. It was well-documented and understood at the time (even predicted,[54] and welcomed by some[55]), that prior to 2016 there were a few years "of

[52] Appendix A, *supra* note 49, at 8.
[53] Appendix A, *supra* note 49, at 6.
[54] Mark Suster, Opinion, *What Most People Don't Understand About How Startups Are Valued*, Inc. (Feb. 25, 2016), https://www.inc.com/mark-suster/startup-valuations-explained.html (explaining "[m]ost venture capitalists who have been in this business for a long time foresaw this correction and have been talking about it privately for the better part of the past year or two").
[55] *Venture Monitor 2Q 2017*, PitchBook 3 (July 10, 2017), *available at* https://pitchbook.com/news/reports/2q-2017-pitchbook-nvca-venture-monitor.

frenzied investments and lofty company valuations," and early 2016 marked the VC ecosystem "returning to a normal, healthy investment climate."[56] This has been generally described as follows:[57]

> The decrease in 2016 venture investment activity was somewhat expected, given the high activity levels reached in late 2014 and 2015. Driven by an updraft in valuations, the number of deals during this period escalated, creating indigestion in the marketplace for some. As a result, 2016 represented less of a slowdown and more of a return to normalization.

As such, the data about VC investment around 2016 reflects a perceived valuation bubble,[58] VC investment went through a self-correction period where valuations and deal volumes stabilized, experienced a brief plateau, and recovered by the following year.[59]

Investment in AI and life sciences subsectors. The same trends noted above are seen in AI and life sciences subsectors. The number and value of deals in U.S.-based startups that specialize in those industries have risen over the past decade.[60]

Investment in U.S.-based AI startups grew from approximately $5.8 billion in 2009 to over $47 billion in 2018—a 711 percent increase. The number of VC deals in this sector has also grown from just over 1,000 deals in 2009 to over 5,500 deals in 2018.

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[56] Taylor Soper, *VC Investment Activity Dips in 2016, But Still Reaches $69B across 7,751 Companies*, GeekWire (Jan 10, 2017), https://www.geekwire.com/2017/vc-investment-activity-2016-dips-year-prior-still-reaches-69b-across-7751-companies/ (quoting Pitchbook CEO John Gabbert).

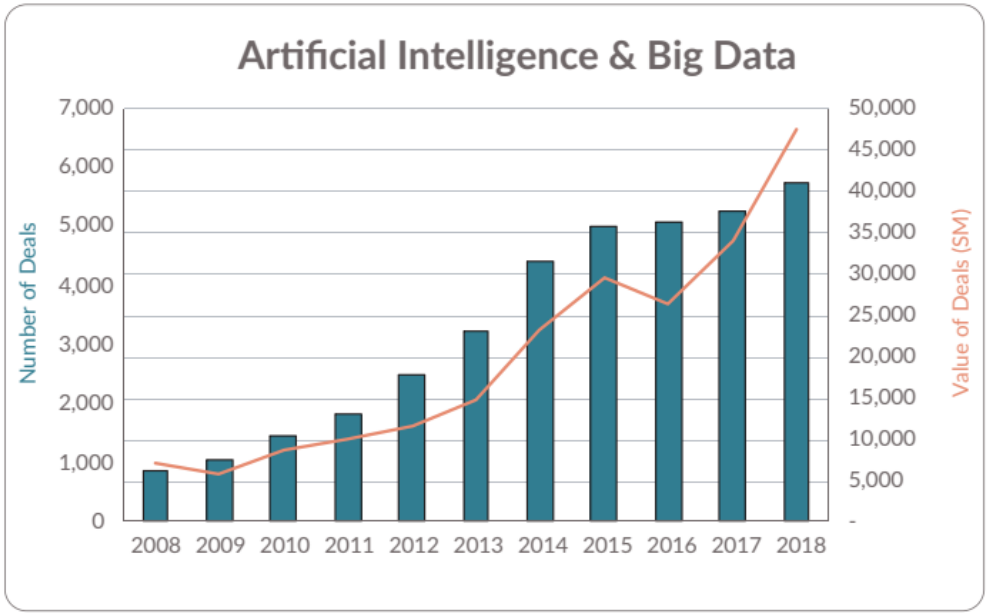
[57] *Venture Monitor 4Q 2016*, PitchBook 3 (Jan. 11, 2017), *available at* https://pitchbook.com/news/reports/4q-2016-pitchbook-nvca-venture-monitor.

[58] *2016 Annual VC Valuations Report*, PitchBook 4 (Mar. 19, 2017), *available at* https://pitchbook.com/news/reports/2016-annual-vc-valuations-report; *see also, e.g.*, Maya Kosoff, *Silicon Valley Shaken as 19 Start-ups See Their Valuations Slashed*, Vanity Fair (Feb. 29, 2016), https://www.vanityfair.com/news/2016/02/silicon-valley-shaken-as-19-start-ups-see-their-valuations-slashed.

[59] *See, e.g.*, *Venture Monitor 2Q 2017*, *supra* note 55, at 3, 4; *see generally Venture Monitor 4Q 2017*, PitchBook (Jan. 15, 2018), https://pitchbook.com/news/reports/4q-2017-pitchbook-nvca-venture-monitor (reporting on 2017 as a historic year for U.S. VC investment).

