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**Before the**  
**SUBCOMMITTEE ON COURTS, INTELLECTUAL PROPERTY AND THE**  
**INTERNET COMMITTEE**

**on**

**“Lost Einsteins: Lack of Diversity in Patent Inventorship and the Impact on America’s**  
**Innovation Economy”**

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**U.S. House of Representatives, Washington, DC**

**I. Introduction**

Chairman Johnson, Ranking Member Roby and Members of the Subcommittee:

Good morning. Thank you for hosting this hearing on the important topic of diversity in patent inventorship and the impact on America’s innovation economy. I am Michelle Lee, the most recent, former Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office, co-founder of ChIPs, a non-profit organization whose mission is to promote the development and retention of women in technology and intellectual property, an electrical engineer and computer scientist by training, an intellectual property lawyer, and a person who spent much of her childhood and career in and around technology. Thank you for inviting me to testify today.

Invention is a cornerstone of America’s continued economic prosperity and well-being. We are confronted by numerous pressing challenges including global warming, food insecurity, outbreaks of disease and cyber security. We also have many exciting opportunities such as finding cures for disease, gaining greater understanding of the human genome, replacing fossil fuels with renewable energy and more. Solving these problems requires using all of the talent, insights and ingenuity our society can muster. Yet, when it comes to technological innovation, we are rowing with one hand tied behind our back.

**II. The Numbers**

We have all seen the numbers on diversity and patent inventorship. In a recent report published by the United States Patent and Trademark Office,<sup>1</sup> which is consistent with other similar studies, there are a few key take-aways:

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<sup>1</sup> See <https://www.uspto.gov/sites/default/files/documents/Progress-and-Potential.pdf>.

1. the vast majority of patents go to men;
2. while the numbers have been gradually improving, the percentage of patents granted to unique women inventors was only 12% in 2016; and
3. despite increases in the number of women in science, technology, engineering and math (STEM) fields, women inventor rates remain significantly below their share of science and engineering jobs.

### **III. Why?**

There are numerous reasons for this gender disparity. The first is educational and occupational choices. Fewer girls and women pursue STEM fields when it comes to choosing majors in college and as careers than their male counterparts. The net result is women hold about a quarter of STEM jobs despite filling close to half of all jobs in the overall U.S. economy. Studies have found a myriad of reasons for the lower numbers of girls and women in STEM including differences in upbringing, societal expectations, images in the media, and fewer role models.

Furthermore, the attrition rate for women in STEM fields continues to remain high at every level. A 2013 study found that 50% of women working in STEM careers left their field for other occupations in the first twelve years of their career, compared to only 20% of professional women in non-STEM fields. This has impact on the patenting rates. The ability to invent something new, useful and nonobvious requires deep understanding of current technology and then the insight on how to achieve the desired goal faster, cheaper and/or more effectively. These insights may not come to a scientist in his or her first several years as a professional. To the extent women leave STEM careers at faster rates and earlier, there are fewer who remain with the expertise necessary to make the cutting edge innovations that our patent system rewards, thus exacerbating the disparity.

The pipeline and attrition problems of women in STEM are consistent with my observations and experiences growing up and moving through the ranks in my professional career. As a young girl, I had a strong interest in math and science. As I began my STEM journey, the number of boys and girls in my math and science classes was roughly equal and the girls did just as well as the boys, if not better. When I began studying calculus and advanced calculus in high school, the numbers of girls steadily decreased. By the time I went to college at MIT, the percentage of women who chose my selected major of electrical engineering and computer science was a small minority. Later, as a graduate student at the MIT Artificial Intelligence Lab, I was one of a few number of women in the program.

My own passion for technology and innovation led me to later study and practice intellectual property law; I wanted to help our most innovative inventors protect and commercialize their inventions. But as I joined the high stakes and technical world of litigating patents, the number

of women in our chosen field was again visibly small. So throughout my career in tech, I've often been one of a small number of women in the room, and an even smaller number at the table.

Another factor that might contribute to the gender disparity may be the way organizations solicit and generate invention disclosures from employees in order to submit and obtain patents. Based upon my experience as in-house counsel and as a patent attorney in private practice, invention disclosures were mainly generated through (1) voluntary, inventor-initiated submissions, or (2) periodically-held, manager-initiated, brainstorming sessions involving all the relevant team members on a project. I found the latter method more productive for generating invention disclosures from the women scientists and programmers than the former. The women who participated with their colleagues in manager-mandated brainstorming sessions generally made important contributions to the patent disclosure sessions leading to issued patents. Yet, these same women often did not submit invention disclosures through the patent department's voluntary submission process. In a number of instances, the women discounted the novelty and usefulness of their inventions and seemed less willing to dedicate the time to apply for a patent, viewing it more as an "extracurricular" professional activity.

#### **IV. The Impact**

These disparities have important implications for our innovators individually and for society as a whole. For these individual, patents are often crucial in creating and funding a business. As anyone who has watched the TV show "Shark Tank" knows, investors often want to know if you have a patent before they provide funding. According to one study published in 2009, seventy-six percent of venture capital investors consider patents in funding determinations. Funding leads to commercial opportunities for the innovator and job creation for our society.

