

July 17, 2018

The Honorable Steve Chabot
Chairman
House Small Business Committee
U.S. House of Representatives
Washington, DC 20515

The Honorable Nydia Velázquez
Ranking Member
House Small Business Committee
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Chabot and Ranking Member Velázquez:

The Computer & Communications Industry Association (CCIA) respectfully submits this statement for the record to the House Small Business Committee in regards to the Committee's hearing held on July 11, 2018, "Innovation Nation: How Small Businesses in the Digital Technology Industry Use Intellectual Property."

CCIA is an international association that represents companies of all sizes in the high technology sector, including in computer software, e-commerce, telecommunications, Internet products services, semiconductors. CCIA members¹ include some of the largest patent holders in the world and collectively generate more than \$540 billion in annual revenues. Many CCIA members also have venture capital arms designed to help startups develop their own transformative technologies², as well as offering non-venture services employed by many startups.³ Through these funds and services, CCIA members both invest in and enable new technologies like artificial intelligence, automated drug discovery, autonomous vehicles, high-performance networking and computing, and more.

We write to correct certain errors and omissions in the testimony of Mr. Chris Israel, a witness at the hearing on behalf of the "Alliance of U.S. Startups and Inventors for Jobs" (USIJ) and to establish that he draws a conclusion unsupported by his data. These errors and omissions lead to an incorrect impression about the trajectory of venture funding in critical areas of technology, and an incorrect conclusion regarding the impact of changes in patent law on venture funding.

In summary:

- Much of the USIJ data is either incorrectly labeled, misleadingly labeled, or references an entirely different area of technology from the one it claims to describe.
- USIJ categorizes the importance of different sectors inconsistently, placing web browsers on par with pharmaceuticals while denigrating office software.
- USIJ omits relevant context that explains specific changes in VC funding.
- USIJ links declines in funding to events that occurred after the declines had already happened.

¹ A full list of our members is available at <https://www.ccianet.org/members>.

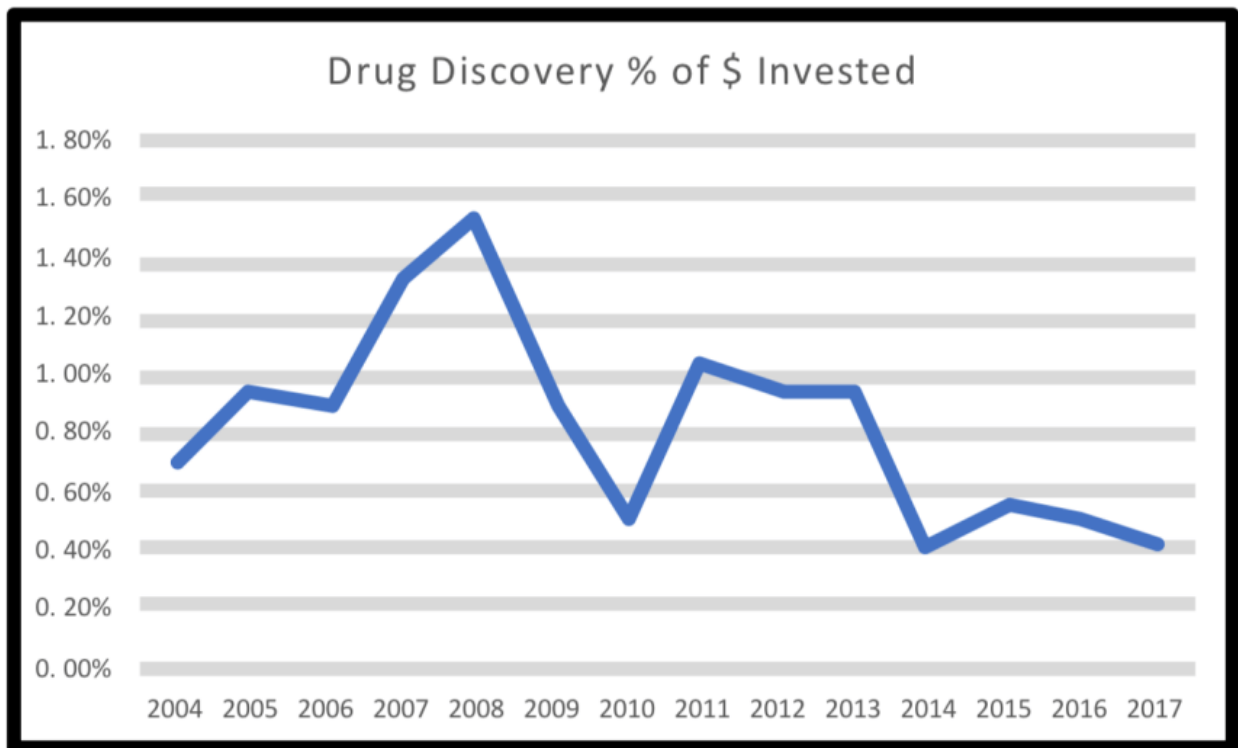
² See, e.g., GV (Google), Intel Capital (Intel), the Alexa Fund (Amazon), GPU Ventures (NVIDIA), and Samsung Ventures (Samsung).

