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INCLUSION IN TECH: HOW DIVERSITY BENEFITS ALL AMERICANS

HEARING

BEFORE THE

SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE

OF THE

COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

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C O N T E N T S

	Page
Hon. Jan Schakowsky, a Representative in Congress from the State of Illinois, opening statement	1
Prepared statement	2
Hon. Tony Cárdenas, a Representative in Congress from the State of California, prepared statement	3
Hon. Robin L. Kelly, a Representative in Congress from the State of Illinois, prepared statement	4
Hon. Cathy McMorris Rodgers, a Representative in Congress from the State of Washington, opening statement	5
Prepared statement	6
Hon. Frank Pallone, Jr., a Representative in Congress from the State of New Jersey, opening statement	7
Prepared statement	8
Hon. Bobby L. Rush, a Representative in Congress from the State of Illinois, prepared statement	10
Hon. Richard Hudson, a Representative in Congress from the State of North Carolina, opening statement	10

WITNESSES

Mark S. Luckie, Digital Media Strategist and Former Manager, Twitter and Facebook	12
Prepared statement	15
Answers to submitted questions	150
Joan Ferrini-Mundy, Ph.D., President, University of Maine	23
Prepared statement	25
Answers to submitted questions	152
Jiny Kim, Vice President, Policy and Programs, Asian Americans Advancing Justice	34
Prepared statement [1]	36
Nicol Turner Lee, Ph.D., Fellow, Center for Technology Innovation, Governance Studies, Brookings Institution	43
Prepared statement	45
Answers to submitted questions	154
Natalie Oliverio, Founder and Chief Executive Officer, Military Talent Partners	63
Prepared statement	64
Answers to submitted questions [2]	156
Jill Houghton, President and Chief Executive Officer, Disability:IN	68
Prepared statement [3]	70
Answers to submitted questions	159

[1] A February 2017 report entitled "Breaking the Mold: Investing in Racial Diversity in Tech" has been retained in committee files and also is available as part of Ms. Kim's written testimony at https://docs.house.gov/meetings/IF/IF17/20190306/108901/HHRG-116-IF17-Wstate-KimJ-20190306.pdf.

[2] Ms. Oliverio did not answer submitted questions for the record by the time of publication.

[3] A report entitled "The 2018 Disability Equality Index: A Record Year for Corporate Disability Inclusion and Leadership" has been retained in committee files and also is available as part of Ms. Houghton's written testimony at https://docs.house.gov/meetings/IF/IF17/20190306/108901/HHRG-116-IF17-Wstate-HoughtonJ-20190306.pdf.

Page

David Lopez, Co-Dean, Rutgers Law School-Newark 74
Prepared statement 76
Answers to submitted questions 162

SUBMITTED MATERIAL

Article of July 26, 2018, "Amazon's Facial Recognition Wrongly Identifies 28 Lawmakers, A.C.L.U. Says," by Natasha Singer, The New York Times, submitted by Mr. Rush 124
Letter of March 6, 2019, from Marc H. Morial, President and Chief Executive Officer, National Urban League, to Ms. Schakowsky and Mrs. Rodgers, submitted by Ms. Schakowsky 128
Letter of March 5, 2019, from Marc Rotenberg, President, and Caitriona Fitzgerald, Policy Director, Electronic Privacy Information Center, to Ms. Schakowsky and Mrs. Rodgers, submitted by Ms. Schakowsky 130
Letter of March 5, 2019, from Sean Perryman, Director of Diversity and Inclusion Policy & Counsel, Internet Association, to Ms. Schakowsky and Mrs. Rodgers, submitted by Ms. Schakowsky 134
Statement of Jennifer Huddleston, Research Fellow, Mercatus Center at George Mason University, March 6, 2019, submitted by Ms. Schakowsky 136
Letter of March 5, 2019, from Maxine Williams, Chief Diversity Officer, Facebook, Inc., to Mr. Pallone, et al., submitted by Ms. Schakowsky 140
Letter, undated, from Hon. Maxine Waters, a Representative in Congress from the State of California, to Mr. Pallone, submitted by Ms. Schakowsky . 146
Blog post of February 27, 2018, "Expanding Apprenticeship Program Across the Country to Hire more Veterans," by Paul Marchand, Executive Vice President, Human Resources, Charter Communications, submitted by Ms. Schakowsky 148

INCLUSION IN TECH: HOW DIVERSITY BENEFITS ALL AMERICANS

WEDNESDAY, MARCH 6, 2019

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:33 a.m., in the John D. Dingell Room 2123, Rayburn House Office Building, Hon. Jan Schakowsky (chairwoman of the subcommittee) presiding.

Members present: Representatives Schakowsky, Castor, Veasey, Kelly, O'Halleran, Luján, Cárdenas, Blunt Rochester, Soto, Rush, Matsui, McNerney, Dingell, Pallone (ex officio), Rodgers (subcommittee ranking member), Latta, Guthrie, Bucshon, Hudson, Carter, and Gianforte.

Also present: Representatives Butterfield and Clarke.

Staff present: Jeffrey C. Carroll, Staff Director; Evan Gilbert, Press Assistant; Lisa Goldman, Counsel; Waverly Gordon, Deputy Chief Counsel; Alex Hoehn-Saric, Chief Counsel, Communications and Technology; Meghan Mullon, Staff Assistant; Joe Orlando, Staff Assistant; Tim Robinson, Chief Counsel; Chloe Rodriguez, Policy Analyst; Melissa Froelich, Minority Chief Counsel, Consumer Protection and Commerce; Peter Kielty, Minority General Counsel; Bijan Koohmaraie, Minority Counsel, Consumer Protection and Commerce; Brannon Rains, Minority Staff Assistant; and Nate Wilkins, Minority Fellow.

Ms. SCHAKOWSKY. The Subcommittee on Consumer Protection and Commerce will now come to order.

I am going to say good morning, and thank you all for joining us today.

And I will recognize myself first for 5 minutes with an opening statement.

OPENING STATEMENT OF HON. JAN SCHAKOWSKY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Once again, good morning to everybody. Thank you to our witnesses.

Today, we are meeting to discuss an important issue, the lack of diversity in the tech workforce. As the presence of technology continues to play a larger and larger role in all of our lives, industry's workforce has remained largely homogeneous. People of color, women, and older Americans have all been notably absent from the tech workforce, and the corresponding problem that that creates

has been that the technology itself reflects that lack of diversity. And I want to hear about that today.

This has real impact on Americans. We have seen algorithms biased against sentencing guidelines, resulting in harsher sentences for minorities. We have seen that automatic soap dispensers sometimes fail to recognize the hands of African Americans and Latinos—imagine that—who are seeking to use the product to wash their hands. These may seem like two opposite sides of the spectrum as far as harm, but they both clearly demonstrate that something is amiss.

Simply put, diverse voices are lacking in the tech workforce. Moreover, diverse startups are facing difficulty competing with the large multinational technology companies. It strikes me that unfair business practices and extreme market concentration in tech may, in fact, perpetuate the bias and the old boys' club, or actually the young boys' club, that we are examining today. This lack of diversity in the workforce has real-life impact on consumers, and I thank our panel for coming here to discuss this very important issue.

[The prepared statement of Ms. Schakowsky follows:]

PREPARED STATEMENT OF HON. JAN SCHAKOWSKY

Good morning and thank you all for joining us today. Today, we are meeting to discuss an important issue, diversity in the tech workforce. As the presence of technology continues to play a larger and larger role in Americans' lives, the industry's workforce has remained largely homogenous. People of color, women, and older Americans have all been notably absent from the tech workforce.

This has real impacts on Americans—we have seen algorithmic bias impact sentencing guidelines, resulting in harsher sentences for minorities. We have seen soap dispensers fail to recognize the hands of African Americans and Latinos seeking to use the product to wash their hands. These may seem like two opposite sides of the spectrum, as far as harm, but they both clearly demonstrate that something is amiss.

Simply put, diverse voices are lacking in the tech workforce. It strikes me that unfair business practices and extreme market concentration in tech may in fact perpetuate the boys club that we are examining today. As previously stated, this lack of diversity in the workforce has real life impacts on consumers. I thank our panel for coming here to discuss this important issue.

With that, I yield to my vice chair from California, Mr. Cárdenas, for 1 minute.

Ms. SCHAKOWSKY. With that, I want to yield 1 minute to the vice chair of this subcommittee, from California, Mr. Cárdenas, for 1 minute.

Mr. CÁRDENAS. Thank you very much, Madam Chairwoman.

It is no secret that the tech industry has a diversity problem, and every day we are seeing more and more unintended consequences when companies lack a diverse body of employees. We are seeing fitness trackers, for example, that have problems with dark skin. They just don't operate properly. Virtual assistants like Alexa having a hard time recognizing accents.

Something that is no secret is that we still have something that is news to some people: Diversity is actually good for business. The Hispanic community in America has a buying power annually of upwards of $1.5 trillion. Hispanics make the fastest-growing number over number of growing Americans in this country. Also, it is a younger population, and Hispanics happen to have a high brand

loyalty. So, it is good for business to have diversity, especially when it comes to Hispanics.

Reports show that companies with more diversity amongst senior executives were 33 percent more likely to see an increase in their bottom line. When you have diverse backgrounds and experiences among your employees, you spur innovation; you avoid creating bias into your products; you avoid turning your back on a whole group of Americans.

So, how do we solve this problem? I will say this: for example, a sharp Princeton-educated computer engineer recently told me she heard her coworker say that women and people of color dilute the talent pool for tech companies. I take that very personal. I am an electrical engineer myself.

We have a problem in our culture in the tech industry that diversity is not only not prioritized, it's seen as a hindrance, of which nothing could be further from the truth.

I would like to say much more, but, again, thank you, Madam Chairwoman, and I yield back the balance of my time.

[The prepared statement of Mr. Cárdenas follows:]

PREPARED STATEMENT OF HON. TONY CÁRDENAS

Thank you, Chairwoman Schakowsky. It's no secret that the tech industry has a diversity problem. Every day we're seeing more and more unintended consequences when companies lack a diverse body of employees. We're seeing fitness trackers for example that have problems with dark skin. Virtual assistants like Alex having a hard time recognizing accents.

Something else that's no secret—but might still be news to some people—diversity is good for business.

The Hispanic community in America has a buying power annually of upwards of $1.5 trillion. Hispanics have high brand loyalty. It's good for business to have diversity, especially when it comes to Hispanics.

Reports show that companies with more diversity among senior executives were 33 percent more likely to see an increase in their bottom line.

When you have diverse backgrounds and experiences among your employees, you spur innovation. You avoid accidentally embedding bias into your products. You avoid turning your back on a whole group of Americans.

So how do we solve this problem?

I'll say this—a sharp, Princeton-educated computer engineer recently told me she heard her coworker say that women and people of color dilute the talent pool for tech companies. Not only is that false—it's highly offensive. I myself am an engineer by training. We have a problematic culture in the tech industry when diversity is not only NOT prioritized—it's seen as a hinderance. And nothing can be further from the truth.

Let's make technology work for all Americans and also help businesses succeed.

I yield back my time to the chairwoman.

Ms. SCHAKOWSKY. And I yield now the balance of my time to Congresswoman Kelly.

Ms. KELLY. Thank you, Madam Chair.

Thank you, Chairwoman Schakowsky and Ranking Member Rodgers, for holding this hearing today.

As a founder of the Tech Accountability Caucus and founder of the Diversifying Tech Caucus with my colleague on the other side of the aisle, Cathy McMorris Rodgers, I am glad that this subcommittee is committed to addressing the issue of diversity in tech.

Report after report from technology companies continue to show a lack of diversity in their workforces. According to the National Urban League, less than 5 percent of the digital workforce is Afri-

can-American today. It is not just the large tech companies in Silicon Valley. Organizations like Mentoring Youth Through Technology, or MYTT, in my district help get minority students interested in STEM careers, but I continue to hear from startups in Chicago that they struggle to recruit diverse workforces. This is a fundamental problem, getting women and minorities into the technology jobs, and it must be corrected.

A lack of diversity creates real-world problems of producing programs that can harm underserved communities. Poorly trained artificial intelligence tools can lead to implicit racial, gender, or ideological biases and can perpetuate existing biases. As AI use becomes more common and decisions are made by machines, we may not understand it is vital that these considerations are taken into account.

I am hopeful that companies are going to see the benefits of having a diverse workforce that brings new ideas and perspectives. While there is no one solution to this problem, I hope that the witnesses today—and I am happy to see a former colleague, Dr. Turner Lee—will share their experiences and make recommendations, so we can continue to make tech a more diverse and inclusive community.

Thank you, Madam Chair.

[The prepared statement of Ms. Kelly follows:]

PREPARED STATEMENT OF HON. ROBIN L. KELLY

Thank you, Chairwoman Schakowsky and Ranking Member Rodgers for holding this hearing today. As a founder of the Tech Accountability Caucus and founder of the Diversifying Tech Caucus with my friend on the other side of the aisle, Cathy McMorris Rodgers, I am glad that this subcommittee is committed to addressing the issue of diversity in tech.

Report after report from technology companies continue to show a lack of diversity in their workforces. According to the National Urban League, less than 5 percent of the digital workforce is African-American today. It is not just the large tech companies in Silicon Valley. Organizations like Mentoring Youth Through Technology or MYTT in my District, help get minority students interested in STEM careers. But I continue to hear from start-ups in Chicago that they struggle to recruit diverse workforces. There is a fundamental problem getting women and minorities into the technology jobs and it must be corrected.

A lack of diversity creates real world problems of producing programs that can harm underserved communities. Poorly trained artificial intelligence tools can lead to implicit racial, gender, or ideological biases and can perpetuate existing biases. As AI use becomes more common and decisions are made by machines we may not understand, it is vital that these considerations are taken into account.

I am hopeful that companies are going to see the benefits of having a diverse workforce that brings new ideas and perspectives. While there is no one solution to this problem, I hope that the witnesses today will share their experiences and make recommendations so we can continue to make tech a more diverse and inclusive community.

Ms. SCHAKOWSKY. Thank you. Thank you.

And now, it is my pleasure to recognize for 5 minutes our ranking member, Ms. McMorris Rodgers.

OPENING STATEMENT OF HON. CATHY McMORRIS RODGERS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mrs. RODGERS. Thank you. Thank you, Madam Chair, and I appreciate you organizing this panel today, and appreciate the additional voices at the table.

As my colleague Congresswoman Kelly just said, we organized the Diversifying Tech Caucus in 2015. It was aimed at highlighting some of these issues that we are going to hear more about today, getting more women, people with disabilities, minorities, veterans, into the tech sector.

At a time when we are celebrating a booming economy because of our work on tax reform and to lift the regulatory burden, our economy has more jobs today. We have record low unemployment, record participation with African Americans, Hispanics, people with disabilities, people coming off the sidelines. It means that there are more opportunities for people to find better-paying jobs and have an opportunity for a better life.

Today's hearing focuses, I believe, on an important aspect of encouraging those opportunities for all. And it is the focus on recruitment. We need to be doing more to recruit into the tech field, but also, once we recruit, to retain and promote these individuals into positions of leadership.

The creation of one high-tech job is projected to create 4.3 other jobs in the local economy. I often say the job is the opportunity. It is vital that these opportunities are available to people from all walks of life. A vibrant and dynamic workplace with women, people of color, people with disabilities, reflects the promise of America, where, no matter who you are, you can achieve your version of the American dream.

Oftentimes, it might look different than your own. I am excited personally for the opportunities for those with disabilities to work because more are offering the accommodations and the job coaches. Employing people with disabilities fosters innovation and it creates a stronger workplace culture.

Many tech companies are leading in hiring those with autism. And because of their unique abilities for the attention to detail and the abilities to detect patterns, taking a software testing company like ULTRA Testing, the founder's wife one day told him, quote, "We spend all this time focused on things these children may never be good at, but we spend no time nurturing the skills they already have a talent for. Isn't that a shame?" And he agreed, and he got to work hiring people with autism to leverage their strengths. And now, ULTRA Testing is outperforming bigger companies in software quality assurance.

This month, we are also celebrating Women's History Month, and it is a time to celebrate women who are leading across the board. Our goal today is to see more women in tech leading, being those disruptors, inspiring our next generation of transformational women leaders.

Again, it may look different. Women have different leadership styles. And research is showing that we have greater understanding for teams and systems. We foster a healthy workplace culture. When women are not at the table, our perspectives and voices

aren't represented. A study by McKinsey shows that companies with women in executive positions outperform the average profitability of their industries by 21 percent. Tech companies that don't open the door for women to shine and be decisionmakers risk being left behind. So, yes, we need to do more to open the door to allow these women to shine and do more to retain and promote these women.

America has led the world in innovation. We celebrate that every single day. Entrepreneurs from all walks of life are taking an idea, making it a reality, creating more opportunities for hardworking people across the country. Again, that is the promise of America. It is not the promise for just some people or the somebodies in Silicon Valley. It is a promise for everyone. When we celebrate every person's strengths and abilities and embrace what every person has to offer, we are living up to that promise.

I recognize there has been tremendous efforts, like recruiting more girls into STEM, and hiring people with disabilities, like ULTRA Testing that I mentioned. We need to continue to do more to address the pipeline, whether it is young people of every background, in girls in elementary and middle school, and exceptional people with disabilities, but we also need to focus on how we retain those individuals once they are recruited, and do more to encourage their promotion to leadership positions. So, today I look forward to hearing how the tech industry is leading on this and where you can also do better.

Thank you all for being here.

[The prepared statement of Ms. Rodgers follows:]

PREPARED STATEMENT OF HON. CATHY MCMORRIS RODGERS

Good morning.

Today we are focused on an issue I have led on for quite some time: diversity in the tech industry.

Today, we will have an opportunity to give credit where credit is due, while also exploring how we continue to do better.especially where we can continue to improve where we recruit, retain, and promote a more diverse workforce.

I want to thank Chair Schakowsky for organizing this hearing today and for including all the voices at the table.

I also would like to recognize my good friend from Illinois, Robin Kelly.

In 2015, we launched the Diversifying Technology Caucus aimed at getting more women, people with disabilities, minorities, and veterans into the tech sector.

I want to thank Ms. Kelly for working with me to promote more opportunities for all in the tech sector.

This is an exciting time in America. Because of our work on tax reform and to lift the regulatory burden our economy is booming. After a decade of Americans asking, "where are the jobs?" wages are rising and there are more jobs available than people looking for work.

As the Wall Street Journal just reported, women are driving the laborforce comeback.

In addition, a record number of African Americans, Hispanics, and people with disabilities are coming off the sidelines and finding work.

It means that more people are finding opportunities for a better life in healthcare, energy, construction, the service industry and more.

Today's hearing is about ensuring more individuals have opportunities to pursue and advance careers in the tech industry too.

The creation of one high tech job is projected to create 4.3 other jobs in a local economy.

Because a job is the opportunity it's vital that these opportunities are available to people of all walks of life.

A vibrant and dynamic workplace with women, people of color, people with disabilities, and more reflects the promise of America where no matter who you are, you can achieve your version of the American dream.

Oftentimes it may look different and I'm excited about more opportunities for those with disabilities to work because of more commitments to accommodations and job coaches.

Employing people with disabilities fosters innovation and it creates a stronger workplace culture.

Many tech companies are leading in hiring people on the autism spectrum because of their unique abilities for attention to detail, and abilities to detect patterns.

Take a software testing company called, ULTRA Testing. The founder's wife one day told him:

"We spend all this time focused on things these children may never be good at but we spend no time nurturing the skills they already have a talent for—isn't that a shame?"

He agreed, and got to work hiring people with autism to leverage their strengths. Now ULTRA Testing, a startup, is outperforming bigger companies in software quality assurance.

This month we are also celebrating Women's History Month.

It's a time to celebrate the women who are leading in tech being disruptors and inspiring our next generation of transformational women leaders.

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Tech companies that don't open the door for women to shine and be decision makers risk being left behind.

Yes, that means hiring more women but it also means fostering an environment focused on retention and the promotion of women too.

America is leading the world in innovation.

Every single day, entrepreneurs from all walks of life are taking an idea making it a reality and creating more opportunities for hardworking people across the country.

Again, that's the Promise of America. It's not the promise for just some people or the somebodies in Silicon Valley. It's a promise for everyone.

When we celebrate every person's strengths and abilities and embrace what every person has to offer we are living up to that promise.

I recognize there's been tremendous efforts like recruiting more girls into STEM and hiring people with disabilities, like at ULTRA Testing.

We need to continue to do more to address the pipeline, whether it's young people of every background and girls in elementary and middle school. and exceptional people with disabilities.

We also need to focus on how we retain those individuals once they are recruited and do more to encourage their promotion to leadership positions.

So today, I look forward to hearing how the tech industry is leading on this and where you can also do better.

Thank you to our witnesses.

I yield back.

Ms. SCHAKOWSKY. The gentlewoman yields back. And now, the Chair recognizes Mr. Pallone, chairman of the full committee, for 5 minutes for his opening statement.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Madam Chair.

As this subcommittee knows well, the influence of the internet and technology in our lives has grown exponentially over the past two decades, and our daily lives as consumers and workers have become dependent on technology. But while the U.S. has become more and more diverse, the workforce of the technology sector has

not kept up. And we are seeing the effects of that in the products and services we use, like the wearable fitness trackers that don't work for people with dark skin, online job advertisements targeted at men over women, and websites with buttons and links too small for people with motor impairments to use.

Without inclusive workforces, too often product design leaves people out, and the result can be embarrassing for the company when discovered and harmful for society when a discriminatory result is not identified and fixed. These are complicated and often uncomfortable discussions, but they are necessary to start to make changes.

The Congressional Black Caucus launched its Tech 2020 Initiative in 2015 and has been working to hold companies accountable since. And several members of this committee have been working on these issues for years.

I would like to yield time to some of them today. So, I will start beginning with Mr. Luján. I would yield 1 minute to him.

[The prepared statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

As this subcommittee knows well, the influence of the Internet and technology in our lives has grown exponentially over the past two decades. Our daily lives as consumers and workers have become dependent on technology.

But while the United States has become more and more diverse, the workforce of the technology sector has not kept up. And we are seeing the effects of that in the products and services we use-like wearable fitness trackers that don't work for people with dark skin, online job advertisements targeted at men over women, and websites with buttons and links too small for people with motor impairments to use. Without inclusive workforces, too often product design leaves people out. The result can be embarrassing for the company when discovered and harmful for society when a discriminatory result is not identified and fixed.

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Thank you, I will also yield a minute to Mr. Butterfield for 1 minute.

Thank you. And I will yield my final minute to Mr. Rush.

Mr. LUJÁN. Thank you very much, Mr. Chairman. And I thank our Chair and our ranking member for this important hearing.

When it comes to diversity in tech, let me be clear, more is needed. The tech industry is not where it needs to be on this issue. Representation of women and people of color in tech companies lags the rest of corporate America, and this matters.

As Dr. Lee notes in her testimony, the absence of diversity among the people that make the decisions around products and services for the tech sector and the markets that these companies serve hurts us all. This lack of diversity informs the algorithms that determine whether people get a loan or a job, impacts how much people pay for everyday products and services. Investigations and studies have shown that these algorithms often have biased results and discriminatory outcomes.

It is one reason why I am reintroducing the Accountable Capitalism Act with the inclusion of diversity language, to push cor-

porations to make more socially responsible decisions. Action and accountability are a must.

And I yield back.

Mr. PALLONE. And, Madam Chair, I would now like to yield a minute to Mr. Butterfield.

Mr. BUTTERFIELD. Thank you, Chairman Pallone. Thank you, Chairwoman Schakowsky.

For too long, the promise of the internet age for communities of color has been left unfulfilled. Technology is a fast-growing and lucrative industry, employing thousands every year. However, the rate of racial minorities in tech industries has not increased at a sufficient rate. This is unacceptable, Madam Chair, considering the number of capable racial minority students and workers that are available.

The problem is exacerbated by insufficient resources in K–12 schools to HBCUs and often low expectations for our minority students. Studies show that African-American children enter kindergarten at a competitive disadvantage. To close the gap in tech, we must give our students the resources they need to compete, not starting in college, but in the earliest stages of primary education. Public and private sectors have a responsibility to work together to create effective diversity and inclusion initiatives.

The CBC Tech 2020 has been pounding tech companies now for years. We are beginning to see modest results.

And so, I want to thank you for your effort in this space, and I yield back.

Mr. PALLONE. Thank you.

Before I yield to Mr. Rush for the last minute, I just want to say, as you could probably tell, Mr. Rush had a subcommittee hearing in the Energy Subcommittee on diversity in the workforce. And now, we are doing this in the Consumer Protection Subcommittee with Ms. Schakowsky. Because the Energy and Commerce Committee has jurisdiction over so many sort of jobs of the future and areas of the future, I think it is particularly important that we address this issue of diversity.

Mr. Rush, I yield the balance of the time.

Mr. RUSH. I want to thank you, Chairman Pallone, for yielding. And I want to thank you, Chairwoman Schakowsky, for holding this important hearing.

In the 1990s, Chicago's O'Hare Airport, the world's busiest airport at the time, became the first to install touchless faucets. This innovation's promise of making things more sanitary and wasting less water were anticlimactic, however, when it was shown that these faucets had difficulties in recognizing the hands of black and brown Americans. While seemingly trivial, this is just one example of the real-world impediments that people of color across the Nation face because of their lack of representation in the technology industry.

This same phenomenon has been repeated in facial recognition technology that mistakenly identified 28 Members of Congress, myself included, in search engines that provide ads related to criminal record history when associating, quote, "black-sounding names," end of quote.

Madam Chairman, it should be clear that, while the issue and emergency in tech may seem like a relatively straightforward problem, its ramifications are much bigger and go much deeper than it would appear. Madam Chairman, progress and innovation must go beyond being just skin deep.

So, I thank you for holding this hearing and I look forward to hearing from the witnesses.

And, Madam Chair, I would like unanimous consent to submit a New York Times article about mistakes in facial recognition for the record.

And thank you. I yield back the balance of my time.

Ms. SCHAKOWSKY. Without objection, so ordered.

[The article appears at the conclusion of the hearing. The prepared statement of Mr. Rush follows:]

PREPARED STATEMENT OF HON. BOBBY L. RUSH

Thank you, Chairman Pallone, for yielding. And thank you, Chairwoman Schakowsky, for holding this important hearing.

In the 1990s, Chicago's O'Hare Airport—the world's busiest airport, at the time—became the first to install touchless faucets. This innovation's promise of making things more sanitary and wasting less water were anticlimactic, however, when it was shown that these faucets had difficulty in recognizing Black and Brown Americans' hands.

While seemingly trivial, this is just one example of the real-world impediments that people of color across the country face because of the lack of representation in the technology industry. This same phenomenon has been repeated in facial recognition technology that mistakenly identified 28 Members of Congress, myself included, and in search engines that provide ads related to criminal record history when searching "Black sounding" names.

Madame Chairwoman, it should be clear that while the issue of diversity in tech may seem like a relatively straightforward problem, its ramifications are much bigger and go much deeper than it would appear.

So, I thank you for holding this hearing and look forward to hearing from the witnesses.

Madame Chairwoman, I ask unanimous consent to submit a New York Times article about mistakes in facial recognition for the record.

Thank you, I yield back the balance of my time.

Ms. SCHAKOWSKY. And I want to thank the ranking member for her indulgence on going over some time.

Next, I will yield 5 minutes to Mr. Hudson, who has been designated to take the place of our ranking member of the full committee, Mr. Walden.

OPENING STATEMENT OF HON. RICHARD HUDSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NORTH CAROLINA

Mr. HUDSON. Thank you, Madam Chair.

This is my first opportunity publicly to say congratulations on your chairmanship. I look forward to working with you and finding common ground where we can work together. I know you are going to provide strong leadership.

Thank you for recognizing me.

I would say that today we have an exceptional panel of witnesses here to examine inclusion and diversity in tech. I am proud to represent a district that has many institutions of higher education that have recognized the value a diverse workforce brings to the table.

As a member of the Historically Black Colleges and Universities Caucus, I have seen firsthand how these institutions greatly contribute and prepare our students for a 21st century workforce. Fayetteville State University is a prime example of this leadership. Because of their great track record, they are a recent recipient of a $2 million grant from the project Strengthening Student Success in STEM. The project at Fayetteville State University seeks to build on previous successful efforts to increase the participation of African-American students in STEM disciplines through education and research.

Additionally, we will examine ways to include other groups of individuals, including service-disabled veterans and military spouses. My district is home to the epicenter of the universe, Fort Bragg, home of the Airborne Special Operations Forces. Our community is no stranger to supporting these groups, and we understand the value that they bring to our community.

Many businesses and entrepreneurs in the tech space have started in our community, including RLM Communications, a minority-owned and service-disabled, veteran-owned small business which has repeatedly been recognized for its outstanding work.

The fact is that a variety of experiences and perspectives yield better results. That is exactly what diversity brings to the table. That is why I have been proud to work very closely with Chairman Rush the past two Congresses on the issue of diversity in our 21st century energy economy and preparing our students for those jobs, particularly minority students and disadvantaged groups. And I look forward to working with my colleagues on this important issue here in the tech industry as well.

With that, Madam Chair, I would like to yield the balance of my time to my good friend from Montana, Mr. Gianforte.

Mr. GIANFORTE. Thank you, Mr. Hudson, for the recognition.

Getting more Americans working in tech businesses increases opportunities for all of our communities, not just in Silicon Valley. In Montana, we continually face a workforce availability challenge across most businesses. It is particularly pronounced, however, in the high-tech sector. In the software business that I built in Montana, we were always competing to get the best and the brightest. Rather than go far and abroad, however, we worked to develop people from within.

Recently, I had the pleasure of spending a day with fourth-graders at Bozeman's Emily Dickinson School during their hour of code. Allowing the kids time to engage in coding early increases awareness and drew new faces into the field. Using prewritten code, these students were able to blow up their screens and make farm animals talk. They were having fun and they were learning at the same time.

Another successful program for the State has been Code Montana. This class brings high school students into the computer lab. Students experiment with JavaScript and other programs to create their own apps and earn college credit.

Over 90 percent of Montana parents want their kids to study computer science. Unfortunately, only 40 percent of our public schools offer this curriculum.

Our company understood that we needed to grow our workforce organically, and we recognized the challenges facing our local schools. We started working with the local university, Montana State, to develop cutting-edge computer science programs. Other entrepreneurs developed classes to develop their employees for the next generation. And through organizations like the Montana High Tech Business Alliance, we created space to share ideas and address challenges facing tech in Montana. We are making progress, but there is still a lot more to do. I look forward to the testimony and the discussion as we look for solutions.

Thank you, and I yield back.

Ms. SCHAKOWSKY. Mr. Hudson, do you yield back?

Mr. HUDSON. I do.

Ms. SCHAKOWSKY. OK. Thank you.

So, the Chair wants to remind Members that, pursuant to committee rules, all Members' written opening statements shall be made part of the record.

And now, I would like to introduce our illustrious panel and our witnesses.

First, we have Mr. Mark Luckie, digital media strategist and former manager at Facebook and Twitter.

Dr. Joan Ferrini-Mundy, president of the University of Maine, welcome.

Ms. Jiny Kim, Vice President of Policy and Programs at Asian Americans Advancing Justice.

Dr. Nicol Turner Lee, fellow at the Center for Technology Innovation, Governance Studies, at the Brookings Institution.

Ms. Natalie Oliverio, CEO of Military Talent Partners.

Ms. Jill Houghton, president and CEO of Disability:IN.

And Mr. David Lopez, counsel at Outten & Golden, LLP, and co-dean of the Rutgers Law School.

And we are missing somebody, right? Did I get everybody? OK, I guess it is Natalie Oliverio, who is not here yet.

OK. So, let's begin, then, with Mr. Luckie, 5 minutes.

STATEMENTS OF MARK S. LUCKIE, DIGITAL MEDIA STRATEGIST AND FORMER MANAGER, TWITTER AND FACEBOOK; JOAN FERRINI-MUNDY, PH.D., PRESIDENT, UNIVERSITY OF MAINE; JINY KIM, VICE PRESIDENT, POLICY AND PROGRAMS, ASIAN AMERICANS ADVANCING JUSTICE; NICOL TURNER LEE, PH.D., FELLOW, CENTER FOR TECHNOLOGY INNOVATION, GOVERNANCE STUDIES, BROOKINGS INSTITUTION; NATALIE OLIVERIO, FOUNDER AND CHIEF EXECUTIVE OFFICER, MILITARY TALENT PARTNERS; JILL HOUGHTON, PRESIDENT AND CHIEF EXECUTIVE OFFICER, DISABILITY:IN, AND DAVID LOPEZ, CO–DEAN, RUTGERS LAW SCHOOL-NEWARK

STATEMENT OF MARK S. LUCKIE

Mr. LUCKIE. Chairwoman Schakowsky and members of the committee, I thank you for the invitation to participate in today's hearing on inclusion in tech.

From toddlers to seniors, technology has become a vital part of the lives of many Americans. However, the way we use these tech

products is not singular. Gender, age, race, ethnicity, sexual orientation, disability, religion, political beliefs, geographic location, and other factors can all dramatically change the way people interact with a product.

And yet, the hundreds of thousands of people who are creating these technologies remain mostly homogeneous. The tech industry continues to be populated by mostly white and Asian men. Diversity is an integral part of the fabric of America, but that is not reflected in the companies that affect the lives of millions of this country's citizens.

In my time as a manager at tech companies, including Facebook, Twitter, and Reddit, I have seen firsthand the issues around diversity that continue to plague the industry. The concerns surrounding the lack of diversity at U.S. technology companies is not just about the fair treatment of their employees.

What is even more alarming is the discrimination built into the products emerging from Silicon Valley companies, from the use of artificial intelligence software, more likely to flag black defendants as future criminals; Asian-Americans being charged higher prices for online test prep; apps lightening the skin of users to make them more attractive; Amazon's recruiting tool penalizing resumes that included the word "women's," to Facebook's real-name policy that discriminates against Native American names and transgender people.

In many of these instances, the transgressions were unintentional and later corrected, but most of these oversights can be mitigated by employing and retaining staff from diverse backgrounds in an environment that welcomes all voices. Statistically, tech companies are not doing that. In 2017, at eight of the largest tech companies in the U.S., women, on average, made up a little over 30 percent of the staff; 4.2 percent were black, and 6 percent were Latinx, according to the company's self-reported numbers. While there is a disproportionately high number of Asians who work in tech, industry data shows they are the least likely to attain a leadership role.

One of the common explanations of why there is a lack of diversity in Silicon Valley is the pipeline. Tech companies argue that there are not enough women and people of color graduating with degrees in computer science. However, there are more women and people of color with tech-related degrees that are graduating than are actually being hired.

The discussions around the pipeline also ignore an obvious, but overlooked fact. Most jobs at tech companies are not in engineering. At least one-third of the jobs listed in the career websites of many of the top tech companies are on nonengineering teams.

There is a common refrain in Silicon Valley: "We can't lower the bar." This term is widely understood to infer that black, Latinx, and women candidates are less qualified. Their hiring would be a token, putting them over more qualified white or Asian male candidates, who in some cases are actually equally or sometimes less qualified.

When women and people of color are hired, they often face unwelcoming environments that upend the great work they came to do. Half of all diverse employees said they see bias as part of

their day-to-day work experience, according to a recent study. Women in tech are leaving the industry at nearly double the rate as men. A person over 40 at a tech company is a rarity, and even more so if they are not in a managerial position.

Despite all these challenges, we are thriving. We are leaders impacting our communities and executing the ideas that are transforming the landscape of technology and beyond. Tech companies need to recognize the greatness or risk losing some of the industry's most brilliant minds.

A study by McKinsey found that ethnically diverse companies were more than 35 percent more likely to outperform their industry counterparts. And companies in the bottom quartile, both for gender and for ethnicity and race, are statistically less likely to achieve above-average financial returns.

Superficial proclamations from corporate leaders are not enough. It is time to stop saying we can do better and to start being better.

For Congress and this committee, more oversight of this Nation's tech companies is absolutely necessary. Continuing to learn about how the industry functions in hearings like this will lead to better economic solutions for all Americans.