Further, being named as an inventor on a patent often represents a milestone in a person's own life story. Being an author of a patent is validation of hard work, creativity and a significant professional accomplishment. This accomplishment often leads to enhanced career opportunities such as promotions, tenure, peer recognition, as well as collaboration, commercial and speaking opportunities.

Beyond the implications on the individuals, our society loses when we fail to harness the full innovative talents of our population across all demographics and geographic regions. Having diverse perspectives on teams can lead to more rigorous, productive problem solving, more effective decision making and products better suited to customer needs. And studies have shown the importance of patents to fuel a country's economic growth.

Finally, STEM jobs are attractive -- growing faster (three times faster than non-STEM jobs, according to a Department of Commerce report) and often pay more. Yet, many of our

most innovative companies cannot hire all the technical talent they need and often look overseas for hires. We need to develop and take advantage of all our talent (1) to allow more Americans to share in these attractive job opportunities, and (2) to meet the labor needs and fuel the growth of our innovation economy. The latter is especially important as our country finds itself in an increasingly competitive international landscape and as we look to solve the world's most complex and pressing challenges.

## **V. What to do?**

I believe all of us can play a role in helping develop the full potential of our country's innovative talents. Personally, as a woman in technology, I have felt a heightened calling to address the issues discussed today. My experiences led me in 2005, along with six other women heads of patents and intellectual property from major technology companies, to establish ChIPs (loosely standing for "Chief Intellectual Property" counsel). ChIPs is a non-profit whose goal is to promote the development, mentoring and retention of women in technology and intellectual property. What started as a small gathering of seven women has now grown to over three thousand members worldwide.

Further, as the first woman Under Secretary of Commerce and Director of the USPTO in our country's 200+ year history, I led the launch of the USPTO's "All In STEM Initiative." The purpose of this Initiative is to encourage more girls and women to pursue STEM degrees and careers and to become inventors and innovators for the benefit of our society.

Improving the numbers of women inventors requires a long-term approach and attention and resources at every level. In 1990, the USPTO in collaboration with the non-profit Invent Now started to reach out to girls (and boys) as early as elementary school through such programs as Camp Invention. Each year, more than 100,000 elementary-school-aged kids in all 50 states participate in this week-long, summer camp, where they get hands-on experience on how to design, prototype, build, test and refine a specific device. They also learn about intellectual property rights and contemplate how they might commercialize their creation. The program also gives scholarships to under-represented minorities to participate.

The USPTO also worked with the Girl Scouts and the Intellectual Property Owners Association to create a patch on IP and innovation, an effort I championed during my tenure. To earn the IP patch, the girls had to learn about the fundamentals of patents, trademarks, trade secrets and copyrights, then put their innovative spirits to work to create something. Programs such as this gives girls the skills they need to succeed in the 21<sup>st</sup> century innovation economy and to become our future inventors and entrepreneurs.

In furtherance of the All in STEM goals, the Agency held workshops for women inventors and entrepreneurs providing information about the basics of intellectual property, how to obtain

such rights and resources offered by the Agency such as the discounts and pro bono services I mentioned earlier. And, to broaden the image of what an inventor looks like, the USPTO created and distributed to school children inventor “baseball” cards, highlighting the stories of some of our country’s greatest inventors, specifically including women inventors.

Outside the USPTO, there is a role for all of us to play in helping develop and grow our full innovative talent. First, measuring and tracking progress on the relevant statistics within our organizations where innovations occur (whether universities, companies, research institutions or governmental agencies) is a good first step. Second, being conscious of the disparate ways we raise our boys and girls – from the toys they play with, to the activities they pursue, to our expectations of them. Third, broadening the image of inventors for all our children, by sharing stories of successful women innovators and, with one’s buying power, encouraging the media to do the same. Fourth, mentoring (something all of us can do) helps. Each of us has the ability to spark an interest in a student, at any age, in science and technology and to help support her or his interest in, and development of, their maximum potential in STEM. Fifth, within each of our organizations, working on ways to reduce unconscious bias and to recruit, retain and provide support networks for women and other under-represented minorities in the STEM fields. This does not entail favoring one group over another, but rather giving someone who might not otherwise have the chance to prove themselves the opportunity to do so. Sixth, if in alignment with an organization’s priorities, including patenting in tenure and promotion decisions, offering clear guidance on how such activities are weighed and providing support and training for such endeavors (e.g., training on patents and the patent process). These are just a few steps that may be taken.

To be clear, I am not advocating for gender parity in the patenting numbers merely for the sake of achieving parity. However, I do believe we need to encourage, develop to its maximum potential and harness all of our nation’s innovative talent, in whatever size, gender, age, color or background it may come, for the benefit of our society and world.

Thank you for the opportunity to provide comments to the Committee. I would be happy to answer any questions.