³ See, e.g., Amazon Web Services, Google Cloud, and the NVIDIA GPU Cloud (forthcoming).

When viewed in light of the additional information provided below, CCIA believes that it is clear that venture capital funding remains healthy and that the attempt to blame patent law for illusory declines is contrary to both data and logic.

1. USIJ Has Provided Mislabeled Data

In reviewing the USIJ testimony from Mr. Israel, CCIA determined that USIJ provided a graphic describing the amount of VC funding provided to “drug discovery” startups.⁴ This graphic is reproduced below.



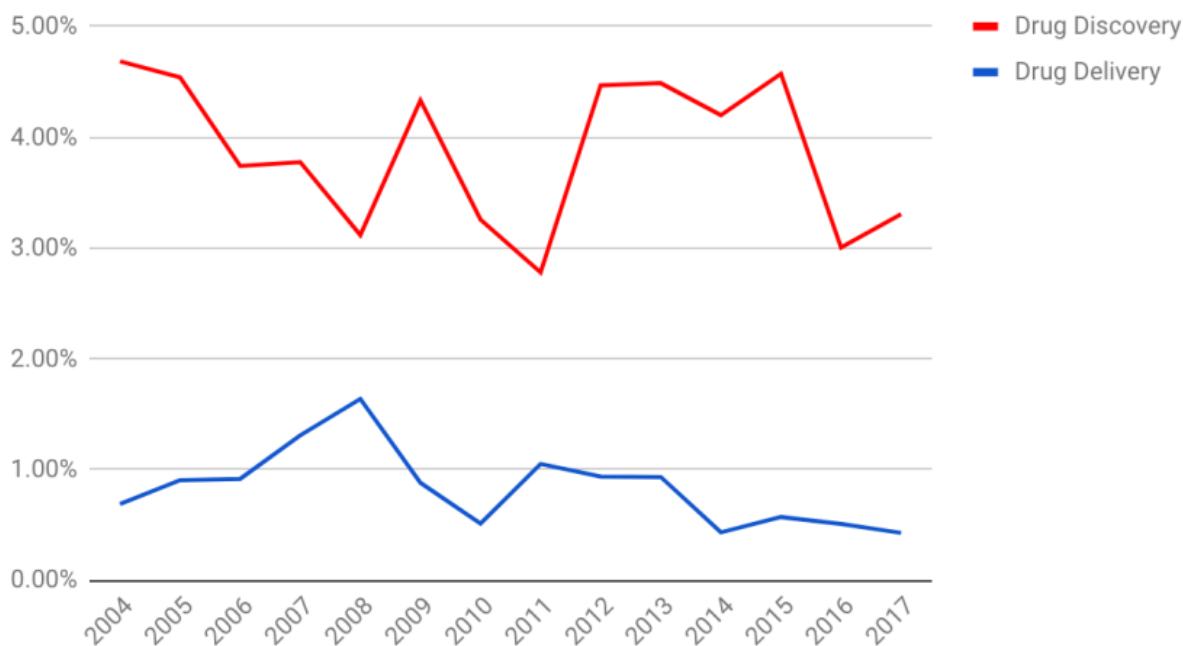
However, this data does not match the data provided by Pitchbook/NVCA, which USIJ has identified as the source of its data. It appears that USIJ labeled the data for “drug delivery” startups as that for “drug discovery” startups. “Drug delivery” is defined as “researchers and developers of medication delivery methods”, while “drug discovery” is defined as “researchers and developers of new drugs.”⁵

Below, we have provided a graphic illustrating the percentage of total VC funding for drug delivery and drug discovery.