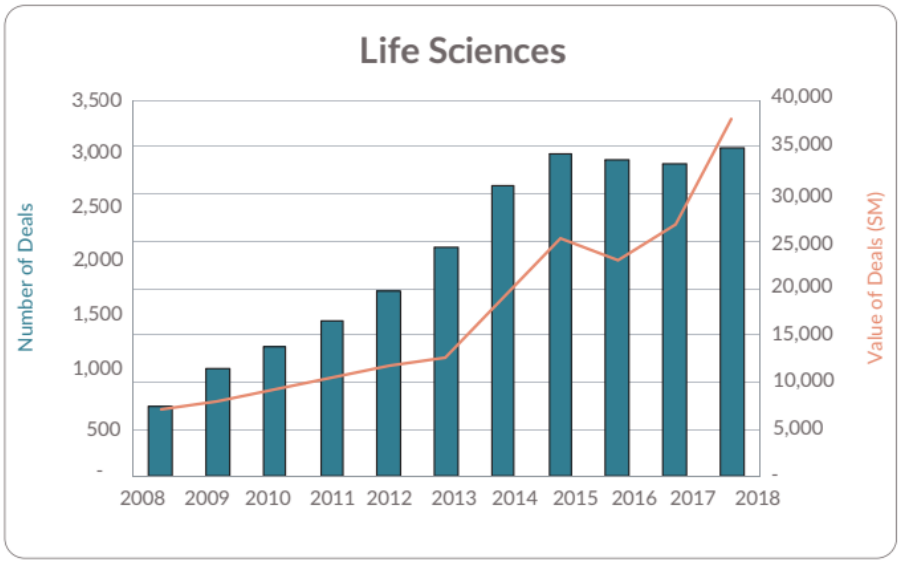
[60] The same positive trends in VC investment are seen in others' analyses. Georgetown's Center for Security and Emerging Technology (CSET) found that nearly 64 percent of equity investment in privately-held AI companies went to U.S. companies. Zachary Arnold et al., *Tracking AI Investment*, Center for Security and Emerging Tech., at iv (Sept. 2020), *available at* https://cset.georgetown.edu/wp-content/uploads/CSET-Tracking-AI-Investment.pdf. And while investment in Chinese companies appears to be shrinking over the past few years, CSET estimates that investment in U.S. based AI companies has grown from $20 billion in 2015 to nearly $50 billion in 2019. *Id.* at 8-10. And PitchBook routinely reports on U.S. biotech and pharma deal activity increasing substantially over the past decade. For example, its data indicate deal value has grown from $4.9 billion in 2011 to $27.2 billion in 2020, a 455% percent increase. *Venture Monitor Q2 2021*, *supra* note 51, at 17; *see also, e.g.*, *Venture Monitor 2Q 2017*, *supra* note 55, at 3, 15 (describing life sciences investment reaching 10-year high in 2017, growing at a 48% over the previous year, compared to 16% growth in overall venture funding).

Chart 6. Investment in U.S.-based AI startups.



Likewise, investment in U.S.-based AI startups grew from over $8 billion in 2009 to nearly $38 billion in 2018—a 373 percent increase. The number of VC deals the life sciences sector also grew from nearly 1,000 in 2009 to over 3,000 in 2018.

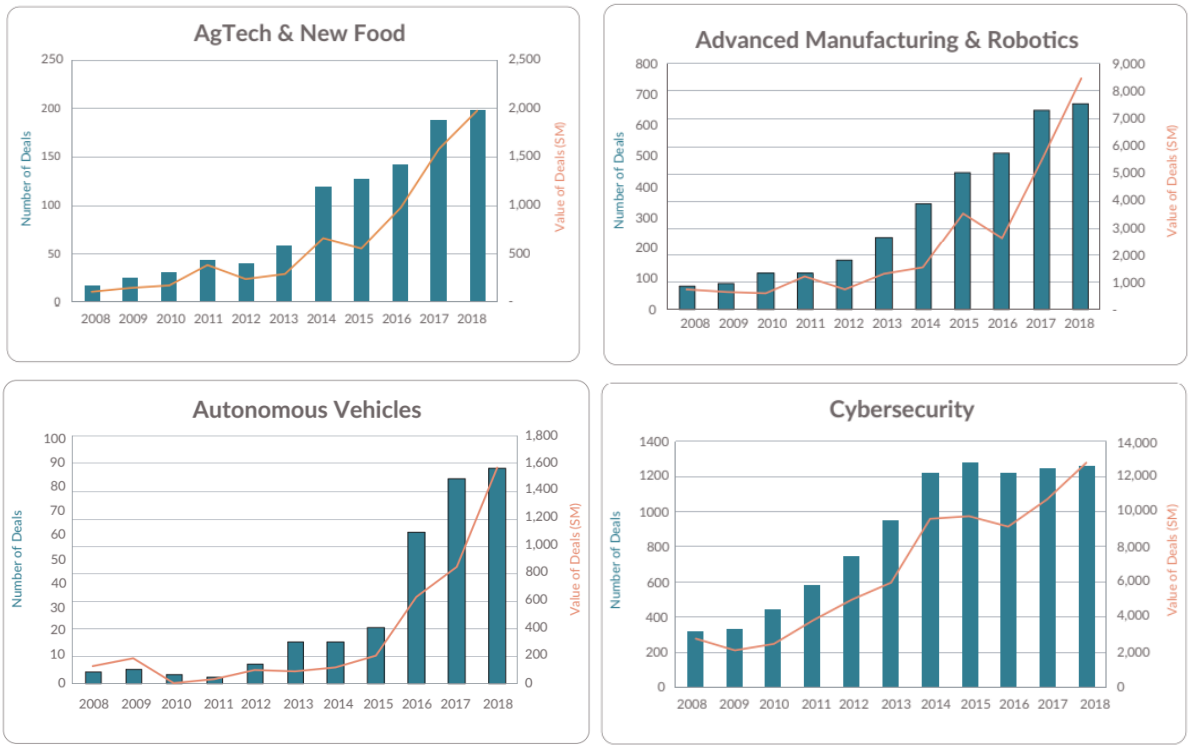
Chart 7. Investment in U.S.-based life sciences startups.



Investment in other subsectors. Appendix A includes data about startup investment in other industry subsectors which, while not identified in the PTO's present request, may be of interest. Merely by way of example: investment in U.S.-based AgTech startups grew 1254 percent (from $146 million to nearly $2 billion) between 2009 and 2018; investment in U.S.-based startups focused on advanced manufacturing and robotics grew 1170 percent (from $670 million to $8.4 billion) over the

same time; investment in autonomous vehicle startups likewise grew 752 percent (from $184 million to $1.6 billion); and investment in cybersecurity startups grew 486 percent (from $2 billion to $12.7 billion).

Charts 8-11. Investment in U.S.-based startups, by selected subsectors.