Tech companies must do their part, step up, and reflect the ideals of equality, democracy, and justice for all, on which this country was founded.

Thank you for this opportunity to share, and I look forward to answering questions you may have.

[The prepared statement of Mr. Luckie follows:]

HEARING BEFORE THE SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE OF THE COMMITTEE ON ENERGY AND COMMERCE U.S. HOUSE OF REPRESENTATIVES

March 6, 2019

Testimony of Mark S. Luckie
Digital strategist and former manager at Twitter and Facebook

Chairwoman Schakowsky and Members of the Committee, I thank you for the invitation to participate in today's hearing on Inclusion in Tech: How Diversity Benefits All Americans.

Technology is playing an increasingly important role in every second of our lives. I constantly marvel at the number of times I hear someone refer to a post they saw on Facebook or a tweet in the news. Google searches have become part of our daily routine. From toddlers to seniors, using smartphone apps or connected devices has become second nature to many Americans.

Social media apps can quite literally change how people feel. They can bring joy into our lives or sorrow and pain depending on what appears in a person's feed.

No two people are alike in their use of these technologies. Gender, age, race, ethnicity, sexual orientation, disability, religion, political beliefs, geographic location, and other factors can all dramatically change the way people interact with a product.

And yet the hundreds of thousands of people who are creating these technologies remain mostly homogenous. The tech industry continues to be populated by mostly white or Asian men. Diversity is an integral part of the fabric of America and yet it is not reflected in the companies that affect the lives of millions of this country's citizens. Underrepresented groups find themselves shut out of the development of products they use every day.

In my time inside of tech companies, I've seen firsthand the issues around diversity that continue to plague the industry.

Most recently, I served as Manager of Global Influencers at Facebook, based in its Silicon Valley headquarters. In this role, I facilitated the company's relationships with high-profile talent and notable figures from underrepresented backgrounds. Previously, I served as Head of Media for the popular social networking site Reddit and Manager of Journalism and News at Twitter. Prior to my transition into the tech industry, my career was in journalism, teaching newsrooms around the world how to connect with their communities through digital tools.

Prior to my departure from Facebook in November 2018, I published publicly an internal memo in which I outlined how the company was failing its black users and employees. This happened and continues to occur through systematic discrimination, silencing voices, unequal resources,

and other ongoing inconsistencies. Following the memo's publication, I received hundreds of emails and private messages from people working in tech and a wide variety of other unrelated industries. Many were encountering similar issues of discrimination in their own workplaces. Most had stayed quiet about their experiences. Others who worked in tech had walked away from the industry completely.

The concern surrounding the lack of diversity at U.S. technology companies is not just about the fair treatment of their employees. What is even more alarming is the inequalities in consumer technology that the deficiency is creating. Unfortunately, there is no shortage of examples of discrimination built into the products emerging from Silicon Valley companies.

BIAS IN PRODUCTS

- COMPAS, the artificial intelligence software used across the country by judges to determine if a convicted criminal is likely to commit more crimes, was found to be biased against minorities. The formula built into the product was particularly likely to falsely flag black defendants as future criminals, wrongly labeling them this way at almost twice the rate as white defendants, according to ProPublica.

- When Amazon's Prime same-day delivery service rolled out nationally in 27 metropolitan areas, it excluded ZIP codes that have predominantly black populations, according to an analysis by Bloomberg.

- Upon its release in 2014, Apple's HealthKit app enabled users to track a wide range of vital functions like sleep, blood pressure, calorie intake, respiratory rate, blood-alcohol level, and even copper intake. But it did not track menstrual cycles, one of the most fundamental parts of women's lives, until one year later.

- A widely circulated video on YouTube shows a "smart" soap dispenser that automatically detects when a hand is waved beneath its nozzle but appears to not work on black skin.

- The website for The Princeton Review's online SAT prep course listed prices that varied depending on the ZIP code of the user, according to another ProPublica investigation. Asians were nearly twice as likely to be charged a higher price, even if the income in their area was below average.

- Early versions of the image-recognition algorithm in Google's Photos app automatically labeled images of African-Americans as gorillas.

- FaceApp introduced filters in 2017 that allowed users to upload a selfie and select an Asian, Black, Caucasian, or Indian filter to change their racial appearance. The filters were decried as racially insensitive. FaceApp's "hot" filter was also taken down earlier that year after users discovered the filter was lightening their skin in an effort to make them look more attractive.

- Amazon found in 2015 that its recruiting tool for rating candidates for technical jobs had taught itself that male candidates were preferable. According to Reuters, it penalized resumes that included the word "women's" and downgraded graduates from all-women's colleges.

- Facebook's policy that requires users to include their "real name" in their profile was found to discriminate against Native American names which sometimes differ some standard Anglo-Saxon names. The policy also disproportionately affects transgender people who often don't use legal names for safety and privacy reasons. Users who violate the policy face having their account suspended.

- The use of Facebook's ad platform by Russian-backed organizations to create political tension in the U.S. has become the focus of intense scrutiny. In addition to this oversight, the platform also allowed its advertisers to target housing ads based on race and specifically exclude certain races from seeing housing ads, which is a federal crime.

In many of these instances, the transgressions were unintentional and later corrected. There are a number of reasons why some of these oversights happen, including over-reliance on algorithms, teams without diverse voices, or lack of input from communities of color. Incidents like these can result in poor publicity, alienating consumers, profit loss, and limited financial futures for American businesses small and large.

Many of the aforementioned products rely on artificial intelligence — the simulation of human intelligence processes by computer systems. A.I. is learning from the prejudices of its creators, the people from whom it collects information or both. If we allow these algorithms to be developed by a narrow range of people, the products on which they are built will inevitably reflect the biases of their creators.

Most of these oversights can be mitigated by employing and retaining staff from diverse backgrounds in an environment that welcomes all voices. Statistically, tech companies are not doing that.

In 2017, at eight of the largest tech companies in the U.S., women on average made up only 30.75 percent of staff, 4.2 percent were black and 6 percent were Latinx, according to self-reported numbers. While there's a disproportionately high number of Asians who work in tech, industry data shows they're the least likely to attain a leadership role.

THE "PIPELINE"

One of the common explanations of why there is a lack of diversity in Silicon Valley is the "pipeline." Tech companies argue that there are not enough women and people of color graduating with degrees in computer science. It is true that most of the graduates coming out of

computer science programs in the U.S. are white men. An increase in STEM education around the country, particularly in black and Latinx communities, will help close this gap.

However, there is more to this story. The percentage of women and people of color who are actually hired by tech companies is well below the number of those with tech-related degrees, many of whom graduate from top programs. More people from underrepresented backgrounds are graduating than are actually being hired.

In 2015, women constituted only 28 percent of workers in science and engineering occupations, even though they accounted for half of the college-educated workforce overall, data from the National Science Foundation shows. Black workers accounted for 5 percent of employment in science and engineering occupations and Hispanic workers accounted for 6 percent, far lower than their share of the U.S. population.

The discussions around the "pipeline" also ignore an obvious but overlooked fact: most jobs at tech companies are not in engineering. As of March 1, 2019, at least one-third of the jobs listed on the career websites of Microsoft, Google, Facebook, Adobe, Uber, Samsung, and more are on non-engineering teams.

There is a universe of roles on core teams like design, sales, finance, legal, marketing, business development, and research, among others. And yet women and people of color are missing from these roles as well. Furthermore, the points in the pipeline are far more institutional than tech companies admit to publicly.

A common practice at Silicon Valley companies, including my previous employers Facebook and Twitter, is the use of an internal tool through which employees can recommend friends and former colleagues for open positions. By submitting names and résumés through this system, current employees can fast track the application directly to recruiting teams. The applicant is given priority review and may receive a response from a recruiter in as little as 24 hours.

This may seem like an efficient way to identify qualified candidates. However, if the majority of the employees at tech companies are white and Asian, the candidate pool is highly likely to be more of the same. Past research has shown that a great majority of white Americans had no friends outside of their racial group. Silicon Valley is a self-contained bubble in which the majority of workers graduate from the same schools, live in the same cities, and share the same previous workplaces.

This system limits the success of applicants who come from outside of these circles. In an attempt to correct this imbalance, black and Latinx employees are highly encouraged to recommend applicants they may know. But given the ratio of applications being submitted by colleagues, qualified candidates from underrepresented backgrounds don't always make it through the initial stages of the recruiting process.

Many tech companies have expanded their recruiting efforts to diverse institutions and affinity groups. It is no secret though that they heavily recruit from the same small list of universities, all of which have a relatively low number of students from underrepresented backgrounds.

Some of the largest tech companies also partner directly with these few universities to inject their workflows and requirements into the curriculum. This gives an exclusive group of students an edge in the recruitment process and puts grads from other institutions at a disadvantage even if they have the skills required for the role.

Most tech companies have created programs that offer workshops, summits or internships specifically for underrepresented groups. There is a gap here as well. These programs usually focus on STEM and operate autonomously from the recruiting process or are surface level compared to the exclusive university partnerships.

The broken pipeline furthers into the interview process. There is a common refrain in Silicon Valley: "we can't lower the bar." This term is widely understood to infer that Black, Latinx, and women candidates are less qualified. Their hiring would be a token, putting them over more qualified white or Asian male candidates (who in some cases are actually equally or less qualified).

Executive leadership is made to strike an awkward balance. They want to further their diversity goals while not upsetting their core employee demographic. In lieu of quantifiable demographics like gender, race, age, or ethnicity, loosely defined goals such as "diversity of thought" or "diversity of opinion" are championed.

DISCRIMINATION AT WORK

Many tech companies would be far more diverse if employees from underrepresented backgrounds weren't leaving because of the ongoing bias they face. When women and people of color are hired, the numbers show they don't tend to stay.

In a Harvard Business Review study on tech, half of all diverse employees said they see bias as part of their day-to-day work experience. Members of majority groups continue to underestimate the bias diverse employees encounter every day. White heterosexual males, who occupy the bulk of leadership positions, were 13 percentage points more likely to say that the day-to-day experience and major decisions at their company are free of bias. The lack of empathy combined with the unwelcome environments diverse employees face leads many to leave the industry altogether.

The Center for Talent Innovation found that women in tech jobs in the U.S. leave the field at a 45 percent higher rate than men. Family reasons are thought to be the common reason for these departures. However, only 27 percent of women in one survey cited family as a primary reason for leaving.

A person over 40 at a tech company is a rarity and even more so if they are not in a managerial position. A study by Visier found that Baby Boomers aged 52 to 70 make up less than 12 percent of the tech workforce, far below the 27 percent represented in non-technical occupations. Those

older employees sometimes find they are subconsciously discriminated by their co-workers against because they are visibly dissimilar from the rest of the team.

The diversity reports issued by tech companies also fail to acknowledge that there is a disproportionate number of people of color in contract or contingent worker positions. This skewed classification is unintentionally creating a second-class system on Silicon Valley campuses. Few companies encapsulate this divide more than Facebook, where signs that read "Contractors = People" line the hallways. Contingent workers are excluded from benefits and amenities, prevented from attending company-wide meetings and events, and are even denied access to certain buildings open to all full-time employees. Diverse voices are quite literally shut out from the company.

Whether they are full-time or part-time, too many diverse employees around the country are facing microaggressions, discriminatory comments (made either knowingly or unknowingly), limited resources, denigration, exclusion, and countless other taxing encounters. In speaking about these issues, we risk impairing professional relationships, jeopardizing future opportunities, and losing out on what are among the most competitive salaries in the country.

Despite all these challenges, we are dope. We are thriving. We are changing the world. We know what our talents are and how they can affect change in the companies in which we work. We are not tokens. We are leaders impacting our communities, developing new technologies, executing the ideas that are transforming the landscape of technology and beyond. Our shine cannot be denied. Tech companies need to recognize the greatness or risk losing some of the industries' most brilliant minds.

Adorning product marketing materials with multicultural faces is not enough. There is an increasing pushback from people of color and women who reject products that don't take into account their needs and at worst make them difficult or problematic to use.

Black Americans have an estimated $1.3 trillion in purchasing power, Latinx Americans have $1.5 trillion, and the LGBTQ market is nearing $1 trillion, according to Selig Center for Economic Growth. Women control an estimated two-thirds of the spending power in the U.S. Devaluing customers from underrepresented backgrounds comes at the detriment of American businesses.

Unless a company serves a completely homogeneous consumer base, it is placing itself at a competitive disadvantage by not having a representative workforce. The best companies, in tech or elsewhere, foster inclusion and in doing so strengthen the ability of teams to see the world from their customers' perspectives. Open discussions among people from varying backgrounds are what makes companies great. This leads to better problem-solving and more efficient product development, which translates to higher revenues and profits, expanded customer bases, and greater market share.

BUILDING BETTER BUSINESSES

A 2015 McKinsey study found that ethnically diverse companies were more than 35 percent more likely to outperform their industry counterparts. Companies in the top quartile for gender diversity are 15 percent more likely to have financial returns above their respective national industry medians. Companies in the bottom quartile both for gender and for ethnicity and race are statistically less likely to achieve above-average financial returns.

Leadership starts at the top. McKinsey also found that CEOs who increased the demographic diversity of their boards elicited higher profit margins for the company. Each 10 percent increase in racial and ethnic diversity on the senior executive team yielded on average a rise of 0.8 percent in earnings before interest and taxes. A study by Dow Jones of more than 20,000 venture-backed companies found that those companies with at least one woman executive were more likely to succeed than those with only men in leadership positions.

In order to be successful, tech companies need to approach diversity like they would any other business priority. It requires true commitment from executive leadership paired with tailored implementation strategies for the various teams within the organization. Top-performing companies set quantifiable goals and track their progress over time by establishing clear metrics and accountability. When organizations hold managers responsible for their diversity goal targets, they produce better results than organizations that rely on one-off diversity trainings.

Superficial proclamations from corporate leaders are not enough. It's time to stop saying "we can do better" and start being better. If tech companies have figured out how to launch self-driving cars, create virtual worlds, and how to bring internet to the furthest reaches of the planet, they can surely figure out how to make their workplaces more diverse.

WHAT'S NEXT

The smartest companies are already turning their missions into action. Tech giants are bringing on diverse board members and increasing their percentages of diverse employees, however marginally. In coordination with these efforts, they must take greater care to gather input from the communities who make their businesses possible. Establishing more regularly scheduled focus groups and product testing with underrepresented groups will offer even more insight on how to grow their platforms.

For Congress and this committee, more oversight of this nation's tech companies is absolutely necessary. Continuing to learn more about how the industry functions and hearings like this will lead to better economic solutions for all Americans.

I am here today because I, like many people in tech, care deeply about the companies in which we work and, by extension, the communities they affect. I applaud the work that diverse employees are doing and thank those in and around the tech industry whose efforts have moved the representation of diverse groups forward.

While it may seem like we live in fractured times, it is the ever-evolving digital technology around us that will continue to expose us to new ideas and bring this country together. Tech companies must do their part, step up, and reflect the ideals of equality, democracy, and justice for all on which this country was founded.

Thank you for this opportunity to share and I look forward to answering any questions you may have.

Ms. SCHAKOWSKY. Thank you very much.

Next, I want to invite Dr. Joan Ferrini-Mundy for 5 minutes.

STATEMENT OF JOAN FERRINI-MUNDY

Dr. FERRINI-MUNDY. Thank you. Good morning, Chairman Schakowsky, Ranking Member Rodgers, and members of the subcommittee. Thank you for inviting me here today.

My name is Joan Ferrini-Mundy, and since July of 2018, I have been the president of the University of Maine and the University of Maine at Machias.

I plan to comment on the roles of institutions of higher education in the preparation of a diverse STEM and technology workforce that is ready to solve problems and innovate through diversity, and to provide pathways, especially in STEM, for diversity.

The mission of the University of Maine is to advance learning and discovery through excellence and innovation in undergraduate and graduate academic programs while addressing the complex challenges and opportunities of the 21st century through research-based knowledge.

Our population on our campus of about 11,000 students in Orono, Maine, is 51 percent women. Our geographic diversity is above the national average, but we are below the national average in racial and ethnic diversity. White students comprise about 82 percent of our student body, and 12 percent of our students are black or African-American, Hispanic, or Latino, and other races and ethnicities.

In addition to diversity of race, gender, and ethnicity, at U Maine we have diversity on the dimensions of age, sexual orientation, socioeconomic status, religion, disability, disciplinary background, veteran service, and experience. In Maine, 47 percent of precollege students are economically disadvantaged. Twenty-six percent of our entering students are first-generation college students.

For some college students, the diverse environments of higher education are their first experience with people different from themselves and from their home communities. Our institutions need to be skilled and effective in supporting their success and opening up their pathways into the tech industries and into the STEM fields more generally. At the University of Maine, we have more than 40 different organizations and initiatives to support our diverse students.

Scott Page has argued that people from different backgrounds have varying ways of looking at problems. There is certainly a lot of evidence that people's identity groups, ethnic, racial, sexual, age, matter when it comes to diversity in thinking. And as we have heard, their solutions to problems will be equitable and more effective.

One function of the university is to prepare leaders and a workforce for tomorrow. And universities across the country are doing so with inclusive, cross-disciplinary STEM programs, research to better understand and ensure inclusion, support services to promote student success, curriculum and instruction designed to build from the diversity on our campuses and to engage diverse students, and through partnerships.

Through the University of Maine, for example, students, faculty, and staff from around the world and from very diverse backgrounds come together in our Graduate School for the Biomedical Sciences and Engineering to participate in convergence research. They work in molecular and cellular biology, bioinformatics and genomics, toxicology, neuroscience, and biomedical engineering, to address some of tomorrow's biggest challenges. And the diversity that they bring to those challenges is absolutely essential.

Our campus Center on Aging promotes and facilitates activities on aging and aging-related education and training programs. Our Center for Community Inclusion and Disability Studies partners with the community to enhance the lives of individuals with disabilities and their families.

In Maine, within 1 year of high school graduation, 50 percent of economically disadvantaged youth are enrolled in higher education compared to 75 percent of noneconomically disadvantaged youth. Enabling all students to be able to attain degrees is critical for the diversity that we discuss here today. The University of Maine is addressing this through a new First Year Student Initiative.

Some of our focus is directly in the curriculum. With funding from the National Science Foundation INCLUDES Program, U Maine anthropologist Dr. Darren Ranco and colleagues are developing the Wabanaki Youth in Science Program to bridge inclusion in postsecondary education through the sciences. The team is developing a course that brings together traditional ecological knowledge and Western science for undergraduates. The success of this ongoing effort will depend upon diversity and student engagement with ideas that are unfamiliar and with experts who bring diverse experiences.

I would like to also mention that the University of Maine system partners with Educate Maine in a project to match students with internships and full-time jobs in computing occupations. And we hope to bring underrepresented minorities, women, and rural students to pursue a variety of experiential learning opportunities.

In closing, our Nation's diversity is a resource for learning and for solving the most complex problems of our times. As technologies and advances lead to changes in our workplace, new generations of STEM professionals will bring their collective diversity to bear on improvements and innovations. U.S. higher education has a key role to play in ensuring the pathways for inclusive learning environments, so that those professionals are ready to make a difference.

Thank you for the opportunity to speak with you today.

[The prepared statement of Dr. Ferrini-Mundy follows:]

Testimony of
Joan Ferrini-Mundy, Ph.D.
President, the University of Maine and the University of Maine at Machias

Before the
Subcommittee on Consumer Protection and Commerce

For the
Committee on Energy and Commerce
United States House of Representatives

March 6, 2019

Inclusion in Tech: How Diversity Benefits All Americans
"The Critical Role of Higher Education in Preparing a Diverse Science, Technology, and Engineering Workforce for Tomorrow"

Good afternoon Chairman Pallone, Chairman Schakowsky, Ranking Member Walden, Ranking Member Rodgers, and members of the subcommittee. My name is Joan Ferrini-Mundy and I am the President of the University of Maine and its regional campus, the University of Maine at Machias.

The mission of the University of Maine is to advance learning and discovery through excellence and innovation in undergraduate and graduate academic programs while addressing the complex challenges and opportunities of the 21st century through research-based knowledge. Through integrated teaching, research, and outreach, the University of Maine improves the quality of life for people in Maine and around the world, and promotes responsible stewardship of human, natural, and financial resources.

The University's Diversity Action Plan guides our efforts to achieve seven key goals: communicate clearly and affirmatively the University's commitment to diversity; make substantial progress on our Affirmative Action goals; retain employees of difference; value diversity as an essential component of the curriculum; increase the percentage of undergraduate and graduate students of color; retain those students through degree completion; and offer programming to sustain a community of respect for differences.

Today I will discuss how diversity and inclusion are central to the successful executing of that mission and those goals, within the context of U.S. higher education and a workplace being dramatically influenced by technology.

Diversity powering the changing science, technology, engineering, and mathematics (STEM) workplace. Tomorrow's workplace is changing, and the workplace already features diversity on many dimensions. That workplace requires STEM professionals who are prepared to collaborate with colleagues from multiple disciplines, from diverse backgrounds and from a wide range of experiences. Diversity and inclusiveness in the workplace are central in solving complex problems, learning from and with others as work demands change over their careers, finding competitive solutions to improve efficiency and productivity, and bringing new ideas to market.

The concept of "convergence" already characterizes some of our greatest research advances in STEM, and diversity is foundational to convergence. MIT's Phillip Sharp told American Association for the Advancement of Science members in 2011: "Convergence is a broad rethinking of how all scientific research can be conducted, so that we capitalize on a range of knowledge bases, from microbiology to computer science to engineering design ... It entails collaboration among research groups by, more deeply, the integration of disciplinary approaches that were originally viewed as separate and distinct." (MIT, 2011). The students who are undergraduates in universities across the nation today already are working in labs that do convergence research, and will be the leaders of this convergence future, both as researchers and professionals across the knowledge economy. At the University of Maine, for example, our Graduate School for the Biomedical Sciences and Engineering brings together students from molecular and cellular biology, bioinformatics and genomics, toxicology, neuroscience, and biomedical engineering, in partnership with researchers from several laboratories across Maine. This represents diversity of disciplinary background.

As one of its 10 Big Ideas, The National Science Foundation identified "The Future of Work at the Human Technology Frontier." (NSF, n.d.a). The call for core research proposals (NSF, n.d.b) describes this changing environment: "The landscape of jobs and work is changing at unprecedented speed, enabled by advances in computer and engineering technologies such as artificial intelligence and robotics, deeper understanding of societal and environmental change, advances in the learning sciences, pervasive, intelligent, and autonomous systems, and new conceptions of work and workplaces. This technological and scientific revolution presents a historical opportunity to the Nation and its people, in the creation of new industries and occupations, enhanced productivity and quality of work life, and the potential for more people to participate in the workforce, ultimately yielding sustained innovation and global leadership."

NSF acknowledges the complexity of this changing workplace: "But, as history teaches, such changes also come with risks. Some risks are immediate, such as jobs lost to automation or demand for skills not met by current educational pathways. Other equally important risks include new security threats, algorithmic biases, unanticipated legal consequences including privacy implications, dependence on technology and erosion of human knowledge and skills, inadequate workplace policies and practices, or undesirable impact on the built environment." The students coming through our universities will be those who shape the ways in which these exciting changes are enacted, by capitalizing on collaborations across differences.

And, as noted in a recent National Academies workshop on the topic of the STEM workforce, "There is often a significant gap between the knowledge, skills, and abilities most often sought by employers (e.g., data analysis skills, problem-solving skills, creativity, and employability skills such as teamwork and interpersonal communication) and the knowledge, skills, and abilities that students bring into the workforce immediately upon graduation. To the extent that employers and colleges/universities can work together to close that gap, and create campus-based and work-based learning experiences for students that enable them to develop those skills, there may be opportunities to better prepare students to thrive in the workplace early in their careers." (National Academies of Sciences, Engineering, and Medicine, 2016). Recognizing that these workplaces will be diverse and will benefit from diversity is key in the joint planning by universities and employers.

There is much discussion about the need for the continued re-skilling and up-skilling of the STEM workforce, as technologies, processes, and manufacturing change. Higher education already has a substantial role in that activity, particularly at the community and technical college levels, and programs offering stackable credentials and certificates are opening up as a function for higher education. This move toward "work-based learning" is discussed in a recent National Academies Workshop Report (NAS, 2016). For higher education, recognizing that providing inclusive environments for the returning adult learners, who bring a key type of age and experience diversity to campus, will be important if higher education is to be an effective partner in this kind of education. In Maine, 66% of high-wage, in-demand Maine job openings from 2014-2024 will require postsecondary education beyond high school (See Educate Maine, Education Indicators for Maine 2018). Higher education responses will need to incorporate the diversity needs and opportunities that will present themselves in this new sector of the mission.

Higher education playing a critical role. Technology increasingly pervades the STEM fields. For instance, a recent Bureau of Labor Statistics report (Riley, 2018) discusses projected growth in the mathematical sciences professions of 29.7% by 2026, and attributes that growth to the need for analytical ability, "particularly as big data becomes more prominent and useful for businesses." As both science and the workplace change, higher education has a part to play in ensuring that students will thrive in those environments and be the leaders of tomorrow. Central to supporting these changing workplace demands is an inclusive undergraduate and graduate education that provides deep experience in interdisciplinary work and collaborative problem solving. Quality preparation depends on groups that have many kinds of diversity coming together effectively.

U.S. higher education has a fundamental role in preparing the future U.S. science, technology, engineering, and mathematics (STEM) workforce to thrive through diversity in a rapidly changing workplace. According to the National Science Foundation (NSF), "The representation of certain groups of people in science and engineering (S&E) education and employment differs from their representation in the U.S. population. Women, persons with disabilities, and three racial and ethnic groups – blacks, Hispanics, and [Native Americans] or Alaska Natives – are underrepresented in S&E." (NSF, 2017). At the same time, a recent Pew Center report drawing on data from the U.S. Census Bureau indicates that "nearly half of postmillenials [6- to 21-year-olds] are racial or ethnic minorities" (Fry & Parker, 2018).

which means that U.S. higher education should be expected to fully mirror that diversity over the next two decades.

Institutions of higher education, especially land-grant institutions like the University of Maine, have a responsibility in their states and for the nation to help prepare tomorrow's innovative workforce in STEM. This workforce must be educated to create solutions to complex global problems, to improve quality of life for our people, and drive the economy through innovation. Specifically, the land-grant mission includes a strong outreach tradition, originally around agriculture, such that the new information arising from research would benefit the people of the state, with cooperative extension agents working in the field. That tradition is robust in Maine, in increasingly technologically sophisticated areas of agriculture and aquaculture, and beyond. In addition, our university is preparing leaders in a transforming forest resources industry, in marine sciences, in the health and future of Maine's coasts (all 3,478 miles!), in health care, in biomedical engineering, and other key fields.

Universities are microcosms of the diversities in society, yet for some college students the diverse environments of higher education are their first experience with people different from themselves. Their learning can be greatly enhanced by their interaction with people across the span of various diversity dimensions. For instance, at the University of Maine, 26% of our entering students are first-generation college students. At our Machias campus 54% are first-generation. These are populations that bring critical perspectives to university classrooms and labs, and our institutions need to be skilled in supporting their success.

In a recent administration of the National Survey of Student Engagement at UMaine, our students give us low marks on the opportunities they have here for "discussions with people of a race or ethnicity other than their own" and "institutional emphasis on encouraging contact among students from different backgrounds." We have a robust set of distributed activities in place on campus with more than 50 partner organizations aimed at enabling a highly inclusive campus that uses the great diversity we do have here, on various dimensions, as an asset to our students' experiences, and that endeavors to expand that diversity. For instance, our campus Center on Aging is engaged in promoting and facilitating activities on aging and aging-related education and training programs. Our Center for Community Inclusion and Disability Studies partners with the community to enhance the lives of individuals with disabilities and their families.

Economically disadvantaged students in Maine face challenges in securing higher education. In the 2017-18 school year, 47% of all Maine students in public school were classified as economically disadvantaged. Educate Maine has released goals that are directly related to improving diversity in our state's higher education, (EducateMaine, 2108) and they note the state goal of "60% of Mainers to hold a postsecondary credential of value by 2025." They argue that "we need to increase the number of Mainers with postsecondary credentials of value. ...to provide more academic supports and the price for college needs to be made more affordable..." (pg. 18) In Maine, within one year of high school 50% of economically disadvantaged students are enrolled in college compared to 75% of non-economically disadvantaged. The college completion rate for students who were economically disadvantaged while in high school in Maine is 40%; the rate for non-economically disadvantaged is 62%.

Diversity in socioeconomic status is central for us, and higher education success is tightly linked to college affordability. The University of Maine is addressing this in part by an exciting new first-year student success initiative[1] which is addressing the supports and opportunities needed to draw on diversity and ensure a fully inclusive environment.

Many types of diversity are important for university environments today and workplace environments tomorrow, including diversity of gender, sexual orientation, race, ethnicity, religion, age, disability, personality, socioeconomic status, disciplinary background, and experience. Promising research- and evidence-based practices show we can effectively create learning environments to build on diversities of many types in encouraging learning to occur and in fostering learner success. Indeed, today's college students expect and demand learning in such environments. Interacting with diverse learners can lead to more creativity, better ideas, and stronger motivation and engagement – all important workplace assets. (See Selingo, 2018, Gentile, Brenner, & Stephens, 2017, Chronicle of Higher Education, 2018).

Universities are also becoming quite expert at customizing the educational experience to assure that the needs of diverse learners are met. Innovations to support student success include use of predictive analytics, "intrusive" advising, the reform of gateway courses, adaptive learning, and inclusive teaching practices. There are increasingly widespread efforts to reduce cost and enhance access for a wider range of audiences, including pre-college students, through dual enrollment programs and community college partnerships, adults, place-bound learners, veterans, and other groups.

Universities are creating networks to amplify efforts to improve inclusion and results. For example, the Association of Public and Land Grant Universities (APLU) has launched ASPIRE: The National Alliance for Inclusive & Diverse STEM Faculty, with funding from the NSF INCLUDES program. The program "will pursue three mutually reinforcing strategic goals all focused on faculty. The ultimate aim is attracting more underrepresented students—women, members of minority racial and ethnic groups, persons with disabilities, and those from low socioeconomic backgrounds—into STEM college programs, assist them to stay in these programs, and help them graduate and succeed in a modern STEM workforce." (York, n.d.). Initiatives such as these will help frame the efforts of universities to sustain and enhance their diversity focus. Our institutions of higher education, as microcosms of the society and the workplace, are ideal for cultivating the abilities and providing the learning environments to use difference as an asset and to collaborate, learn, and solve problems in such environments.

Research indicates that when solutions are derived by diverse teams those solutions are more feasible and effective, and often more profitable. For instance, Cumming and Leung (2018) have studied the role of diversity on corporate boards. They summarize literature on this as providing evidence that diversity in race and expertise "positively affect innovation," and that diversity in experience and gender affect innovation. Hong and Page (2004) use mathematical modeling to demonstrate that "when selecting a problem-solving team from a

[1] visit https://umaine.edu/first-year/

diverse population of intelligent agents, a team of randomly selected agents outperforms a team comprised of the best-performing agents." (pg. 16387) Page has made strong claims about the important role of diversity in problem solving, stating that "People from different backgrounds have varying ways of looking at problems ... there's certainly a lot of evidence that people's identity groups – ethnic, racial, sexual, age – matter when it comes to diversity in thinking." (Dreifus, 2008).

The University of Maine is Committed to Diversity and Inclusion: Maine is an aging state, above the national average for persons 65 years of age and over (US census.gov). Our population is 94.7% White, 1.6% Black or African American, and 1.6% Hispanic or Latino. Maine is considered a rural state, with population per square mile about half of the US average. (43 compared to 87). Maine is the oldest state (median age of 44.7) and the most rural, with more than 60% of Mainers living outside a metropolitan region. (PPH, 2018).

I have been the president of the University of Maine and its regional campus the University of Maine at Machias since July 2018, and am learning about how excellence and inclusion are fully central to our three core strategic values: fostering learner success, creating and innovating for Maine and beyond, and growing and stewarding partnerships.

On our campus of 9,365 undergraduates and 2,039 graduate students in Orono, Maine, we score above the national average in gender diversity (51% percent of our student body is women) and geographic diversity, and below the national average in ethnic diversity, according to College Factual. White students comprise 82% of our student body, while Black or African American, Hispanic/Latino, and all groups other than those of unknown ethnicity comprise about 12% of our student body. In the faculty and staff, 76% are white, 7% report as nonwhite, and 19% are unknown.

I wish to provide examples of University of Maine / University of Maine System initiatives that illustrate the place of diversity. The first is a project funded by the NSF INCLUDES program. NSF INCLUDES was cited recently in the Administration's 2019 Science and Technology Highlights (The White House, 2018) as an effort to make a "lasting impact in diversifying the STEM workforce of the future through partnerships and collaborations at scale." In 2017 a group of principal investigators at UMaine led by anthropologist Dr. Darren Ranco received funding to develop and assess the *Wabanaki Youth in Science Program to Bridge Inclusion in Post-Secondary education Through the Sciences*. Part of the project is the development of a course that brings together Traditional Ecological Knowledge and Western Science for undergraduates." (Ranco, Daigle, & Crandall, 2017). This kind of instructional innovation overtly focuses on bringing diversity by race and ethnicity into the undergraduate and graduate university curriculum. The success of this ongoing effort will depend upon diversity and student engagement with ideas that are unfamiliar, via experts with experiences that span a range.

Funded by the NSF Research Traineeship (NRT) program funding, Dr. Sandra De Urioste-Stone leads another project that places diversity at the center. The project is developing "an interdisciplinary curriculum based on active learning models, professional development, and collaborative research that integrates biophysical and social sciences. The curriculum

consists of four diverse learning experiences: (1) integrated courses that provide theoretical and research foundations in socio-ecological resilience and science communication; (2) an internship with a conservation management, policy or science organization to master STEM professional skills; (3) an interdisciplinary research project; and (4) a mentoring program to ensure trainee success. Training will include close interactions with key conservation partners from state and local agencies, the National Park Service, non-governmental organizations, and community partners. NRT Trainees will learn to promote a systems approach to conservation through a wide range of biophysical and social science models and methods. (De Urioste-Stone, Calhoun, Nelson, Silka, & Weiskittel, 2018). Here, the students will learn how to interact with a range of diverse groups that have different stakes, motivations, and objectives.

The University of Maine partners with Educate Maine, a business-led education advocacy organization. One of Educate Maine's programs, Project>Login, focuses on growing a diverse tech workforce in Maine. The program facilitates employer events at five of the campuses to match students with internships and full time jobs in computing occupations. By partnering with career staff members, student organizations, and individual departments, Project>Login assists underrepresented minorities, women, and rural students to pursue a variety of experiential learning opportunities in technology.

Finally, the work of Dr. Brian Beal at the University of Maine at Machias centers on building marine research infrastructure with its partner, the Downeast Institute. Faculty, students, community members, and fishermen engage together to examine factors affecting the hatchery, nursery, and grout phases of shellfish cultures. This work brings together diversity of expertise and experience, is cross-generational, and is addressing meaningful challenges for the region as a part of the university experience.

Conclusion. Our nation's diversity is a resource– for learning and for solving the most complex problems of our times. As technologies and advances lead to changes in our workplaces, new generations of STEM professionals will bring their collective diversity to bear on improvements and innovations. U.S. higher education has a role to play in ensuring that those professionals are ready to make a difference.

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Ms. SCHAKOWSKY. Right on the dot. Thank you.

Ms. Jiny Kim, you are now recognized for 5 minutes.

STATEMENT OF JINY KIM

Ms. KIM. Good morning, Chairwoman Schakowsky, Ranking Member Rodgers, and members of the subcommittee. Thank you for the opportunity to testify on the importance of diversity in the technology sector.

My name is Jiny Kim, and I am vice president for policy and programs at Asian Americans Advancing Justice, AAJC, a national civil rights organization dedicated to advancing the civil and human rights of Asian-Americans and building and promoting a fair and equitable society for all.

The economic rationale for diversity has been well-documented in numerous studies. Companies in the top quartile in terms of racial diversity are 35 percent more likely to have financial returns higher than the national median in their industry. But, despite this economic reality, women and people of color have historically been excluded from both the rank and file and from positions of leadership within tech companies. According to the EEOC, African Americans and Latinos were underrepresented in the tech sector by 16 to 18 percentage points compared with their presence in the American labor force overall.

