

Testimony of Mike Abbott
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The Senate Committee on Commerce, Science, and Transportation
Hearing: "The Connected World: Examining the Internet of Things"
February 11, 2015

Chairman Thune, Ranking Member Nelson, and distinguished members of the Senate Commerce Committee, I appreciate the opportunity to testify before you today on the exciting and important topic of our connected world and the dynamic role of the Internet of Things ("IoT"). I would also like to thank Senators Fischer, Booker, Ayotte and Schatz for your interest in this topic and for requesting this hearing.

I am here today in my capacity as a general partner at the Silicon Valley-based venture capital firm, Kleiner Perkins Caufield & Byers. Our firm, Kleiner Perkins has more than 40 years of experience helping entrepreneurs deliver world-changing ideas to market. Through our Consumer Digital and Enterprise Digital initiatives alone, we have invested in and are mentoring more than 30 entrepreneurial companies with over \$300 million in investments in the IoT space. I am by background an engineer, an entrepreneur, an investor, and a serial optimist about the power of technology and innovation to help improve our lives.

Today I will focus my testimony on 3 key areas:

1. The Internet of Things is a robust and vibrant ecosystem – in both the consumer and enterprise space – with new platforms and applications coming on-line every day and strong venture capital investments to help grow it.
2. The rapid growth in both data and devices leads to a next wave of innovation focused on efficiencies and smart systems using the cornerstones of successful IoT: smart hardware, software and cloud integration.
3. IoT – or "the Third Wave of the Internet" as analysts like to call it, is nascent but very competitive. Consumer confidence is paramount, but we must not over-regulate and stifle innovation.

As we look back on investments in the verticals we called “Bits, Bytes, Bugs, and Drugs,” we now see the rise of the Internet of Things: a connected world that allows us to jump from old platforms of the last decade into a new world in which we can manage every aspect of our lives, from our health to our finances to our home, all with the swipe of a finger on a smartphone. And the market is responding. Overall venture investments (\$48 billion) in 2014 reached their highest levels since 2000¹ and the 2014 IPO market was strong, both domestically and globally. Overall IoT investment is harder to immediately qualify since it crosses over so many sectors. So what do we mean by the IoT?

It is my understanding that the primary focus of this hearing is the consumer side of the IoT. But it’s worth mentioning that there are many other applications for IoT including business-to-business and machine-to-machine – applications that will only expand. As such, I tend to categorize IoT in two ways:

- First is the consumer market, what I call “The Internet of Me,” because it enables people to use connectivity to enrich their lives and the lives of their family and friends.
- Second is “The Internet of IT,” consisting of large data generation for enterprises to make smarter systems for everything from precision agriculture to efficiencies in large-scale manufacturing.

IoT enables the collection of an unprecedented quantity and quality of data through sensors and devices. According to an often-cited Cisco report, there will be more than 50 billion connected devices by 2020² — approximately 2x growth every 5 years. And as the recent EMC Digital Universe and market research company IDC report noted, data is

¹ NVCA, “MoneyTree™ Report by PricewaterhouseCoopers LLP (PwC) and the National Venture Capital Association (NVCA), based on data from Thomson Reuters,” January 16th, 2015.
<http://nvca.org/pressreleases/annual-venture-capital-investment-tops-48-billion-2014-reaching-highest-level-decade-according-moneytree-report/>

² Dave Evans, “The Internet of Things: How the Next Evolution of the Internet Is Changing Everything,” Cisco Internet Business Solutions Group (IBSG), April 2011.
http://www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf

doubling in size every two years and expected to reach 44 zettabytes by 2020³ – that’s 44 trillion gigabytes. To put that in perspective, we were at 4.4 zettabytes, just over a tenth of that, in 2013.

So how will we deal with our data obesity problem? What are the smart solutions for managing all of this data in a way that improves, rather than complicates, our lives? With many platforms to spur technological advances from the home to the body to the car to the factory to the farm, we must innovate our way into a smarter, connected future. At Kleiner Perkins, we are looking across platforms and enterprises, at disrupters and at incumbents, and at the entire IoT ecosystem to use connectivity to transform how we work, play, and care for our families and ourselves.