Response to Topics 4-6

As the PTO considers patent eligibility jurisprudence in the U.S.,[61] and any comparisons to foreign law, it is critical the agency not lose sight of what a U.S. patent is and how the patents it issues do (but also often never) correlate with domestic innovation.

At the outset, data about patents is often used as an admittedly-imperfect proxy when trying to quantify innovation,[62] and data about the patents issued by the PTO can similarly be an even more imperfect proxy for domestic, U.S. innovation. As the PTO well knows, a U.S. patent is the right to exclude others in this country from doing what the patent covers.[63] It is not a reward for conducting research in the country, and there are no requirements that the owner of a U.S. patent do anything,

[61] The *Patent Eligibility Jurisprudence Study* request for information predominantly refers to "patent eligibility" but in a few places asks for information about "subject matter eligibility." For the purposes of these responses, we assume those terms are used interchangeably. In these responses, we also use language of "§ 101" challenges and references to Supreme Court case law analogously.

[62] *See, e.g.*, Petra Moser, *Patents and Innovation: Evidence from Economic History*, 27 J. Econ. Perspectives 23, 23-24 (2013) (noting that "[i]n the absence of economy-wide data on the quantity of innovations, patent counts have become the standard measure of innovation," yet patent data "may fail to capture innovation that occurs *outside* of the patent system")

[63] *See, e.g.*, Janice M. Mueller, Patent Law 15 (3d. ed. 2009); 35 U.S.C. § 154(a)(1) (2013).

make anything, hire anyone, or sell anything in the U.S. Indeed, each year the PTO issues slightly more than 50 percent of patents to foreign applicants.[64]

The corollary to that is U.S. patents—which only apply in the U.S.—can stand in the way of domestic innovators. That is a cost we accept in order to incentivize innovation. But it is a problem if the U.S. patents are directed to mere abstract ideas, without significantly more, because those patents can improperly prevent companies and innovators from using such basic building blocks here—and only here.

Against this backdrop, the U.S. may have things to learn from other countries' patent offices. For example, the European Patent Office (EPO) routinely scores high marks for patent quality.[65] To the extent the EPO's resources or procedures for promoting patent quality could be adopted in the U.S., that could improve quality in our patent system.

But, if the PTO and U.S. policymakers want to understand the impact patent eligibility jurisprudence has on domestic innovation, Topics 5 and 6 in the PTO's present request may elicit odd or irrelevant responses. And it will be critical that the PTO approach these topics with an eye toward detail, with nuance and some caution.

Merely by way of example, a recent study looking at patent applications submitted to three patent offices could be misunderstood and cited to the PTO without correct context. That study counted applications that were allegedly abandoned in the U.S.—because their claims were deemed ineligible—but were granted by the EPO or China.[66] Reading a subset of those applications revealed, however, that the majority of the applications (85 percent) were abandoned for reasons beyond eligibility—some were directed to patent eligible subject matter at the time of abandonment and others were abandoned while facing multiple rejections based on, e.g., §§ 102, 103, and/or 112 of the Patent Act.[67] Likewise, a majority of the applications (over 75 percent) were filed by foreign applicants. Data showing foreign entities abandoned U.S. patent applications when PTO examiners found them, e.g., obvious or anticipated, should be of little (if any) relevance to questions about the role of patent eligibility jurisprudence in domestic innovation.

As such, we urge the PTO to not merely look at high-level numbers about the patents it issues, without more, and compare those to the numbers of patents issued by other countries. That sort of analysis provides nothing more than two numbers. Digging deeper is necessary to understand what the numbers say and why it matters.

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[64] Data compiled from *Calendar Year Patent Statistics (January 1 to December 31)*, U.S. Patent and Trademark Office, https://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports_stco.htm (last visited Oct. 11, 2021).
[65] *E.g.*, Liz Rutherford-Johnson, *European Patent Office Still Top for Quality and Service, New IAM Benchmarking Report Finds*, IAM (May 27, 2020), https://www.iam-media.com/law-policy/epocontinues-dominate-in-quality-and-service-new-iam-benchmarkingreport-finds (U.S. ranks 4th out of 5 patent offices for quality).
[66] *See* Kevin Madigan & Adam Mossoff, *Turning Gold to Lead: How Patent Eligibility Doctrine is Undermining U.S. Leadership in Innovation*, 24 Geo. Mason L. Rev. 939 (2017) (describing the dataset).
[67] Appendix B.

Finally, while it is outside the scope of the PTO's authority and likely beyond the reach of the present study, there are a number of things U.S. policymakers could (and should) be doing to encourage domestic innovation to stay in the country. For example, existing immigration policies, including a lack of pathways to the U.S. for immigrant innovators, are contributing to innovative startups moving to other countries, can stand in the way of talented entrepreneurs and high-skilled workers who want to build things and create growth in the U.S., and are putting our global leadership at risk.[68] These are factors outside the patent system that directly affect the U.S. startup ecosystem. If the PTO learns of any domestic innovators moving investments or activities overseas, it should probe what caused or directly contributed to that movement.

Response to Topic 9

There are numerous instances where current patent eligibility jurisprudence has resulted in more efficient resolution of patent infringement litigation.[69] Likewise, current case law has reduced the cost and duration of litigation, especially for cases filed by patent assertion entities (PAEs), and made it possible for more (and smaller or less-well-resourced) companies to defend against weak or abusive patent assertions.[70]

One eligibility challenge can help numerous other innovators and small businesses. Section 101 is a valuable tool for weeding-out weak, overbroad patent applications and improvidently-issued patents asserted in litigation. This is especially true for the types of patents that are routinely asserted against startups and small businesses. Broad, preemptive patents directed to abstract ideas—those appropriately deemed ineligible under current law—are especially concerning because they can be, and are, asserted against numerous accused infringers based on routine business activities or the use of generic technology. For example:

- In the Nutritionix experience, previously noted,[71] the ineligible claims directed to using picture menus on a computer had previously been asserted against over 70 companies.[72]
- In the Playsaurus experience,[73] the owner of the purported patent covering "electronic tokens" was sending demand letters to multiple companies.[74]