While there is a higher representation of Asians in the tech workforce, they are still underrepresented in nontechnical roles compared to their presence in technical roles, and they are disproportionately left out of C-suite positions.

While the effort companies are making to provide transparency in their diversity data should be appreciated, there remain issues in how that data is reported. Asian-Americans and Pacific Islanders include over 50 different ethnic groups and over 100 languages and dialects. Yet, companies fail to disaggregate the data, resulting in overlooking the most underrepresented and historically marginalized AAPI communities with lower levels of educational attainment, higher rates of poverty, and larger populations with limited English proficiency. When these groups are left out, those efforts by industry and other stakeholders to encourage recruitment and build pipelines from diverse communities remain incomplete.

Not surprisingly, tech companies have developed digital tools to review the myriad applications for positions in their companies. The problem with this approach is that the ideal profile being used as a model reflects a majority white culture and the resulting unconscious bias.

Issues are not limited to recruitment, and greater effort is also needed to retain employees of color and women. Some tech companies have taken the important step of reporting attrition rates of employees from diverse backgrounds, as well as supporting their employees through mentorship programs and employee resource groups. We applaud these efforts as positive steps toward understanding what is needed to retain diverse staff and eventually place them in the leadership pipeline.

Now it is a common understanding among civil society organizations that the prejudice, ignorance, and the hate we combat in real

life live in the digital space as well. Tech companies that foster a majority white male employee base feed their own biases into the machines they create.

In the criminal justice system, we see disturbing examples of algorithmic bias. Courts have begun using predictive software to sentence convicted individuals. ProPublica published an account of two individuals who separately committed shoplifting. One was African-American, and the other was white. When a sentencing algorithm was used to predict the likelihood of each committing a future crime, the African-American individual was rated a higher risk, even though she had only committed misdemeanors as a juvenile, while the white individual had previously been convicted of attempted armed robbery. Two years later, the computer algorithm was proven wrong, with only the white individual having committed a felony.

Further alarming is facial recognition technology. In 2015, this technology came under scrutiny when software incorrectly categorized photos of African Americans as primates. Despite this incident, companies have still failed to take adequate action. Studies published as recently as last year found that facial recognition algorithms had significantly higher error rates detecting the gender of darker-skinned individuals compared to lighter-skinned individuals.

Given the magnitude of the impact of lack of diversity in tech, a serious culture shift must take place. And civil rights organizations like Advancing Justice, AAJC, have already begun to play their part. Last month, we joined more than 40 advocacy groups in sending a letter to congressional leaders urging them to put civil and human rights at the center of the digital privacy discourse. And tech companies have begun engaging our organizations on diversity and inclusion issues and taking part in civil rights audits.

The tech sector has transformed the way we communicate and connect with one another. We must ensure that the development of technological products, services, and experiences leave no one behind and do not harm communities of color. In order to do so, employees who create these innovative tools must reflect the diversity of the communities that the companies seek to reach.

Thank you for this opportunity.

[The prepared statement of Ms. Kim follows:][1]

[1] A February 2017 report entitled "Breaking the Mold: Investing in Racial Diversity in Tech" submitted by Ms. Kim has been retained in committee files and also is available as part of her written testimony at https://docs.house.gov/meetings/IF/IF17/20190306/108901/HHRG-116-IF17-Wstate-KimJ-20190306.pdf.

Testimony of Jiny Kim
Vice President, Policy and Programs
Asian Americans Advancing Justice | AAJC

Before the
United States House Subcommittee on Consumer Protection and Commerce
of the Committee on Energy and Commerce

Hearing on "Inclusion in Tech: How Diversity Benefits All Americans"
March 6, 2019

Good morning, Chairwoman Schakowsky, Ranking Member McMorris Rodgers, and Members of the Subcommittee. Thank you for the opportunity to testify on the importance of diversity in the technology sector. My name is Jiny Kim, and I am the Vice President of Policy and Programs at Asian Americans Advancing Justice | AAJC, a national civil rights organization founded in 1991 that is dedicated to advancing the civil and human rights of Asian Americans, as well as building and promoting a fair and equitable society for all. To pursue our mission, we work with over 160 community partners across the country, as well as in coalition with other civil society organizations that represent diverse constituencies. In our technology work, we hold private sector entities accountable to ensure that communities of color are not left behind in the world of innovation and advancement.

With millions of jobs created each year by the tech industry, there is no reason anyone should be left behind. However, the case for diversity is more than just a moral one – there's a real economic advantage that must be recognized. While many technology companies have taken the important step of addressing their lack of racial and gender diversity in the tech sector by releasing annual updates on diversity, there is still little overall progress being made. Further, companies have yet to collectively build effective tools for retaining, recruiting, and promoting those employees from diverse backgrounds. What is more concerning is that the programs,

products, and services created by these companies not only reflect this lack of diversity, but also have a disproportionately negative impact on communities of color. Effective reform will take more than just hiring reform, but a strong collaboration with civil society organizations to change a deep-seated culture in tech companies.

THE ECONOMIC ARGUMENT FOR DIVERSITY

Beyond the moral reasoning behind hiring diverse staff and creating products without troubling impacts on communities of color, the economic reasoning behind diversity has been well-documented in numerous studies, including ones referenced in Open MIC's 2017 report on investing in racial diversity in tech, which I have included for your reference. In fact, companies in the top quartile in terms of racial diversity are thirty-five percent more likely to have financial returns higher than the national median in their industry. This is even more true for the tech sector where products are the result of creative collaboration, so any edge you can gain on creativity will be lucrative.

DIVERSITY DATA IN TECH COMPANIES: A CLOSER LOOK

The unfortunate reality is that the massive success of tech companies comes at the cost of excluding women and people of color not only from their employment listings, but also from positions of leadership. According to the U.S. Equal Employment Opportunity Commission's study of tech sector employment data in 2014, African Americans and Latinos are underrepresented in tech by sixteen-to-eighteen percentage points compared with their presence in the American labor force overall. While there is higher representation of Asians in the tech workforce, they are still underrepresented in non-technical roles compared to their presence in technical roles and they are disproportionately left out of C-suite positions. In fact, white

employees are represented at a higher rate in the tech sector's executives category: the same EEOC study referenced above showed an 83% representation of white employees as tech executives in technical positions.

Data released by the top five tech companies this past year reflect a similar trend. Facebook reported having representation by African Americans grow from 2% to 4%, while Microsoft reported an overall 0.1% growth of African American staff from 2017 to 2018. While Amazon reported 63% of their leadership representation to be white in 2017, Google reported in 2018 that their white leadership representation was 66.9%. Finally, Apple reported that their leadership representation of Latinos stayed the same from 2016 to 2017 – at 7%. These numbers are disappointing given the fact that tech companies have committed to recruiting diverse staff and leadership, as well as investing in pipeline programs for at least the past five years.

While the effort companies are making to provide transparency in their diversity data should be appreciated, there remain several issues in how that data is reported. For example, the Asian American and Pacific Islander community represents over fifty different ethnic groups and 100 languages and/or dialects. Yet, in reporting their data, companies fail to disaggregate the data, resulting in overlooking those groups that have a lack of educational attainment, higher rates of poverty, and larger populations with limited-English proficiency. When these groups are left out, those efforts by tech companies and other stakeholders to encourage recruitment from diverse communities or increase investment in STEM programs is incomplete. Finally, we are encouraged to see that some companies are specifically listing data for Native American, Native Hawaiian & other Pacific Islander communities, but this is still not a mainstream practice.

ISSUES WITH RECRUITMENT, PROMOTION, AND RETENTION

Not surprisingly, tech companies have developed digital tools to review the myriad of applicants who apply for positions in their companies. Similar tools are also used to assess qualifications for promotion within the company. The problem with this approach is that the ideal profile being used as a model applicant reflects a majority white culture and the resulting unconscious bias. Posted job listings also use racially or gender-conforming language to push a white, male cultural norm which is incorporated into the initial screening process. To address these issues, companies should avoid using racially or gendered-coded terminology, as well as implement anonymous hiring tools to screen candidates without seeing personally identifiable information that may indicate age, gender, or race. Finally, training hiring teams and committees to identify unconscious and interpersonal bias will help improve hiring outcomes.

Greater effort is also needed to retain employees of color and women. In research conducted by the Level Playing Field Institute (LPFI), young women of color perceived race-based stereotypes as much more ominous barriers than those based on gender. Additionally, a 2007 Corporate Leavers Survey conducted by LPFI showed that white women are 1.5 times more likely than white men to leave the workplace due to the cumulative effect of subtle biases. People of color, regardless of gender, leave at more than 3.5 times that rate solely due to unfairness.

Some tech companies have taken the important step of reporting attrition rates of employees from diverse backgrounds. We applaud this effort as one step towards understanding what mechanisms and environmental factors are needed to retain diverse staff and eventually place them in the leadership pipeline. Companies that focus on supporting their employees through mentorship programs and Employee Resource Groups are also taking critical steps

towards retaining employees.

BIAS AND DISCRIMINATION IN TECH PRODUCTS

It is a common understanding among civil society organizations that the prejudice, ignorance, and hate we combat in real life live in the digital space at the same level, if not a greater magnitude. Similarly, tech companies that foster a majority white male employee base simply feed their own biases into the machines they create. We see this often in the search results for popular search engines. For example, type in "Asian girls" or "Latina girls" into a search and what will come up will be explicit images or other mature suggestive content. Given the fact that these searches are driven by predictive technologies created by human beings, the results are troubling.

In the criminal justice system, we see other disturbing examples of algorithmic bias. When a popular algorithm designed to predict when and where crimes will take place was used by police in Oakland, California, the program repeatedly sent officers to neighborhoods with a high proportion of people from racial minority groups, regardless of the true crime rate in those areas. Courts have also begun using predictive software to sentence convicted individuals. ProPublica published an account of two individuals who separately committed shoplifting – one individual was African American and the other was white. When a sentencing algorithm was used to predict the likelihood of each committing a future crime, the African American individual was rated a higher risk, even though he had only committed misdemeanors as a juvenile prior to the current offense, while the white individual had been convicted of attempted armed robbery as an adult prior to the current offense. Two years later, the computer algorithm was proven wrong with only the white individual having committed a felony.

Algorithmic bias has also shown up in housing, an area that has a long history of discriminatory practices against communities of color. A University of California Berkeley study found that both online and face-to-face lenders charge higher interest rates to African American and Latino borrowers, earning 11 to 17 percent higher profits on such loans. The algorithm, in this instance, was able to determine which applicants might do less comparison shopping and accept higher-priced offerings by the lender. The result was a disproportionate impact on minorities applying for loans. There are many reasons why communities of color may shop around less. One reason may be that they live in areas with less access to a range of financial products.

The most alarming practice by technology companies is commercializing products that have clear algorithmic bias. Facial recognition technology has a long history of bias which notably came to the spotlight when an African American man in 2015 was shocked to find an album of his digital photos titled "Gorillas" in which the software categorized him and his friend as primates. Regardless of the controversy surrounding the incident, companies have still failed to take adequate action. A study published in February of last year by researchers from MIT Media Lab found that facial recognition algorithms designed by IBM, Microsoft, and Face++ had error rates of up to thirty-five percent higher when detecting the gender of darker-skinned women compared to lighter-skinned men. Now companies such as Microsoft and Amazon have begun engaging government entities on the sale of such products. While some companies have developed internal principles around the ethical use of artificial intelligence, we cannot underestimate a private company's desire to edge out competition and maximize profit in any given sector.

THE ROLE OF CIVIL SOCIETY

There is a serious culture shift that must take place within these companies, and civil society, and specifically, civil rights organizations like Asian Americans Advancing Justice | AAJC have already begun to play their part in this long overdue change. For example, Facebook with its well-documented issues, is taking part in a civil rights audit where several civil rights groups, like The Leadership Conference on Civil and Human Rights, will provide feedback on areas ranging from social media ads to company culture. Other tech companies have begun engaging civil society on diversity and inclusion issues, even sharing diversity data before it is publicly released. We have also joined our civil society partners in advocating for diverse communities in all aspects of tech policy. Last week, this subcommittee heard from Ms. Brandi Collins-Dexter from Color of Change who referenced the letter sent to Congressional leaders by 40 advocacy groups urging leaders to put civil and human rights at the center of the digital privacy discourse. I've included that letter for your reference.

CONCLUSION

The tech sector has transformed the way we communicate and connect with one another. Technological tools, which were once a benefit to have, have now become a critical necessity. We must ensure that the development of these products, services, and experiences leave no one behind and do not harm communities of color. In order to do so, employees who create these innovative tools must reflect the diversity of the communities that companies seek to reach. Thank you for providing me with the opportunity to testify on this important subject. I look forward to answering your questions.

Ms. SCHAKOWSKY. Thank you.

We do have that letter in the record from last year, from the last hearing rather. So, thank you for that.

And next, I want to recognize Dr. Nicol Turner Lee for 5 minutes.

STATEMENT OF NICOL TURNER LEE

Dr. TURNER LEE. Thank you. Good morning, Chairwoman Schakowsky, Ranking Member Rodgers, and members of the subcommittee.

I am encouraged by your interest in this topic, particularly as some of the members of the subcommittee have worked to diversity your own staff.

Let me start just by stating again what Congressman Luján summarized from my written testimony. The absence of diversity among the people who make decisions around products and services, along with the markets that these companies and the tech serve, will ultimately lead the U.S. to abysmal failure.

With the U.S. population predicted to become minority white in 2045, tech companies that do not fully embrace diversity will ultimately compromise the quality of future technologies and make it difficult for all people to gain the benefits of the digital revolution.

Today, existing and emerging technologies are helping to solve complex social problems through automation, advanced scientific research, and artificial intelligence, while disrupting legacy industries and widely accepted norms. Yet, despite this growth, African Americans and Hispanics remain vastly underrepresented in the computer and mathematical fields, 7.9 percent and 6.8 percent, respectively, compared to whites, which are over at least 12 to 14 percent.

In fact, African Americans and Hispanics are the most underrepresented in certain tech jobs by nearly 50 percent. Less than 5 percent of the tech workforce in social media companies is African-American, with similar findings for Hispanics and certain Asian-American populations.

The irony here is that 35 percent of Hispanics and 24 percent of African Americans have no other online connection, except through their smartphones and mobile devices, compared to 14 percent whites, but they are connected to the applications and the platforms that actually run off these devices. Without them, they have no other way to live, learn, earn, vote, and network. These mismatched realities also make these populations most susceptible to digital disruption when the jobs that they once held are automated and eliminated or predatory products and services are marketed to them online on an ongoing basis.

So, this is why diversity matters. In certain sectors of tech, there is a talent pipeline problem, leaving empty pockets of workforce diversity in board, C-suite, and other leadership positions. And this human resource problem ultimately impacts the design, implementation, and evaluation of products and services, some of which are collectively profiling, surveilling, and even discriminating against protected classes. That is why we are here today.

I am going to just summarize in my closing remarks three things that I have actually put forth that I think Congress and the tech sector should do.

First, tech companies must be more deliberate and systematic in the recruitment, hiring, and retention of diverse talent and change the sources for where they find talent of color. Historically Black Colleges and Universities and Hispanic-serving institutions are often discounted in remedying pipeline concerns. Yet, 22 percent of African-American college students graduate from one of the 101 HBCUs and offer some of the Nation's most gifted talent which are prepared to work in Silicon Valley. Yet, those colleges are not the source for where we actually look for talent.

In addition to that, they may be challenged by the resources that HBCUs and HSIs find. The appropriations that go to those universities and colleges are often comparable to others; therefore, reducing their ability to entice a tech center to actually hire them. Congress, we must do better than that.

Second, tech companies must explore ethical and collaborative frameworks that explore the intended and unintended biases of algorithms and deploy solutions that quell these biases. With big data being collected in real time from users at all times, people are now being denied credit based on their web-browsing history or aggregated predictive analytics are wrongly determining a person's suitability for employment or applying a longer prison sentence. These are deplorable, and we need to work together, as my colleagues have said, to increase the pipeline, so we can make less of these mistakes. Even among members of the Congressional Black Caucus, facial recognition technology wrongly associated them with arrest records 90 percent of the time, and I know my distinguished members of the CBC aren't those people.

And finally, I would say this inattentional blindness is a problem in the tech sector that should no longer be tolerable. The strength of the online economy proves that it is no longer insulated from the guardrails designed for other regulated industries, especially those that establish baseline protections against discrimination.

Congress should consider review and the potential modernization of civil rights law and apply them to certain online cases. We did it in the case of housing. We did it in the case of civil rights. We have done it in the case of equal opportunity, and we should do it in the online space.

Thank you very much, and I look forward to your questions.

[The prepared statement of Dr. Turner Lee follows:]

TESTIMONY OF NICOL TURNER LEE
Fellow, Center for Technology Innovation, Brookings Institution

Before the
Subcommittee on Consumer Protection and Commerce
United States House Committee on Energy and Commerce

Hearing on "Inclusion in Tech: How Diversity Benefits All Americans"

March 6, 2019

Chairwoman Schakowsky, Ranking Member Rodgers and Members of the Committee, thank you for the opportunity to testify. I am encouraged by the interest of this committee on the issue of inclusion in tech, particularly as some Members of this subcommittee have worked to diversify their own staff. I am Nicol Turner Lee, Fellow in the Center for Technology Innovation at the Brookings Institution. With a history of over 100 years, Brookings is committed to evidenced-based, nonpartisan research in a range of focus areas. My particular research expertise encompasses data collection and analysis around regulatory and legislative policies that govern telecommunications and high-tech companies, along with the impacts of digital exclusion, artificial intelligence and machine-learning algorithms on vulnerable consumers. My new book, *Digitally invisible: How the internet is creating the new underclass* also addresses this topic and will be published by Brookings Institution Press next year.

Let me start my testimony by strongly asserting that the absence of diversity among the people that make the decisions around products and services for the tech sector, along with the markets that these companies serve will ultimately doom the United States to abysmal failure.

With the U.S. population projected to become "minority white"[1] in 2045, as documented by my colleague William Frey, tech companies that do not fully embrace diversity will ultimately compromise the quality of solutions and future technologies and make it difficult for all people to gain the benefits of the digital revolution.

In my testimony, I will touch upon why diversity matters in the burgeoning digital economy and the threats to our democracy when efforts to diversify people, products and services fail or are non-existent. I will conclude my testimony with recommendations for Congress and the private sector on how to safeguard consumers from the discriminatory effects of the explicit and implicit biases often linked to non-diverse workplaces, identify and mitigate algorithmic biases, and employ strategies to recruit and hire professionals from underrepresented populations.

I. Background

According to a study by Accenture, one-fifth or 22 percent of the world's economic output is generated by the digital economy, with investments in the United States accounting for 33 percent of its output.[2] Over 40 percent of the U.S. labor force and 26 percent of its accumulated capital comes from digital and related activity compared to other countries.[3] The digital sharing economy and the broad net of digital goods comprise this sector, creating

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[1] William H. Frey (2018). "The U.S. will become 'minority white' in 2045, Census projects: Youthful minorities are the engine of the future." *Brookings Institution*, March 14, 2018. Available at https://www.brookings.edu/blog/the-avenue/2018/03/14/the-us-will-become-minority-white-in-2045-census-projects/ (accessed March 2, 2019).

[2] Knickrem, M., Berthon, B. and Daugherty, P. (2016). Digital Disruption: The Growth Multiplier. *Accenture Strategy*. Available at https://www.accenture.com/t00010101T000000__w__/br-pt/_acnmedia/PDF-14/Accenture-Strategy-Digital-Disruption-Growth-Multiplier-Brazil.pdf (accessed March 3, 2019).

[3] Ibid

abundant opportunities for greater diversity and inclusion. At the core of the sharing economy are exchange-oriented activities that happen between individuals over online platforms for free or for a fee. Examples of these activities include ride-sharing services (e.g., Uber and Lyft), home or vacation rentals (e.g., Airbnb and VRBO), or online job matching sites (e.g., TaskRabbit or SquarePeg). The digital economy casts a much larger net, including the skills, equipment and variety of other goods and services enabled by the internet and high-speed broadband networks. Generally, existing and emerging technologies are helping society solve complex social problems through automation, advanced scientific research and artificial intelligence (AI), while disrupting legacy industries and widely accepted norms.

Despite the narrowing of digital disparities across the U.S., Pew research indicates that approximately 13 percent of African-Americans, 11 percent of Hispanics, 35 percent of those lacking a high school degree, 22 percent of rural residents, and 37.2 percent of households that speak limited English lack access to the internet through high-speed broadband service.[4] Not surprising, mobile access has converged among many of these groups with 77 percent of whites, 75 percent of African-Americans, and 77 percent of Hispanics owning a smartphone, according to the Pew Research Center.[5] For many whites, access to the internet via a smartphone supplements a high-speed, in-home broadband connection, while lower-income

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[4] Ryan, Camille (2018). Computer and Internet Use in the United States: 2016. *American Community Survey Reports*. U.S. Census, August 2018. Available at https://www.census.gov/content/dam/Census/library/publications/2018/acs/ACS-39.pdf. (accessed March 3, 2019). See also, Anderson, M., Perrin, A. and J. Jingjing (2018). 11% of Americans Don't Use the Internet. Who Are They? *Pew Research Center Blog*, March 5, 2018. Available at: http://www.pewresearch.org/fact\tank/2018/03/05/some americans-don't use-the-internet-who-are they/. (accessed March 2, 2019).

[5] "Mobile Fact Sheet." 2018. Washington, DC: *Pew Research Center*, February 5, 2018. Available at http://www.pewinternet.org/fact-sheet/mobile/. (accessed March 2, 2019)

populations, less-educated and even younger populations tend to be more "smartphone-dependent," relying on mobile broadband as their primary – and often only – connection to the internet.[6] Further, 35 percent of Hispanics and 24 percent of African-Americans have no other online connection except through their smartphones or other mobile devices, compared to 14 percent of whites. Finally, 31 percent of individuals making less than $30,000 per year regularly rely upon their mobile device as their only gateway to the internet.[7]

Many of these smartphone-dependent populations closely resemble those impacted by higher rates of unemployment, the "homework gap" and limited economic mobility. They are also most susceptible to digital disruption when the jobs that they once held are automated and eventually eliminated, or online predatory products and services are marketed to them on an ongoing basis. Given these realities, the prioritization of diversity and inclusion matters in the tech sector because it ensures that these consumers will be protected from the consequential harms emanating from the design and implementation of ill-advised online products and services.

II. Where is the talent "pipeline"?

According to new research from Brookings, African-Americans and Hispanics remain vastly underrepresented in the computer and mathematical fields (C&M), despite their increased participation in the broader tech workforce, including computer programming and operations research.[8] African-Americans comprise 11.9 percent of all workers in the tech sector, but only

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[6] Ibid.

[7] "Internet/Broadband Fact Sheet" (2018). Washington, DC: *Pew Research Center*, February 5, 2018. www.pewinternet.org/fact-sheet/internet-broadband. (accessed March 2, 2019)

[8] M. Muro, A. Berube, and J. Whiton (2018). "Black and Hispanic underrepresentation in tech: It's time to change the equation. *Brookings Institution*, March 28, 2018. Available at

7.9 percent of workers in the C&M fields.[9] Hispanics make up 16.7 percent of all workers in tech, but only 6.8 percent of C&M workers, according to Brookings research. In fact, these numbers represent a decline in minority participation during the period of 2002 to 2016, making African-Americans and Hispanics the most underrepresented in certain tech jobs by nearly 50 percent.[10]

Civil rights advocates, including the National Urban League and the Rainbow PUSH Coalition, have consistently called out the tech sector on their lackluster efforts to change their practices and recruit more diverse leadership on boards, in C-suite positions and as frontline workers. In the National Urban League's 2018 State of Black America report, the findings indicated that despite 8.2 percent of all degrees conferred to African-Americans were in the STEM fields, only 5.7 percent of total black employment in 2017 was in the tech sector.[11] For whites, 12.8 percent of degrees were conferred to whites in STEM, and 8.5 percent of white workers were in the tech industry.[12] Further, fewer than 5 percent of the tech workforce in social media companies is African-American, with similar findings for Hispanics and certain Asian American populations.

The role of Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving Institutions (HSIs) are often discounted in remedying pipeline concerns. Twenty-two percent of African-American college students graduate from one of the 101 HBCUs and offer some of the

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https://www.brookings.edu/research/black-and-hispanic-underrepresentation-in-tech-its-time-to-change-the-equation/ (accessed March 3, 2019)

[9] Ibid.

[10] Ibid.

[11] State of Black America (2018). Save our cities: Powering the digital revolution. *National Urban League*. Available at http://soba.iamempowered.com/sites/soba.iamempowered.com/files/SOBA2018-Digital%20Inclusion%20Index.pdf (accessed March 2, 2019).

[12] Ibid.

nation's most gifted talent, which are prepared to work in Silicon Valley. Despite the creation of existing partnerships and programs with HBCUs to address pipeline concerns, tech companies generally rely upon a smaller subset of schools to find scientists, programmers, engineers, and other tech-aligned employees, contributing to the narrative around the shortage of workers.[13] In a Gallup poll of over 60,000 college graduates from a range of higher education institutions, HBCU graduates had the highest rate of financial, career, and emotional well-being when compared to other respondents, despite being scarcely recruited and hired at tech companies.[14] They deserve a chance to demonstrate their talent.

Unfortunately, there are disparities between the amenities, services and funding found at majority versus minority-serving colleges and universities. Technology access can be scarce or virtually non-existent at HBCUs and HSIs due to limited institutional resources or infrastructure. HBCUs and other minority-serving colleges and universities are also subjected to decreased or unequal government funding, contributing to the lack of technology on campus or faculty in technological fields, such as artificial intelligence and data analytics. According to the State of Black America report, HBCUs receive fewer research and development funds per student and as a result, spend less per student compared to predominantly-white colleges and universities.[15] The average HBCU receives just 10.2 percent of the federal per student R&D funds directed to

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[13] Brittany Oliver (2018). Top companies are missing talent from historically black colleges. Fast Company, February 27, 2018. Available at https://www.fastcompany.com/40535627/top-companies-are-missing-talent-from-historically-black-colleges (accessed March 3, 2019).
[14] Ibid.
[15] State of Black America (2018). Save our cities: Powering the digital revolution. *National Urban League*. Available at http://soba.iamempowered.com/sites/soba.iamempowered.com/files/SOBA2018-Digital%20Inclusion%20Index.pdf (accessed March 2, 2019).

non-HBCUs and spends just 7.9 percent of what the average non-HBCUs spend on R&D per student, making the case for improved federal budget appropriations to these institutions.[16]

While limited budgets and other constraints of HBCUs and HSIs may limit the advancement of their students in highly-technical fields, it's no excuse for the lackluster recruitment, hiring and retention of talented individuals of color. While some tech companies have been more proactive in their efforts to recruit from these institutions, others should follow suit to once and for all further diversity on their corporate campuses.[17] Moreover, investments in programs which promote STEM and coding among school-age youth should increase and institute direct pathways to mentorship and employment into the tech sector.

III. Bias in consumer products

In addition to these human resource concerns, the tech sector must also have diligence in applying diversity and inclusion principles to the design, execution and evaluation of their products and services. The problems associated with application redlining[18] can have long-term effects on protected groups, expanding systemic discrimination and racism to online platforms and other tech-related products. Whether it's the explicit bias of online users who ultimately leverage these products to discriminate or the implicit biases of technologists, consumers are

[16] Ibid.

[17] Google has extended its recruitment efforts to HBCUs through its Tech Exchange program which partners with 11 HBCUs and HSIs by sending students to their Mountain View, California campus. They also instituted a program model called Howard West, a pilot with Howard University to place students at their corporate office.

[18] "Application redlining" is a term defined by the Multicultural Media, Telecom and Internet Council ("MMTC") in a letter to the Hon. Larry Strickling, January 13, 2017. The term is compared to the practice of "geographic redlining," which has a long history of keeping people of out of schools, banks and most notoriously, homes.

left to identify and mitigate these inequalities, often with limited resources and understanding for how the internet works.

A. Big data and explicit bias

Today, big data are collected in real-time from users through a series of interactions with web sites, social media platforms, e-commerce vehicles and targeted online search queries. These portions of data become compiled, mined and eventually repurposed for commercial or public use. Big data serves a variety of purposes, from helping to advance breakthroughs in a variety of social service applications such as health care, science, energy, education and transportation to enhancing government efficiencies through aggregated citizen input.

However, big data can also exclude populations. In a report published by the Federal Trade Commission (FTC), the agency with regulatory oversight over high tech companies, when big data analytics are misapplied, online users can be tracked, profiled and subject to massive surveillance based on their online activities and behaviors.[19] Consequently, users can be denied credit based on their web browsing history or aggregated predictive analytics can wrongly determine an individual's suitability for future employment or an educational opportunity. Online proxies, including one's zip code, can also be used by marketers to extrapolate and potentially exploit an individual's socioeconomic status based on neighborhood, resulting in subjective assumptions about one's lifestyle or preferences.[20] In these and other examples, the

[19] Ramirez, E., J. Brill, Ohlhausem, K., McSweeny, T. (2016). Big Data: A tool for inclusion or exclusion. FTC. Available at: https://goo.gl/wUxwU1 (accessed March 3, 2019).
[20] Noyes, K. (2015). Will big data help end discrimination—or make it worse? Fortune. Available at: http://fortune.com/2015/01/15/will-big-data-help-end-discrimination-or-make-it-worse/ (accessed March 3, 2019).

collection of online data can potentially lead to the disparate treatment of protected classes, which are distinguishable by their race, gender, age, ability, religion and sexual orientation.

In 2016, Airbnb, an online home-sharing company and app, found some hosts were rejecting renters based on race, age, gender and other factors. In these cases, renters were acting upon their own explicit biases, which were enabled by the technology platform. While Airbnb has worked to eradicate these types of biases through community commitment agreements that reinforce legal compliance, the harmed renters were subjected to unfair racial treatment and systemic online discrimination.[21]

Among ride-sharing services, researchers exposed similar occurrences of explicit discrimination when Uber and Lyft drivers were found to be either cancelling rides or extending the wait times of African-American customers in Boston and Seattle.[22] In a sample of 1,500 rides in both cities, the study found that Uber drivers were more likely to cancel on riders with "black sounding" names, and that African-Americans typically waited longer to be picked up.[23] The study also concluded that women were taken on longer routes to extend the cost of the fare.[24] Uber has since elevated its commitment to diversity through the hiring of key executives tasked with addressing these types of challenges.

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[21] Murphy, L. (2016). Airbnb's work to fight discrimination and build inclusion. Airbnb Blogs. Available at: https://goo.gl/2GtAQ8 (accessed March 3, 2019).
[22] Ge, Y., Knittel, C., MacKenzie, D., Zoepf, S. (2016). Racial and gender discrimination in transportation network companies. The National Bureau of Economic Research. Available at: https://www.nber.org/papers/w22776 (accessed March 2, 2019).
[23] Ibid.
[24] Ibid.

In these cases of explicit bias, algorithms - which are the scientific procedures that automate problem-solving or a sequence of repetitive tasks[25] - are powering these actions, which may not start out being discriminatory or have prejudicial intent. However, over time, the algorithm can adapt to the personal biases that are baked within its model or adjust to historical and societal biases, resulting in unfair stereotypes and profiling.

Unfortunately, the identification and mitigation of biases and discriminatory practices are becoming much harder when big data is weaponized against certain groups (e.g., in elections) or when algorithmic decisions are driven by implicit or unconscious biases, resulting in critical misjudgments and assessments about certain groups.

B. *Algorithmic bias driven by implicit and unconscious assumptions*

Consider the results of these innocuous search queries when exploring the role of implicit or unconscious biases. In 2011, author Safiya Noble found that on a Google search query of the words "black girls" returned mostly pornographic and sexually explicit content. In 2013, online search results for "black-sounding names" were more likely to link arrest records with profiles, even when false. In 2015, Google apologized for an algorithm that automatically tagged and labeled two African-Americans as "gorillas" after an online word search. In 2016, a comparative search of "three black teenagers" and "three white teenagers" generated very different search results. The former returned a range of police mug shots of young, African-American males, while the latter produced groups of white teenagers smiling.[26]

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[25] C.T. (2017). What are algorithms? *The Economist.* Available at: https://goo.gl/C32K1f (accessed March 4, 2018).

[26] Jessica Guynn (2016). Three black teenagers google search sparks outrage. *USA Today*, June 10, 2016. Available at: http://www.usa.today/story/tech/news/2016/06/09/google-image-search-three-black-teenagers-three-white-teenagers/85648838/ (accessed March 2, 2019).

While Google has proactively addressed the errors generated in these displays of algorithmic bias by improving upon the training data and models used to construct the said algorithms, these examples point to the need for more diverse workforces on the business development side.

The Kirwan Center for the Study of Race and Ethnicity defines implicit bias as "the attitudes or stereotypes that affect our understanding, actions, and decisions in an unconscious manner."[27] Citing individuals' common susceptibility to these biases, the Kirwan Center found that it is the nature of homogenous associations and relationships to harbor particular feelings and attitudes about others based on race, ethnicity, age, and appearance.[28] Compared to explicit bias, implicit bias in the digital age can appear in courts and parole boards that have become increasingly reliant upon predictive analytics to determine future criminal behavior, or appropriate bail and sentencing limits. Some researchers have found that many of the predictive algorithms are inaccurate or still fueled by societal stereotypes, leading to African Americans being predicted as more likely to commit violent crimes than whites.[29] For example, questions have emerged around the race neutrality of the popular COMPAS [30] algorithm, which assigns risk scores between 1 and 10 to assess the likelihood of a defendant's future criminal activity. Based on the algorithm, defendants with scores of 7 are more likely to reoffend at

[27] Kirwin Center. (2015). Implicit Bias Review 2015: State of the Science. *Kirwan Center for the Study of Race and Ethnicity.* Available at: https://goo.gl/RRmSLG (accessed March 5, 2018).
[28] Ibid.
[29] Angwin, J. Larson, J. (2016). Bias in Criminal Risk Scores Is Mathematically Inevitable, Researchers Say. *Propublica.* Available at: https://goo.gl/S3Gwcn (accessed March 5, 2018).
[30] Yong, E. (2017). A Popular Algorithm Is No Better at Predicting Crimes Than Random People. *The Atlantic.* Available at: https://goo.gl/VRnD6K (accessed March 5, 2018).

twice the rate as those with scores of 3.[31] High risk defendants are more likely to be detained while awaiting trial based on their COMPAS score. Unfortunately, when these predictions are not accurate, certain groups are left to suffer irreparable harms, especially blacks who are historically unjustly punished and more harshly penalized than whites.

Implicit bias also presents itself in the complex calculations of machine learning and AI. In her research on "word embedding," which is commonly used in translation apps, Joanna Bryson found this type of bias creates issues for machines that do not have the moral compass of humans when it comes to identifying stereotypical traits.[32] In this application, researchers have discovered that words that included "female" and "women" were more likely to be associated with arts and humanities occupations, while "male" and "man" were often correlated with math and engineering jobs, thereby creating false positives and negatives.[33] The same study also surfaced that European American-sounding names were more likely as associated with pleasant word associations, while "black-sounding" names were often associated with unpleasant words.[34] Consequently, stereotypes about African Americans remained pervasive.

The negative implicit assumptions associated with words and predictive criminal justice models unmask the fact that algorithms are not necessarily devoid of societal biases, prejudices, stereotypes and even incorrect assessments about people and their circumstances.

These are the reasons why diversity matters.

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[31] Corbette-Davies, S. Pierson, E. Feller, A. Goel, S. Huq, A. (2017). Algorithmic decision making and the cost of fairness. *Conference on Knowledge, Discovery, and Data Mining.* Available at: https://goo.gl/WDaqTX (accessed March 5, 2018).
[32] Caliskan, A. Bryson, J. Narayanan, A. (2017). Semantics derived automatically from language corpora contain human-like biases. *Science.* Available at: https://goo.gl/TxaG6d (accessed March 5, 2018).
[33] Ibid.
[34] Ibid.