⁴ USIJ Testimony, Appendix at 14.

⁵ NVCA/Pitchbook Yearbook 2018 at 65.

Drug Discovery vs. Drug Delivery



As is clear from the graphic, when the correct data is examined drug discovery funding is both significantly higher than drug delivery funding and has maintained approximately consistent funding at between 3-5% of the total VC funding invested over the entirety of the studied timeframe. No sustained decline is observable.

As USIJ correctly notes, total VC funding has nearly quadrupled over that timeframe, meaning that drug discovery funding has seen a steady increase over time.

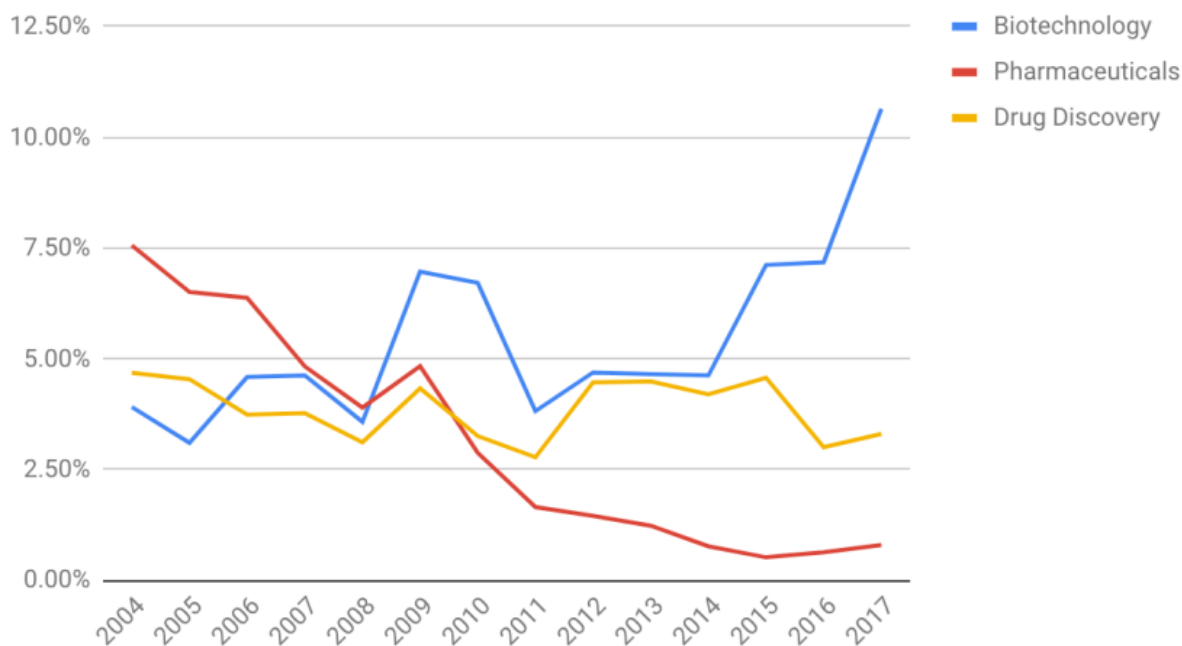
2. USIJ Omits Important Data

The USIJ testimony provides the correct data for investment in “pharmaceuticals.” However, the use of this label obscures important information. Specifically, NVCA/Pitchbook reserves the “pharmaceuticals” category for investment into “manufacturers and distributors of established drugs/ pharmaceuticals.”⁶ In other words, “pharmaceuticals” is essentially defined as production of well-known drugs. Such production does not fall within “sectors that are investing heavily to push the outer boundaries of science and technology.”

As discussed above, USIJ failed to provide the correct data for drug discovery. In addition, USIJ completely omitted a critical area of life sciences investment—biotechnology. Biotechnology is the area of investment which produces new biologic drugs and has been one of the largest areas of recent VC investment. The graphic below illustrates the percentage of total VC funding provided within the areas of biotechnology, drug discovery, and pharmaceuticals.