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[68] Jennifer Weinhart, *U.S. Needs a Startup Visa for Innovation to Thrive*, Medium (July 16, 2021), https://engineadvocacyfoundation.medium.com/u-s-needs-a-startup-visa-for-innovation-to-thrive-a84f2e505f7d (discussing reforms to immigration law to attract talent and entrepreneurs); Caleb Watney, *America's Innovation Engine is Slowing*, The Atlantic (July 19, 2020), https://www.theatlantic.com/ideas/archive/2020/07/americas-innovation-engine-slowing/614320/ (discussing the flow of talent from overseas, and the impact on domestic innovation, universities, etc. if policy and pandemic limit the free flow of top talent to the U.S.); Ian Rutledge, *#StartupsEverywhere Profile: Nicholas Hinrichsen, Co-Founder & CEO, WithClutch*, Engine (Sept. 17, 2021), https://www.engine.is/news/startupseverywhere-sanfrancisco-ca-withclutch (discussing need for a startup visa, noting "there are a lot of talented people who would not go home after studying in the U.S. or work from abroad, if they could just start their company here").

[69] For examples, *see supra* Response to Topic 2.

[70] *See also, e.g.*, *supra* Responses to Topics 1-2 (reciting relevant data and listing exemplary startups and entrepreneurs who benefited directly from current patent eligibility jurisprudence).

[71] *Supra* Response to Topic 2.

[72] *E.g.*, *Patent on Picture Menus*, *supra* note 44.

[73] *Supra* Response to Topic 2.

[74] *E.g.*, Cyrus Farivar, *"Patent Troll" Doubles Down, Now Accuses* Clicker Heroes *Maker of Libel*, ArsTechnica (Apr. 2, 2018), https://arstechnica.com/tech-policy/2018/04/patent-troll-doubles-down-now-accuses-clicker-heroes-maker-of-libel/.

It is unfortunately not uncommon for a PAE to dismiss cases asserting weak patents before any judgment on the merits, thereby preserving ineligible claims for assertion in subsequent demand letters and lawsuits. This can be seen, for example, in one case where Shipping and Transit asserted three patents directed to monitoring and reporting the location of vehicles. One week after the defendant moved for judgement on the pleadings that the asserted claims were ineligible, Shipping and Transit moved to dismiss its own case with prejudice and provided the defendant a covenant not to sue. The court found Shipping and Transit had "repeatedly dismissed its own lawsuits to evade a ruling on the merits and yet persist[ed] in filing new lawsuits advancing the same claims." And the court would have found the claims ineligible, had the case not been dismissed by the patent owner. Yet numerous other defendants were/had been threatened with those same patents: one of the patents had been asserted in over 400 lawsuits, two of the patents had been asserted in more than 90 lawsuits, and in the month after Shipping and Transit dismissed this case it filed at least six new cases asserting the same patents against other defendants.[75]

Having § 101 as a tool helps startups, because they might be able to afford to defend themselves. Startups accused of infringing an ineligible patent claim can raise this as a defense early in litigation, on the pleadings, meaning they may be able to afford to defend themselves.

The costs of defending a full patent lawsuit are out of reach for most startups. The average seed-stage startup raises $1.2 million, a sum that is expected to cover all its costs for nearly two years. And most startups have far less money than that.[76] By comparison, the cost of defending a lower-stakes patent infringement suit averages $1.5 million - $1.875 million.[77] Since patent eligibility challenges can be filed very early, as Rule 12(b)(6) motions to dismiss, litigants can avoid incurring years of expensive legal fees, discovery costs, and expert witness costs.[78]

Without this type of fast, affordable option to challenge ineligible patent claims, startups would be forced to settle or could be forced out of business altogether. If ineligible claims are being asserted by PAEs, those entities are likely seeking nuisance value settlements, which startups often feel pressured to pay just to avoid incurring such high legal costs.[79] However, startups can also be accused of infringement by their established competitors wielding weak, overbroad patent claims or

[75] *Shipping and Transit, LLC v. Hall Enterprises, Inc.*, No. CV 16-06535-AG-AFM, 2017 WL 3485782 (C.D. Cal. July 5, 2017) (plaintiff, which had sued hundreds of companies for infringement, dropped this case one week after defendant filed § 101 motion to dismiss, and court awarded defendant its attorneys fees).
[76] Appendix A, *supra* note 49, at 17.
[77] Am. Intellectual Prop. Law Ass'n, 2019 Report of the Economic Survey 50-51 (2019) (reporting costs of litigation, and specifically defending claim by non-practicing entity, where $1-$10 million is at stake).
[78] In the intermediary liability context, it can cost a startup $15,000 - $80,000 to file a motion to dismiss. Evan Engstrom, *Primer: Value of Section 230*, Engine (Jan. 31, 2019), https://www.engine.is/news/primer/section230costs.
[79] *See, e.g.*, James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 Cornell L. Rev. 387, 404-05 (2014) (explaining NPE tactic of pursuing nuisance suits against companies of all sizes, where the NPE is willing to settle for smaller payments, often less than the cost of litigation).

frivolous infringement allegations. And those patent holders may not be willing to settle.[80] Meaning, if a startup cannot afford the cost of defense, it will have to close up shop.[81]

For startups operating on thin margins, avoiding litigation costs and risks is particularly important. Even if a startup has the resources to fund a litigation defense (which many do not), that money, wasted on litigation over an ineligible patent claim, could be better spent on engineer salaries, research, product development, or marketing.[82] Current or potential investors will be more reluctant to fund companies facing any (even meritless) litigation, and prolonged litigation could cause a substantial drop in valuation.[83] Indeed, the "staggering costs of litigation . . . threaten to limit entry to innovators with deep pockets who can bear the risks, not only of failing in the marketplace, but of patent litigation." Not only that, but as enormous costs are imposed on innovators who have to settle or defend frivolous litigation over low-quality patents, society also pays "through lost innovation or unwarranted monopoly prices."[84] Cost-effective and efficient mechanisms for challenging low-quality patents, like early eligibility challenges, promote innovation and competition.