We have two critical issues on this front. The first is power management of the devices themselves, and the second is data management, including machine learning. With a growing number of power hungry devices, our firm is looking at innovators working in the Low Power Everywhere space – devices getting lighter, smaller and more efficient. We’re also looking at low power processors and energy scavengers that search for energy sources without batteries. There are promising advancements in this space such as the work being done by Ambiq Micro in sub-threshold circuits to improve efficiency in sensors and devices.

As investors, we do extensive analysis before investing in a company. But when you are at the disruptive edge of a new technological revolution, it’s hard to fully predict how consumers will react. In order for a technological revolution to take root, you must invest early and work with the company to produce some wins.

A great example of this is our investment in Nest. When we started, we couldn’t know for sure that Nest would be an attractive device to consumers. But now, with great technology

³ EMC Digital Universe & IDC, “The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things,” April 2014. <http://www.emc.com/leadership/digital-universe/2014iview/executive-summary.htm>

and smart marketing, it's influencing the development of the smart home. This is because the Nest team got two of the most critical IoT elements right: intuitively designed and aesthetically pleasing hardware, and smart software. Together, these produce a seamless and enjoyable user experience, enabling the customer to easily, and remotely as needed, adjust the temperature in one's home and save on heating and cooling costs.

It's the possibility of more stories like Nest that led Kleiner Perkins to partner with Google Ventures to start the Thoughtful Things Fund. The Thoughtful Things Fund is an initiative to back the ideas and companies that can expand what the conscious home™ can do. Consumers see immediate benefits from a connected home, whereas the cycle for enterprise systems may take a longer period of time. But the seeds of change for both consumers and enterprises are there, and we've already had thousands of submissions from all over the world.

If great hardware and software are the cornerstones of a robust IoT ecosystem, it is the third element – hardware + software + cloud services that will show major advances and create smarter systems. With all of these new devices, the stream of data will continue to accelerate. Successful systems must provide data-driven intelligence at both the endpoint devices and through machine learning in the cloud. In order for IoT to grow in meaningful ways to keep both consumer and enterprise users engaged, we must have a more intelligent way to manage and rank order data, with real-time usage feedback on what needs a fix or an upgrade. Recent advances in “deep learning” – the use of algorithms in machine learning for modeling abstractions in data – combined with these streams of real-time sensor data, will present enormous opportunities for innovation on which we are focused.

My testimony today is based primarily on my experience as an engineer and investor. I am not an expert in public policy. There is so much promise in this space, but we are in the early days. Consumer confidence is paramount to growth and innovation in the IoT space and reasonable security and best practices should help bolster that confidence.

The FTC has thoughtfully presented ideas, benefits and risks in its Internet of Things: Privacy & Security in a Connected World report. Congress, as evidenced by today's hearing, is also looking at the intersection of technology and public policy. However, I would ask that regulators and legislators proceed with caution when considering over-regulation in this space to prevent stifling innovation. As is common in nascent markets, interoperability in IoT is now a challenge and, over time, standards will emerge from the winners in the market. We are at a critical moment in this industry, in which innovators and entrepreneurs are competing with some of the biggest and most historically successful enterprises in the country – and that is healthy. This competition is creating consumer choice in the marketplace, delivering to consumers much better products and services at a lower cost.

An insightful colleague of mine once said that we'll know that we've succeeded when we no longer use the term the "Internet of Things" – just as we no longer say that we "download MP3s." As we've found with our music and phones, innovators are turning the scientific and technical breakthroughs of our time into products that benefit everyone, changing the way we live and giving us new opportunities to connect with and relate to one another and achieve our goals. Soon, my bet is that these technologies will likewise become unobtrusive, another chapter in how entrepreneurs and their innovations can help improve the quality of life for new generations, in this country and around the world.

I would like to thank the Committee for the opportunity to testify today. I look forward to answering any questions.