⁶ See NVCA/Pitchbook Yearbook 2018 at 65.

VC Funding By Sector As % Of Overall US VC Funding



Drug discovery funding has received a steady percentage of all VC funding throughout the relevant timeframe. While pharmaceuticals have declined somewhat by percentage, this decline is more than made up for by the increased funding given to the promising new biological treatments enabled by biotechnology.

Taken as a whole, the percentage of overall VC funding given to the discovery of new drugs and manufacture and distribution of existing drugs has not exhibited an increasing or decreasing trend over the reviewed timeframe; in fact, it reflects a shift into development of new drugs and technology and away from investment in known drugs. USIJ has omitted the data that would illustrate this shift from his testimony.

3. USIJ Mislabels Categories

In another example, the USIJ testimony refers to “medical devices.”⁷ However, in the supporting appendix USIJ has provided a graph illustrating the “medical supplies” category.⁸ “Medical supplies” refers to “medical supplies that would be considered non-durable” and includes “syringes, diabetes supplies, bandages, and protective wear.”⁹ Investment in actual medical devices is tracked in the categories “diagnostic equipment”, “monitoring equipment”, and “therapeutic equipment,”¹⁰ none of which are described in the USIJ appendix. While

⁷ USIJ Testimony at 3.

⁸ USIJ Testimony, Appendix at 15.

⁹ See NVCA/Pitchbook Yearbook 2018 at 65.

¹⁰ See NVCA/Pitchbook Yearbook 2018 at 64-65.

bandages incorporate complex technology, they are not typically described as medical devices. The reference in his testimony to “medical devices” is thus inappropriate and is not supported by the data in his appendix.

Similarly, USIJ refers to “surgical devices.” This category only reflects devices used in surgery and does not include supporting equipment such as ultrasound machines (“diagnostic equipment”), heart-rate monitors (“monitoring equipment”), or pacemakers (“therapeutic equipment.”)

Finally, USIJ labels one graph with the category “app software.”¹¹ NVCA/Pitchbook does not provide an “app software” categorization. NVCA/Pitchbook does provide a category for “application software”, but that category refers to developers of software for specific tasks or applications—examples might include Microsoft Office, Oracle’s JD Edwards applications, and Adobe Reader—as well as being the catch-all category for software not placed within other categories.¹² It seems trivially apparent that the modern meaning of “app” is incorrectly applied here. The data reports 4% of all VC funding in 2004—four years prior to widespread availability of third-party ‘apps’—being dedicated to “app software.”

4. USIJ Inconsistently Categorizes The Importance Of Software Sectors

The mislabeling of “app software” discussed above is particularly important given USIJ’s identification of “Internet software” as patent-intensive “strategic software.” NVCA/Pitchbook defines “Internet software” as “software for accessing and manipulating internet content” which “includes internet browsers, and file transfer protocol (FTP) programs.”

While Web browsers and file-transfer programs are useful software, it is unclear what logic USIJ is applying that would label a Web browser patent-intensive “strategic software” but would not apply the same logic to other basic computer software like word processors and PDF readers, found in the “app software” category the USIJ testimony describes as “non-strategic software” that does not require invention protection.

5. USIJ Has Provided Data Of Unknown Provenance

There are other graphs which are of undetermined provenance.

For example, the USIJ testimony refers to a general “B2C” category. NVCA/Pitchbook data does not appear to contain any such categorization. There is an umbrella “consumer products and services” category, but that category encompasses everything from office supplies to consumer electronics to food to transportation and automotive. Of note, critically important advances like autonomous vehicles would be included within this category.

¹¹ USIJ Testimony, Appendix at 22.

¹² See NVCA/Pitchbook Yearbook 2018 at 66.

This is not the only category which appears to refer to a categorization other than that used by NVCA/Pitchbook. “Networking equipment” also appears to be absent from the NVCA/Pitchbook categorizations.

Given the errors in the data with correct provenance, the failure to identify the source of this data gives rise to questions about its accuracy.

6. The USIJ Data Lacks Important Context

In several cases, the USIJ data lacks context related to the venture capital environment, the industrial environment of a specific sector, or relevant individual venture capital investments.