Likewise, the availability of early § 101 challenges has helped reduce the overall costs of patent litigation. As noted earlier,[85] between 2015 and 2017 the median overall cost for a lower-stakes patent case declined 47 percent.[86] And practitioners have explained that "recent U.S. Supreme Court rulings . . . especially on patent eligibility, continue to influence a patent holders' decision on whether

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[80] *Cf.* Colleen Chien, *Of Trolls, Davids, Goliaths, and Kings*, 97 N.C. L. Rev. 1571, 1587-88 (2009) (describing "strategic use of patent litigation by established companies to impose distress on their financially disadvantaged rivals").
[81] *See, e.g.*, Amy L. Landers, *The Antipatent: A Proposal for Startup Immunity*, 93 Neb. L. Rev. 950, 979-80 (2015) (examples of two startups who won patent cases but lost out on market opportunities); Engine, *Startups Need Comprehensive Patent Reform Now* 7-14, https://perma.cc/8E7R-S46Q (recounting additional stories of startups harmed by assertion of wrongly-issued patents).
[82] *See, e.g.*, *I/P Engine, Inc. v. AOL Inc.*, 576 F. App'x 982, 996 (Fed. Cir. 2014) (Mayer, J. concurring) ("an early determination that the subject matter of asserted claims is patent ineligible can spare both litigants and courts years of needless litigation").
[83] *See, e.g.*, Collen Chien, *Startups and Patent Trolls*, 17 Stan. Tech. L. Rev. 461, 461-62 (2014) (startups accused of infringement report significant operational impacts, like hiring freezes, shutting down business lines); Stuart J.H. Graham, et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey,* 24 Berkley Tech. L.J. 1255, 1315 (2009) (startups are "particularly sensitive to accusations of infringement because they are likely to experience resource constraints when faced with the costs of funding a suit"); Fed. Trade Comm'n, to Promote Innovation: The Proper Balance of Competition and Patent Law and Policy 7-8 (2003) (even meritless patent claims can scare investors); Feldman, *supra* note 23, at 280 (survey of venture capitalists revealed patent demands could deter all investors); Joe Mullin, *New Study Suggests Patent Trolls Really Are Killing Startups*, Ars Technica (June 11, 2014), https://arstechnica.com/tech-policy/2014/06/new-study-suggests-patent-trolls-really-are-killing-startups/ (in a case that was ultimately dismissed, startup valuation dropped by $4 million during the suit and as a result the company had to lay off over 25% of its staff).
[84] Timothy B. Dyk, *Ten Prescriptions for What Ails Patent Law*, 17 Stan. Tech. L. Rev. 345, 352 (2014); *see also, e.g.*, Ted Sichelman, *The Vonage Trilogy: A Case Study in "Patent Bullying,"* 90 Notre Dame L. Rev. 543, 549-50 (2014) (explaining how low-quality patents can be used strategically by companies to "impose distress on their financially disadvantaged rivals," and "prevent innovative, disruptive technologies from competing"); Jay P. Kesan, *Carrots and Sticks to Create A Better Patent System*, 17 Berkeley Tech. L.J. 763, 767 (2002) ("the social costs of improvidently granted patents are numerous"); Christopher R. Leslie, *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 Minn. L. Rev. 101, 116 (2006) (discussing how low-quality patents can prevent would-be competitors from exploring R&D or business opportunities).
[85] *Supra* Response to Topic 2.
[86] These numbers have started to rise since 2017; and in 2019 the cost of even a lower-stakes case was $1.5 million. Am. Intellectual Prop. Law Ass'n, 2019 Report of the Economic Survey 51 (2019) (reporting costs of litigation with $1-$10 million at stake).

they should litigate," and §101 motions allow defendants to "nip cases in the bud and lessen litigation costs."[87]

For similar reasons, § 101 also shifts the balance in abusive or frivolous patent assertion, making coercive patent practices less profitable (and therefore, less common).[88] Indeed, many startups and small businesses will not be able to afford even the cost of a motion to dismiss.[89] But upon receipt of a demand letter, startups accused of infringement can respond, where appropriate, that the patent-at-issue is ineligible, and the patent holders may walk away or agree to settle for a much smaller amount.[90] Early, less-expensive defenses like § 101 also reduce the incentives to assert low-quality patents in the first place.

Current patent eligibility jurisprudence contributes to judicial efficiency. Judges across the country have accurately acknowledged the benefit of resolving patent eligibility disputes at the earliest opportunity. As a former chief judge of the Federal Circuit has explained:

> Addressing 35 U.S.C. § 101 at the outset not only *conserves scarce judicial resources* and *spares litigants the staggering costs* associated with discovery and protracted claim construction litigation, it also works to *stem the tide of vexatious suits* brought by the owners of vague and overbroad business method patents.[91]

And he is not alone. Other judges have explained how the "effects of resolving § 101 issues at the pleadings stage include 'conserve[ing] scarce judicial resources,' 'provid[ing] a bulwark against vexatious infringement suits,' and 'weeding out . . . patents that stifle innovation and transgress the public domain.'"[92]

This is particularly noteworthy, because "[p]atent disputes are notoriously time-consuming and costly." Indeed, § 101 also offers vital judicial efficiency to benefit the broader federal court