IV. Recommendations

While it is with good intent that Congress has convened today's hearing, what happens next? Should Congress be encouraging some level of self-regulatory behavior among the tech sector or introducing policy interventions that ensure digital equity? My final section outlines a set of high-level recommendations for consideration among Members of the committee and Congress as a whole.

1. **The tech sector must be more deliberate and systematic in the recruitment, hiring and retention of diverse talent to avert and address the mishaps generated by online discrimination, especially algorithmic bias.**

Less diverse workforces contribute to algorithmic bias, whether intentional or not. Recent diversity statistics report these companies employ less than two percent of African Americans in senior executive positions, and three percent of Hispanics when compared to 83 percent of whites.[35] Asian-Americans comprise just 11 percent of executives in high tech companies.[36] In the occupations of computer programmers, software developers, database administrators, and even data scientists, African-Americans and Hispanics collectively are under six percent of the total workforce, while whites make up 68 percent.[37] Even when people of color are employed in high tech industries, the feelings of professional and social isolation also have been shown to marginalize these employees, potentially restricting their active workplace engagement, affecting their participation in the feedback loop, and contributing to higher rates of attrition.[38]

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[35] Atwell, J. (2016). Lack of women and minorities in senior investment roles at venture capital firms. *Deloitte*. Available at: https://goo.gl/iah1VZ (accessed March 5, 2018).
[36] Ibid.
[37] EEOC. (2016). Diversity in High Tech. *EEOC*. Available at: https://goo.gl/EwKBUJ (accessed March 5, 2018).
[38] Scott, A. Kapor Klein, F. Onovakpuri,U. (2017). Tech Leavers Study. *Kapor Center*. Available at: https://goo.gl/Zgf6dg (accessed March 5, 2018).

At Google, employees have been subjected to anti-diversity memos,[39] and women have experienced documented backlash from male employees on hiring. This alienation within high-tech workforces neither encourages nor welcomes diverse input into work products. It also may distract from efforts to incorporate elements of "diversity in the design" of algorithms, where biases can be avoided at the onset. In the case where the algorithm led to the misidentification of African Americans as "gorillas," the Google app developer pointed out that he didn't anticipate the technology's poor identification of darker-skinned faces,[40] which was due to his analysis of training datasets largely populated by whites and most likely, the absence of a diverse work team who would potentially be more sensitive to these issues.

Technologists may not be necessarily trained to identify cues that are outside of their cultural context and can be fenced into work groups that share similar experiences, values and beliefs. For example, when the algorithm for FaceApp lightened the skin tones of black users, it was unconsciously (and perhaps explicitly) signaling mainstream, or European American, standards of beauty, and applying them to blacks – a compelling reason for why racial diversity was needed on the design team.[41] These behaviors are what some researchers have dubbed *inattentional blindness.*

These largely unconscious bias errors strongly support why high-tech companies should be striving for more diverse workforces to identify and quell online discrimination. Companies that

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[39] Conger, K. (2017). Here's the 10-page anti-diversity screed circulating internally at Google. *Gizmodo*. https://goo.gl/UEYNhx. Available at: https://goo.gl/9ctiyF (accessed March 5, 2018).
[40] Miller, D. (2017). Design biases in Silicon Valley are making the tech we use toxic, expert says. *Australian Broadcasting Company*. Available at: https://goo.gl/6WGaon (accessed March 5, 2018).
[41] Morse, Jack. (April 24, 2017). "App creator apologizes for 'racist' filter that lightens skin tones." *Mashable*. Available at: https://mashable.com/2017/04/24/faceapp-racism-selfie/#zeUItoQB5iqI (accessed March 5, 2018).

are disrupting societal norms through the sharing economy, social media and the internet of things must do better to address the less than remarkable representation of people of color as creators, influencers and decision makers.

As in the case of HBCUs and HSIs, the tech sector should work to strengthen those relationships and programs, which target these students for future employment. Congress and federal agencies, including the U.S. Department of Education, need to also do more to ensure that minority-serving institutions are establishing premiere programs that include both technology access and cutting-edge career development in fields where the nation will soon face massive shortages. We need to take notes from the former Obama administration that pushed the U.S. toward a "race to the top," urging collaboration between the private and public sectors to realize the nation's global competitiveness and edge over our international counterparts.

2. **Tech companies must explore ethical and collaborative frameworks that explore the unintended biases of algorithms and deploy solutions that quell these biases.**

The tech sector must be more proactive in developing solutions that reduce, or better yet, eliminate bias from newer and emerging technologies. Transitioning to a more of a "white-box" construct for designing and evaluating algorithms, the tech sector can employ better practices that pre-identify potential unintended consequences of algorithms, while minimizing the effects of digital inequalities. Further, tech companies must recognize that data scientists, engineers and other innovators bring their own set of explicit, implicit, and unconscious biases to the design of computer systems and computational procedures. Without getting too technical in my testimony, operators of algorithms, including the companies that license and distribute them, must also pay more attention to the training data being used to create these

models and the unintended consequences potentially lurking underneath. Current challenges of facial recognition software are unearthing these discrepancies, particularly in the accurate identification of darker-skinned complexions.[42]

Tech companies must continue to willingly advance conversations on ethical frameworks for algorithms. At the very least, algorithms should not perpetuate historical inequities that perpetuate discrimination online. Next month, I will be issuing a paper on algorithmic bias detection and mitigation, co-authored with a technologist and a civil society stakeholder, on the importance of developing quality instruments and questions which measure the extent and impact of bias for companies, government and others that are in the business of developing algorithms.[43]

Finally, employing "diversity in the design" of algorithms upfront can trigger and potentially avoid harmful discriminatory impacts on certain protected groups. While the immediate consequences of biases may be considered small, operators of algorithms should not discount the possibility or prevalence of bias and should seek diverse workforce participation in its development, integrate inclusive products and spaces in their products (e.g., improved focus groups or codes programmed by minority developers), and employ tools that ensure that cultural biases are identified upfront and checked throughout the process, potentially giving consumers the opportunity to provide feedback on the algorithm's treatment.

3. **Congress should modernize civil rights laws to safeguard protected classes from discrimination.**

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[42] Buolamwini, Joy Adowaa (2017). "Gender Shades: Intersectional Phenotypic and Demographic Evaluation of Face Datasets and Gender Classifiers." *Massachusetts Institute of Technology*. Available at: https://dspace.mit.edu/handle/1721.1/114068 (accessed March 2, 2019)

[43] N. Turner Lee, P. Resnick and G. Barton (2019). Algorithmic bias detection and mitigation: Best practices and policies to reduce consumer harm. *Brookings Institution* (forthcoming in April 2019).

Finally, the strength of the online economy proves that it is no longer insulated from the guardrails designed for other regulated industries, especially those that establish baseline protections against discrimination. Consequently, Congress should consider a review and the potential modernization of civil rights laws and apply them to certain online use cases. In 1964, Congress passed Public Law 88-52 that "forbade discrimination on the basis of sex as well as race in hiring, promoting, and firing." The Civil Rights Act of 1968 was amended to include the Fair Housing Act, which further prohibits discrimination in the sale, rental and financing of dwellings, and in other housing-related transactions to federally mandated protected classes. The Equal Credit Opportunity Act (ECOA) in 1974 prohibits any creditor from discriminating against any applicant from any type of credit transaction based on protected characteristics. Without question, many of these legislative and regulatory frameworks should be applied to digital and other-related activities which seek to harm online users, especially individuals from protected classes.

Congress might also promote self-regulatory models where businesses identify, monitor and correct biases that negatively impact the online experiences of users. For example, Google's decision to ban ads that promoted payday loans was an example of self-regulation. Or, Facebook's updates to its ad policies to prevent race-based targeting, especially those that attempt to include or exclude demographic groups in housing, employment and credit, is another example of how companies are correcting ill-advised practices.

In the end, it is important for Congress to determine what role, if any, they want to play in prescribing some level of accountability to tech companies going forward. It may be the case

that without accountability or further conversation between policymakers, technologists and civil society, this conversation will be for naught.

V. Conclusion

Diversity matters to business and unless tech companies, who have grown exponentially comfortable with their consumers, take meaningful steps responsive to the issues that I've identified, they will sacrifice our nation's place in the global digital marketplace.

Thank you again to the Members of the Committee for the opportunity to testify before you and I look forward to your questions.

Ms. SCHAKOWSKY. Thank you very much.

Next, we will recognize Ms. Natalie Oliverio. You are recognized for 5 minutes. Welcome.

STATEMENT OF NATALIE OLIVERIO

Ms. OLIVERIO. Thank you so much for allowing me to testify before you this morning.

My name is Natalie Oliverio, and I am a post-9/11 Navy veteran, the founder and CEO of Military Talent Partners.

And too frequently, too often, veterans and military spouses are left out of the diversity conversation. It doesn't naturally occur to you to think of them as diverse individuals, but less than 1 percent of our country today serves. So, when you serve in the military or you are a spouse supporting your significant other as they serve, time doesn't stand still. The world keeps moving without you while you are serving your country. The military is its own business and it has ever job type, skill, and capability to run on its own, and those skills really prepare veterans to do anything.

But I talk with companies every single day who feel that they don't have jobs suitable for veterans. They don't have security-type or protective work, which is what they believe that veterans are qualified and capable of doing. There have been massive steps forward in the programs offered, the trainings available, and the abilities that veterans can then leverage to their second careers. But not everyone knows about them because they are just left out of the conversation, even more so for military spouses.

For veterans, unemployment isn't really the issue anymore. It is more of underemployment. Meaningful careers make all the difference. From an extreme case of contributing to 22 suicides a day in the veteran communities, meaningful careers can put a stop to that. Meaningful careers for military spouses help them provide for their families when today's economy really needs a two-income household. Putting your life on hold to support your spouse as they are service member is a major sacrifice, but in today's job market they are seen as risky hires or job-hoppers, but that is not the case at all. So, we have a lot of stereotypes to overcome, but those challenges can be overcome by adding veterans and military spouses to the conversations around diversity and inclusion.

I, myself, had a very difficult transition from active duty post-9/11, and I thought I had it all figured out, but I didn't know what kind of resources were available to me and what kind of possibilities existed. So, I struggled for years to find my niche, and that has been my motivation to lead the way in mentorship and coaching for all active-duty transitioning service members, military spouses, and Gold Star families, to help them find and obtain the meaningful careers for them.

But that is just one small step. There is a lot of work to be done. It is really up to Congress to lead the way for more veteran initiatives, and not just the initiatives and programs that are benefitting us today, but to make it known, widespread, so there is no question about the capabilities that a military spouse or a veteran brings to the corporate world today.

Thank you so much.

[The prepared statement of Ms. Oliverio follows:]

March 5, 2019

The Honorable Frank Pallone, Jr.
Chairman
U.S. House Energy and Commerce Committee
2125 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Greg Walden
Ranking Member
U.S. House Energy and Commerce Committee
2322A Rayburn House Office Building
Washington, D.C. 20515

The Honorable Jan Schakowsky
Chairman
U.S. House Energy and Commerce Subcommittee on Communications and Technology
2125 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Cathy McMorris
Ranking Member
U.S. House Energy and Commerce Subcommittee on Communications and Technology
2322A Rayburn House Office Building
Washington, DC 20515

Dear Chairman Pallone and Ranking Member Walden, Chairman Schakowsky, and Ranking Member McMorris,

As a post-9/11 Navy veteran I experienced a difficult transition from active-duty. I was unaware of what resources, if any, existed to help guide my career decision-making. I enrolled in college to gain an education in a career field separate from my military job. There wasn't a veteran group or focus for me at my University, and I felt lost and alone in a post-9/11 world. I was so uncomfortable in the traditional classroom that I transitioned to distance learning. I stuck out like a sore thumb. I would compare it to feeling as though I had been held back a few grades, now being an older, unfamiliar student amongst recent high-school graduates. No one knew how to talk to me, and I didn't know how to talk to them.

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After graduating I spent more than 10 years as a Technical Recruiter, working for six different companies. It took years to fit in and find my niche. At every company I worked for, all highly technical, I couldn't successfully implement a veteran hiring initiative. It wasn't for a lack of strong effort or determination. It wasn't a priority for the business. This created a void that I needed to fill. I felt undervalued and my potential was capped at much lower level than I was comfortable with. Countless veterans and spouses feel this way. I began volunteering as a professional mentor to help fellow veterans and military spouses find meaningful careers.

Through mentorship, I found my true purpose. It became my goal to build my own business that would pair the power of mentorship with full-lifecycle technical recruitment. I would ensure that free mentorship services would be provided to every active-duty service-member, veteran, military spouse, and gold-star family member, and personally see that they were well-matched to careers that were meaningful to them. My veteran-owned, woman-owned small business launched full-time on July 1, 2018. Since then, we have mentored every day, and matched veterans and spouses to meaningful careers every week. At Military Talent Partners, we work with all veterans from all branches, across all ranks, of both enlisted and commissioned.

In addition to my personal experience, I have personally witnessed the daily struggles of over 3,000 transitioning military service-members, veterans, and their spouses since 2016. The commonality they share, regardless of rank or service, is that they are not prepared to transition into a civilian career. While the military provides transition assistance, it is not the military's priority to equip its members with skills outside of their military commitment. Transition Assistance Program (TAP) classes are designed to prepare them to understand and utilize their benefits as they become veterans. They are given outdated resume templates and maybe a quick glance of machine-matched jobs that they may or may not actually qualify for, or be interested in.

Underemployment is a major concern for veterans and military spouses, more so than unemployment. Lack of a meaningful career can lead to feeling undervalued, loss of impact and mission-focus. A derivative of this problem in an extreme case is that a failed transition can contribute to the statistic of 22 suicides a day amongst veterans. A lesser example being a hostile work environment, or unemployment.

Military Spouses on the other hand face massive unemployment issues. 52% of spouses were unemployed last year. Transitioning from the military takes BAH (housing allowance) off the table and creates the need for a two-income household. Military Spouses often have gaps in employment, or are seen as "job-hoppers," who suffer in a competitive job market and interview process. This is one example of many barriers to meaningful employment that Military Spouses face. There are extenuating

stereotypes spouses face outside of this example including being seen only as homemakers, when in reality, they are degreed, technically-competent candidates. They are assumed to be female only. Although there are many male military spouses who support their family while their spouse serves. We have a lot of work to do for our force behind the force.

In today's job market, if you were to sit a newly separated veteran beside a recent college graduate in an interview, the hiring manager is far more likely to hire the recent college graduate. A recent graduate is seen as a blank slate - highly trainable, moldable, and more likely to quickly acclimate to the corporate culture. Veterans however, are often seen as rigid, stiff, or "set in their ways," making them more difficult to train. Overcoming these stereotypes in a technical career can be impossible. But it is necessary to effect change and to enhance employment opportunities for veterans.

Diversity and inclusion are more popular now than ever before – and that's a wonderful accomplishment. The definition of diversity often stops with women, minorities, and people with disabilities. Veterans are overlooked as being a diverse group and that is a dialogue that needs widespread empowerment.

Tax incentives for hiring post-9/11 veterans in transition are not widely known. There must be more education and knowledge sharing of these incentives. They can't be leveraged if no one knows about them. This is the same with DoD Skill bridge programs. Employers need to know what opportunities exist in order to consider taking advantage of these benefits.

Military Talent Partners has created an online career accelerator for anyone in a career transition. Designed with military transition for active duty, veterans and spouses in mind, it's accessible from anywhere in the world on their own schedule. Collaborative group participation drives the focus of the program, alongside six power-packed lessons that will better prepare any participant to gain a meaningful career post military. It is our hope that this will enhance the value of existing TAP classes and better equip our veterans and spouses to command their own success after the service.

The more support we show our military and spouse community as they transition into civilian-hood, the more we empower their future. We have the ability to diversify and grow our nation's workforce by sharing knowledge of resources available to the service-members and spouses as well as the benefits available for companies to take advantage of. While our program is just one program, launched by a small business, we are making a big difference every day. That proof of concept shows that change can be made, and that the need is there. Political influence and government support can vastly impact the progress made for our service-members and their families. The resources exist, the benefits have been approved, but the message hasn't yet been heard. Including veterans in the diversity

conversation will bridge the gap in understanding and uncover the limitless potential that lives in this minority.

In closing, I want to convey that by better preparing veterans and spouses for successful transition, we are investing in a stronger future – not just for them as they have more than earned it, but for our country. Veterans in our workforce are a win-win for the American economy as they are strong leaders, creators, and hard-workers who will fulfill the goals of any business, across all industries, and locations to best serve the mission at hand. I hope that you as members of the House Energy and Commerce Committee find this argument from a veteran minority helpful in conducting your hearing on Inclusion in Tech: How Diversity Affects All Americans.

Very Respectfully,

Natalie Oliverio

Founder + CEO, Military Talent Partners

Ms. SCHAKOWSKY. Thank you.

And now, Ms. Jill Houghton is recognized for 5 minutes. Thank you.

STATEMENT OF JILL HOUGHTON

Ms. HOUGHTON. Chairman Schakowsky, Ranking Member McMorris Rodgers, members of the committee, thank you for the opportunity to testify today.

My name is Jill Houghton. I am the president and chief executive officer of a nonprofit called Disability:IN, and we exist to help business achieve disability inclusion and equality. We have over 50 affiliates across the country. We represent more than 170 major Fortune 1000 corporations, and almost one-quarter of those corporations operate within the technology industry.

My testimony is rooted in my personal experience. I am a female leader and I have a nonapparent disability. And I really want to focus on three issues today. I think it is really important that you remember that disability is an important component of diversity. No. 2, disability drives business performance. And No. 3, disability inclusion drives innovation.

Disability knows no stranger. Race, gender, ethnicity, sexual orientation, gender identity, it can happen to any one of us at anytime in our life. According to the Centers for Disease Control and Prevention, 1 in 4 Americans live with a disability, and disability is often forgotten. We are said to be the silent "D" in diversity. And yet, there are 61 million Americans living with disabilities. So, we are an integral part of diversity.

When the Americans with Disabilities Act was passed in 1990, that was opportunity, economic opportunity, for people with disabilities, but the one thing that it couldn't do was legislate attitudes. And so, we know that, when we look at the Bureau of Labor Statistics in January of 2019, that the labor force participation rate for people with disabilities was 20.5 percent versus people without disabilities of 68.3 percent.

At Disability:IN, we have committed our self to helping corporate America with data and insight. In that spirit, we have joined forces with the American Association of People with Disabilities to create something called the Disability Equality Index. This is the Nation's trusted disability inclusion benchmark, because business wants to do better. and it looks at things like leadership and culture, employment practices, community engagement, enterprisewide access, and supplier diversity. The technology industry actively participates in the DEI, and we are growing by 30 percent every year.

The companies that score an 80 or above are publicly acknowledged on our website at disabilityequalityindex.org and ranked as the best place to work for people with disabilities. But I will tell you, even the companies that are scoring a hundred would be the first to tell you that they don't have it all figured out, that they want to do better, but there is a lot more work to do.

Using the Disability Equality Index, we teamed with Accenture, because what we know, if we are going to take disability inclusion and diversity to the board room, to the C-suite, we need the business case. So, we teamed with Accenture. They studied the first 4 years of data. They worked with Vanguard and algorithms. What

they found in getting to equal the disability inclusion advantage is that, on average, companies, leading companies, that are driving disability inclusion rated 28 percent in higher revenue, double the net income, and 30 percent higher economic profit margins than their peers. Disability inclusion impacts business performance.

With that concrete evidence, we confirmed that disability inclusion is good for business and investors are viewing it as the next frontier in environment, social, and governance investing. We rolled out that report on the floor of the Stock Exchange and Wall Street. And the Comptroller DiNapoli from New York State has issued a letter—he runs the third largest pension fund in the Nation—to the top Nasdaq companies calling on them to ask what they are doing around disability inclusion.

And last, disability inclusion drives innovation. We like to say that inclusion and disability, at the nexus is accessibility, and without accessibility, we have got nothing. And so, that is very important, that the tech sector continue to focus on building accessibility and driving disability inclusion.

Thank you.

[The prepared statement of Ms. Houghton follows:][2]

[2] A report entitled "The 2018 Disability Equality Index: A Record Year for Corporate Disability Inclusion and Leadership" submitted by Ms. Houghton has been retained in committee files and also is available as part of her written testimony at https://docs.house.gov/meetings/IF/IF17/20190306/108901/HHRG-116-IF17-Wstate-HoughtonJ-20190306.pdf.

BEFORE THE

HOUSE OF REPRESENTATIVES SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE OF THE COMMITTEE ON ENERGY AND COMMERCE

HEARING ON "INCLUSION IN TECH: HOW DIVERSITY BENEFITS ALL AMERICANS"

March 6, 2019

TESTIMONY OF JILL HOUGHTON

PRESIDENT AND CHIEF EXECUTIVE OFFICER OF DISABILITY:IN

Introduction
Chairwoman Schakowsky, Ranking Member McMorris Rodgers, and Members of the Committee, thank you for the opportunity to testify today.

My name is Jill Houghton. I'm the President and Chief Executive Officer of Disability:IN, formerly known as the US Business Leadership Network. Disability:IN is a non-profit organization that empowers corporations to achieve disability inclusion and equality.

Disability:IN represents over 170 corporate partners, primarily Fortune 1000 companies, with almost one quarter operating in the technology industry. Disability:IN has strong alliances with other disability organizations, and other minority groups supporting women, LGBTQ individuals, and people of color.

In collaboration with corporate partners, Disability:IN develops disability inclusion best practices, benchmarking data and insight, and customized inclusion plans spanning hiring practices, accommodations, inclusive design and supplier diversity.

I bring to the committee my experience as a disability rights advocate and leader working in a long-standing partnership with top corporations.

The main points of my testimony are the following:
1. Diversity must include disability
2. Disability inclusion drives business performance
3. Disability inclusion drives technology innovation

Current State of Disability in the U.S.
Disability knows no race, gender, or ethnicity. Anyone can acquire a disability at any time. According to the Centers for Disease Control and Prevention, 1 in 4 Americans live with a disability[1]. Disability is often forgotten in the context of diversity because 70% of disabilities including learning disabilities, autism, and depression are non-apparent. With 61 million Americans with disabilities, we can no longer ignore disability as an integral component of diversity.

When the Americans with Disabilities Act was passed in 1990, it was a historical moment for people with disabilities. However, you can't legislate attitudes. Exclusion of people with disabilities is still a widespread problem. The Bureau of Labor Statistics reported that in 2018, only 33.3% of working-age people with disabilities participated in the labor force, compared to 76.9% of working-age people without disabilities.

Inclusion Drives <u>Business Performance</u>
At Disability:IN, we have committed ourselves to advancing disability inclusion efforts through data and insight. In partnership with the American Association of People with Disabilities, Disability:IN created the Disability Equality Index, a comprehensive tool benchmarking disability inclusion in corporate America[2].

[1] https://www.cdc.gov/media/releases/2018/p0816-disability.html
[2] https://disabilityequalityindex.org/

The Disability Equality Index, or the DEI, analyzes disability inclusion across Leadership and Culture, Enterprise-Wide Access, Employment Practices, Community Engagement and Supplier Diversity. The technology industry actively participates in the DEI, which has grown on average 30 percent each year. The companies that score well on the DEI are publicly recognized as Best Places to Work for Disability Inclusion.

Using historical data from the DEI, Accenture in partnership with Disability:IN and AAPD, produced the report "*Getting to Equal: The Disability Inclusion Advantage.*" The report identified that leading companies in areas specific to disability employment and inclusion had, on average over the four-year period, 28 percent higher revenue, double the net income and 30 percent higher economic profit margins than their peers[3]. Even if the company *begins* the journey of disability inclusion, they are four times more likely to earn stronger shareholder returns than their peers.

This concrete evidence confirms disability inclusion is good for business, and investors are viewing it as the next frontier of Environmental, Social and Governance (ESG) investing. By including disability in ESG investments, corporations and investors are leveraging disability inclusion for better outcomes. New York State Comptroller Tom DiNapoli, manager of the third-largest pension fund in the nation, has already publicly announced he is encouraging the companies they invest in to be disability inclusive.

This year, over one-quarter of Fortune 500 companies registered to participate in the DEI, showing they are ready to start benchmarking their efforts.

Inclusion Drives Technology Innovation

Inclusion not only drives business performance, but also drives innovation. This is not something new; we've known this for a long time. Take for instance, digital assistants like Siri or Alexa. These tools help blind or low-vision people, but also benefit anyone looking to better manage their day.

Take for instance, Microsoft. Prioritizing disability inclusion was a decision made in the board room and was championed at the top. Microsoft CEO Satya Nadella wants to empower all, which includes people with disabilities. To lead this, Microsoft has a Chief Accessibility Officer role, which is held by Jenny Lay-Flurrie, Disability:IN's Board Chair.

By driving inclusion and accessibility, Microsoft is putting their bias to the side. Inclusive hiring like the Autism Hiring Program recognizes traditional hiring practices screens talent out[4]. Further, Microsoft joins with other companies, including tech companies DXC Technology, SAP, and IBM in sharing best practices in an Autism Employer Roundtable[5]. Disability:IN guides the Roundtable in advancing disability inclusion, and to put aside competition, for greater innovation.

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[3] https://www.accenture.com/pwd

[4] https://www.microsoft.com/en-us/diversity/inside-microsoft/cross-disability/hiring.aspx#coreui-heading-sp7tqgo

[5] https://disabilityin.org/what-we-do/autism-employer-roundtable/

By building a culture of inclusion, where diversity includes disability, corporations are building a more innovative workforce. People with disabilities are creative, smart, and great problem solvers – after all, many of them have to solve challenges in their everyday life to find accessible solutions or alternative accommodations.

Disability inclusive workplaces also ensures the products or services the company provides are inclusively designed. Diverse teams drive diverse ideas. However, in order to innovate, in an inclusive way, there must be accessibility. Leading technology companies understand this; in order to get the talent with disabilities, they must be accessible.

The inclusive workforce creates inclusive products and services – which is giving them a competitive edge. Technology is used by everyone, and if your technology isn't inclusive, you are missing a huge audience.

Take for example, Comcast's X1, which includes a talking guide that gives customers with visual disabilities the ability to explore thousands of TV shows and movies. Comcast has also set up a specially trained customer support team via Comcast's Accessibility Support Center for Customers with Disabilities, to help troubleshoot issues of importance of their customers[6].

Google also takes an inclusive approach. In 2017, Google launched a campaign with Local Guides to add accessibility information to Google Maps. Using local knowledge, the guides answer questions like "Does this place have a wheelchair accessible entrance" and many more. So far, Google has provided accessibility information for more than 40 million places on Google Maps, helping ensure they are the map of choice for people with disabilities[7].

Facebook has recently rolled out automatic alternative text, with the help of artificial intelligence, which describes the content of photos to blind and visually impaired users[8]. Facebook also implemented an option to increase the default font size on Facebook for iOS, a feature 10 percent of Facebook users take advantage of.

Technology companies are realizing that everyone benefits from inclusive offerings. Any of the items I mentioned before can also benefit senior citizens, or people who have a temporary disability. On the other hand, when disability inclusion is an afterthought, there is a missed market opportunity and often times remediation is more costly.

Thank you again for the opportunity to speak with you today. Disability inclusion is a ***business imperative***. There is an estimated 10.7 million people looking for work, ready and willing. If just 1% of the Americans with disabilities gained employment, the nation could see an increase in GDP by ***25 billion dollars***. The potential for innovation and economic strength is right here.

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[6] https://www.xfinity.com/support/articles/accessibility-services
[7] https://www.blog.google/products/maps/building-map-everyone/
[8] https://www.facebook.com/accessibility/videos/automatic-alternative-text/1082033931840331/

Ms. SCHAKOWSKY. And next, Dean David Lopez, you are recognized for 5 minutes.

STATEMENT OF DAVID LOPEZ

Mr. LOPEZ. Thank you very much, Chairwoman Schakowsky, Ranking Member Rodgers, members of the subcommittee, for inviting me to this very important hearing.

My name is David Lopez, and I am currently the co-dean of Rutgers Law School in Newark. Over the last 100 years, Rutgers Law School has stood as an exemplary model of a public institution that both welcomes and promotes diversity, meaningful sociability, and leverages the law to achieve equality of opportunity in the public, private, and nonprofit sectors. We believe we have normalized the idea of opportunity.

From 2010 to 2016, I was the longest-serving general counsel of the U.S. Equal Employment Opportunity Commission, twice nominated by President Barack Obama and twice confirmed by the U.S. Senate. I was the first Latino selected to this position, and in the capacity as general counsel, I led the litigation program charged with enforcing Federal antidiscrimination statutes nationwide. So, I come here both as an educator and as a lifelong civil rights practitioner.

During the last 30 years, technology has transformed our economy and changed our daily lives—how we work, how we learn, how we make decisions, how we play. The tech industry has produced remarkable tools and resources, providing us with social media and new ways to connect with others, as well as instant access to huge amounts of information.

But, as we have heard, it is no secret that the tech industry has suffered with the persistent problem of the absence of diversity. We have heard many of the Members here today, from many of you, from many of the panelists. And this all comes at a time when tech jobs are growing rapidly in our economy.

To use the words of a very common phrase today, "The tech industry operates in a bubble." It operates in a bubble. It operates without the cross-currents of thinking, from reflecting the beauty of this country.

Of course, ideals of living in a discrimination-free society with equal opportunity, these are bedrock principles central to social mobility and the American dream. The elimination of arbitrary barriers ensures that hard work matters, that investing in your dreams matters.

It is well established that racial, gender, and other types of diversity in the workplace has a positive influence on teams, and we have heard many of those studies. Diverse teams are more productive. Teams that are made up of individuals of diverse backgrounds are more innovative, generally make more error-free decisions. Further, there is convincing evidence that increased diversity in the workplace leads to higher revenues and increases innovation.

One of the problems I believe that the tech industry faces is the problem of implicit bias. The science of implicit bias is recognized as the automatic associations of stereotypes or attitudes about a particular group. One study demonstrated implicit bias by showing that resumes with more white-sounding names received requests

for interviews 50 percent more frequently than the same resume with more African-American-sounding names, but with equal or better qualifications.

A number of recent studies also suggest that isolation and bias influenced women leaving STEM careers. Often, it is not simply the choices that employees make that influence the careers, but the workplace environment that drives denial of opportunity.

Now let's talk a little bit about the products. And we have heard many of the stories here today about the end results of perhaps the absence of diversity. Big data analytics allows your employer to know whether you are pregnant even before you disclose it. That is against the law. In one high-profile incident, one retailer, drawing on consumer data, knew a young woman was pregnant before her parents did. Software used by many police departments across the country that determines the likelihood of recidivism has been shown, as discussed today, to have a bias against African Americans. Companies are using algorithms to determine who is likely to default on a loan or recommit crimes, despite the algorithm's tendency to reflect society's bias towards racial minorities.

So, all of this demonstrates that this is a very important discussion. Diversity is important not only because it is the right thing to do and it is a reflection of the American dream; diversity also has consequences on these tools and these products of predictive analytics and artificial intelligence rapidly changing our environment, and the way that we live and that we play in our society.

The public university has a very special role in addressing these issues because a public university provides an opportunity for interdisciplinary learning, for computer science, that enshrines values of equal opportunity, fairness, competition, and justice.

And I welcome your questions. Thank you.

[The prepared statement of Mr. Lopez follows:]

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Testimony of David Lopez
Before the House Subcommittee on Consumer Protection and Commerce of the U.S. House Committee on Energy and Commerce

"Inclusion in Tech: How Diversity Benefits All Americans"
(Revised)

March 6, 2019

Introduction

Good morning. Thank you for this opportunity to address this committee on the very critical issue relating to the direction and path of our economic development - diversity in the tech sector and the emergence of data analytics and artificial intelligence.

My name is David Lopez and I am currently the Co-Dean of Rutgers Law School-Newark. I also remain Of Counsel to Outten and Golden LLP, the nation's largest plaintiff-side employment firm.

From 2010 to 2016, I was the longest-serving General Counsel of the U.S. Equal Employment Opportunity Commission ("EEOC") after being twice nominated by President Barack Obama and confirmed by the U.S. Senate. I was the first Latino selected for that position. As General Counsel of the EEOC, I led the litigation program for the nation's primary administrative agency charged with enforcing federal anti-discrimination employment laws, including Title VII of the Civil Rights Act, the Age Discrimination in Employment Act, and the Americans with Disabilities Act. Specifically, I oversaw the litigation programs in 15 regional offices nationwide and collaborated with a wide range of internal and external stakeholders on the enforcement of the workplace anti-discrimination statutes. Before serving as the General Counsel of the EEOC, I spent many years as an EEOC trial attorney enforcing the rights of workers who had been subjected to discrimination.

Prior to joining the EEOC, I was senior trial attorney with the Civil Rights Division Employment Litigation Section of the U.S. Department of Justice in Washington D.C. I have had the opportunity to teach anti-discrimination law at Harvard Law School and the Georgetown University Law Center.

Throughout my career, I have been blessed with the opportunity to exchange ideas with hundreds of people nationwide, the so-called "experts" but also the entrepreneurs and workers on the front line, about these deep concepts of opportunity, equality, and fairness in the workplace. Some of this, to be true, has been in the context of litigating against companies, including tech companies, we believed ran afoul of the law, but most has been part of a greater national conversation about how to live up tour nation's finest ideals.

Over the last 100 years, Rutgers Law School has stood as an exemplary model of an institution that both welcomes and promotes diversity and leverages the law to achieve equality of opportunity in the public, private, and nonprofit sectors. As the largest public law school in the Northeast and one of the largest in the nation, Rutgers Law School is proud to be considered one of the most inclusive and diverse law schools in terms of its students' race, ethnicity, as well as economic and social background. Rutgers also prides itself in affording opportunity and social mobility to a substantial number of first-generation undergraduate and graduate level students.

When I was selected as Co-Dean in 2018, I was honored to contribute my extensive experience in civil rights work and leadership positions to Rutgers Law School's formidable legacy of social justice and inclusion, in significant part catalyzed by the disturbances in Newark but over time transforming our campus to a learning environment I believe reflects the beauty of this country better than any other in the nation.

During my time as Co-Dean of Rutgers Law School, I have been privileged to join a special community dedicated to academic distinction and debate, diversity and opportunity, clinical and skills-based education, affordability, collegiality, and principles of justice. The faculty and student-body have welcomed me and together we are working to both address the issues that

concern our institution and take Rutgers Law to the next level. This includes the issues I have been invited to discuss today.

The Central Importance of Tech to Our Daily Lives

During the last thirty years, technology has transformed our economy and changed our daily lives - how we work, how we learn, how we make decisions, and how we play. The tech industry has produced remarkable tools and resources, providing us with social media and new ways to connect with others, as well as instant access to huge amounts of information. This information includes not just access to the internet but detailed information about individuals, their activities, their characteristics, their demographics, and their interactions with certain types of content, as well as their interactions with other people. Vast amounts of this information is collected and stored in giant data sets by websites, advertisers, and other companies who use algorithms, machine learning, and predictive analytics to target their products or services based on user interests, demographics and activities.

As a result of continuous innovation in the tech industry, very large data sets and sophisticated algorithms are being utilized more and more frequently that make observations and predictions about individuals and their likely behaviors, demographics, affiliations and socio-economic status. The predictive analytics and software created by the tech industry is used by businesses and other organizations to make quick and efficient decisions grounded in their ability to make predictions based on large amounts of data. In certain cases, data is based upon actual demographic information—such as age or gender—and in other cases, companies can actually estimate race and other demographic information based on where individuals live, their online activities and other factors. It is clear that there are many outcomes resulting from using these powerful datasets that are influencing our society, including politics, law, medicine, industry, markets for economic opportunity and our personal lives. They have the potential to expand opportunity for all Americans if used responsibly. However, these digital tools present an even greater potential for misuse if they lock in and exacerbate our country's longstanding disparities based on race, gender, and other characteristics. This highlights the need to examine algorithms and big data in the context of their

effects on society and the need to have a framework in place that supports its ethical and just use.