While the USIJ testimony acknowledges that VC funding has increased nearly 400% over the timeframe he describes, it presents data as a percentage of total VC. Because of this, sectors that have seen consistent increases in VC investment are shown as decreasing. For example, even in drug delivery (the category USIJ misidentifies as drug discovery) funding has seen a steady increase. While drug delivery has shifted from approximately 0.75% of total VC funding to 0.4% of total VC funding, the fourfold increase in total VC funding over this timespan has resulted in drug delivery funding increasing from \$151.5 million to \$364.63 million. By presenting data only in percentages of the total amount spent, increases in funding for an industry are presented as decreases.

Some of the data also fails to support USIJ’s explicit linkage of the decline in investment to patent policy. As described above, the “networking equipment” data might potentially refer to “connectivity products” or “fiber optic equipment.” However, the decline in these arenas is unlikely to be linked in any way to patent policy. In fact, the decline appears likely to be related to the over-investment and collapse in this sector in the early 2000s. Telecom companies poured money into building new infrastructure and built so much over-capacity that there were insufficient customers; many collapsed.¹³ The decline in investment reflects this collapse.

USIJ also provides a graphic illustrating “production semiconductors”, which are defined as “owners and operators of semiconductor foundries”—“companies that manufacture semiconductors, but are not involved in their design.”¹⁴ The decline in this category is tied to two changes in the semiconductor industry over that timespan, neither of which is related to patent policy.

First, there has been a general shift in the semiconductor industry business model. Semiconductor companies used to vertically integrate, both designing and producing their own chips. This model is vanishing, replaced by the “fabless” model in which companies design chips and have a foundry fabricate the chip for them. The separation between design and fabrication allows each entity to focus and specialize on the aspects of technology they excel at.

¹³ See, e.g., Starr, *The Great Telecom Implosion*, The American Prospect (Sep. 8, 2002) available at <https://www.princeton.edu/~starr/articles/articles02/Starr-TelecomImplosion-9-02.htm>.

¹⁴ NVCA/Pitchbook Yearbook 2018 at 66.

With the exception of a few companies like Intel and Samsung, most modern semiconductor companies are fabless.

Second, the cost of creating a new fab to produce chips has grown enormously. Modern fabs cost billions or tens of billions of dollars just to build the facility, with billions more required to develop new technology and to actually operate the fab.¹⁵ That amount is simply beyond the reach of venture-funded startups. But a semiconductor startup can relatively easily contract out for the manufacture of a chip they designed, using the fabless model. These paired changes explain the entirety of the decline in investment in the production semiconductor sector.

Changes in a given industry are not the only external factors of relevance to VC investment. USIJ provides a graph illustrating VC funding for consumer finance. However, this data does not appear to be reflective of a general trend towards consumer finance. The sharp increase in 2015 is essentially entirely due to a large investment in a single company, SoFi. A significant portion of the increase over background activity in 2017 is also due to SoFi. Absent these investments in a single company, consumer finance VC levels appear to have remained roughly consistent over the study period.

7. USIJ's Conclusion Is Unjustified By Its Data

USIJ's ultimate conclusion is that "the elimination of injunctive relief for patent owners, significant limitations on the ability of inventors to even obtain patents in key areas of life sciences and software, and a procedure at USPTO that allows an open-ended opportunity for anyone to challenge any valid U.S. patent, multiple times, and often without any business reason for doing so" have led to significant declines in VC investment.¹⁶ USIJ suggests that the appropriate response is to pass the STRONGER Patents Act, revise patentable subject matter, and roll back AIA procedures like IPR. This conclusion is unsupported by the USIJ's own data, and his own data implies that passage of STRONGER Patents, revisions to patentable subject matter, and the rollback of the AIA would create new declines.

Examining the graphs provided for the sectors USIJ identifies as of particular importance, the vast majority of the decline occurs in the 2004-2008 timeframe. From 2011 onward, investment in many of the sectors USIJ identifies as more important is roughly level.

As members of this Committee are no doubt aware, the AIA was passed in 2012. Asserting that declines in investment¹⁷ experienced prior to 2012 are due to a law passed in 2012 is simply incorrect. Similarly, the major decisions in patentable subject matter eligibility in life sciences were issued in 2012 and 2013. Asserting that declines in investment in life sciences, the majority

¹⁵ See, e.g., Ellis et al., *TSMC Ready to Spend \$20 Billion on its Most Advanced Chip Plant*, Bloomberg Tech (Oct. 6, 2017), available at <https://www.bloomberg.com/news/articles/2017-10-06/tsmc-ready-to-spend-20-billion-on-its-most-advanced-chip-plant>.