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[87] Malathi Nayak, *Cost of Patent Infringement Litigation Falling Sharply*, Bloomberg Law (Aug. 11, 2017), https://biglawbusiness.com/cost-of-patent-infringement-litigation-falling-sharply/.
[88] *Supra* Response to Topic 2.
[89] *See, e.g.*, *supra* notes 78, 49 (research indicates that motions to dismiss in other contexts can costs as much as $80,000, while the average seed-stage startup has only $1.2 million to spend in approximately 2 years (or $55,000 per month), a sum well above what most startups have but that is supposed to cover all of a startup's costs, from payroll to R&D, marketing, and product development); *Startup Funding Infographic*, Fundable, https://www.fundable.com/learn/resources/infographics/startup-funding-infographic (last visited Jan. 13, 2021) (estimating the average startup raises $78,000 in its first year).
[90] *See, e.g.*, *Patents Spur Innovation - Bitmovin*, Innovate Without Fear, https://innovatewithoutfear.engine.is; Kenneth R. Carter, Op-Ed., *Silicon Valley: The Land of Unicorns—and Trolls*, The Hill (Nov. 10, 2018, 11:00 AM), https://thehill.com/opinion/finance/415956-silicon-valley-is-the-land-of-unicorns-and-trolls (summarizing experience of one company raising § 101 in pre-litigation response to patent assertion entity, to avoid costly litigation).
[91] *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1364-65 (Fed. Cir. 2015) (Mayer, J. concurring) (citations and quotations omitted) (emphasis added); *see also, e.g.*, *Am. Well Corp. v. Teladoc, Inc.*, 191 F. Supp. 3d 135, 137 (D. Mass. 2016) (quotation omitted) (similar); *Roche Molecular Sys., Inc. v. Cepheid*, No. 14-CV-03228-EDL, 2017 WL 6311568, at *6 (N.D. Cal. Jan. 17, 2017) (similar); *Wolf v. Capstone Photography, Inc.*, No. 2:13-CV-09573, 2014 WL 7639820, at *6 (C.D. Cal. Oct. 28, 2014) (similar); *Two-Way Media Ltd. v. Comcast Cable Commc'ns, LLC*, No. CV 14-1006-RGA, 2016 WL 4373698, at *3 (D. Del. Aug. 15, 2016) ("Early resolution of § 101 issues, where appropriate, is desirable.").
[92] *Network Apparel Grp., LP v. Airwave Networks Inc.*, No. 6:15-CV-00134, 2016 WL 4718428, at *4 (W.D. Tex. Mar. 30, 2016) (quotations omitted).

system.[93] Without early § 101 challenges, "a scourge of meritless infringement suits clogged the courtrooms and exacted a heavy tax on scientific innovation and technological change."[94]

Patent eligibility plays a unique role. Here again, patent eligibility jurisprudence plays a unique role in litigation. As we have previously explained:[95]

> Invalidity defenses under §§ 102, 103, and 112 are not adequate substitutes for §101's gatekeeping. In cases where the asserted patents are arguably ineligible on their face (on the pleadings), defendants can file § 101 motions to dismiss before discovery even starts. Because a startup has fewer resources to spend on litigation, and because receiving demand letters or being involved in litigation makes it harder to raise money, earlier and less expensive exits from litigation matter more to the startup's bottom line. The other invalidity defenses only come later in a case and after significant costs are incurred. Anticipation (under § 102),[96] obviousness (under § 103),[97] lack of enablement,[98] and insufficient written description[99] (under § 112) all involve questions of fact. And each of these provisions is evaluated from the perspective of a person of ordinary skill in the art, which almost always requires expert testimony. Therefore, before resolving a case on these §§ 102, 103, or 112 grounds, the parties must complete fact discovery, claim construction, and expert discovery.

Response to Topic 10

A critical feature of a strong patent system is its ability to provide protection for truly new inventions while also preventing patents on things that are not inventive and preventing patents on things that belong in the public domain. For example, in the decades leading up to the Supreme Court decisions in *Bilski*, *Mayo*, *Myriad*, and *Alice*, there were well-noted and widespread concerns about the harms associated with a lax patent eligibility standard.[100] Current patent eligibility jurisprudence is an important component of how the U.S. achieves essential balance, improving our

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[93] *See, e.g.*, *Gaelco S.A. v. Arachnid 360, LLC*, 293 F. Supp. 3d 783, 789 (N.D. Ill. 2017) ("district courts should take Section 101 seriously, apply it early, and check the bona fides of the concept underlying the patent") (quoting *O2 Media, LLC v. Narrative Sci. Inc.*, 149 F. Supp. 3d 984, 990 (2016); *IPLearn-Focus, LLC v. Microsoft Corp.*, No. 14-CV-00151-JD, 2015 WL 4192092, at *3 (N.D. Cal. July 10, 2015) ("[s]ection 101 questions should be resolved as early as practicable in a case").

[94] *In re Marco Guldenaar Holding B.V.*, 911 F.3d 1157, 1164–65 (Fed. Cir. 2018) (Mayer, J., concurring).

[95] Engine letter, *supra* note 3, at 6.

[96] *E.g.*, *Orion IP, LLC v. Hyundai Motor Am.*, 605 F.3d 967, 975 (Fed. Cir. 2010).

[97] *E.g.*, *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-51 (Fed. Cir. 1988).

[98] *E.g.*, *Strick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008).

[99] *E.g.*, *Vasudevan Software, Inc. v. MicroStrategy, Inc.*, 782 F.3d 671, 682 (Fed. Cir. 2015).

[100] *See, e.g.*, Adam B. Jaffe & Josh Lerner, *Innovation and Its Discontents: How Our Broken Patent System is Endangering Innovation and Progress, and What To Do About It*, at x-xi, 115-19, 142-49, 197-205 (2007); Margo A. Bagley, *Patents and Technology Commercialization Issues and Opportunities*, in *Technological Innovation: Generating Economic Results* 117, 122-23, 126-27, 137 (Gary D. Libecap, Marie C. Thursby eds., 2008); James Bessen & Michael Meurer, Essay, *The Direct Costs from NPE Disputes*, 99 Cornell L.R. 387, 421-22 (2014); Robert A. Kreiss, *Patent Protection for Computer Programs and Mathematical Algorithms: The Constitutional Limitations of Patentable Subject Matter* , 29 N.M.L. Rev. 31 (1999); Andrew A. Schwartz, *The Patent Office Meets The Poison Pill: Why Legal Methods Cannot Be Patented*, 20 Harv. J.L. Tech. 333 (2007).

system and ensuring there are meaningful checks on eligibility which encourage innovation and competition.

The value of § 101 as a litigation defense is particularly acute in light of (now abrogated) controversial Federal Circuit decisions in the mid- to late-1990s that opened the doors too wide to software and business method patents—and in light of the corresponding, dramatic increase in patent litigation.[101] Software and business method patents are much more likely to be litigated, imposing significant cost and risk across industries, disincentivizing innovation and R&D in certain sectors, and imposing social costs.[102] Section 101 is valuable, and needed especially now, to focus the U.S. patent system on technological advances, improvements, and solutions, as well as to curb the rates of litigation over low-quality patents—all of which improves confidence in our system.