For example, over the past several years, employers have gained access to data, information and tools that enable them to discriminate in advertising, hiring and other employment decisions. In some cases employers have used information provided by third parties on race, age and gender of persons to target their advertising or recruiting efforts in a discriminatory manner. And in other cases, I will discuss further below, employers like Amazon have developed their own proprietary computer programs to rate candidates, only to realize that such programs were biased against women.[1]

A recent report by Upturn, a research and advocacy organization dedicated to tech equity, highlights the increasing use of digital technology for recruiting and hiring decisions by employers. Many tools are developed and operated in a black box without transparency. An increase in transparency would permit regulators, employees or others the ability to evaluate whether such tools are enhancing or undermining equal opportunity in order to prevent the potential discriminatory effects of their use.[2]

The Demographic Profile of the Tech Industry

The tech industry is a sector of the labor market that is rapidly increasing in size and influence and it should provide significant opportunities for students and workers today and in the future. According to the Bureau of Labor Statistics, an agency within the Department of Labor, computer science jobs are projected to grow 19 percent from 2016 to 2026, much faster than the average for all occupations.[3] There is a huge demand for talent leading to a remarkable opportunity to expand the ranks of people of color and women in the tech industry. As a result, careers related to data science, machine

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[1] Dastin, "Amazon scraps secret AI recruiting tool that showed bias against women," Reuters (Oct. 8, 2018), available at https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G (last visited March 3, 2019).

[2] Bogan, Miranda and Rieke, Aaron, "Help Wanted: An Examination of Hiring Algorithms, Equity, and Bias," Upturn (Dec., 2018), available at https://www.upturn.org/reports/2018/hiring-algorithms/ (last visited on March 4, 2019).

[3] Bureau of Labor Statistics, "Occupational Outlook Handbook," available at https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm (last retrieved March 3, 2019).

learning, and artificial intelligence offer some of the best opportunities for students. It is difficult to imagine future career paths that would not benefit from an education in collecting, analyzing, summarizing and applying data using computation.

Yes, the tech industry is transforming all aspects of our daily lives. However, despite the promising outlook of the tech industry for students today, the tech industry is lagging dramatically in diversity compared to the private sector as a whole. For example, the number of African Americans and Latinos combined working in the tech industry is less than 50% of the number of Whites working in the tech industry. Specifically, according to the EEOC:

- The high-tech sector has trended toward employing a larger share of Whites (63.5 percent to 68.5 percent), Asian Americans (5.8 percent to 14 percent) and men (52 percent to 64 percent), and a smaller share of African Americans (14.4 percent to 7.4 percent), Hispanics (13.9 percent to 8 percent), and women (48 percent to 36 percent).

- The lack of diversity is even more apparent at the executive level. In the tech sector nationwide, whites are represented at a higher rate in the Executives category (83.3 percent), which typically encompasses the highest level jobs in the organization. This is roughly over 15 percentage points higher than their representation in the Professionals category (68 percent), which includes jobs such as computer programming. However, other groups are represented at significantly lower rates in the Executives category than in the Professionals category; African Americans (2 percent to 5.3 percent), Hispanics (3.1 percent to 5.3 percent), and Asian Americans (10.6 percent to 19.5 percent).

- Of those in the Executives category in high tech, about 80 percent are men and 20 percent are women. Within the overall private sector, 71 percent of Executive positions are men and about 29 percent are women.[4]

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[4] EEOC, "Special Reports, Diversity in High Tech," available at: https://www.eeoc.gov/eeoc/statistics/reports/hightech/ (last retrieved March 3, 2019).

Additionally, two of the largest companies dominating the tech industry, Apple and Google, still have very low percentages of employees who are Black or Hispanic, despite their attempts to hire more diverse employees and increase transparency in those efforts. In addition, both companies have persistent gender disparities in leadership and other employment levels.

In 2018, Google reported:

- Tech employees are 50.7% White, 41.1% Asian, 3.6% two or more races, 2.8% Latinx, 1.5% Black, 0.2% Native American
- Leadership is 66.9% White, 26.3% Asian, 2.7% two or more races, 2.0% Black, 1.8% Latinx, 0.4% Native American
- Tech employees are 78.6% male and 21.4% female
- Leadership is 74.5% male and 25.5% female

In 2017, Apple reported:

- Tech employees are 52% White, 31% Asian, 8% Hispanic,7% Black, 2% multiracial, 1% other
- Leadership is 66% White, 23% Asian, 7% Hispanic, 3% Black, 1% multiracial 0% other.
- Tech employees are 77% male and 23% female
- Leadership is 71% male and 29% female[5]

Further, the large corporations that dominate data science and AI research are few and largely localized to a few, highly affluent areas. The top companies – Google, Facebook, Apple, Amazon, Microsoft, Uber – comprise half of the top companies in the world for market capitalization. Four of these companies have their headquarters within 50 miles of each other.

While these companies provide services on a global scale, their employee perspectives are shaped by a tiny, socio-economic sliver of the United States. These companies' artificial intelligence, data analytics and algorithm-based research is disconnected with most of the population that feels their impact,

[5] Apple, "Inclusion & Diversity," available at https://www.apple.com/diversity/ (last retrieved March 3, 2019).

especially with areas with larger percentages of ethnic minorities. With expertise and privilege geographically located, there is the possibility of negative feedback loops excluding de facto opportunities to learn the skills to obtain these positions. This suggests that without intervention the lack of representation in the tech industry and associated problems are unlikely to improve. From a workforce development perspective, it becomes critical to develop ways to bring the technological capabilities that underlie these advances to the broadest group of people.

The Critical Importance of Diverse Teams

Of course, the ideas of living discrimination free and with equal opportunity are bedrock principles in our society central to social mobility and the American Dream. The elimination of arbitrary barriers based on race, sex, national origin, religion, and disability ensure that hard work matters - that investing in your dreams matters. Diversity and inclusiveness takes us out of our bubbles and destroys stereotypes. It is the right thing to do. Diversity and inclusiveness is also good business.

It is well established that racial, gender and other types of diversity in the workplace has a positive influence on teams. Teams that are made up of individuals of diverse backgrounds are more innovative and generally make more error-free decisions. These benefits are particularly relevant in the science, technology, engineering, and mathematics (STEM) fields.[6] Further, there is convincing evidence that increasing diversity in the workplace leads to both higher revenues and increases in innovation. One important study shows that ethnically diverse companies are 35% more likely to outperform their less ethnically diverse competitors and gender diverse companies are 15% more likely to outperform their less gender diverse competitors. Despite this evidence, white men continue to be overrepresented in the technology industry at greater rates than the private sector as a whole.[7]

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[6] Godsil, Rachel, "Why Race Matters in Physics Class," 64 UCLA L. Rev. Disc. 40 (2016), available at https://www.uclalawreview.org/race-matters-physics-class/ (last visited March 3, 2019).

[7] Hunt, Laton and Prince, "Why diversity matters," McKinsey & Company Jan, 2015), available at https://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters (last visited March 3, 2019).

Despite many large tech companies actively trying to increase the diversity of their workforce, there are still factors at play leading to sub-optimal results that need to be discovered and ameliorated. One of those issues is likely "implicit bias" in the hiring and employment context. The science of implicit bias is recognized as the automatic associations of stereotypes or attitudes about particular groups. In our current society where overt efforts have been made to eliminate more obvious forms of discrimination, implicit bias has emerged in the public discourse to explain more subtle types of discrimination. People can have conscious values that are still betrayed by their implicit biases. Implicit biases are frequently better at predicting discriminatory behavior than people's conscious values and intentions.[8] One study demonstrated implicit bias by showing that resumes with more "White" names received requests for interviews 50% more frequently that the same resume with a more "African-American" name.[9] Continued implicit bias offers one explanation for the continued lack of diversity in many high tech companies despite their attempts to increase diversity.

Another possibility affecting tech companies' ability to retain diverse employees may be found in a national study that examined why employees voluntarily leave their jobs in tech. Tech employees from all backgrounds said that their perception of unfairness was the most important factor that drove them to leave a position. The perception of unfairness speaks directly to the culture of the organization. Turnover in any workplace affects the bottom-line but turnover due to perceived unfairness in tech costs the industry $16 billion a year. This factor for leaving a job was even more profound in minorities and women.

- Underrepresented men of color were most likely to leave due to unfairness (40%)

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[8] Godsil, Rachel et. al,, ADDRESSING IMPLICIT BIAS, RACIAL ANXIETY, AND STEREOTYPE THREAT IN EDUCATION AND HEALTH CARE, THE SCIENCE OF EQUALITY, VOLUME 1 (Nov. 2014) , available at http://perception.org/wp-content/uploads/2014/11/Science-of-Equality.pdf (last visited March 3, 2019).

[9] Bertrand and Mullainathan, "Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination," 94 The American Economic Review 991 (Sep., 2004), available at https://www2.econ.iastate.edu/classes/econ321/orazem/bertrand_emily.pdf (last visited March 3, 2019).

- Women of all backgrounds experienced and saw considerably more unfair treatment overall than men

- Unfairness is most prominent in the tech industry: employees in tech companies were considerably more likely to leave due to unfairness than technical employees in other industries (42% vs. 32%)[10]

There are many examples of unfairness in the workplace that are indirect but will make employees feel unwelcome. A former employee of Google, who is an advocate for the underrepresented, describes her reasons for leaving Google after eleven years as tied into multiple factors of unfairness. She describes a pattern at Google where "Management would overstep, rank and file workers would point out how to avoid harm to users, and we'd have a constructive internal dialogue about how to proceed."[11] In addition, she felt she was not promoted in a way that was consistent with her responsibilities. She also describes an escalation of harassment, doxxing, and hate speech in Google internal communications that were silently tolerated. The event that truly tipped the scales in employee morale was the report of a $90 million payout to a Google executive credibly accused of sexual harassment of a subordinate.[12]

There are additional possible reasons for the lack of diversity in tech jobs due to the unique nature of tech skills. During the hiring process there may be a demand for specific skills at the time of hiring that are rapidly changing, hiring may occur through networks of personal connections without vetting, and there may be a reward for career paths that have a mixture of self-employment and employment with others. Further, there is a trend in the tech industry towards a general unwillingness to train new hires.[13]

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[10] Kapor Center, The 2017 Tech Leavers Study, available at https://www.kaporcenter.org/the-2017-tech-leavers-study/ (last visited March 3, 2019).

[11] Fong-Jones, Liz, "Google Workers Lost a Leader, But the Fight Will Continue," Medium (Feb. 13, 2019) available at https://medium.com/s/story/google-workers-lost-a-leader-but-the-fight-will-continue-c487aa5fd2ba (last retrieved March 4, 2019).

[12] Wakabayashi, Daisuke and Benner, Katie, "How Google Protected Andy Rubin, the 'Father of Android'," The New York Times (Oct. 25, 2018) available at https://www.nytimes.com/2018/10/25/technology/google-sexual-harassment-andy-rubin.html (last retrieved March 4, 2019).

[13] Hyde, Alan, *Working in Silicon Valley: Economic and Legal Analysis of a High-Velocity Labor Market.* (2003).

Despite all the evidence that teams that are made up of individuals of diverse backgrounds are more innovative and generate more value for their companies, problems still remain in hiring and retaining diverse employees in the tech industry.[14] Most of the factors identified that help with understanding why this is a continual problem point to the problem of the less conscious type of bias, implicit bias. A number of recent studies suggest that isolation and bias influence women leaving STEM careers. Often, it is not simply the choices that employees make that influence career advancement, but it is the workplace environment that drives access to opportunity. Training and awareness about the role of implicit bias can be an important first step. But more needs to be done. It cannot be a one-off. Efforts to advance diversity cannot be just a check box for legal compliance – equality must be a fundamental value of the organization. To have a tangible impact in expanding opportunity, it takes leadership and a coherent series of actions and systems to drive inclusive behaviors. And we see the most progress when there is leadership diversity as well as a commitment to hiring from a broad range of backgrounds.

The Power of Algorithms and Machine Learning to Bolster or Deprive Opportunity

How do these ongoing challenges to diversity in high tech impact the end product of the work? How do the ongoing challenges to the tech sector in our nation impact the algorithms and machine learning tools that increasingly impact our daily lives?

It is difficult to state with precision. But it is helpful to survey some of the recent technological and algorithmic trends to start to examine this link.

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[14] Godsil, Rachel, "Why Race Matters in Physics Class," 64 UCLA L. Rev. Disc. 40 (2016), available at https://www.uclalawreview.org/race-matters-physics-class/ (last visited March 3, 2019

Undoubtedly, the long-term ramifications of Data Science and Artificial Intelligence have generated excitement, debate, and consternation. As will be discussed below, there have already been some high-profile mishaps with Artificial Intelligence and Big Data.

I am definitely not here as a neo-Luddite, urging that we put the brakes uncritically on technological and computations advances. Indeed, technology itself has also forced us to look in the mirror at the ongoing reality of virulent forms of overt racism. Not a day passes without the smart phone documenting some other racist rant going viral with the help of social media.

https://www.youtube.com/watch?v=yKrQnRpB1pY
Description: White Woman Fired For Racist Rant at Black Neighbor – TIME

https://twitter.com/davian1lopez/status/1073250524085043200
Description: Student's Racist Rant About Lynching Black Men and Cross Burning at Southington High School in Connecticut – Law and Crime

https://www.pbs.org/video/onr-racist-rant-university-oklahoma/
Description: Racist Rant at University of Oklahoma – PBS

https://www.youtube.com/watch?v=eWKgsDr8-OM
Description: Man Berates Landscapers in Rant Caught on Camera – CNN

https://www.cnn.com/2018/05/17/us/new-york-man-restaurant-ice-threat/index.html
Description: NYC Attorney (Aaron Schlossberg) in Viral Rant Says He's not a Racist – CNN

https://globalnews.ca/video/4631073/woman-fired-after-racist-rant-goes-viral
Description: Women Fired After Racist Rant Goes Viral – Global News CA

https://nypost.com/video/white-men-built-these-streets-man-goes-on-racist-rant-in-seattle/
Description: "White Men Built These Streets": Man goes on racist rant in Seattle – NY Post

https://video.foxnews.com/v/5973734549001/#sp=show-clips
Description: AZ restaurant patron responds with racist rant after woman asks to sit at adjacent table: 'You will be wiped out' – Fox News

https://www.cnn.com/videos/us/2018/12/15/woman-nyc-subway-tirade-sot-vpx.hln
Description: Women Arrested After Racist Tirade on NYC Subway – CNN

https://www.youtube.com/watch?v=KPuDkz8TApA
Description: Video Captures Ryanair Passenger's Racist Rant at Black Women – NBC News

Likewise, New York Times columnist Seth Stephens-Davidowitz, in his book Everybody Lies: Big Data, New Data and What the Internet Can Tell Us About Who We Really Are,[15] mine big data sets from Google search to discover disheartening patterns about the prevalence of discriminatory attitudes. For instance, the top search in California related to Muslims was "kill Muslims", that searches for racist "N-jokes" rise 30 percent on Martin Luther King Day, and that racist, anti-African American searches were much more prevalent in upstate New York than in the South and more prevalent east of the Mississippi than west of the Mississippi.

As civil rights practitioners know, this raises questions as to where an act may fall on the spectrum of unconscious bias to overt but unspoken discrimination and stereotypes. These data points open the door for a broader, sometimes difficult, discussion about the critical steps we should take as a society to counter harmful and hateful stereotypes, overt and unconscious.

I believe that our shared goal should be to ensure that broad values such as opportunity, non-discrimination, inclusion, social mobility, privacy and competition are meaningfully protected in an era of dizzying and mind-boggling technological advances.

As a lifelong civil rights lawyer, I am particularly interested in the danger that the use of big data, algorithms, artificial intelligence and predictive analytics poses in denying opportunity and fairness in employment, education, credit, insurance, housing, public accommodations and the criminal justice system. That is why, the question of whether the absence of diversity in tech impedes the ability of the tech sector, including some of its most highly-dominant players, to anticipate and remedy any problems is critical.

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[15] Stephens-Davidowitz, *Everybody Lies: Big Data, New Data and What the Internet Can Tell Us About Who We Really Are* (2017).

At the end of the day, it is not the technology or the data sets or the algorithms, but the people who create, apply, analyze, and improve them who are responsible. Bad data inputs lead to bad results[16] and can deepen inequality and discrimination. There is a long tradition in machine learning that algorithm performance can only work in the context of unbiased data. Increasingly, people and algorithms are engaged in interactive processes wherein neither the humans nor the algorithms receive unbiased data.[17] The failure to diligently incorporate values of anti-discrimination and equal opportunity into our technological advances or to develop teams reflecting the richness and beauty of this country is a recipe for compromising these values to the detriment of the public.

Horror stories abound about the failure of big data, algorithms, artificial intelligence and predictive analytics to live up to our ideals of non-discrimination, opportunity, fairness, and privacy abound.

On one hand, the use of big data and predictive analytics may eliminate subjective biases and discrimination, as promised by many in the industry. On the other hand, this turns on the data producing the algorithm and whether it is constructed with an effort to enshrine values of non-discrimination, fairness, and privacy and counteract historical disparities. There have been an alarming number of mishaps with employment screening emanating from the elevation of statistical correlation between some variable, such as a person's zip code with purported job performance, qualifications or qualities.[18] In the public sector, this is even more alarming as algorithmic decision is particularly weighty both because governmental decisions may be especially

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[16] Newcombe, "When Bad Data Happens to Good Companies," SAS Best Practices, available at https://www.sas.com/content/dam/SAS/en_us/doc/whitepaper1/bad-data-good-companies-106465.pdf (last visited March 3, 2019).

[17] Nasraoui, O. and Shafto, P., Human-algorithm interaction biases in the big data cycle: A markov chain iterated learning framework, arXiv (Aug. 29, 2016), available at https://arxiv.org/pdf/1608.07895.pdf (last visited March 4, 2019).

[18] Kirchner, "When Big Data Becomes Bad Data," ProPublica, available at https://www.propublica.org/article/when-big-data-becomes-bad-data (last visited March 3, 2019).

significant, and because democratically-elected governments bear special duties of accountability.[19]

Professor Pauline Kim of the Washington University Law School has written extensively about the ongoing pitfalls with big data screening algorithms in the employment context. Often these decisions are based on correlations rather than causal relationships - for instance an interest in Manga comics with coding proficiency. This obscures the basis on which employment decisions are made and further exacerbates inequality because error detection is limited and feedback effects compound the bias.[20]

Even absent conscious bias, use of these proxy variables can have a profound discriminatory impact in a variety of areas.[21] Use of big data in the employment context also raises issues with the unlawful disclosure and consideration of disabilities.[22] One scholar compared early efforts at screening applicants as having the scientific rigor of the discredited science of phrenology, the practice of determining traits and aptitude by skull size.[23] The use of these new technologies to bolster productivity also implicates privacy concerns.[24] Advertisers are being sold on the idea of being able to target highly specific individuals with the right characteristics which has

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[19] Brauneis, Robert and Goodman, Ellen, "Algorithmic Transparency for the Smart City," 20 Yale J. of Law & Tech. 103 (2018), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3012499 (last visited March 4, 2019).

[20] Kim, Pauline, "Data-Driven Discrimination at Work," 58 Wm. & Mary L. Rev. 857 (2017), available at https://scholarship.law.wm.edu/wmlr/vol58/iss3/4 (last visited March 3, 2019).

[21] Barocas, Solon and Selbst, Andrew, "Big Data's Disparate Impact," 104 California Law Review 671 (2016), available at https://ssrn.com/abstract=2477899 (last visited March 3, 2019).

[22] Hoffman, "Big Data Analytics: What Can Go Wrong " 15 Indiana Health Law Review 227 (2018), available at https://ssrn.com/abstract=3190521 (last visited March 3, 2019).

[23] O'Neill, Cathy, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy,"* (2016).

[24] Ajunwa, Ifeoma, "Algorithms at Work: Productivity Monitoring Applications and Wearable Technology as the New Data-Centric Research Agenda for Employment and Labor Law" 63 St. Louis U. L.J. (2019, Forthcoming), available at https://ssrn.com/abstract=3247286 (last visited March 3, 2019).

become possible because of the massive amounts of data collected on people.[25]

The following examples provide cautionary tales abound about the failure of predictive analytics to live up to our ideals of non-discrimination, opportunity, and privacy.

- Amazon stopped using its own artificial intelligence hiring tool when it was discovered that it was biased against women.[26]

- Big data analytics allows your employer to know whether you are pregnant even before you disclose it.[27] In one high profile incident, one retailer, drawing on consumer data, knew a young woman was pregnant before her parents did.[28]

- Several major companies have been sued for using Facebook's micro-targeting tools to limit job advertisements based on age, gender and race in the context of housing, employment, and credit, in violation of the Fair Housing Act, Title VII of the Civil Rights Ave, and the Equal Credit Opportunity Act.[29]

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[25] Guynn, "Russians used Facebook the way other advertisers do: By tapping into its data-mining machine," USA Today (Nov. 1, 2017), available at https://www.usatoday.com/story/tech/news/2017/11/01/russians-used-facebook-way-other-advertisers-do-tapping-into-its-data-mining-machine/817826001/ (last visited March 3, 2019).

[26] Dastin, "Amazon scraps secret AI recruiting tool that showed bias against women," Reuters (Oct. 8, 2018), available at https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G (last visited March 3, 2019).

[27] Zarya, "Employers Are Quietly Using Big Data to Track Employee Pregnancies," Fortune (Feb, 17, 2016), available at http://fortune.com/2016/02/17/castlight-pregnancy-data/ (last visited March 3, 2019).

[28] Weisbaum, "Big data knows you're pregnant (and that's not all)," CNBC Markets (Apr. 9, 2014), available at https://www.cnbc.com/2014/04/09/big-data-knows-youre-pregnant-and-thats-not-all.html (last visited March 3, 2019).

[29] Assistant Secretary for Fair Housing and Equal Opportunity v. Facebook, Inc., Housing Discrimination Complaint (01-18-0323), available at https://www.hud.gov/sites/dfiles/PIH/documents/HUD_01-18-0323_Complaint.pdf (last visited March 4, 2019); Angwin, Scheiber and Tobin, "Facebook Job Ads Raise Concerns About Age Discrimination," New York Times (Dec. 20, 2017), available at https://www.nytimes.com/2017/12/20/business/facebook-job-ads.html (last visited March 4, 2019).

- Software used by many police departments across the country to determine likelihood of recidivism has been shown to have a bias against African-Americans.[30]

- Correctional agencies use "risk assessment" systems to assign restrictions on clients and decide how to enforce them, with little concern about how those devices might affect disparities in race and class.[31]

- Companies are using algorithms to determine who is likely to default on a loan or recommit crimes[32] despite the algorithms' tendency to reflect society's biases toward racial minorities.[33]

- Although it is likely that insurance companies can already identify individuals by race, gender and ethnic group, without big data, the danger is that the use of algorithms may mask the fact that particular groups are being charged higher prices.[34]

In other spheres, we have seen an increased scrutiny of outcomes as the prominence of predictive analytics and algorithms in decision-making and other aspects of society increases and is better understood. This includes the tendency of search results themselves to reflect stereotypes and bias. The combination of private interests in promoting certain sites, along with the monopoly status of a relatively small number of Internet search engines, leads to a biased set of search algorithms that privilege whiteness[35]

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[30] Angwin, Julia, et al., "Machine Bias," ProPublica (May 23, 2016), available at https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing (last visited March 3, 2019).

[31] *Id.*

[32] *Id.*

[33] Lipton, Chouldechova, and McAuley, "Does mitigating ML's impact disparity require treatment disparity?," Advances in Neural Information Processing Systems 31 (NIPS 2018), available at http://papers.nips.cc/paper/8035-does-mitigating-mls-impact-disparity-require-treatment-disparity (last visited March 3, 2019).

[34] Swedloff, Rick, "Risk Classification's Big Data (R)evolution," 21CONN.INS.L.J. 339(2014) (invited symposium piece) available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2566594 (last visited March 3, 2019).

[35] Berlatsky, "Google search algorithms are not impartial," NBC News (Feb. 21, 2018), available at https://www.nbcnews.com/think/opinion/google-search-algorithms-are-not-impartial-they-are-biased-just-ncna849886 (last visited March 3, 2019).

Likewise, tech companies in the rapidly developing field of artificial intelligence (AI) have not always provided benefits that are consistent across protected classes of minorities and women. A recent WIRED magazine article contrasted the enormous expectations and promise of artificial intelligence in a broad range of areas from health care, journalism, finance, and policing with the relative dearth of female programmers. The article highlighted the enormous societal stakes and risks involved in this groundbreaking research being conducted by homogeneous work teams with few women and few African-Americans and Asians. "Last year, researchers at the universities of Virginia and Washington showed that two large image collections used in machine learning research, including one backed by Microsoft and Facebook, teach algorithms a skewed view of gender. Images of people shopping and washing are mostly linked to women, for example."[36]

The following examples highlight the ways in which artificial intelligence can be used across industries to advance those industries while harming our society by surreptitiously engaging in unlawful and discriminatory acts by using algorithms. These algorithms are not well understood by the general public, even as their use becomes more prevalent. As importantly, use of predictive analytics may not currently be subject to an adequate legal scheme designed to prevent algorithmic discrimination in the areas of housing, employment, criminal justice and more.

- When developing facial recognition software, two widely used aggregate datasets were used that were overwhelmingly male and white. So, the algorithm works exactly as it was trained, that is, for a largely white, male world. As a result, for women and dark-skinned persons, the errors increase considerably (from <1% for a white male to up to 35% for a dark skin-toned woman) when using facial recognition software.[37]

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[36] Chin, "AI Is the Future—But Where Are the Women?," Wired (Aug. 17, 2018), available at https://www.wired.com/story/artificial-intelligence-researchers-gender-imbalance/ (last visited March 3, 2019).

[37] Buolamwini, Joy, "Gender shades : intersectional phenotypic and demographic evaluation of face datasets and gender classifiers," (2017), available at https://dspace.mit.edu/handle/1721.1/114068 (last visited March 3, 2019).

- Facial recognition software is being used by police departments[38] despite the fact that it fails to correctly identify people of color[39]

- Amazon's proprietary face recognition software used by law enforcement across the country incorrectly matched 28 members of Congress, identifying them as other people who have been arrested for a crime in a test conducted by the ACLU. The false matches were disproportionately of people of color, including six members of the Congressional Black Caucus.[40]

- Microsoft's facial recognition software was found to have an error rate as high as 20.8 percent when identifying the gender of people of color, especially women with darker skin tones was criticized in a research paper earlier this year for its error rate—as high as 20.8 percent—when attempting to identify the gender of people of color, particularly women with darker skin tones.[41] Microsoft states that is has improved the problem but obvious issues remain if this software is used by law enforcement. [42]

- A study determined that emotion reading facial software is biased against black people. It assigns more negative emotions to black faces

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[38] Wingfield, "Amazon Pushes Facial Recognition to Police. Critics See Surveillance Risk," New York Times (May 22, 2018) available at https://www.nytimes.com/2018/05/22/technology/amazon-facial-recognition.html (last visited March 3, 2019).

[39] Buolamwini and Gebru, "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification." 81 Proceedings of Machine Learning Research 1 (2018) Conference on Fairness, Accountability, and Transparency, available at https://www.media.mit.edu/publications/gender-shades-intersectional-accuracy-disparities-in-commercial-gender-classification/ (last visited March 3, 2019).

[40] Snow, "Amazon's Face Recognition Falsely Matched 28 Members of Congress With Mugshots," ACLU (Jul. 26, 2018) available at https://www.aclu.org/blog/privacy-technology/surveillance-technologies/amazons-face-recognition-falsely-matched-28 (last visited March 3, 2019).

[41] Buolamwini and Gebru, "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification,"81 Proceedings in Machine Learning 1 (2018), available at http://proceedings.mlr.press/v81/buolamwini18a/buolamwini18a.pdf (last visited March 3, 2019).

[42] Austin, "Microsoft 'Improves' Racist Facial Recognition Software," Gizmodo (Jun 26, 2018), available at https://gizmodo.com/microsoft-improves-racist-facial-recognition-software-1827141398 (last retrieved March 3, 2019).

and black faces consistently score as angrier than white faces.[43] There are obvious disturbing ramifications to this bias if the facial recognition software is used by law enforcement or in the employment context.

- In 2015 a software engineer noticed that Google Photos classified his black friends as "Gorillas." Google apologized and said that they would fix the problem. However, they have never fixed the problem other than blocking its algorithm from recognizing anything as a Gorilla and removing Gorilla, along with Chimp, Chimpanzee and Monkey as a possible classification term. It appears that they have been unable to fix the underlying problem with the algorithm. [44]

- An analysis was conducted on two mugshot databases to determine the effects of aging on the accuracy of the facial recognition software. There was a clear turning point after approximately 6 years in which the accuracy of the algorithm started to continually decline. This raises obvious issues of possible bias in face recognition software of older people.[45]

Diversity and the Challenges of Algorithmic Justice and Ethical Coding

All of these recent events highlight the ways in which data and algorithms can be used across industries to advance those industries while harming unwitting members of our community and our society by surreptitiously engaging in unlawful and discriminatory acts by using algorithms. The worrisome implications of tech's ongoing challenges with gender, racial, ethnic, and age diversity is engendering growing attention.

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[43] Rhue, "Racial Influence on Automated Perceptions of Emotions,"(Nov. 9, 2018), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3281765 (last visited March 3, 2019).

[44] Vincent, "Google 'fixed' its racist algorithm by removing gorillas from its image-labeling tech," The Verge (Jan, 12, 2018), available at https://www.theverge.com/2018/1/12/16882408/google-racist-gorillas-photo-recognition-algorithm-ai (last visited March 3, 2019).

[45] Best-Rowden, Lacy and Jain, Anil, "Longitudinal Study of Automatic Face Recognition," 40 IEEE Transactions on Pattern Analysis and Machine Intelligence 148 (2017), available at https://ieeexplore.ieee.org/document/7815403 (last visited March 3, 2019).

Indeed, it is not surprising that the benefits of data and computation are not equitably shared in light of the people who are represented, and not represented, in the companies creating these technologies. This problem has many roots to these. First, algorithms are often predicated on data that amplifies rather than reduces the already present biases in society---racial, ethnic, and socio-economic---in part because these issues may not be noticed or a consideration to the people creating the technology.

Second, tech careers are primarily entered from narrow, single-discipline university training, in fields such as computer science, which, even at the most highly-regarded schools, do not demand the kind of interdisciplinary, engaged thinking that would connect developments in computer science to their legal and ethical consequences.

Finally, people who employ these technologies do so without regard to the subtle ways they may interact with the socio-economic and ethnic characteristics of the people they are being applied to. Subjective judgements are made and with those judgements comes the innate biases of the individuals making the decisions. These biases are not always harmful, but when they are they can have serious and in some instances illegal ramifications.

Recommendations

Who will ensure that the opportunities afforded by these technologies and skills are available regardless of race or ethnicity, gender, or means? Who will develop, and educate students who will develop, technologies that are fairer, more equitable, and just? Who will drive the creation of an ethical legal regulatory framework to protect against bias in society?

To be sure, we need greater investments in education and training, and efforts play a critical role in fostering a diverse pipeline and, Rutgers University, as a public university, holds a unique position of responsibility and opportunity in this area.

Rutgers University, with its commitment as an anchor institution and established legacy of diversity and inclusion, holds a unique position in ensuring that all students--regardless of race, ethnicity, gender, or class--have access to the education and experts required to develop future professionals.

It is important to ensure that the very best ideas are produced by organizations, like Rutgers, that serve and answer to and reflect the diversity of our society. To ensure that students have equitable access to the very best opportunities, we seek to invest in educational experiences around creating algorithms and using data to create more equitable and inclusive futures.

As Co-Dean, I am working with an outstanding group of interdisciplinary partners throughout the University to establish Rutgers as a model of engaged research and education around our mission as a public university, emphasizing 21st century skills of programming and Data Science toward decreasing social injustice. To ensure that these developments better our society, we seek to develop a workforce development infrastructure that will spin-out ideas developed in research, and expertise developed in education, into companies and non-profits that improve our society and strengthen our democracy.

Our hope is Rutgers will be able to immerse all students in a culture of data and algorithms and the attendant legal, ethical, and socio-political implications. Regardless of their major, students will have contact with faculty who conduct cutting-edge data and computational research that is relevant to their field and have access to such research opportunities through contact with graduate students, postdocs, and faculty. Students will graduate with an understanding of how computing and data are used in their respective major, the ability to program, analyze and understand data, the legal, social and political contexts, and personal contacts with people that embody how the skills they have learned can be translated into the real world.

Yes, there is much to do on issues of infrastructure to ensure a diverse pipeline into high tech and develop the next generation of tech entrepreneurs, engineers, and employees to tackle amazingly complex work with serious attentiveness to the values of fairness, opportunity, privacy, and competition.

At the same time, the need to develop the pipeline must not be an excuse for companies to ignore the critical need for companies to act now on issues of opportunity and fairness. There are several specific and common-sense steps the tech industry can take immediately to reflect better the beauty of this country and, bolster, the likelihood of good decisions reflecting broadly-shared societal values.

1. First, embedding equality into your core values, means ensuring employment practices, from recruitment to hiring and promotion, reinforce this value. This always starts with leadership at the top. Assess your current obstacles. Often barriers can be subtle, so it is essential to collect and analyze data to see if seemingly neutral policies may disadvantage certain demographic groups. Be willing to rethink how you work to increase flexibility, invest in skill development to ensure pathways to advancement, and create mentoring, sponsorship, and support networks. What leads employees to believe that they can be successful in advancing to the highest levels of an organization? Research shows that it is workplace culture and practices. Does the company authentically value diversity? Does maternity leave undermine advancement? Are different leadership styles embraced? These external factors at a company weigh twice as heavily in a woman's confidence she'll reach top management, compared to individual initiative, such as communicating your own ambitions, asking for promotions, and seeking out opportunities.

   The good news is that as leaders in organizations, we can make a huge impact. There are critical steps we can take to create an organizational culture that advances diversity and inclusion. When we create systems for hiring, setting pay, or promotions that focus managers on the job-related skills and behaviors needed for success, we can ensure we don't leave talent on the table.

2. Second, broaden your net in your search for talent. Many top companies now hire from only certain select universities, and are tapping into only 1% of the talent pool. At a recent EEOC meeting, Ben Jealous of Kapor Capital estimated that although there are 2000 educational institutions nationwide, VC firms only fund people who went to ten of those. Yet, as Ben emphasized, "genius is constant in every zip code in this country."

Many students who may not have the "perfect" resume from a top university, have overcome significant obstacles and have the grit and experience to contribute great value. Look also at whether your hiring practices create opportunities for workers with disabilities as well as older workers. Think of how subjective and informal networks create opportunities for hire and advancement, and evaluate whether these networks might work against underrepresented communities without the same access.

3. Third, evaluate whether your benefits appeal to all demographic groups. Perks like free dinner might be appealing for a young single person, but a parent who prioritizes meals at home may place greater emphasis on retirement savings options. Do parental leave policies allow both women and men to take the same amount of time off to bond with a new child? Are leave and telework policies in place to support parents, other caregivers, as well as people with disabilities?

Thank you for your time and attention. I would be happy to answer any questions.

Ms. SCHAKOWSKY. Thank you so much. This has been really a wonderful panel that I think underscores how diversity is not just a side issue.

And now, we will move to a number of questions. Each Member will have 5 minutes to ask questions of our witnesses, and I am going to start by recognizing myself for 5 minutes.

I just want the panel to know that there are a lot of things going on today. The fact that there are a number of empty chairs is not indicative of lack of interest in what you are saying. All of your statements will be in the record, and I expect people will be coming in and out.

So, I am going to focus on women. Just 31 percent of the employees at Facebook are women, and that's also true at Apple. The number of women who work in technical roles at these companies is even lower. We also see that the female share of computer science degrees has actually dropped from 28 percent to 18 percent between 1993 and 2016, while at the same time the tech industry is booming and continuing to grow at an unprecedented rate.

This isn't a problem that will be solved overnight. But, starting at the top, getting more women into visible technical positions, providing role models for young women, college students deciding on choosing a technical path of study, seems to be a very good strategy.