¹⁶ USIJ Testimony at 2.

¹⁷ This presumes that such declines are real, which is questionable at best for the reasons set forth above.

of which occurred in the 2004-2008 timeframe, are attributable to decisions made in 2012 and 2013 beggars belief.

Given the increase in investment that occurs roughly co-extensively with the AIA and patentable subject matter decisions, the causal link between patent law and VC funding suggested by this data is that the AIA and patentable subject matter decisions in the 2010-2014 timeframe have actually *increased* investment.

Finally, USIJ is flatly incorrect in its statement that injunctive relief for patent owners has been eliminated. While the *eBay* case unanimously determined that no presumption of injunctive relief applies, replacing it with the same equitable injunctive test that is applied in every other area of law, injunctive relief remains a regular remedy issued by district courts in patent cases. But even if USIJ were correct that injunctive relief became unavailable in 2006, that still would not explain why the declines in investment in his data began two years prior to that date.

USIJ's data simply does not support its conclusions.

8. New Areas Of Technology Are Important

The USIJ testimony complains that there's been an increase in investment in social networks, platforms, software apps, B2C technologies, and financial services. It claims that "these are not sectors that are investing heavily to push the outer boundaries of science and technology to remain competitive in a global market." That claim is incorrect as well.

For example, social network and platform companies have invested billions of dollars in developing new software improving the performance of databases and new technologies that enable more efficient data centers for large-scale computing. Without that kind of technology, data centers like the ones that are enabling current advances in AI¹⁸ and drug discovery¹⁹ aren't feasible. In fact, next week the National Institutes of Health will hold a workshop in which participants hear from "leading industry experts and scientists who are employing AI/ML in biomedical research settings."²⁰

Social networking and platform companies have also invested in basic AI research, producing tools like TensorFlow (Google) and PyTorch (Facebook). These tools are then released to the public for public usage. The direct products produced by these investments also have follow-on impacts, enabling others to push the outer boundaries of science and technology. Many small startups working in AI right now are creating new technologies built on a machine learning substrate. But that machine learning substrate likely utilizes one of the AI tools produced by a

¹⁸ See, e.g., MCubed Session on Reinforcement Learning (RL): a gentle introduction with a real application, available at <https://www.mcubed.london/sessions/reinforcement-learning-rl-gentle-introduction-real-application/>.

¹⁹ See, e.g., Mullin, *Rise of the smartish machines*, Chemical and Engineering News (Apr. 2, 2018), available at <https://cen.acs.org/articles/96/i14/Rise-smartish-machines.html.html>.

²⁰ See NIH Workshop: Harnessing Artificial Intelligence and Machine Learning to Advance Biomedical Research, announced at <https://datascience.nih.gov/community/2018biomedAI>.

social network or platform company, and many run on ubiquitous compute platforms like Amazon Web Services provided by B2C service companies.

Without understanding the importance of areas of software like platforms or B2C technologies, it's impossible to understand how best to support the development of cutting-edge technology. While semiconductors and pharmaceuticals are, and will remain, an important area of technology, failing to acknowledge the importance of new areas of research is dangerous and risks the United States falling behind.

9. Conclusion

Patents serve a useful purpose in our society. Insufficient patent protection will result in reduced investment, but too much protection will reduce investment by raising risk on innovators to unsustainable levels. Achieving that balance is critical and proper use of data is essential to ensuring that the balance is maintained.

Contrary to the testimony provided by USIJ, venture capital funding is in fact growing healthily—in fact, there was more U.S. venture capital investment in the first quarter of 2018 than in the entirety of 2009.²¹ Based on the actual data, this Committee should feel confident that the changes in patent law over the past 15 years have not harmed the incentives to invest in research and development; in fact, the data suggests that they have likely helped.

CCIA appreciates the Committee's consideration of this letter and is available to discuss our own analysis and conclusions at the Committee's convenience.

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²¹ See NVCA/Pitchbook Venture Monitor Q1 2018.