Response to Topic 11

Responses to other topics addressed herein are also responsive to this topic.

Response to Topic 12

As noted above, current patent eligibility jurisprudence has contributed to domestic startup success, increasing rates of R&D in the U.S., and greater investment in key emerging technologies.[103] Specifically considering how the current law impacts the U.S.'s position in developing and adopting AI, as we have previously explained, current patent eligibility jurisprudence is well suited to protect AI inventions while avoiding patents that improperly cover underlying abstract ideas or human mental tasks without significantly more. Importantly, just like *Alice* and related cases have confirmed that appending "do it on a computer" to an abstract idea is not enough to create patent eligibility, "do it on a neural net" or "do it with AI" should also not render an abstract idea patent eligible.

In more detail, as we have explained in previous comments to the PTO, which may be relevant to the present study:[104]

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[101] *See In re Alappat*, 33 F.3d 1526 (1994), *abrogated by In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (reversing PTO and holding that a general purpose computer operating pursuant to any software is patent eligible); *State Street Bank & Trust Co. v. Signature Financial Grp.*, 149 F.3d 1368 (Fed. Cir. 1998) *abrogated by In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (reversing district court and upholding patent directed to data processing system for implementing spoke and hub investment structure); see also, e.g., John R. Thomas, The Patenting of the Liberal Professions, 40 Boston College L. Rev. 1139 (1999) (discussing Federal Circuit cases, noting "few restraints bound the sorts of subject matter that may be appropriated by the patent system," and proposing solutions to focus U.S. law on the appropriate subject matter for patenting).

[102] *See generally, e.g.*, James Bessen, *A Generation of Software Patents*, 18 B.U.J. Sci. & Tech. L. 241 (2012) (study examining changes in patenting behavior of the software industry since 1990s, with findings that make it "hard to conclude that software patents have provided a net social benefit in the software industry"); Yu-Kai Lin & Arun Rai, *Patent Protection and Software Innovation: Evidence from Alice* (Sept. 9, 2020), *available at* https://ssrn.com/abstract=3703055 (post-*Alice* study showing increased sales, market valuation, and open source activity by software firms after *Alice*, in findings that suggest for software industry the value of patents is generally outweighed by the costs).

[103] *E.g.*, *supra* Responses to Topics 1, 2, 3.

[104] Tyler D. Robbins & Phil Malone, Comments of Engine Advocacy & The Elec. Frontier Found. *In re* Request for Comments on Patenting Artificial Intelligence Inventions, Docket No. PTO-C-2019-0029 (Nov 8, 2019), *available at*

Artificial intelligence ("AI") is a quintessential disruptive technology. It has already significantly affected aspects of our everyday lives, from healthcare to entertainment. And it is difficult to imagine an industry or sector AI will not touch in the future. While many AI technologies are already ubiquitous, we are still in the early stages of an AI revolution, with myriad new advanced technologies and commercial applications on the horizon.

But, despite its transformative tendencies, AI does not need to disrupt the U.S. patent system. Patents have adapted to accommodate revolutionary technologies in the past, such as computer software and genetic engineering. While our patent policies should account for the value of emerging AI technologies—and we commend the Patent Office for seeking public input—the U.S. patent system does not now need substantial changes to accommodate AI.

Existing statutes, regulation, guidance, and case law map well onto the types of AI inventions commonly produced today and on the immediate horizon. . . .

AI technologies perform tasks that conventionally require human intelligence, such as learning, reasoning, and perception. Usually, these technologies are implemented as computer software or hardware. AI is a broad discipline, including technologies such as expert systems, fuzzy logic, and robotics. But, regardless of the specific technology, most AI innovations today involve machine learning methods.

Machine learning methods solve problems without being explicitly programed. These methods have roots in statistical modeling and largely use statistical methods. Generally, both statistics and machine learning develop mathematical models from analyzing the inputs and outputs of a process. However, whereas traditional statistics tries to define a model of the process itself, machine learning methods try to predict the outputs of that process without trying to model or understand how it works. By treating the process as unknown while trying to functionally approximate it, machine learning methods can learn to perform incredibly complicated and not well-understood tasks, such as object detection, that would be difficult, if not impossible, to explicitly program.

. . .

AI inventions do not require unique patent eligibility law or policy considerations. Recently decided cases, especially since *Alice*, have helped to reduce the proliferation of weak, overbroad patents by refining subject matter eligibility standards. The Patent Office should be careful these standards do not regress when considering AI inventions.

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https://static1.squarespace.com/static/571681753c44d835a440c8b5/t/5dd4520517a6ae540f87faca/1574195725987/Comments+of+Engine+Advocacy+and+The+Electronic+Frontier+Foundation.pdf (citations omitted).

. . .

AI software inventions should not be any more patentable than typical software. If anything, AI patent claims are more likely to be directed towards abstract ideas under *Alice* and subsequent case law than other software inventions. This is primarily for two reasons:

First, unlike typical software that is programed with explicit instructions, AI software often uses self-learning algorithms to achieve tasks. Essentially, these algorithms—many of which are now conventional, widely-available "off-the-shelf" technology—optimize mathematical models for approximating an opaque phenomenon from its inputs and outputs. Claiming such a process, without some additional limitations, can be the sort of data manipulation and generation the Federal Circuit considered ineligible in *Digitech* and *SAP America*. Additionally, a claim just for the trained model itself should be ineligible because it is a mathematical representation of the relationship between the input and output data.

Second, AI inventions, by definition, try to perform tasks traditionally requiring human intelligence. Broad claims for AI inventions may thus be directed towards concepts analogous to human mental work, from conscious processes, like making predictions, to implicit processes, like perception. AI technologies are powerful information processing systems that can perform a wide variety of tasks. The simple idea of using an AI system to do a typical human mental task, without more, is not the type of inventive contribution warranting patent protection. As *Alice* established with computers, merely using AI to carry out an abstract idea, such as mental steps, should not be enough to transform an abstract idea into patent eligible subject matter.