So, Dean Lopez, intentional efforts to reduce the bias that is not necessarily deliberate in recruiting have dramatically increased opportunities for women in other fields. For example, orchestra auditions where the musician's gender was hidden has increased the hiring of women by over 25 percent. What are some ways that tech companies can change their recruitment techniques in order to adapt to the need of diversity in the workforce?

Mr. LOPEZ. I thin the most important thing a tech company can do really is provide meaningful leadership at the top. If tech companies want to be diverse, they need to have the leadership making very clear pronouncements that they will examine every aspect of the work culture, the evaluation system, the recruitment system, the promotion system, to make sure that it is free from gender bias. And that means looking at issues of implicit bias.

You see this particularly in pay disparities based on gender, where you often have systems that are almost systematically stacked against women. So, it really takes a clear statement from leadership that diversity is important, that inclusiveness is important.

The other thing that is really important is to really examine how you conduct recruitment. Recruitment is often based on sort of the tap on the shoulder, the old boys' club. It is really important, I think, for high-tech companies to examine their networks. As the co-dean at a public university, as a graduate of Arizona State University, I certainly understand the grit and the talent that you get out of those universities, but often the Silicon Valley recruits in a very, very narrow way, right?

And then, the last thing I want to mention is that, as diversity relates to the end product, we have seen Amazon, for instance, they had to stop a hiring tool because they found out that the hiring tool

itself was biased against women. The algorithms they used were biased against women.

We have seen lawsuits recently involving Facebook's dropdown box where women were excluded from certain job advertisements in traditionally male industries. So, there is a connection between the two.

Ms. SCHAKOWSKY. Thank you.

Funding for female entrepreneurs is minuscule compared to men. Women receive just 2.2 percent of the venture capital investment. This is despite the fact that women-founded businesses generate more than two times the revenue per investment dollar than businesses founded by men.

Ms. Kim, what do you think is happening here? What is going on?

Ms. KIM. Much like the other economic reasons for having diversity, you are seeing something that doesn't make sense. It is the system that exists that needs a complete culture shift in how to—I mean, whether it is employee recruitment or whether it is investing in programs to recruit from diverse populations, as well as investing in building those opportunities for entrepreneurs as well. It doesn't make sense, what is going on, because there is a clear economic rationale to hire and promote from communities of color, hire and promote women, and invest in businesses led by people of color and women.

And so, we call on the tech sector to examine what within the culture is going on, and, also, to engage with civil society organizations, and civil rights organizations, in particular, to talk to us about what is going on in the hiring and investment practices that results in these very harmful impacts.

Ms. SCHAKOWSKY. Yes, I wish I could get to—5 minutes goes really fast. Maybe at the end I can open it up to others on the panel. But, in the meantime, I want to yield for questions to our ranking member, Ms. McMorris Rodgers.

Mrs. RODGERS. Thank you. Thank you, Madam Chair.

And thank you, everyone, for being here. Excellent testimony today.

I wanted to start with Ms. Houghton. I wanted to ask you to speak some more to how companies can build an inclusive workforce for people with disabilities, and address both the physical and intellectual disabilities, and what the benefits are that you see as a result.

I also wanted to ask you to speak and share some of the examples of the impact of having people with disabilities in the workforce and how that ensures products and services are accessible to everyone.

Ms. HOUGHTON. Thank you, Congresswoman McMorris Rodgers.

I think that what we are seeing is really driven in tech. It is companies like Microsoft and SAP and DXC Technology that have created these inclusive hiring programs that are based on the premise that there is bias in their hiring process, and they want to tear down those walls. And so, they have created these hiring programs where they are sourcing talent with disabilities, with all different kinds of disabilities, and bringing them in, perhaps rather than in a typical interview, coming in and maybe doing a two-week

program. And maybe the interview is with LEGOs and like a different kind of a process.

Because what they recognize is that the traditional models are screening the talent out. And so, they have grown these inclusive programs, these Autism at Work programs, and they are putting everything out in the public domain to try to help their peers.

I think what they are experiencing, as a result of this, is that this talent is coming in and helping them develop new products and tools and make things more accessible. Filing for patents, things that wouldn't have happened if they hadn't torn down those walls.

Mrs. RODGERS. Would you speak briefly as to the impact of job coaches or accommodations, the internships, just very briefly?

Ms. HOUGHTON. Yes, people with disabilities, we come in different shapes and sizes. The on-the-job supports when individuals have the opportunity to perform with the right support, they far exceed their peers. Their productivity, their decrease in absenteeism, they stay.

Mrs. RODGERS. That is great. Thank you. Thank you for being here.

Dr. Ferrini-Mundy, I wanted just to ask you to speak a little bit more about how you see the commitment to science, technology, engineering, and math helping create the pipeline, and are you seeing that translate into the opportunities with the tech companies, in particular?

Dr. FERRINI-MUNDY. Thank you.

Absolutely. The STEM field, science, technology, engineering, and mathematics, writ large, are often a key foundation for people who will pursue careers in the technology areas. And so, making certain that that basic preparation—and I will speak specifically about mathematics; it is my own field. And also, it is an underpinning for so much of what goes on in the tech industry.

Making certain that our approach to engaging people in mathematics, to instruction, is inclusive, that it attends to differences and draws on those, and supports students to be successful, to draw on their grit, because mathematics is not necessarily seen as an easy kind of pursuit.

To continue, I wanted to just tack on a little bit on these questions about internships and how companies can be more fully engaged with diversity. Universities can be wonderful partners and are across our Nation, our public universities, in particular, with the private sector. And we have found that U Maine, for example, in our engineering college, that a large percentage, maybe 75 percent of our students have actual internships in a variety of high-tech sectors, and those internships turn into positions. And so, getting to know students and making opportunities for diverse students early on is really crucial to this whole business.

Mrs. RODGERS. Thank you.

And finally, Ms. Oliverio, would you speak, just in the 20 seconds I have left, just what do you see veterans—what are the unique qualities that veterans can add to this conversation?

Ms. OLIVERIO. Veterans are so unique. They are natural leaders and that leadership is cultivated in an authentic way throughout their military service. They are resilient. They can adapt and over-

come to any situation and any challenge. If tech can just meet them where they are, they will be able to diversify on their own.

Mrs. RODGERS. Great. Thank you all.

I yield back.

Ms. SCHAKOWSKY. I recognize Representative Castor for 5 minutes.

Ms. CASTOR. Thank you, Chairwoman Schakowsky.

Sharing diversity and inclusion in the technology sector workforce and products is critical to a thriving industry. Unfortunately, the U.S. Congress and the industry itself have overlooked this topic for too long. So, I am glad we are holding this hearing today.

Thank you very much, and I want to thank the witnesses for your expert advice on what Congress can do to make the workers in the tech sector more representative of America. Because I believe, when that happens, business will thrive and consumers will benefit.

In addition to your testimony, I have seen report after report that has been rather troubling about technology adversely affecting communities of color. Companies have given different prices and credit card deals to consumers based upon location, which can mean white neighborhoods are offered better deals and prices than minority neighborhoods. Supposedly unbiased algorithms that companies use for a variety of different processes have been shown to produce discriminatory results. Facial recognition software often cannot accurately recognize people of color.

Ms. Turner Lee, these are just a few examples, but they illustrate a larger pattern in tech of discriminatory products and processes. What are some of the specific policies the tech industry could adopt right now to fix this, and what should Congress be doing?

Dr. TURNER LEE. Yes, thank you for just acknowledging all those examples. Because as we go deeper and deeper into the tech space, I think we are going to see more of these.

I think it is important, as I recommended and, again, put into my written testimony, that we think about a guardrail that we have now, which are the antidiscrimination laws. I think as we see more of these offers become discriminatory or produce a discriminatory output, people being denied credit because of the fact that their web-browsing history suggests that they are not creditworthy, higher education using algorithmic decisionmaking on whether or not kids should be accepted into college, those types of things have, I think, implications that we have not really looked at in connecting the physical and the digital spaces.

So, I would implore Congress to just have a review and analysis of what those nondiscrimination laws are and see if there is any connection to what we actually see in the digital space that can generate these unintended consequences. I think that is the first.

I would also just add real quickly, I think there will be innocuous cases, as it was suggested, where the training data may not be correct and companies themselves will self-regulate. I think those conversations still need to be had.

Google voluntarily removed payday ads from their search query, just to make sure that low-income people were not being dragged into this pathway of inequality. I think we need to see more of that, and I think Congress can actually use the bully pulpit in

some ways to suggest that those conversations should happen, as well as collaborations with civil society, who actually see the outputs of this.

It is the technologist that oftentimes sits within the vacuum, and civil society groups like AAJC, then, sort of have to clean it up. And then, Congress has to somehow get in the middle of these conversations.

I think more collaborative dialog to best understand how these ecosystems work and the application of guardrails that we have in our favor can actually help quell some of these biases.

Ms. CASTOR. Thank you very much.

Mr. Luckie, isn't there also a role for people of diverse backgrounds in decisionmaking positions in these tech companies? And how do we encourage that and what are the barriers that prevent that from happening now?

Mr. LUCKIE. I think there is a lot of focus on the managerial positions and having someone at the top that will filter down and make a workplace more diverse. I think it is more important on the employee level to have multiple people in the room who can say, hey, are we testing on this particular audience; have we thought about this particular impact on this community?

As I said in my opening statement, making sure that those voices are being heard, that there is an equal opportunity for people to share those concepts, and it is important for tech companies to do an audit of these individual teams and understand where are the gaps in diversity, not just in the company overall, but on the individual teams that are all impacting the company's overall goals.

Ms. CASTOR. Thank you very much.

I have a few other questions. I had a group of neighbors from Florida come and visit me who happened to be blind, and they had a number of suggestions. My time is running out. So, I am going to submit those to you for the record and ask you to please send in your specific answer to those.

Thank you.

And I yield back.

Ms. SCHAKOWSKY. Thank you.

And now, 5 minutes to Mr. Guthrie.

Mr. GUTHRIE. Thank you, Madam Chair. I appreciate it very much. Thanks for this hearing. This is a very important hearing.

A couple of things. One, and this is for Dr. Ferrini-Mundy, or anybody that would like to answer the questions, but I will focus on you. I understand that Facebook, Google, and all the tech companies have people in marketing in all different degrees, but I am going to focus on the STEM side of their businesses.

I think the Chair just said in her questions that, as we need more computer science people, as that seems to be the initial higher, where big money is, people in tech fields, if I heard you correctly—I know you said it correctly—but if I heard you correctly, 28 percent of the computer science used to be women and now it is down to 18 percent. So, I guess my question is, does the tech workforce in Silicon Valley or in tech, the tech people, does it reflect the people in the tech programs, the demographics? So, is it kind of they are hiring who we are training or educating as a nation? And if so, how do we get more people into it? How do we get

a more diverse STEM populace, so that there will be a more diverse technical? Because the other side is, if it doesn't reflect that, that means they are just really being biased in who they hire. Of course, I am talking on the STEM side of their business, their employees.

Dr. FERRINI-MUNDY. Right.

Mr. GUTHRIE. OK.

Dr. FERRINI-MUNDY. Thanks. And so, there are several questions in there. I think in terms of the tech workforce, others in this panel are more expert in the dispersed expertise across that tech force, because I suspect it comes from a variety of areas. That all said, we must do better in higher education to attract people to these STEM fields, to computer science, and to make their time in higher education much more inclusive, so that they are a part of the groups that are, then, going to be taking on these product questions when they get into the tech workforce.

Mr. GUTHRIE. How do we get more people, a diverse group, into the——

Dr. FERRINI-MUNDY. Right.

Mr. GUTHRIE [continuing]. Because what happens in tech school, not just computer, if you are talking about a manufacturing company in Kentucky needs a computer science, I mean a numerical control person, whether it is male, female, or whatever, they can't find them, and we have all these people not going to secondary schools. So, there seems to be a breakdown in the market——

Dr. FERRINI-MUNDY. Right.

Mr. GUTHRIE [continuing]. For getting people into the right—no matter who they are.

Dr. FERRINI-MUNDY. At U Maine, I just learned that about 47 percent of our students are in STEM fields, which is high. What that means is that we are creating pathways from our secondary schools that are welcoming. We do an early college program that gives students the opportunity to study with our faculty before they get out of high school.

I think a lot of it is about pathways and helping students be able to see themselves in these careers, see them as meaningful career options. And a lot of that has to do, then, with real-world kinds of problem-solving as undergraduates, so that it is real-world learning outside the classroom in internships, in clinical experiences, that put them together with people in these fields. A lot of collaboration with K–12 is crucial for this, too. It begins very early. So, all of the work in coding, for example, that we heard about is one piece of, I think, an important systemic effort to get people interested, to get diverse people interested in STEM.

Mr. GUTHRIE. I have got a few seconds. I want to ask another question. Anybody want to comment on how we get more people into, a more diverse, educated group to come out, so a pool?

Dr. TURNER LEE. Yes. No, Congressman, I think it is a great question. I mean, overall, we have a national shortage of tech workers. So, let's just start there. I mean, in programming, we have seen that in government where years ago there were 10 to 15 thousand people we couldn't employ in cybersecurity tech jobs. So, if we look at the national shortage of where we are as a country,

and then, you trickle that down to diversity, it becomes even more problematic, right?

But I think what we are seeing is this movement in colleges and universities to sort of focus on computer science, which I think may become a better shift. I mean, I have seen Members of Congress, your colleagues, sort of introduce computer science as a national initiative. It has not been a national priority.

People, you know, they change where they are in terms of their leaning towards STEM. There are studies that say, with African-American children, if a young African-American boy is not actually focused on math by sixth grade, it is less likely that he will pursue a STEM career when he goes to college.

That is why I say I think it is important for us to look at the sources of where we are recruiting students and build up where there is a possibility of more appropriations in these programs, opportunities. It is also important——

Mr. GUTHRIE. I do have one more quick question I want to get to.

Dr. FERRINI-MUNDY. OK.

Mr. GUTHRIE. I apologize for that.

Ms. Oliverio, I wanted to ask you a question about veterans. I served in the military myself. But I think you said to maybe Congresswoman McMorris Rodgers, you said, "Tech will meet veterans where they are and they will diversify themselves." I mean, what does that mean, tech needs to meet veterans where they are?

Ms. OLIVERIO. By more fellowships, apprenticeships, and opportunities for veterans to bridge their skills gap in a field such as coding. Coding is wildly popular, and there is a lot of professional opportunity across corporate America to get a job in coding. But that is one major skill that is not utilized in any branch of service.

Mr. GUTHRIE. And 5 minutes does pass too fast.

[Laughter.]

So, thank you, Madam Chair.

Thank you for your answers.

Ms. SCHAKOWSKY. Now I recognize Congresswoman Kelly for 5 minutes.

Ms. KELLY. Thank you, Madam Chair.

Algorithms are the undercurrent of the internet. So much of what we do online is run by automated machine-learning algorithms. But it has become clear, as we have talked about, that bias of all kinds permeates many of these algorithms.

In his written testimony, Mr. Luckie pointed to several examples of bias output of algorithms. What makes this even more concerning is that, apparently, no one, often not even in the engineers and computer scientists creating the algorithms, really know how these machine-learning algorithms work. All they really know is what datasets are used to train the algorithms and what results come out of the other end. As we often hear, garbage in, garbage out.

Ms. Kim, can you expand on how the decisions made by algorithms can hurt vulnerable communities?

Ms. KIM. Thank you, Congresswoman.

Ms. KELLY. You're welcome.

Ms. KIM. In terms of, again, the specifics of the technical aspects of why things happen, it is upon industry to let us know, have more transparency, and work and engage with us in terms of civil rights organizations and communities of color to let us know why these things are happening.

But, in terms of the examples that have happened, we have seen, for instance, in Oakland, California, the police department using predictive software to send police to neighbors that are more often than not communities of color, regardless of the actual crime rate of those neighborhoods. You see examples again and again like this. And it is upon us, it is our job as civil society organizations to raise these issues to tech companies, but the tech companies must engage, and many have. And we appreciate companies that have engaged in civil rights audits and other opportunities to raise these concerns, and often to raise concerns before they become actual problems. And so, we look forward to additional engagement.

Ms. KELLY. So you feel the companies need to be more proactive?

Ms. KIM. Absolutely.

Ms. KELLY. Mr. Luckie, you said that some of the more major incidents that you listed can result in bad publicity, which can alienate customers, leading to profit loss. Is it fair to say that there are biased outcomes that have not been identified?

Mr. LUCKIE. Absolutely. One of the things about working at Facebook, in particular, is that you don't see the fires that the company has put out before it gets to the public. And there are whole teams that are just working on getting those out of the public eye.

What I will say is that companies like Facebook think about the best possible uses of their platform and not the worst. That is where you see issues like Russia and hackings and privacy, and then, they become issues that they have to fix later down the road.

Ms. KELLY. So, are you saying that companies, again, need to be more proactive and not just reactive—

Mr. LUCKIE. Absolutely. Absolutely.

Ms. KELLY [continuing]. When something happens or when the press is looking?

Mr. LUCKIE. And having more people in the room from different backgrounds will aid in that.

Ms. KELLY. OK. Targeted online advertising has become so sophisticated that advertisers can skirt Federal law by using interests as a proxy for disability, race, or other protected traits. Mr. Luckie, what do platforms need to do to address these loopholes and fight less blatant forms of discrimination?

Mr. LUCKIE. It is really about the education and making sure that that is being disseminated from the top. Too often what is happening is this is happening on a ground level, where employees are fighting the good fight and educating up, rather than that happening top-down. And so, it has to be a priority for leadership and them to be vocal and, also, to hold people accountable in order to make sure that these things aren't happening.

Ms. KELLY. Dr. Turner Lee, do you have anything more to add?

Dr. TURNER LEE. Yes, I would add, the interesting area that we are in, Congresswoman, right now is the fact that we do not have demographic data collected about us by technology companies. And so, what you are suggesting is that use proxies, your zip code,

maybe your profile picture, things that actually are subjective measures to sort of come at your identity. Because a lot of what we see in algorithms are inferential circumstances, right, it is inferring from my purchasing behavior where I visit, who I speak to and connect to, the type of person that I am; therefore, determine the type of product that I might be interested in. Thus, leading to targeted advertising.

I think there is an opportunity here for Congress as well as the tech sector to think about ways to look at how to correct bias. Are there secondary datasets that they can use to sort of ensure, as Mr. Luckie has said, that this algorithm is not going to generate an unintended consequence? Are there cases where they want demographic data and want permission from consumers to collect that, to ensure that the algorithm will not be biased? I think as we go forward those conversations will need to be had.

I think it is also important for customers and consumers to have a feedback loop.

Ms. KELLY. Let me just get my last question in——

Dr. TURNER LEE. Yes.

Ms. KELLY [continuing]. Which you can answer and anybody else. What is the role of the Federal Government? Do Federal laws and guidelines need to be updated to reflect changes in advertising technologies? So, I just wanted to quickly get that.

Dr. TURNER LEE. Yes, and I will be quick. I have said it, and I will keep saying it. I think we need to revisit those nondiscrimination laws and, where they are applicable, apply them to digital space, and maybe not do it in a way that is punitive, but just extend those protections to consumers.

Everything that you have heard around algorithm bias is mitigated through existing guardrails, but I also think that it is important that we have self-regulatory measures where the tech sector sits down with civil society, it has been mentioned, to think through these cases. There are going to be use cases where data will be weaponized against communities of color, against women, against people with disabilities, and we need to find ways to stop that.

Ms. KELLY. Thank you.

Ms. SCHAKOWSKY. Now I recognize Congressman Gianforte for 5 minutes.

Mr. GIANFORTE. Thank you, Madam Chair.

And thank you for the panel today, for your testimony. This is a very important topic.

In our technology business, we found that internship programs and coding classes were effective ways to train and recruit good hires. And I would love to hear from Dr. Ferrini-Mundy. With that in mind, can you please discuss some of the steps your university is taking to engage with the local business community to match up the educational pursuits with the needs in the marketplace?

Dr. FERRINI-MUNDY. Thank you for the question.

We, of course, are situated in Maine, in a rural State like yours. So, we are very, very eager to be certain that we are serving the economic development of the State of Maine with very well-prepared students who will engage that business and industry. And there are a few key fields where this is especially opportune for us

in Maine, in the forest resources industry and agriculture fields, in the marine science areas, for a few. Those fields are all becoming increasingly technological. So, they are not high-tech in the sense that we are discussing here exactly, but they really do depend upon people who will bring the kind of knowledge that we are discussing.

So, we are very eager. We have a number of important internship opportunities. We have an incubator that allows students to work together with companies that are looking to expand and new companies coming into the State. We try to make those real-world problems that these companies are facing a part of the education of our students.

Mr. GIANFORTE. OK. Thank you.

We have been talking a lot today about the shortage of workforce. One of the things we have experimented with—not experiment, we have done it in Montana—was we, particularly in the computer science curriculum, we have introduced a bachelor of arts in computer science versus a bachelor of science——

Dr. FERRINI-MUNDY. Right.

Mr. GIANFORTE [continuing]. To attract more people.

Mr. Guthrie was asking about how do we broaden the net to attract more people into these STEM programs at a college level. Could you just talk to that a little bit, about other things we might try?

Dr. FERRINI-MUNDY. Sure. And I should say that, prior to coming to the University of Maine, I worked at the National Science Foundation for a number of years, and was a part of a variety of conversations there. In part, the NSF has identified something called The Future of Work at the Human-Technology Frontier, as one of its initiatives that is described on their website. And that is a program that is calling for research that will help us to better understand these technological changes that our society is addressing and how we can really better understand what it takes to prepare people to work in these spaces.

So, within computer science, for example, there is a national conversation about what you described, creating the BA in computer science, but also the notion of computer science plus some other field as a kind of major. So, computer science plus biomedical engineering, computer science plus sociology. The idea that we want to advertise to students, the computer sciences is meant to help us solve a very wide range of problems, not only problems that are specifically in some vision of technology that may be an old-fashioned one.

Just one quick last point that I wanted to make relative to the discussion of the algorithms and the algorithmic bias. I do think that a piece of addressing this should be sitting within universities as well, so that researchers are working within machine learning, within AI, to understand and help to shape these algorithms in ways that are consistent with the kind of diversity we are talking about.

Mr. GIANFORTE. Well, I certainly agree with you. It is a truism that computers are here to stay, and I can't imagine any degree that wouldn't benefit——

Dr. FERRINI-MUNDY. Right.

Mr. GIANFORTE [continuing]. Without some minor in computer science——

Dr. FERRINI-MUNDY. Right.

Mr. GIANFORTE [continuing]. Making a better candidate for any job in the marketplace.

Dr. FERRINI-MUNDY. Absolutely.

Mr. GIANFORTE. Yes. Ms. Oliverio, I understand your organization works with veterans. We have the second-highest per capita number of veterans of any State in the country in Montana. Some people might have a difficult time understanding how a ranch hand or a combat veteran might end up in the tech industry, but I believe the key to a good employee is always work ethic and selflessness. I am interested in having you just summarize for me briefly the work that you do to help veterans make that transition into the tech industry.

Ms. OLIVERIO. For us at Military Talent Partners, we believe that everything begins with mentorship, understanding the goals and the purpose and helping veterans and spouses really find their "why" and understand what they want to accomplish in their career. It may have absolutely nothing to do with their job in their service, but by aligning their goals and their purpose, they become empowered to find a meaningful career that is meant for them.

Mr. GIANFORTE. OK. Great.

And just, Ms. Houghton, if I could, I understand some companies exclude people with disabilities. One of the reasons they give is the cost. Can you just comment briefly on how can companies accommodate costs associated with hiring people with disabilities and what impact that really has?

Ms. HOUGHTON. So, I think that that is a myth, and that what we have found and what we have shown with the Accenture data is that it is quite the contrary. For companies that are committed to disability inclusion, they actually four times greater total shareholder returns.

Mr. GIANFORTE. Thank you for your enthusiasm.

With that, I yield back.

Ms. SCHAKOWSKY. Mr. O'Halleran, I recognize you for 5 minutes.

Mr. O'HALLERAN. Thank you, Madam Chair.

And, Panel, I have really appreciated this discussion today.

Mr. Luckie had identified within his written testimony at least that there were 22 percent of rural residents that did not have the high-speed broadband ability to be able to even get prepared for the industry. Whether it is gender bias or racial bias or disability bias or geographic bias, and it really bothers a lot of us on all those fronts, along with our veterans, the bottom line is that it is still human input into this process and somewhere along the line these organizations need to identify that peer review, and input from the community is critically important to be able to get some fairness into the process. I would rather see that done through the companies themselves, and I think that that is the direction we need to go.

I am going to kind of go to the geographical issue right now. Dr. Ferrini-Mundy, you have mentioned a ton of programs at the university, but it gets down to how do we get students from those geographic areas. My district in Arizona has 12 Native American

tribes that make up 24 percent of the district's population. Twenty-some percent of the district population is Hispanic. A tremendous amount of poverty. Arizona is a big State. Sixty percent of the land mass of that State is in my district.

And so, the problem becomes that, when it gets down to just the sheer technology needs, and now that we are going from where we are at now to 5G, I think personally that that is going to put rural America and those areas back further, even though they will get better than what they have, they will lose ground from where people are going to be in urban areas. What is your experience in getting students from those areas, first, into the university, keeping them in the university, and getting them into these programs? Also, we have, obviously, many of those families that the first time they hit the university is the first person from that family ever to get there.

Dr. FERRINI-MUNDY. Right, right. So, I can speak to that in a couple of ways. In the University of Maine, we are actually a part of a university system with several regional campuses across the State, many of them located in extremely rural areas. In fact, one of them, the University of Maine at Machias, is a regional campus of the University of Maine. And so, we are very dependent upon making certain that those campuses, and particularly Machias, are responding to the challenges and issues of that particular geography. It is a coastal area. It is a very economically disadvantaged area. So, we are seeing that campus really thrive as a center for the community, as a way to address issues that are of interest there, to try to build a workforce that can thrive in such areas as healthcare and community services. So, some of this is about customizing what the institutions offer to the regions that are there.

The broadband issue is a serious challenge in Maine. And so, we face that in a variety of ways, working together with the State, with the legislature, to see what kind of progress we can make on that front. Because online opportunities will continue to abound, and we want to be certain that those are accessible to all students.

Mr. O'HALLERAN. How much of a disadvantage is this to those residents and their children from those areas versus urban areas?

Dr. FERRINI-MUNDY. It certainly is a major challenge. That is why at this point we want to be certain that our regional campuses are providing very good opportunities and services, ranging from programs for first-generation college-going students to other kinds of support. But it is a serious problem for us in our State.

Mr. O'HALLERAN. And just a comment towards the end here on our veterans. First of all, it is Women's Month and we need to make sure that—we can't just take 50-some percent of our population and not them have an active high-level role in our society and leaders of our society. But our veterans, again, when you take a look at the training that our service personnel go through, that is a key indicator of leadership in the future, the ability. All they need is that little bit extra to be able to adapt. It is not changing; it is adapting to a new role. We all go through that in life, and we just need to make sure our veterans have that opportunity.

So, thank you for what you are doing.

I yield.

Ms. SCHAKOWSKY. Mr. Carter, you are recognized for 5 minutes.

Mr. CARTER. Thank you, Madam Chairman.

And thank all of you for being here. We appreciate this. This is certainly a very important subject.

I want to start with you, Ms. Ferrini-Mundy. Is that right?

Dr. FERRINI-MUNDY. Yes.

Mr. CARTER. I'm sorry. Thank you.

Obviously, you have got an extensive background in developing policies that would help young people enter into the job market and into new opportunities, particularly as it relates to STEM and particularly as it relates to getting a number of minorities involved, a number of those who don't have the opportunities perhaps that some others do.

Would you agree that there is a major problem in the number of minority communities that have access to these STEM fields and tech-related jobs?

Dr. FERRINI-MUNDY. Certainly if we look at the numbers of minorities well represented in the STEM fields, there is a problem.

Mr. CARTER. Right.

Dr. FERRINI-MUNDY. I mean, those numbers should be tracking at least with representation across the society.

Mr. CARTER. So, let's talk about that for just a second. When you say "STEM," I think we all think of just STEM and more engineering.

Dr. FERRINI-MUNDY. Right.

Mr. CARTER. But there is more to it than that.

Dr. FERRINI-MUNDY. Certainly, certainly.

Mr. CARTER. In the State of Georgia, we have been very successful in building up our film industry through tax credits and different incentives, and through the work of the Georgia State legislature, and particularly the economic development committee in the House and our chairman. Chairman Ron Stephens has done an outstanding job. It has resulted in a lot of opportunities for these type of jobs. It has created a number of jobs.

One of the things that we are very proud of is the Georgia Film Academy. That was established through the State, and it runs through 12 different institutions, through the university system and the technical college system. They offer degrees and certificates, and that is the type of thing.

Can you think of any other examples like this where it necessarily might not be engineering jobs per se, which is I think what we think of when talk about STEM? But it is opportunities, nonetheless, and good opportunities and good-paying jobs.

Dr. FERRINI-MUNDY. I would mention a few areas at least that are relevant for us along these lines in Maine and that do require some combination of background in science, technology, engineering, and mathematics. I will keep putting in plugs for mathematics and statistics as central features for these areas.

But industries such as the forestry industry in the State of Maine or aquaculture, a growing industry in our State, these are industries that do depend on technological solutions to some of the challenges that they face. Agriculture, more generally, is, of course, also facing opportunities with new technologies. So, people with a range of backgrounds really can come together to solve the sorts of

problems that these industries face in States that are particularly suited to particular industries.

Mr. CARTER. Great. And thank you for mentioning timber because Georgia is the No. 1 forestry State in the Nation. That is something that is very important to us as well.

Real quickly, I am going to switch over to you, Ms. Oliverio. I'm sorry. I hope that is OK. But I am very blessed; in the First Congressional District of Georgia we have four military installations. We have a number of veterans. We are home to over 75,000 veterans. Our quality of life and all the things that we enjoy, our environment, lead to a lot of people retiring in our area, particularly after we have four military installations, a lot of them just stay there and retire.

The hiring of veterans, this is something that is very important. A lot of companies in the First District have really capitalized on this and found the veterans to be excellent employees. What are some of the challenges that we face, that veterans have faced, to being hired?

Ms. OLIVERIO. Specifically, to the major Atlanta area, there are a number, a massive number of veterans that want to relocate to that area and to work, and have struggled to find meaningful job opportunities to get in front of the interviews. So, while there is a huge footprint for veterans in that area in the beautiful State of Georgia, we can do better on the messaging on what is available for veterans and how we can better acclimate them into the businesses in that State, and then, therefore, retain them and mitigate turnover issues across the landscape of the corporate build in Georgia, and in specifically Atlanta. But if we can make it more well known as to what is available and welcome them in, we would have a much higher success rate.

Mr. CARTER. Is there anything we can do from a State perspective or from a government perspective as far as certificates, as far as our technical schools are concerned?

Ms. OLIVERIO. Absolutely. I think encouraging mentorships or fellowships or apprenticeships of technical schools is an excellent idea. It is making it known. We create a lot of great programs and ideas, but the word doesn't get out, and it becomes too difficult for people to understand how they can apply to it or how they qualify or how their business will fit into that model. So, by making it more accessible, they can take more advantage.

Mr. CARTER. Great. Well, thank you all very much. This is extremely important.

And thank you, Madam Chair, and I yield back.

Ms. SCHAKOWSKY. Thank you.

And now, I am calling on Congresswoman Blunt Rochester for 5 minutes.

Ms. BLUNT ROCHESTER. Thank you, Madam Chairwoman, and thank you for having this very important panel.

Diversifying and including folks in the tech industry is one that I think all of us on the committee can agree with. I really wanted to use this time to talk about the fact that, whether it is diversifying the workforce or whether it is the products that are being created, if you don't have representation, we don't get a good product. We have already heard the stories of facial recognition that might

not recognize darker-skinned people or voice-enabled devices that have a hard time with accents. And at its worst, we have seen algorithmic bias result in criminal risk assessment software predicting that black offenders were almost twice as likely to reoffend than white offenders, even though their history showed otherwise.

So, it is really vitally important to have this panel. I am grateful to the diversity even of the panel that is represented here and for the work that you do.

My first question is for Dr. Turner Lee. In your written testimony, you mention COMPAS, the AI software used across the country by judges to determine how likely a convicted criminal is to commit more crimes. Can you speak more about the real-world consequences of the bias found in the program?

Dr. TURNER LEE. Thank you, Congresswoman.

Yes. I think as a researcher—and I have a degree in sociology—I think that is a really important use case that deserves some more discussion. What we are talking about in the COMPAS algorithm is the ability of judges to rely upon automated decisionmaking to assess whether or not people should have longer sentences, be released on bail, et cetera. But the challenge with that comes—and I think we have heard it a few times—in the training data. We all know in the criminal justice system that African Americans are more likely to be arrested. They, therefore, are more likely to be populated within this training set. As a result of that, when it comes to sentencing, they are more likely to be penalized or assessed larger penalties because of their overrepresentation there.

That is problematic because what that is suggesting is that we are not taking technology and assessing against settled research, settled stereotypes, or information that we know are assumptions about stereotypes, which brings in, I think, what was discussed around implicit and conscious bias, and it also brings in structural race and the discrimination. Unless we fix those, we, then, develop products that will continue to pick up on those errors.

Ms. BLUNT ROCHESTER. Right.

Dr. TURNER LEE. And so, again, Congressman, you picked up on something that is quite problematic because there are irreparable consequences to being incarcerated longer that we cannot solve.

Ms. BLUNT ROCHESTER. Thank you.

And it leads me to Mr. Lopez. I know you were the longest-serving general counsel at the U.S. EEOC. What role should the EEOC play in all of this? And do you have the tools?

Mr. LOPEZ. Yes. No, I think the EEOC has been very active in terms of collecting the data on the absence of diversity in the high-tech field. It has also held, I believe, three commission meetings which focused on developing information on the use of big datasets as employment screens, which is, I think, one of the more controversial and one of the most important areas in terms of how predictive analytics are now being used as a way to recruit and to select applicants.

And I think what happens is that many of the companies involved in these efforts market them as a way to actually eliminate bias, and that is a possibility. I mean, really big data, data analytics, if used correctly, is not necessarily a bad thing. I don't think any of us are coming here as Neo-Luddites against the technology.

But I think the EEOC has been very active in terms of talking about the problem of bad data in, bad data out, some of the inherent biases in these tools in terms of addressing discrimination.

Ms. BLUNT ROCHESTER. Thank you.

And, Ms. Houghton, I want to briefly say that I was pleased to see the work that you are doing, and I also wanted to reinforce what you said about the statistics for people with disabilities. When you intersect that with being a woman or being a person of color, it is even double. In the last 20 seconds, could you talk about some of the myths that people, particularly employers, have for hiring individuals with disabilities?

Ms. HOUGHTON. I think that that is a great question, Congresswoman. And there are a lot of myths. There are myths that the talent doesn't exist. There are myths that, if I hire these people, that they are going to cost me money, that they are going to sue me, and on and on and on.

Ms. BLUNT ROCHESTER. Great. And I yield the balance of my time.

Ms. SCHAKOWSKY. Mr. Bucshon, you are recognized for 5 minutes.

Mr. BUCSHON. Thank you very much.

My daughter is currently majoring in computer science at Cornell University. She is a junior, and she is primarily in STEM because, when I first came to Congress, I heard all these stories about how we needed more diversity in STEM, which is very true, and we all agree on that, I think. I told her, look, if you want a job, you should probably look at computer science, and she did. So, it is the only kid that has listened to me so far. The rest of them, you know, they won't listen.

[Laughter.]

And she will be interning in a large bank in New York City this summer.

And so, in this discussion I think—and I apologize, I had another hearing—but we a lot of times focus on edge providers like Facebook, Google, Twitter, and other tech companies like that. But, really, these opportunities are growing across all sectors of our economy.

And so, Dr. Ferrini-Mundy, can you explain how universities are working to promote these types of tech opportunities to their students, including, for example, the big banks which are hiring more tech people than they are bankers?

Dr. FERRINI-MUNDY. So, again, I think there are many things universities are doing and can do. One is to make sure that the education that we provide our students both deep and broad enough to enable them to seek those kinds of opportunities.

The second is to continue to work to have internships, apprenticeships, opportunities for students along the way as undergraduates to get access to chances to work in some of these different sectors, and to both show what they bring because of their diversity and their knowledge, and also get a chance to imagine whether they could work there. Those frequently turn into offers at those kinds of companies.

Mr. BUCSHON. Based on American Community Survey-PUMS data, 1.1 percent of people from Indiana have a degree in computer

science. Again to you, diversity is important in all industries, including diversity of ideas and background. Can you provide examples of what efforts universities might be taking to promote STEM degrees like computer science in rural communities? And honestly, I think this may be as applicable to urban settings also, but particularly rural communities that may not have the knowledge of these job opportunities offered in the tech sphere.

Dr. FERRINI-MUNDY. A lot of the examples that I am aware of have to do with working at the K–12 level, to actually go into schools, to create after-school learning opportunities, coding kinds of programs. So that students can get a picture of what it might be like, rural students particularly who may not have a good opportunity to see these options, and then, imagine what they could be in those careers. So that they can follow a pathway that will take them toward an undergraduate major.

Mr. BUCSHON. Dr. Turner Lee, why do you think we are having a discussion about the lack of diversity in tech? I mean, what is your fundamental view about—I mean, why? I think we have answered some of that today and we have given some opinions today. But that is fundamentally why we are here, right? We all believe that diversity is very important, diversity based on like my daughter; she is a woman. And then, what is your view? I mean, fundamentally, when you get really cut to the chase? And what can we do about it?

Dr. TURNER LEE. Yes, I think, fundamentally, we are having this conversation because we are in this fourth Industrial Revolution, right? And this Industrial Revolution has people tethered to technology, and we are seeing the consumption trends sort of amplify itself to the extent to which people who are now consuming these products are not part of the decisionmaking of these products.

And just like we saw in other industries, let's just go back, we saw in the '60s and '70s the same type of diversity programs initiated to bring in more representation, and they made companies better. And so, I think, going forward, we are——

Mr. BUCSHON. Yes, for medicine, for example.

Dr. TURNER LEE. Yes, medicine.

Mr. BUCSHON. I am a doctor. My wife is a doctor.

Dr. TURNER LEE. That is right. Automobiles——

Mr. BUCSHON. Right. If you look back at the '60s, the makeup of people who are physicians was not very diverse, right?

Dr. TURNER LEE. Yes. I just think we are at a turning point, Congressman. I think it is one of those conversations that for years people have been discussing, but, as technology becomes more entrenched and the boundaries between the physical space and the digital space become much more connected, that we are just trying to figure out as a country, for us to be internationally competitive, how do we bring in more diverse perspectives and minds. That is why the diversity of this panel reflects this conversation.

By the same token, we don't want these products that people are depending upon—we are no longer an in-line economy; we are in an online economy—to hurt them or harm them. And that is why we are having a discussion around consumer protection. So, I think that is at the crux of why we are here today.

Mr. BUCSHON. OK. Thank you. I yield back.

Ms. SCHAKOWSKY. Beautiful.

I am calling on Mr. McNerney right now for 5 minutes.

And I just want to say, you are seeing that people are coming back. They really feel that this panel and this discussion is very important.

Mr. McNerney?

Mr. MCNERNEY. Well, thank you. I thank the Chair.

And I thank the witnesses. I apologize for missing most of your testimony.

But, first of all, I want to say I am a mathematician by education. I cochair the Congressional AI Caucus. And I represent a district that is very, very diverse. So, while I am excited about many of the technology innovations that we are witnessing today, I am also concerned that many people will be left behind, and what that means for my district and my constituents.

Specifically, I am worried about how automated decisionmaking can impact my constituents' ability to obtain a loan, to receive social services, to see housing ads, to be promoted in jobs, or even to get consideration for a job in the first place. So, it is clearly critical that the teams designing these products are representative of who the products are going to serve.

Now there is a real need for greater transparency in how these algorithms are produced and the decisionmaking is made. Mr. Lopez, in your written testimony you noted that algorithms are often predicated on data that amplifies, rather than reduces, the already present biases in society, racial, ethnic, and socioeconomic. Can you elaborate on that a little bit, please, and maybe provide an example?

Mr. LOPEZ. I mean, I think a good example would be using social media to advertise for housing opportunities and to limit the advertisement to certain zip codes. Zip codes have traditionally, due to the history of housing segregation in this country, have often been used as a proxy for minority——

Mr. MCNERNEY. So, is that being done by algorithms or by human beings, those decisions, or both?

Mr. LOPEZ. Everything that we are talking about is being done by human beings at the end of the day. I think what happens is that the algorithms—and let me use a different example from the employment context. Let's say there is a correlation between having an interest in manga comic books and being somebody who might be a good computer engineer. This is a real example. But, again, the individuals—it is correlation, not causation—and the individuals that tend to have an interest in manga comic books tend to be men, right? And so, if you start to use that algorithm to select computer engineers, what you do is you sort of reinforce and you replicate, I think, the general systemic exclusion of women.

Mr. MCNERNEY. So, that is an example of why machine learning makes bias more difficult, right?

Mr. LOPEZ. Yes, yes.

Mr. MCNERNEY. Thank you.

Ms. Turner Lee, in your testimony you mentioned that you will be issuing a paper next month addressing a course of developing quality instruments and questions to measure algorithmic bias. Do some of these instruments already exist?

Dr. TURNER LEE. There are some instruments, and I think it has been mentioned that we have seen companies more on the tail end that do audits. The paper that we will be releasing at Brookings is more of a forward-thinking paper, to your point, and it is coming up with questions. Do we need an algorithm for this actual use case? If we do, is there diversity in design? A lot of the questions that you are asking. Are the right people at the table? Is civil society part of the conversation and debate? Is there a feedback loop? I think that is part of the pathway toward more responsible governance over the way that we are constructing algorithms, evaluating, et cetera.

But I do want to suggest to you, Congressman, something in your previous question. I don't want us to put in a bucket that all technologies are acting discriminatory or racist.

Mr. MCNERNEY. Right.

Dr. TURNER LEE. I think the way the technology has been structured and how opaque the internet has become, these algorithms are adapting to our human behavior. So, there are cases where a developer, a technologist, may not say, "I want to flag women for this particular job." But how the internet has actually become layered, it will see the name Mary and assume that Mary is a woman, and populate itself and operate and function pretty much adapting to the historical biases that we have as a society.

Mr. MCNERNEY. Again, that is machine learning, a machine-learning tool.

Dr. TURNER LEE. That is machine learning, yes. And I think the paper that we are going to be putting out is really trying to help companies have a more proactive stance to actually how you look at these conditions and how you look at these teams, and how you look at these outputs, and come up with solutions to do something about it.

Mr. MCNERNEY. Well, you also mention that businesses have taken action to correct bias, such as Facebook and Google, but that was only after a lot of public pressure. Are there examples of companies that have proactively acted or do you think that is a trend that we could expect to see without significant motivation from Congress?

Dr. TURNER LEE. I actually want to say that there are companies that are taking advantage of this. Microsoft is another case where they are actually very proactive in how they design algorithms. They had a case where they put out a voice-activated computation or application that was picking up—it was taking in people's voices and, basically, putting out very antisemitic and racist stuff. They took it off market, right, because the developer did not anticipate those consequences.

So, I think we are seeing a blend, which is why I said previously and put it in my testimony, self-regulation is not a bad idea. It is just a combination of how do we combine that framework with what we already have existing in our resource kit.

Mr. MCNERNEY. Thank you. I yield back.

Ms. SCHAKOWSKY. Mr. Soto, for 5 minutes. Welcome back.

Mr. SOTO. Thank you, Madam Chair.

It was briefly mentioned before, a report came out from the ACLU about new facial recognition technology where they

downloaded 25,000 arrest records, used them against pictures of every current Member of Congress in the last term. There are 28 false matches. People of color made up 20 percent of Congress at that time, more now, by the way. And 40 percent of the false matches were people of color, including legendary civil rights hero John Lewis. Obviously, the software as it stood there would disproportionately target minorities. This is a technology that is being used in my hometown of Orlando, only voluntarily, to track officers to test the technology, but certainly it is something that is concerning for us.

Recently, I got to join Representatives Brenda Lawrence, Ro Khanna, and others, on ethical guidelines for AI development, including transparency and process, empowering women and underrepresented populations, and accountability. So, it really brings up sort of a broader topic of what Congress' role is in being able to address these things.

I will start with Dr. Turner. Some of the algorithmic bias mentioned today is the result of bias datasets, are there practices and procedures that can be implemented to reduce the bias in training data that could be helpful?

Dr. TURNER LEE. Yes, I would say start with overrepresentation, right, of what those faces look like. So, an MIT researcher—and I don't want to butcher her last name, maybe Mr. Luckie can help me—Joy Buolamwini has actually done a lot of studies where she has actually said a lot of facial recognition technologies do not work because they are underrepresented in terms of African Americans or darker skin hues. So, we have to actually populate the training data where it reflects the entire population.

I think part of the problem we have, Congressman, why people don't do that, as a researcher, I am subjected to guidelines when it comes to IRB requirements and human conditions. We are rushed to market when we come to proprietary algorithms, right? It is who gets there first.

And so, I think having some attention to overrepresentation is really important. Also, feedback loops also help with the training data. The paper that we will be releasing will talk a little bit about the technical side. Again, I'm not a computer scientist. I am interested in the civil rights outputs that actually come as a result of that and what legislators should actually be looking for. But I think combining those conversations and having multi-stakeholder conversations is also helpful because the left hand often doesn't know what the right hand is doing.

Mr. SOTO. Thank you.

And for Ms. Kim, what is the role for increased transparency and explainability in reducing algorithmic bias?

Ms. KIM. Thank you, Congressman.

In looking at the decisionmakers within the tech sector, the employees, the professionals, the technicians, as well as the executives that make much of the decisions, we need to have more diversity. And the transparency that we need is more data. We applaud the efforts of companies that voluntarily release diversity data for recruitment, retention, and attrition data.

But, for the AAPI community, that data is incomplete because it is not disaggregated. Our communities are so diverse, and we have

to look beyond the glare of the model minority and say, what is actually going on behind the aggregated number? Yes, there are more Asian tech workers than other minority groups, but, in fact, if you look deeper—and we don't have these numbers, but based on other industries and other Census data and other information, we know that there are communities that have incredibly high poverty rates, low educational attainment levels, and high limited English proficiency levels that don't get represented at educational levels in schools, in other sectors. And so, we need more data and more information and transparency from tech companies, so that we can see what is actually going on underneath that model minority myth of Asian-Americans are doing OK.

Mr. SOTO. Thank you, Ms. Kim.

And I just want to end with sort of a personalized story from my own family. My little cousins, I can't get them off of video games. They are of Puerto Rican descent, like I am. And it turned out that when one of my cousins went into the Air Force, that skill set ended up serving him well to be one of only two people out of two dozen to actually pass the drone aviation course.

And it occurs to me how critical having access to technology at an early age is. When you look at Bill Gates or Bill Joy, or others, the stories go about how they had access to computers early on, and that proved critical in them getting their 10,000 hours ahead of everybody and being able to really change the world. So, those are things that we also will be taking very seriously to get into, access at an early age for young people of all communities.

Thank you, and I yield back.

Ms. SCHAKOWSKY. So, I want to thank our panel, but I also want to see—I spoke to our ranking member. I would like 5 more minutes, and I would welcome her taking 5 more minutes.

Mr. Luckie, we have talked a lot about the pipeline and making sure of the educational system and educational opportunities. But you said something that really struck me. It is that, even where women and minorities, and others that aren't represented in the tech industry, are available, that they still are not hired for those jobs and advancing in the positions. We also see women leaving those jobs earlier than men.

So, rather than blame the victims, you know, you have got to go to school and you have got to take these courses, what are we going to do about—there is obviously some discrimination. I really want to stop here, but ask the rest of the panel, what should we be doing? You have mentioned, Dr. Turner Lee, that there are discrimination laws that are in place. You have talked about the EEOC, Dean Lopez. I mean, what should we be doing, both about the algorithmic bias that is there, but also just about hiring people, investing in people right now?

Mr. LUCKIE. Well, it is like you said, a lot of the onus has been put on the people who are graduating from STEM or who have not heard about STEM to break into these tech companies. But what we are finding is that the stopgap is actually happening within the interview process, where employees are not seeing people who look like them. And so, they are choosing the people who look like them, come from the same backgrounds, come from the same schools, which puts others at a disadvantage. We are seeing it in the dis-

crimination that people face once they are inside of the companies. What is happening is that people are graduating from STEM, but end up choosing other industries because they see the discrimination.

I think the most important point that we should take away from this is that the people who come from diverse backgrounds are the representatives of these companies who go back out into the communities and say, yes, you should be STEM, be in the STEM areas. And so, we have to call on those people to say, hey, we need you to go back to the communities; the people who are coming from Maine and from Texas, and from these locations, to go back and say, you can do this because I am inside of the company now and I am making it work.

Ms. SCHAKOWSKY. I wonder, Dr. Turner Lee, how can we use the current laws to help here?

Dr. TURNER LEE. Yes, I think we have some tools in our toolkit. A lot of the stories that we have heard today, it is not just the one-time action where it happen, but it is this latter consequence.

The former Obama administration was real key about putting out reports on algorithmic bias. It is not a new topic to us. The difference is, as we go over time and we let this evolve, that we are going to find people being denied loans. And I don't think we want to see structural discrimination actually find its place into the internet, which has always been the low-hanging fruit for opportunity.

So, I think what Congress does have at its disposal are tools to have a conversation around nondiscrimination and to see which ways do we extend that. And companies, I think, in the tech sector are starting to realize that. Facebook, in particular, last year pulled down a process that was discriminating in the case of housing, where advertisers were able to click off who they did not want to serve, and they immediately stopped that process. But they didn't realize that the Fair Housing Act was one of the levers for why you shouldn't do that in the first place.

So, I think Congress has an opportunity to have conversations about that, as we have had in the past, as we see these transitions happen. And I also think it is important, just to complement your previous question, Congresswoman, STEM has to be a national priority. This is no longer a conversation of investing in programs. We have to invest in people. And if we invest in people, we will have an international competitive edge on any of these careers, particularly as digital access becomes much more permeated and much more embedded in our society.

Ms. SCHAKOWSKY. There is almost a minute left. Anybody else want to comment on that? Dr. Lopez? Go ahead.

Mr. LOPEZ. Congresswoman, as part of Congress' oversight responsibilities over the agencies, I think there is a real opportunity to ask the relevant agencies, EEOC, HUD, Department of Justice, FTC, anybody operating in this space, what they are doing in this area. And it doesn't, obviously, have to be hostile. I came out of the EEOC. I happen to think that they have been very forward-thinking in this area. They continue to be forward-thinking. But I think that the oversight responsibility and the power of the purse is very important.

Ms. SCHAKOWSKY. Go ahead. And did you say something? Anybody else? OK.

Mr. LUCKIE. I would just like to say, in terms of the larger conversation, that we have to stop treating AI and algorithms as omnipotent, as if they know everything. They are still being programmed by humans, and we need to recognize that in order to curb this bias.

Ms. SCHAKOWSKY. Thank you very much.

Mrs. RODGERS. OK. Madam Chair, I wanted just to follow up on your line of questioning right there.

As I said in my opening statement and opening remarks, part of the challenge here is that it does demand change. It is going to demand change in our culture. A lot of the focus today was on recruitment, and I think that is an important piece of this. We have to focus on the pipeline. That is very foundational. Education is important, skills training, access, and exposure to what is possible. Helping people imagine is important.

We have talked a lot about the value of teams and having teams—Mr. Lopez, in your testimony it says, you highlighted that teams that are made up of individuals of diverse backgrounds are more innovative and generally make more error-free decisions.

I, too, just wanted to take this at the close here to kind of those next steps. So, even after we get some of these individuals hired, what is working as far as the retention and the promotion? Because there are these next steps. We have to do better at retaining these employees, and then, promoting them to leadership positions.

I know I have seen some of the work on women where women respond to the coaching and to giving that feedback. But, often, when they are given a chance for leadership, they shine.

So, I, too, just wanted to open this up at the end and ask, what do you see working when it comes to the retention, and then, the promotion to leadership? And how do we better invest in these people after they are hired?

Do you want to start it, Mr. Luckie?

Mr. LUCKIE. Sure. So, I will say the best thing that is driving retention is the employee resource groups that are in major tech companies and businesses everywhere, where women are helping women, black people are helping black people. Part of the reason why I stayed at Facebook as long as I did is because of the black ad group, which was the employees that were coming together, mentoring each other, exploring other opportunities inside the company. The more you empower those employee resource groups, give them the budget, give them the space in which to operate, the more you are going to see that retention increase within these companies.

Mrs. RODGERS. Thank you. OK.

And so, do you want to——

Dr. FERRINI-MUNDY. Yes, I will just add to that. What Mr. Luckie is explaining has to do with cultures within these environments, and those cultures get built by the people who are there. And so, I would still make my argument that education and the pathways that get provided through education, which include early opportunities to work together in groups, to learn how to be re-

sourceful within particular subgroups, all of that is critical to building that kind of culture.

Mrs. RODGERS. All right. Thank you.

Ms. Kim or whoever is next? Yes?

Dr. TURNER LEE. If I can, in a previous life I worked with the cable industry doing some work. What I found there is that, internally, companies have to have metrics, they have to have accountability, and they also have to have some type of executive support. Without it, it doesn't work.

Where we know diversity and inclusion works is when there are bonuses tied to leadership. We know that it works when the executive claims that this is the only way we are going to actually conduct business, training, et cetera. And those invested resources happen at an internal level.

Obviously, we can't manage what companies do inside, but what we can do—and this is something I think in terms of what is next—is we can place a level of stewardship and responsibility on companies through their reporting, whether it is mandatory or voluntary. There are tons of regulated industries that provide voluntary information and scorecards on how they are doing with diversity. And that is something I think is going to be an acceptable practice going forward, because we, as consumers, want to know that people are doing the right thing. And so, I think, going forward, it is going to take a mix of the internal pressure and the external pressure to actually move to a place of, I want to say peace, where everybody can just get along, but where we actually indulge ourselves in diversity in ways that make us more profitability and much more successful as a country.

Mrs. RODGERS. Thank you.

Do you have any thoughts?

Ms. OLIVERIO. Yes, thank you.

I spent more than 10 years in recruiting all across technical fields, across the U.S. And in any company, in any demographic, in any background, the key to retention is making employees feel like they belong. Much like Mr. Luckie was stating, employee resource groups are amazing, but the core value there is making employees feel valued, making them feel like they belong. That is where veterans and military spouses struggle most to feel like they are a part of a unit again, to feel like they are welcomed in their work environment, that they have reasonable accommodation, and that they belong there. There, they are more likely to stay and to be happy and to do well.

Mrs. RODGERS. Thank you.

Ms. HOUGHTON. In addition to seeing yourself and feeling a sense of belonging, I think one key thing that I want to make sure gets on the record is that, internally, within these companies we need accessible technology. If people are going to grow, technology accessibility has to be built in from the beginning, not as an afterthought.

Mrs. RODGERS. OK. Thank you, everyone.

Ms. SCHAKOWSKY. Thank you so much.

I think this has been a terrific panel and something that we, as a Congress, need to follow up on now. Thank you.

I request unanimous consent to enter the following documents into the record. Where are they? OK. The National Urban League letter on diversity in tech; a letter from the Electronic Privacy Information Center; the Internet Association's letter for the record; testimony from Jennifer Huddleston, research fellow at the Mercatus Center at George Mason University; a letter from Maxine Williams, Facebook's chief diversity officer; statement from Representative Maxine Waters; a blog post and case study from Charter Communications. Is that it?

Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Ms. SCHAKOWSKY. Oh, I have one more page? This? OK.

I would like to thank the witnesses for their participation in today's hearing.

I remind Members that, pursuant to committee rules, they have 10 business days to submit additional questions for the record, to be answered by the witnesses who have appeared. I ask each witness to respond promptly to any such question that you may receive, and you may receive them because a number of people were traveling from different hearings.

So, at this time, the subcommittee is adjourned.

[Whereupon, at 12:46 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

The New York Times

Amazon's Facial Recognition Wrongly Identifies 28 Lawmakers, A.C.L.U. Says

By Natasha Singer

July 26, 2018

Representative John Lewis of Georgia and Representative Bobby L. Rush of Illinois are both Democrats, members of the Congressional Black Caucus and civil rights leaders.

But facial recognition technology made by Amazon, which is being used by some police departments and other organizations, incorrectly matched the lawmakers with people who had been charged with a crime, the American Civil Liberties Union reported on Thursday morning.

The errors emerged as part of a larger test in which the civil liberties group used Amazon's facial software to compare the photos of all federal lawmakers against a database of 25,000 publicly available mug shots. In the test, the Amazon technology incorrectly matched 28 members of Congress with people who had been arrested, amounting to a 5 percent error rate among legislators.

The test disproportionally misidentified African-American and Latino members of Congress as the people in mug shots.

"This test confirms that facial recognition is flawed, biased and dangerous," said Jacob Snow, a technology and civil liberties lawyer with the A.C.L.U. of Northern California.

On Thursday afternoon, three of the misidentified legislators — Senator Edward J. Markey of Massachusetts, Representative Luis V. Gutiérrez of Illinois and Representative Mark DeSaulnier of California, all Democrats — followed up with a letter to Jeff Bezos, the chief executive of Amazon, saying there are "serious questions regarding whether Amazon should be selling its technology to law enforcement at this time."

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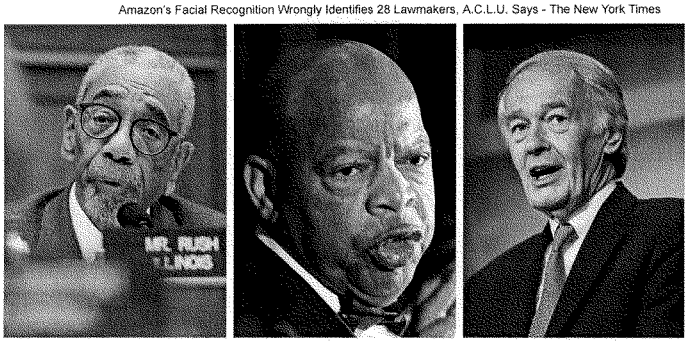
In the letter, the lawmakers asked for details on how Amazon tested its facial technology for accuracy and bias. They also requested a list of all government agencies using Amazon's facial technology as well as all law enforcement and intelligence agencies Amazon had communicated with about the system.



Amazon's facial recognition software falsely matched photos of, from left, Representatives Bobby L. Rush and John Lewis and Senator Edward J. Markey with mug shots of people who had been arrested, according to a report from the American Civil Liberties Union.
Associated Press and Getty Images

Separately, two other congressmen wrongly matched with mug shots — Mr. Lewis and Representative Jimmy Gomez, a California Democrat — wrote their own letter to Mr. Bezos requesting an immediate meeting "to discuss how to address the defects of this technology." The letter was first obtained by BuzzFeed.

Nina Lindsey, an Amazon Web Services spokeswoman, said in a statement that the company's customers had used its facial recognition technology for various beneficial purposes, including preventing human trafficking and reuniting missing children with their families. She added that the A.C.L.U. had used the company's face-matching technology, called Amazon Rekognition, differently during its test than the company recommended for law enforcement customers.

For one thing, she said, police departments do not typically use the software to make fully autonomous decisions about people's identities. "It is worth noting that in real-world scenarios, Amazon Rekognition is almost exclusively used to help narrow the field and allow humans to expeditiously review and consider options using their judgment," Ms. Lindsey said in the statement.

She also noted that the A.C.L.U had used the system's default setting for matches, called a "confidence threshold," of 80 percent. That means the group counted any face matches the system proposed that had a similarity score of 80 percent or more. Amazon itself uses the same percentage in one facial recognition example on its site describing matching an employee's face with a work ID badge. But Ms. Lindsey said Amazon recommended that police departments use a much higher similarity score — 95 percent — to reduce the likelihood of erroneous matches.

Facial recognition — a technology that can be used to identify unknown people in photos or videos without their knowledge or permission — is fast becoming a top target for civil liberties groups and privacy experts.

Proponents see it as a useful tool that can help identify criminals. It was recently used to identify the man charged in the deadly shooting at The Capital Gazette's newsroom in Annapolis, Md.

But civil liberties groups view it as a surveillance system that can inhibit people's ability to participate in political protests or go about their lives anonymously. This month, Microsoft said the technology was too risky for tech companies to deploy without government oversight and called on Congress to regulate it.

Over the last two months, Amazon has come under increasing pressure for selling its Rekognition technology to law enforcement agencies. The company has sold the service as a way for police departments to easily identify suspects in photos or videos.

Amazon's site describes how its system can perform "real-time face recognition across tens of millions of faces" and detect "up to 100 faces in challenging crowded photos." (The New York Times recently used the Amazon technology to help identify guests at the royal wedding of Prince Harry and Meghan Markle.)

In May, two dozen civil liberties groups, led by the A.C.L.U., wrote a letter to Mr. Bezos, demanding that his company stop selling the facial technology to law enforcement. The groups warned that the software could be used to trail protesters, undocumented immigrants or other members of the public — not just criminal suspects.

Similar demands of Mr. Bezos from Amazon employees, Amazon investors, and several hundred academics soon followed.

Mr. Snow of the A.C.L.U. said his group's test of Amazon's software should push Congress to put a moratorium on law enforcement's use of facial recognition technology.

But in a blog post last month, Matt Wood, general manager of artificial intelligence at Amazon Web Services, said that there had been no reports of law enforcement abuse of Amazon's facial technology. He added that Amazon believed it was "the wrong approach to impose a ban on promising new technologies because they might be used by bad actors for nefarious purposes in the future."

In a letter to Amazon, the Congressional Black Caucus noted the potential for racial bias with the technology — an issue raised by a recent M.I.T. study that found some commercial facial recognition systems correctly identified a higher proportion of white men than darker-skinned women. In their letter, the caucus members urged Mr. Bezos to hire "more lawyers, engineers and data scientists of color to assist in properly calibrating this technology to account for racial bias that can lead to inaccuracies with potentially devastating outcomes."

In the civil liberties group's test, the Amazon software misidentified several members of the Congressional Black Caucus, including Mr. Lewis and Mr. Rush, as other people who had been arrested.

"We think these test results really raise the concern that facial recognition has a race problem," said Mr. Snow, the A.C.L.U. lawyer.

A version of this article appears in print on July 27, 2018, on Page B4 of the New York edition with the headline: Tech to Spot Faces Gets It Wrong, Say Lawmakers

National Urban League | ***Empowering Communities. Changing Lives.***

March 6, 2019

Honorable Janice D. Schakowsky
Chair
Subcommittee on Consumer Protection and Commerce
Committee on Energy & Commerce
U.S. House of Representatives
Washington, D.C. 20515

Honorable Cathy M. Rodgers
Ranking Member
Subcommittee on Consumer Protection and Commerce
Committee on Energy & Commerce
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairwoman Schakowsky and Ranking Member Rodgers:

As President and CEO of the National Urban League, and on behalf of its 90 affiliates in 36 states and the District of Columbia, thank you for holding this important hearing on "Diversity and Inclusion in Tech." The National Urban League approaches this issue from the lens of inclusion and equity. Technology is where the jobs of the future are. And technology already has become the primary means through which Americans receive critical services. These services, including social media, education, banking, and healthcare to name a few, are indispensable to economic independence for African American and other communities of color. The National Urban League remains vigilant against our communities being left behind as technology marches relentlessly forward.

It is no secret that the tech industry's history of diversity and inclusion is abysmal. The latest EEO reports filed by Google, Facebook and Twitter show a combined workforce of 41,000 people, where only 1.8 percent were black. This gross marginalization continues to take place, despite African Americans continuing to be avid consumers of digital technology, and over-indexing in social media use. As I stated in the National Urban League's 2018 State of Black America (SOBA) Report, "C-suite executives continuously espouse the gospel of racial and gender diversity and inclusion, but these spaces do not reflect our nations demographic diversity."[1] Technology and how it will include communities of color is so important that the National Urban League, dedicated its entire 2018 SOBA report to this matter, titling the report, "Powering the Digital Revolution." In addition to taking an in-depth look into the state of diversity and inclusion within the tech industry, we went further, but creating a Digital Inclusion Index, to directly measure the extent to which black Americans are being – or as it is, are not, afforded new opportunities in the digital space.

The impact of the tech industry's failure to get serious about diversity goes far beyond lost opportunities for wealth building in African American communities. The lack of inclusion has spilled over into other areas of American society. Without diversity in these companies, no one has sounded alarm bells about the advertising policies of internet platforms, and how they are being used by bad actors to target or exclude African Americans and other historically marginalized communities from the ballot box, affordable housing, and economic opportunity. Without diversity in these companies, algorithms have been designed that create false positives that identify persons with darker complexions as criminals.

[1] Marc H. Morial, "From the President's Desk," Powering the Digital Revolution, State of Black America 2018, 2018, http://soba.iamempowered.com/2018-report

The National Urban League has consistently pressed tech companies to implement meaningful diversity and inclusion policies and has served as a resource to effectuate the changes that must take hold. I have the honor of serving on the Federal Communications Commission's Advisory Committee on Diversity and Digital Empowerment, where I chair a working group of dedicated diversity and inclusion experts who are seeking to provide the industry with best practices, tailored to the tech industry. The National Urban League also works with tech companies to provide guidance on how various policies or products may impact communities of color. We have provided strategic advice in closed door meetings and in coalition with other civil rights and social justice stakeholder groups.

While tech companies have begun to take small steps to address diversity and inclusion, we must continue to demand they do more. This is why we are grateful that you are holding a hearing on this important issue, and we ask that you continue to hold the tech industry to task. Diversity and inclusion are a social good and a business imperative. American competitiveness and standing the world are better when all Americans are included in the workforce.

On behalf of the National Urban League and the more than 2 million Americans we represent, I thank you and look forward to working with your subcommittee and Congress on diversity and inclusion and the many other issues facing the technology industry.

Very truly yours,

Marc H. Morial
President and Chief Executive Officer
National Urban League

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March 5, 2019

The Honorable Janice D. Schakowsky, Chair
The Honorable Cathy McMorris Rodgers, Ranking Member
U.S. House Committee on Energy and Commerce
Subcommittee on Consumer Protection & Commerce
2125 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairwoman Schakowsky and Ranking Member McMorris Rodgers:

We write to you regarding tomorrow's hearing on "Inclusion in Tech: How Diversity Benefits All Americans."[1] EPIC appreciates your timely attention to the key issues of algorithmic decision-making, profiling, and the misuse of personal data.

EPIC is a public-interest research center established in 1994 to focus public attention on emerging privacy and civil liberties issues.[2] EPIC is a leading advocate for consumer privacy and has appeared before this Committee on several occasions.[3] Since 2014, EPIC has promoted "Algorithmic Transparency" to address concerns about bias with AI.[4] This is a core principle in the field of data protection as it helps ensure that automated decisions about individuals are fair, transparent, and accountable. We also believe that Internet firms should be accountable for their business practices and that the Federal Trade Commission could do far more to protect American consumers.

EPIC, Color of Change, the Open Markets Institute and others recently urged the FTC to enforce the Consent Order against Facebook -- but we said more than just fines are necessary.[5] Our groups called for equitable remedies, including reforming hiring and management practices at Facebook. EPIC and others said, "Part of the problem with the company arises also from its failure to hire and maintain a diverse work force. The algorithmic bias of the news feed reflects a

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[1] *Inclusion in Tech: How Diversity Benefits All Americans*, 116th Cong. (2019), H. Comm. on Energy & Commerce, Subcomm. on Consumer Protection & Commerce, https://energycommerce.house.gov/committee-activity/hearings/rescheduled-hearing-on-inclusion-in-tech-how-diversity-benefits-all (Mar. 6, 2019).
[2] EPIC, *About EPIC*, https://epic.org/epic/about.html.
[3] *See, e.g.* Marc Rotenberg, EPIC Executive Director, Testimony before the U.S. House Energy & Commerce Subcommittee on Communications and Technology, *Examining the EU Safe Harbor Decision and Impacts for Transatlantic Data Flows* (November 13, 2015), https://epic.org/privacy/intl/schrems/EPIC-EU-SH-Testimony-HCEC-11-3-final.pdf; Marc Rotenberg, EPIC Executive Director, Testimony before the U.S. House Energy & Commerce Subcommittee on Communications and Technology, *Communications Networks and Consumer Privacy: Recent Developments* (April 23, 2009), https://epic.org/privacy/dpi/rotenberg_HouseCom_4-09.pdf; Letter from EPIC to the U.S. House Committee on Energy and Commerce on FCC Privacy Rules (June 13, 2016), https://epic.org/privacy/consumer/EPIC-FCC-Privacy-Rules.pdf.
[4] EPIC, *Algorithmic Transparency*, https://epic.org/algorithmic-transparency/.
[5] Letter from EPIC et al. to Joseph Simons, Chairman, Federal Trade Comm'n (Jan. 24, 2019), https://epic.org/privacy/facebook/2011-consent-order/US-NGOs-to-FTC-re-FB-Jan-2019.pdf.

predominantly Anglo, male world view."[6] We recommended that the FTC require Facebook to add an independent director who represents the interest of users and also examine the civil rights impacts of Facebook's products and policies. "If the company wishes to connect the world," we said, "it must also be prepared to reflect the world in all of its decision-making."[7]

EPIC also recently joined 43 civil society organizations in a letter calling on Congress to protection civil rights, equity, and equal opportunity in the digital ecosystem.[8] The organizations wrote that any privacy legislation must be consistent with the Civil Rights Principles for the Era of Big Data[9], which include: stop high-tech profiling, ensure fairness in automated decisions, preserve constitutional principles, enhance individual control of personal information, and protect people from inaccurate data. The groups said: "Platforms and other online services should not be permitted to use consumer data to discriminate against protected classes or deny them opportunities in commerce, housing, and employment, or full participation in our democracy."

The Need for Algorithmic Transparency

The use of secret algorithms based on individual data permeates our lives. Concerns about the fairness of automated decision-making are mounting as artificial intelligence is used to determine eligibility for jobs, housing, credit, insurance, and other life necessities.[10] Bias and discrimination are often embedded in these systems yet there is no accountability for their impact. All individuals should have the right to know the basis of an automated decision that concerns them. And there must be independent accountability for automated decisions.

Without knowledge of the factors that provide the basis for decisions, it is impossible to know whether government and companies engage in practices that are deceptive, discriminatory, or unethical. The Pew Research Center recently found that most Americans are opposed to algorithms making decisions with consequences for humans, and 58% think algorithms reflect human bias.[11] Examples of algorithmic errors that have recently been uncovered include:

- Amazon was forced to abandon its artificial intelligence-based recruiting tool after discovering that, based on the data it had "learned" from, it preferred male candidates.[12]
- A Google image matching algorithm identified people of color as "gorillas."[13]

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[6] *Id.*
[7] *Id.*
[8] Letter from Lawyers Comm. for Civil Rights Under Law, EPIC, et al. to The Honorable Frank Pallone, Jr. et al. (Feb. 13, 2019), http://civilrightsdocs.info/pdf/policy/letters/2019/Roundtable-Letter-on-CRBig-Data-Privacy.pdf.
[9] The Leadership Conference on Civil & Human Rights, *Civil Rights Principles for the Era of Big Data*, https://civilrights.org/2014/02/27/civil-rights-principles-era-big-data/.
[10] Danielle Keats Citron & Frank Pasquale, *The Scored Society: Due Process for Automated Predictions*, 89 Wash. L. Rev. 1 (2014).
[11] Pew Research Center, *Public Attitudes Toward Computer Algorithms* (Nov. 2018), http://www.pewinternet.org/2018/11/16/public-attitudes-toward-computer-algorithms/.
[12] Jeffrey Dastin, *Amazon scraps secret AI recruiting tool that showed bias against women*, Reuters (Oct. 9, 2018), https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G.
[13] Maggie Zhang, *Google Photos Tags Two African-Americans As Gorillas Through Facial Recognition Software*, Fortune (July 1, 2015), https://www.forbes.com/sites/mzhang/2015/07/01/google-photos-tags-two-african-americans-as-gorillas-through-facial-recognition-software/.