. . .

The U.S. patent system exists to promote innovation and disclosure. Over the past decade, few fields have experienced a greater explosion in innovation than AI. There are new developments and advancements in AI technology all the time, as investment, research, and interest in the industry increased dramatically over the past few years. AI development thrives everywhere, from universities and research institutions to startups and large companies. To remain globally competitive, the U.S. needs to keep investing in AI research and education.

Notably, this innovation and growth in AI all happened under the current patent framework. . . . Thus, when considering any changes to how it evaluates AI patent applications, [the government] should carefully consider how those changes might impact this "Golden Age" of AI and whether they will hamper innovation. Easing the requirements for patentable AI inventions could have negative effects. In particular,

> the risk of permitting weak, overbroad patents, like those that plagued the patent system prior to *Alice*, could end up restricting downstream innovation in this field.
>
> Additionally, the Patent Office should consider how any changes to the current patent framework might impact the high level disclosure already in the AI development community. AI systems and tools are often distributed for free online under permissive licenses, whether they were developed by for-profit corporations, non-profit research institutions, or a dedicated hobbyist. . . .
>
> Finally, the Patent Office should also understand the greater policy contexts of AI inventions when examining issues around AI patents. Opaque AI systems trained with biased datasets are negatively impacting the lives of already marginalized communities. While addressing these issues is not necessarily within the Patent Office's mandate, the patent system itself can nonetheless have an impact. Strong patents with precise claims can better help the public understand how AI systems make decisions that impact their lives. And properly disclosing the data used to train AI systems in order to meet the enablement requirement can give the public the opportunity to check for bias in the dataset or data collection process. With AI inventions, patents have the special opportunity to promote not only the progress of science and the useful arts, but also the public's general welfare.

Policymakers seeking to boost domestic AI innovation must look beyond the patent system, both to understand the U.S. position as a global innovation leader and to understand the government's role in supporting and promoting this work. For one, there are a constellation of measures policymakers should assess when judging the health of the AI innovation ecosystem—metrics that bear a direct connection to domestic innovation like access to AI talent in the U.S., the amount of public and private investment, the number of high-quality research papers published by U.S. investigators, and the range and scope of AI R&D being conducted in the country.[105] Likewise, policymakers should focus on injecting the tools and resources startups need to succeed in developing and adopting AI here in the country. This should include prioritizing direct funding for the nation's tech innovators,[106] ensuring startups can access other government-provided resources like datasets and computing infrastructure,[107]

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[105] *See, e.g.*, Daniel Castro, Michael McLaughlin & Eline Chivot, *Who Is Winning the AI Race: China, the EU or the United States?*, Center for Data Innovation (Aug. 19, 2019), https://datainnovation.org/2019/08/who-is-winning-the-ai-race-china-the-eu-or-the-united-states/.

[106] *E.g.*, Letter to Hon. Maria Cantwell and Roger Wicker from TechNet et al (Apr. 29, 2021), *available at* https://static1.squarespace.com/static/571681753c44d835a440c8b5/t/608835e54d5b2179f83f7b6e/1619539429281/FINAL+AS+OF+APRIL+27+Endless+Frontier+Act+Multi+Association+Letter.pdf (articulating support for Endless Frontier Act).

[107] *E.g.*, Comments of Engine Advocacy Regarding National AI Research Resource, Docket No. PTO-C-2019-0029 (Sept. 1, 2021), *available at* https://static1.squarespace.com/static/571681753c44d835a440c8b5/t/612fd79874a9b127a859bbd2/1630525336986/NAIRR+RFI.pdf.

attracting talent to the U.S. and training the next generation of AI innovators,[108] and leveraging the government's role as a customer to fill gaps in the market (e.g., when it comes to investing in AI with national security applications).[109]

Response to Topic 13

We applaud the PTO for asking this question, about the public as a stakeholder in the patent system. The decisions the PTO makes, from high-level policy to individual patent grants, impact all innovators in the country. Indeed, many innovators will never apply for a patent and only interact with the patent system when they are accused of infringement. But startups and small business innovators who only experience patents in that context are still vital to the nation and deserving of the PTO's consideration.

On this topic of the public's interest, we encourage the PTO to consider other avenues to collect data about and hear from all stakeholders. While a Federal Register notice published by the PTO will be on the radar for the agency's typical stakeholder communities—including large companies and patent owners, especially those that employ or can hire patent attorneys—such notices have limited potential to reach a broader public audience (including many startups). As such, the PTO's present request will not likely elicit perspectives from everyone in the public that has relevant information to share. Furthermore, the staggered timing of the present request (and a deadline extension announced one business day before comments were initially due[110]) will also make it difficult for the PTO to collect meaningful input from all stakeholders. We encourage PTO to consider other avenues, working with other government agencies and public interest groups, to collect broader input—agencies with expertise in economics, competition, and end-user/patient access to technology, for example. And they may be more likely to have relationships with the public that can help provide the PTO a more comprehensive and diverse perspective on how patent eligibility is working for everyone in the country.

* * *

Thank you again for the opportunity to provide these comments. We appreciate PTO's interest in and efforts to promote technology and innovation in the U.S.. High-growth, high-tech startups are an essential component of our innovation economy, and we encourage the Office to continue to weigh their interests as it evaluates current law. Engine remains committed to engaging with PTO on these and other important issues.

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[108] *E.g.*, Porter Enstrom, *#StartupsEverywhere Profile: Rishi Ranjan, Founder & CEO, GridRaster*, Engine (July 2, 2021), https://www.engine.is/news/startupseverywhere-mountainview-ca-gridraster (discussing access to talent issues facing AI startup).

[109] *Supra* note 60 (finding "few of the American AI companies examined focus on national security or other governmental priorities" and suggesting policymakers us "acquisition, fiscal support, and federal research to fill strategically important gaps in private-sector AI activity" like national security).

[110] Notice re: Patent Eligibility Jurisprudence Study, 86 Fed. Reg. 49521 (Sept. 3, 2021).