- Facial recognition software was 34% less accurate for dark-skinned woman than for white men.[14]
- Amazon, Verizon, UPS excluded older workers from job opportunities with ads on Facebook.[15]
- In 2017, Facebook pledged to change its advertising procedures to prevent rental companies from discriminating against tenants based on race, disability, gender, and other characteristics. However, Facebook was sued in 2018 for allegedly still allowing the practice.[16]
- Google searches involving black-sounding names were found to be more likely to display ads suggestive of a criminal record than in searches of white-sounding names.[17]

"Algorithmic Transparency" must be a fundamental principle for consumer protection.[18] The phrase has both literal and figurative dimensions. In the literal sense, it is often necessary to determine the precise factors that contribute to a decision. If, for example, a government agency or private company considers a factor such as race, gender, or religion to produce an adverse decision, then the decision-making process should be subject to scrutiny and the relevant factors identified.

Some have argued that algorithmic transparency is simply impossible, given the complexity and fluidity of modern processes. But if that is true, there must be some way to recapture the purpose of transparency without simply relying on testing inputs and outputs. We have seen recently that it is almost trivial to design programs that evade testing.[19] And central to the science and innovation is the provability of results.

Europeans have long had a right to access "the logic of the processing" concerning their personal information.[20] That principle is reflected in the U.S. in the publication of the FICO score, which for many years remained a black box for consumers, establishing credit worthiness without providing any information about the basis of score.[21]

The continued deployment of AI-based systems raises profound issues for democratic countries. As Professor Frank Pasquale has said:

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[14] Joy Buolamwini, *When the Robot Doesn't See Dark Skin*, N.Y. Times (June 21, 2018), https://www.nytimes.com/2018/06/21/opinion/facial-analysis-technology-bias.html.
[15] Julia Angwin, Noam Scheiber, and Ariana Tobin, *Dozens of Companies Are Using Facebook to Exclude Older Workers From Job Ads*, ProPublica (Dec. 20, 2017), https://www.propublica.org/article/facebook-ads-age-discrimination-targeting.
[16] Julia Angwin and Ariana Tobin, *Fair Housing Groups Sue Facebook for Allowing Discrimination in Housing Ads*, ProPublica (Mar. 27, 2018), https://www.propublica.org/article/facebook-fair-housing-lawsuit-ad-discrimination.
[17] Latanya Sweeney, *Racism is Poisoning Online Ad Delivery, Says Harvard Professor*, MIT Tech. Rev. (Feb. 4, 2013), https://www.technologyreview.com/s/510646/racism-is-poisoning-online-ad-delivery-says-harvard-professor/.
[18] *At UNESCO, Rotenberg Argues for Algorithmic Transparency*, EPIC (Dec. 8, 2015), https://epic.org/2015/12/at-unesco-epics-rotenberg-argu.html.
[19] Jack Ewing, *In '06 Slide Show, a Lesson in How VW Could Cheat*, N.Y. Times, Apr. 27, 2016, at A1.
[20] Directive 95/46/EC—The Data Protection Directive, art 15 (1), 1995, http://www.dataprotection.ie/docs/EU-Directive-95-46-EC--Chapter-2/93.htm.
[21] Hadley Malcom, *Banks Compete on Free Credit Score Offers*, USA Today, Jan. 25, 2015, http://www.usatoday.com/story/money/2015/01/25/banks-free-credit-scores/22011803/.

> Black box services are often wondrous to behold, but our black box society has become dangerously unstable, unfair, and unproductive. Neither New York quants nor California engineers can deliver a sound economy or a secure society. Those are the tasks of a citizenry, which can perform its job only as well as it understands the stakes.[22]

Solutions: Universal Guidelines for Artificial Intelligence

EPIC recommends legislative solutions based on the Universal Guidelines for Artificial Intelligence (UGAI). Over 250 experts (including former world chess champion Garry Kasparov) and 60 associations (including the American Association for the Advancement of Science, the world's leading scientific association) have endorsed the UGAI.[23]

The Universal Guidelines "are intended to maximize the benefits of AI, to minimize the risk, and to ensure the protection of human rights."[24] The "Guidelines should be incorporated into ethical standards, adopted in national law and international agreements, and built into the design of systems." The Guidelines set forth twelve principles to guide the design, development, and deployment of AI. These principles can provide the framework for any successful legislative efforts. Broadly, the guidelines address the rights and obligations of AI systems to ensure 1) fairness, accountability, and transparency; 2) autonomy and human determination; 3) data accuracy and quality; 4) safety and security; and 5) minimization of scope.

Congress should enact legislation, based on the Universal Guidelines for AI, to address concerns about bias and establish accountability for companies who collect personal data.

We ask that this letter be entered in the hearing record. EPIC looks forward to working with the Subcommittee on these issues.

Sincerely,

Marc Rotenberg
Marc Rotenberg
EPIC President

Caitriona Fitzgerald
Caitriona Fitzgerald
EPIC Policy Director

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[22] Frank Pasquale, *The Black Box Society: The Secret Algorithms that Control Money and Information* 218 (Harvard University Press 2015).
[23] A full list of endorsers is available at The Public Voice, *Universal Guidelines for Artificial Intelligence: Endorsement*, https://thepublicvoice.org/AI-universal-guidelines/endorsement.
[24] The Public Voice, *Universal Guidelines for Artificial Intelligence*, https://thepublicvoice.org/AI-universal-guidelines.

Internet Association

The unified voice of the internet economy / www.internetassociation.org / @internetassn

March 5, 2019

Chairwoman Janice D. Schakowsky and Ranking Member Cathy McMorris Rodgers
House Committee on Energy and Commerce
Subcommittee on Consumer Protection & Commerce
2125 Rayburn House Office Building
Washington, D.C. 20515

RE: Hearing on "Inclusion in Tech: How Diversity Benefits All Americans"

Dear Chairwoman Schakowsky and Ranking Member McMorris Rodgers:

Internet Association (IA) welcomes the opportunity to submit this letter for the record regarding the committee's March 6 hearing entitled "Inclusion in Tech: How Diversity Benefits All Americans." IA is the only trade association that exclusively represents leading global internet companies on matters of public policy.

Our mission is to foster innovation, promote economic growth, and empower people through the free and open internet. We believe the internet creates unprecedented benefits for society and the economy, and as the voice of the world's leading internet companies, IA works to ensure that legislators, consumers, and other stakeholders understand these benefits.

IA member companies recognize the importance of improving the diversity of their workforces to better reflect the internet community and society at large. IA members understand that companies with diverse workforces perform more effectively and create more innovative products. A diverse workforce is both a financial and moral imperative.

IA treats diversity and inclusion efforts with the same importance as other policy areas. IA created the role of director of diversity and inclusion policy to assist IA members in engaging with relevant stakeholders, identifying best practices, and creating an industry-wide understanding of the problem and potential solutions. The role also takes a holistic approach to policy, examining its impact on communities of color and communities underrepresented in tech.

Tech companies face a pipeline issue for talent in STEM generally, but it is especially exacerbated for diverse talent. The industry recognizes it must improve the diversity of its workforce and has invested time, money, and people in addressing this issue.

Many internet companies hold themselves accountable by tracking metrics related to workforce diversity, releasing annual reports on diversity and inclusion, and setting goals for the future. The industry has recognized it needs to diversify its workforce and has begun to take the steps to do so. It is also free from the long history of exclusionary practices that mark many traditional American industries like law and finance. It does face challenges, however, because of its geographic concentration. As it has grown, the industry has directly addressed the issue.

The internet industry is also not immune to the impact of the legacy of discrimination in this country or around the world. One of the focuses of this hearing is potential bias in consumer products, which use

algorithms. Bias is largely determined by the type of data and biases in datasets that reflect societal biases. Therefore, it is critical that companies use diverse datasets that are tested for potential bias.

Artificial Intelligence (AI) and the algorithms that fuel AI are not new technologies, but we are at the beginning of a critical turning point. The combination of large amounts of data and increased computing power has made AI more powerful than in previous decades. AI has the potential to have an enormous, positive impact on human society in areas like healthcare, transportation, education, and beyond. However, datasets that contain historical bias risk perpetuating that bias.

IA members value consumer trust and are dedicated to creating products free of bias. Many IA members use some or all of the following practices to eliminate or monitor any potential bias in products:

- Ensure an appropriate level of oversight by having humans review and work with AI and employing ethicists to monitor AI for signs of bias.
- Promote diversity internally by recruiting, developing, and retaining diverse talent and placing AI research centers in underrepresented parts of the world.
- Catch bias early in project planning by having diverse talent manage AI projects.
- Train algorithms with unbiased data by drawing from sufficiently diverse sources and teaching employees to remove bias from data.
- Review algorithm output for bias by auditing output and making it explainable.
- Develop best practices for inclusive AI by establishing industry working groups such as the Partnership on AI.

Access to larger datasets also helps combat bias. Laws like the Open, Public, Electronic, and Necessary (OPEN) Government Data Act, which allows access to government data in a machine-readable format, help to better train systems and assist in reducing bias.

IA supports these efforts as well as efforts to create public-private groups to study these emerging technologies. The benefits of this technology are just being fully understood and policymakers and companies need to ensure unbiased products without stifling innovation.

We look forward to working with the Committee as it examines this complex issue. The industry is committed to a workforce that resembles its users and to creating products that are fair to everyone.

Sincerely,
/s/ Sean Perryman
Sean Perryman
Director of Diversity and Inclusion Policy & Counsel
Internet Association

MERCATUS CENTER
George Mason University

TESTIMONY

THE FREEDOM TO INNOVATE AND ELIMINATING BARRIERS FOR MORE INNOVATORS

Jennifer Huddleston
Research Fellow, Mercatus Center at George Mason University

House Committee on Energy and Commerce, Consumer Protection and Commerce Subcommittee

March 6, 2019

Good morning, Chairwoman Schakowksy, Ranking Member McMorris Rodgers, and distinguished members of the Consumer Protection and Commerce Subcommittee.

My name is Jennifer Huddleston and I am at a research fellow at the Mercatus Center at George Mason University. Thank you for the opportunity to discuss some of the important issues surrounding diversity in technology and innovation. As a former Teach for America corps member who taught elementary school math in the Mississippi Delta, I learned firsthand how important it is to provide *all* students with the necessary skills to excel in the 21st-century workforce. Today I would like to focus on the following three points:

1. Technological innovation, and particularly the internet, has granted unparalleled access to information. This innovation has enormous potential reduce inequality in opportunity.
2. Regulations, even when well intentioned, can actually create barriers and have a negative effect on the very people they were intended to help. Licensing schemes, in particular, can disproportionately deter small entrepreneurs.
3. Similarly, regulations that limit speech will disproportionately burden marginalized communities. Instead, regulations should seek to foster innovation.

THE POSITIVE IMPACT OF TECHNOLOGY AS A TOOL FOR EQUALITY

Technology has been a great equalizer and an incredibly empowering tool particularly for those who might otherwise have limited opportunities. This fact applies not just to America's recent internet age, but also to a variety of tools Americans may no longer consider innovative, such as the tractor and the washing machine.

In 1870, less than 60 percent of school-age children attended public school, but today greater than 90 percent are enrolled.[1] While changing norms and society's placing increased value on education are certainly a key part of the story in this increase, technology played an important role as well in allowing parents to invest in their children, making those children useful beyond household labor. In fact, early tractor ads touted the opportunity to "keep the boy in school—and let a Case Kerosene Tractor take his

[1] Education Policy Institute, "The Landscape of Public Education: A Statistical Portrait Through the Years" (*Epicenter*, April 2011, Virginia Beach, VA, April 2011), 3.

For more information or to meet with the scholar, contact
Mercatus Outreach, 703-993-4930, mercatusoutreach@mercatus.gmu.edu
Mercatus Center at George Mason University, 3434 Washington Blvd., 4th Floor, Arlington, Virginia 22201

The ideas presented in this document do not represent official positions of the Mercatus Center or George Mason University.

place in the field."[2] Similarly, inventions like the washing machine have drastically decreased the amount of time needed to complete household labor chores that fell disproportionately on women and girls.[3] The connection between the availability of such labor-saving technologies and the opportunity for children to become educated is still seen across the globe today, as girls are more likely than boys to be kept out of school in developing countries, in part owing to household labor requirements.[4]

Technology is also being utilized by teachers and school districts to help close the digital divide so that all children are prepared for a 21st-century workforce. Schools that may have limited resources or not enough students to offer are able to use technology to increase opportunities without overly burdening their budgets. By using virtual classrooms and collaborative teleconferencing technology, school districts—particularly those in rural areas—from Mississippi to Maine have been able to offer Advanced Placement classes and STEM classes that they otherwise would not have been able to.[5] Additionally, new and low-cost resources are able to make a wide variety of topics come alive for students. With just a piece of cardboard, a teacher can take his or her students on a virtual field trip around the world, expanding their point of view and inspiring the next wave of innovators.[6] In my time as a teacher in the Mississippi Delta, I saw firsthand how technology could spark new joy in students and inspire them to imagine a brighter future.

The ability of technology to empower people and bridge gaps does not end with formal education. As much as 80 percent of working mothers have said that they are more productive when they are able to utilize flexible work arrangements, many of which have been enabled by technology.[7] Additionally, 75 percent of stay-at-home moms said they would be likely to work if more flexible work arrangements were available to them.[8] Increasing women's ability to work globally would add as much as $12 trillion to the global economy, according to a McKinsey study.[9] As society has seen in the past, innovation can play a key role in increasing this access.

THE NEGATIVE IMPACT OF LICENSING AND REGULATORY SCHEMES

Often regulations intended to protect citizens may backfire by creating more regulatory red tape for those who wishing to innovate. These burdens can harm diversity by having a greater impact on those fewer resources or connections. America has a long history of being a leader in technology, and the freedom to innovate should continue to be a priority.

Regulations can deter entrepreneurship in the digital age when occupational licenses don't allow for businesses to operate across state lines. For example, websites giving dietary advice and retired veterinarians helping pet owners through teleconferencing have found themselves in court fighting government regulations that require state-specific licenses to engage in such speech online.[10] While many of those entrepreneurs have succeeded in challenging these laws, in general such requirements serve a roadblock to entrepreneurs who wish to bring their products to consumers. This is particularly true for women and minorities, who may have fewer resources available when launching their businesses.

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[2] Chelsea Follett, "Technological Progress Freed Kids from Hard Labor," *Human Progress*, July 2, 2018.
[3] Follett, "Technological Progress."
[4] Follett.
[5] Jackie Mader, "Can Online Learning Level the Advanced Placement Playing Field for Rural Kids?," *Mississippi Today*, March 6, 2018.
[6] Jordan Catapano, "Technology in the Classroom: Google's Virtual Field Trips," *TeachHub.com*, n.d.
[7] Katherine Bowers, "How We Flex," *Working Mother*, October 18, 2016.
[8] James Manyika, "Technology, Jobs, and the Future of Work" (Executive Briefing, McKinsey Global Institute, New York City, May 2017).
[9] Jonathan Woetzel et al., "How Advancing Women's Equality Can Add $12 Trillion to Global Growth" (Report, McKinsey Global Institute, New York City, September 2015).
[10] Institute for Justice, "Florida Diet Coaching," accessed February 8, 2019, https://ij.org/case/florida-diet-coaching/; Conor Beck, "Texas Veterinarian Fights for Right to Give Professional Advice," press release, October 2, 2018, https://ij.org/press-release/texas-veterinarian-fights-for-right-to-give-professional-advice/.

Regulations such as licensing regimes often negatively impact women and minorities and can deter entrepreneurship in low-income communities. Occupational licensing costs the average licensee $209 and requires nine months of education.[11] Such regimes affect not just traditionally licensed occupations such as doctor and lawyer; nearly 30 percent of the national workforce needs a license to work.[12] Both historical context and research on contemporary restrictions show that such requirement have a negative impact on women and minorities entering licensed fields.[13]

To foster diversity in technology, America should encourage the next generation to embrace the freedom to innovate; instead, however, young people often face many government barriers that could discourage them from innovating.[14] "Evasive" entrepreneurs behind products many consumers have rapidly embraced, such as ridesharing,[15] homesharing,[16] and dockless scooters,[17] have found themselves faced with costly lawsuits, cease and desist orders, and governments attempting to shoehorn them into existing regulatory schemes. Such efforts prevent innovative alternatives from replacing existing incumbents and limit choices to consumers.[18] Even children may find their lawnmowing business or lemonade stands closed down for failing to comply with licensing requirements.[19] Rather than teaching all children to embrace their entrepreneurial passions and innovate, such requirements instead discourage them by requiring burdensome permission first.

The freedom to innovate has made America place where many of its greatest innovators start from humble beginnings and trillion-dollar companies are begun in a garage. Rather than use regulations, America should look at how to encourage more innovation across communities by removing barriers to entrepreneurship, both online and offline.

THE FREE EXCHANGE OF IDEAS IS VALUABLE AND CREATES OPPORTUNITIES TO HEAR ALL VOICES

One great benefit of the internet has been to allow increasing numbers of people to share their points of view with the world and to allow marginalized groups be heard. While such a broad marketplace of ideas may at times pose challenges and lead to difficult decisions for technology companies trying to navigate discordant cultural values,[20] it is important to maintain the free exchange of ideas online. Free speech is not a partisan issue.

Regulations could prevent the exchange of information or ideas. For example, residents in European countries covered by the General Data Protection Regulation can no longer access US newspapers online.[21] State regulations like the California Consumer Privacy Act could similarly harm the ability of Californians to access varied viewpoints and information when companies are forced to decide between withdrawing their service or paying the millions of dollars in compliance costs.[22]

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[11] Dick M. Carpenter II et al., *License to Work: A National Study of Burdens from Occupational Licensing* (Arlington, VA: Institute for Justice, May 2012).
[12] Carpenter et al.
[13] Matthew D. Mitchell, "Occupational Licensing and the Poor and Disadvantaged" (Mercatus Policy Spotlight, Mercatus Center at George Mason University, Arlington, VA, September 2017).
[14] Adam Thierer and Jennifer Huddleston Skees, "Lemonade Stands and Permits," *The Bridge*, August 20, 2018.
[15] Michael D. Farren, Christopher Koopman, and Matthew D. Mitchell, "Ridesharing vs. Taxis: Rethinking Regulations to Allow for Innovation" (Mercatus on Policy, Mercatus Center at George Mason University, Arlington, VA, May 25, 2017).
[16] Ally Marotti, "Hotel Industry Group Says AirBnB Hosts Running 'Illegal Hotels,'" *Chicago Tribune*, March 9, 2017.
[17] Jennifer Huddleston Skees and Trace Mitchell, "Will the Electric Scooter Movement Lose Its Charge?," *The Bridge*, July 18, 2018.
[18] Farren, Koopman, and Mitchell, "Ridesharing vs. Taxis," 17.
[19] Thierer and Skees, "Lemonade Stands and Permits," 16.
[20] Jason Koebler and Joseph Cox, "The Impossible Job: Inside Facebook's Struggle to Moderate Two Billion People," *Motherboard*, August 23, 2018.
[21] Alanna Petroff, "LA Times Takes Down Website in Europe as Privacy Rules Bite," *CNN Business*, May 25, 2018.
[22] Jennifer Huddleston Skees, "The Problem of Patchwork Privacy," *Technology Liberation Front*, August 15, 2018.

Much like with the occupational licensure regulations discussed previously, these restrictions could disproportionately affect less common viewpoints and more marginalized communities by increasing barriers to entry and making it more likely that unconventional viewpoints are moderated.[23] Smaller companies are less likely to be able to absorb the high costs of compliance and they are unlikely to be able to simply reallocate resources.[24] As a result, newer, better products that could be used to empower individuals and create a more diverse societal discourse with more points of view might never get off the ground. By raising costs, regulations diminish the voices consumers are able to hear and can limit the viewpoints they may be exposed to and the opportunity to have important conversations.[25] When regulations dictate how innovators and intermediaries must handle difficult decisions, society risks losing innovation, ideas, and voices.

The American approach of encouraging innovation and entrepreneurship has resulted in its being a leader in such fields. Today *anyone* could come up with the next great innovation. We should continue to embrace a freedom to innovate rather seek regulation that might limit who that next great innovator could be.

Sincerely,

Jennifer Huddleston
Research Fellow, Mercatus Center at George Mason University

[23] Brent Skorup and Jennifer Huddleston Skees, "It's Not about Facebook, It's about the Next Facebook," *Real Clear Policy*, June 1, 2018.
[24] William Patrick, "Big Tech Could Benefit from Onerous Data Privacy Legislation Experts Say," *Epoch Times*, January 25, 2019.
[25] Adam Thierer, "GDPR Compliance: The Price of Privacy Protections," *Technology Liberation Front*, July 9, 2018.

March 5th, 2019

Honorable Frank Pallone
Chairman, Committee on Energy & Commerce
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515

Honorable Greg Walden
Ranking Member, Committee on Energy & Commerce
U.S. House of Representatives
2322 Rayburn House Office Building
Washington, DC 20515

Honorable Jan Schakowsky
Chair, Subcommittee on Consumer Protection & Commerce
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515

Honorable Cathy McMorris Rodgers
Ranking Member, Subcommittee on Consumer Protection & Commerce
U.S. House of Representatives
2322 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Frank Pallone, Ranking Member Greg Walden, Chairwoman Jan Schakowsky and Ranking Member Cathy McMorris Rodgers,

Diversity and Inclusion—both of our workforce and in the way our products bring value to different communities globally—are critical if Facebook is to achieve its mission of connecting the world and giving everyone the power of voice. We appreciate your holding a hearing on this important subject, and we could not agree more that diversity in the technology industry—and across all sectors of the economy—benefits all Americans.

I'd like to share with you the efforts we've undertaken and built upon since 2014, when we published our first diversity report. This investment to increase the number of people from traditionally underrepresented groups employed at Facebook and to build a truly inclusive environment is all aimed at making our products better serve the people who choose to use them across the globe. These efforts span the employment process, beginning with education and training for underrepresented groups at the pre-secondary, secondary, and post-secondary levels. For immediate impact, we focus on shaping our recruitment, retention and, promotion practices to find, grow and keep as many currently underrepresented people as possible in a respectful and inclusive environment.

facebook

Address: 1 Hacker Way
Menlo Park, CA 94025

Investing in Education

In order to ensure that the next generation of tech innovators better reflects who we all are, it is critical that children from underrepresented communities be exposed to technology and computer science at the pre-secondary education level and engaged in those fields through high school and beyond.

To that end, in 2012, we launched the **Facebook Academy** initiative, a six-week summer internship program for local teens near our headquarters in Menlo Park, California. Through that program, we have enrolled 100 high school students from our local communities.

In 2015, we launched **TechPrep**, a resource hub created specifically for learners from underrepresented groups and their parents and guardians. It not only exposes students to computer science, but also introduces them to hundreds of different resources that fit their needs based on age and skill level. TechPrep is available in both English and Spanish and enables students and their supporters to find local classes, workshops and learning programs just by entering a zip code.

We have created **CodeFWD by Facebook,** a free online education program that helps educators inspire underrepresented and female 4th to 8th grade students to pursue computer programming. Teachers who participate in the program are eligible to receive a free coding robot and a classroom kit to further the learning process. We have participants from 43 states, including the Harlem Children's Zone, the Chicago Youth Center, Boys & Girls Clubs, and Latinitas, a charter school in Texas.

In 2016, we announced a $15 million commitment to **Code.org** over the next five years. This commitment will help Code.org drive the development of curricula, public school teacher-training, and student skills-building, particularly among traditionally underrepresented populations in engineering and computer science.

Beyond the specific programming described above, we are continually investing in opportunities to bring computer science and STEM programming to middle- and high-school aged students.

At the college and university level, we know that if we're going to hire people from a broader range of backgrounds, it's not enough to simply show up for recruiting events. We need to create practical training opportunities for these students to build on their academic experiences.

Facebook University, our longest-running program in this area, is an eight-week paid internship program that enables students from underrepresented communities to get to know Facebook's people, products and services by working across engineering, analytics, product design, operations and global marketing solutions roles. Facebook University has graduated hundreds of students since its inception more than 5 years ago.

We are also investing in partnerships with organizations that contribute to developing the long-term pool of talent such as Girls Who Code, Year Up, Ron Brown Scholars, T Howard Foundation, Posse Foundation, MLT, The Consortium, and Jopwell.

We recently signed a **partnership with CodePath.org,** a non-profit whose goal is to "eliminate educational inequity in technical education starting with college computer science (CS) education". This partnership will help CodePath reach 2,000 more computer science students at over 20 universities to increase students' preparation for the rigor of tech interviews at companies across the U.S. These include community colleges, HSIs, HBCUs, and other institutions that have traditionally attracted students of color.

We recently announced a new pilot program to bring Oculus Go units and virtual reality training to a number of HBCUs across the country, starting with Florida A&M and launching at up to five additional HBCUs by the end of the year. This will put technology and storytelling capability into the hands of students who will work alongside a team of professionals to create virtual campus tours for prospective students, the cost of making a pre-enrollment visit for some of whom is prohibitively expensive. This will not only help recruiting efforts but will also expose students at HBCUs to emerging technology.

Over the next year, we will partner with the **UNCF** to design courses for their **HBCU CS Summer Academy**. We will also continue to co-host the HBCU CS Faculty Institute in partnership with UNCF's Career Pathways Initiative as we have done since 2016. This program offers faculty important professional development opportunities.

In our Boston, New York, and Washington, D.C., offices, we have created **Above and Beyond Computer Science,** a volunteer-led program of Facebook engineers that helps prepare local college students for the technical interview process by reviewing computer science concepts and applied problem solving. Seventy percent of the students who have participated identify as from a population underrepresented in tech. Our focus is now on expanding the size of this initiative, including creating a remote, web-based pilot program.

As part of our **Engineer in Residence Program,** Facebook software engineers teach in-demand computer science coursework at historically Black and Hispanic serving institutions such as Morgan State University and Cal State Monterey Bay and, as of last fall, at the New Jersey Institute of Technology whose student population is highly diverse. In addition to designing and teaching undergraduate computer science coursework customized for each university's unique context, Facebook Engineers in Residence also fulfill the responsibilities of an adjunct faculty member: hosting office hours, grading, managing teaching assistants, facilitating mock interviews, and providing networking and mentoring opportunities for students.

For two years running, Facebook has been the title sponsor of the **ASBC HBCU College Festival**, the nation's largest, organized by the Alfred Street Baptist Church and the ASBC Foundation. During the 2018 festival alone, 2,117 instant offers for admission to HBCUs were made and $4.8 million in scholarships were awarded.

Facebook also actively recruits at HBCUs including Spelman, Morehouse, Howard, North Carolina A&T, and Morgan State as well as HSIs such as Cal State Monterey Bay, University of Puerto Rico, Florida International University, and the University of Central Florida.

Internal Programs to Recruit, Hire, and Retain a Diverse Workforce

Our investments in education are helping put students from underrepresented groups on a path to

careers in computer science and engineering, but those programs alone won't change the diversity of our workforce - and cannot do so immediately. That's why we also have internal programs, initiatives, and processes that are geared toward making sure our workforce is a reflection of the Facebook community. That means recruiting, retaining and promoting people from diverse backgrounds.

On the recruiting side, we've expanded our recruiting team and partnerships with organizations that provide near-term diverse pools of talent, such as HBCUs and HSIs. We're also looking closer to home; we recently hired an economic opportunities manager at our headquarters to help connect local residents to job opportunities at Facebook and with our vendors.

In 2015, we began testing a **diverse slate approach** to hiring, and we have since implemented and expanded it throughout the company. This approach ensures that recruiters present qualified candidates from underrepresented groups to hiring managers looking to fill open roles. As a result, we are all accountable for identifying more diverse candidates during the interview process. We've seen steady increases in hiring rates for underrepresented people since introducing it in 2015.

However, our efforts in recruiting a diverse workforce are only helpful if we are also creating an inclusive and welcoming environment that helps us retain and promote employees with diverse backgrounds. To do so is critical to make sure that all employees have the tools they need to make this a level playing field where everyone can thrive. At Facebook, we believe that understanding and managing unconscious bias—whether it is toward a particular racial group, religion, gender, or political viewpoint—is the most basic ingredient in building stronger, more diverse and inclusive organizations. When our biases are applied unconsciously to the important decisions we make as leaders, managers and individual contributors, they will negatively impact the workplace we strive to create, and prevent us from achieving our company mission. **Managing Bias** is an interactive workshop that gives Facebook employees an opportunity to explore this important issue and develop strategies to surface and counteract bias in the workplace. Facebook feels so strongly about this course that our leaders expect all Facebook employees to complete the training, particularly people managers, team leaders and intern managers.

The second program I want to mention is our **Facebook Resource Groups (FBRGs)**. These groups—which include Latin@, Black@, Women@, Native@ and Pride@, to name a few—provide all Facebook workers, whether on contract or employed full time, with a platform to celebrate culture, connect and engage with colleagues, and support professional development; the groups also often take the lead on Facebook's community engagement efforts with the constituencies they represent. In addition to the FBRG program, there are myriad groups that allow people at Facebook to surface ideas, share their experiences, and find encouragement and support.

Facebook In the World

As a large company that serves a large portion of the world with our products and services, we feel a strong responsibility to focus our energies and invest in ways that help address issues of diversity and inclusion. We do this through business decisions we make about vendors and suppliers, through partnerships we engage in, and through choices we make about how our

services work and impact the people who use them.

On the business side, Facebook launched a **supplier diversity program** in 2016 to help more U.S. firms owned by minorities, women, veterans, LGBTQ people and differently-abled entrepreneurs do business with Facebook and with the people and communities that Facebook connects. In 2017, Facebook spent $233.6 million with certified diverse suppliers, large and small, and across industries. Of that total, more than $145 million, or 62 percent, was spent with minority-owned businesses.

As part of our mission to accelerate the economic impact and success of underrepresented businesses and creators, a group of Black and Latinx employees launched **Level Up,** a program designed specifically for minority-owned businesses, providing training and mentorship from Facebook employees. In its first year, we've hosted training workshops across the U.S. in cities such as Menlo Park, New York, Austin, Miami, and Chicago, training over 350 Black and Latinx-owned businesses.

Facebook is committed to **training 1 million people and small business owners in digital skills** across the US by 2020, building on the partnership we pioneered with Detroit's Grand Circus tech training institute in 2017 and expanding to partnerships with many organization across the U.S., including the Peralta Community Colleges District in Oakland, Miami Dade College, Austin Community College, and Baltimore City Community College. To meet this ambitious goal, we're creating more in-person training programs, offering online classes, and partnering with local and national organizations—including the National Urban League—that will help teach digital skills in their communities.

In addition to a need for digital skills, we know small businesses—especially female-owned and minority-owned small businesses—struggle with gaining **access to capital** to kick-start the early stages of their development. That's why in 2018, as part of the Ignite Buffalo program, we partnered with startup accelerator 43North, to give 27 promising New York area small businesses access to a combined capital infusion of $1 million and 12 months of mentorship. This program will help give local businesses support in reaching the next stage of their development.

We also recognize our broader responsibility to understand the impact the products we develop and the policies we implement have on the multitude of communities we serve.

For example, the opportunity for people and communities around the world to benefit from artificial intelligence is tremendous. But as AI technology increasingly impacts people and society, the academics, industry stakeholders and developers driving these advances need to do so responsibly and ensure AI treats people fairly, protects their safety, respects their privacy, and works for them. In fact, Facebook recently declared its support for Rep. Brenda Lawrence's resolution calling for the ethical development of artificial intelligence, which was also cosponsored by subcommittee members Representatives Darren Soto and Robin Kelly.

Whether it is the impact of AI, the enforcement of our content policies, or the way content is surfaced through News Feed, we want to be sure that our services are free from unconscious bias and are not having a disparate impact on underrepresented groups. In 2017, we asked Laura Murphy, a highly respected civil rights and civil liberties leader, to guide an audit of our platform

and policies. In just the first six months, Laura, working with a number of leading U.S. civil rights organizations, helped us identify the need to expand our policy prohibiting voter suppression, including banning misrepresentations about how to vote and false statements about whether a vote will be counted. As a direct response to feedback from civil rights advocates, we are focusing on voter suppression as a distinct civil rights challenge and will continue this work to be better prepared for future elections. A number of other important concerns have been identified through this process and through additional feedback from the Facebook community.

We know that we need to do more to create a workforce as diverse as the people we serve: to listen, look deeper, and take action. I am personally deeply invested in ensuring that happens.

Sincerely,

/s/ Maxine Williams

Maxine Williams
Chief Diversity Officer
Facebook, Inc.

MAXINE WATERS
MEMBER OF CONGRESS
43RD DISTRICT, CALIFORNIA

COMMITTEE:
FINANCIAL SERVICES
CHAIRWOMAN

Congress of the United States
House of Representatives
Washington, DC 20515-0535

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The Honorable Frank Pallone, Jr.
Chairman
U.S. House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Pallone,

Thank you, Chairwoman Schakowsky, and the House Committee on Energy and Commerce, for convening today's hearing entitled, "Inclusion in Tech: How Diversity Benefits All Americans" and choosing to address this critical issue. I have long served as an advocate for diversity in the private and public sector. As a nation, we are becoming increasingly diverse, both racially and ethnically. The U.S. Census Bureau estimates that more than half of all Americans will belong to a minority group by the year 2044. There is a growing body of research showing a connection between the level of diversity at a company and the strength of its financial performance. As Chairwoman of the Committee on Financial Services, I have most recently pushed for more opportunities for minority communities in the financial services sector through the creation of the Subcommittee on Diversity and Inclusion. Diverse representation in these institutions, and particularly at the management level, is essential to ensure that all consumers have fair access to credit, capital and banking, and financial services. I've found that minorities and women have particularly low representation at the senior management levels within the financial services industry. Unfortunately, women and minorities face a similar reality within the technology sector.

Despite the entire U.S. workforce consisting of roughly equal numbers of men and women, within careers that require a science, technology, engineering or math (STEM) skillset, men outnumber women 4 to 1.[1] This dynamic has worsened since 1985, when approximately 35% of computer science graduates were women, to an unacceptable 17% today.[2] With so few women joining the technology workforce, their presence should be cherished. Unfortunately, the

[1] Forbes.com. (2019). What Everyone Needs To Know About Diversity In Tech. [online] Available at: https://www.forbes.com/sites/quora/2018/10/08/what-everyone-needs-to-know-about-diversity-in-tech/#6103653835ad [Accessed 5 Mar. 2019].
[2] *Id.*

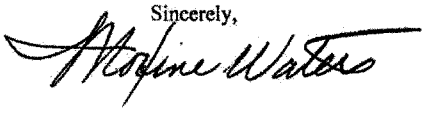
opposite is true: about 41% of women's careers end prematurely due to either a hostile work environment or women earning on average $16,000 less than their male counterparts.[3]

The technology industry also suffers from a lack of representation and a failure to treat diverse employees equally. In 2018, Black and Hispanic individuals in the STEM industries made about $14,000 less than their white coworkers.[4] The lack of representation also mirrors the same concerns I've witnessed in the financial services sector. For example, according to Google's 2018 diversity report, the company's overall workforce was 53% white, 36% Asian, 4% Hispanic, 3% black and less than 1% American Indian or Alaskan Native, and Native Hawaiian or Pacific Islander.[5] These statistics are troubling, particularly in light of the fact that the data continues to show that diversity is not just something that improves our cultural understanding of each other, but also makes smart business sense. According to the American Sociological Association, ethnically diverse teams are 33% more likely to be profitable, while teams that do not have any diversity among their staff are 29% more likely to underperform.[6] The industry and Congress agree that the business case for diversity is clear.

Through the CBCTech2020 initiative, a collaborative effort with Congress, industry, and relevant advocates, the Congressional Black Caucus intends to dramatically improve diversity within the tech industry by the year 2020. Working closely with major tech companies like Facebook and Twitter, I am determined to ensure that all minorities have an opportunity to contribute to the emerging tech industry and the future of the American workforce.

I intend to lead by example and push others in the private and public sector to do the same. We must have these uncomfortable discussions in the light in order to effect change. This is a critical priority for me in the 116th Congress and I pledge to continue to fight to diversify the ranks of companies across the country, from the mailroom to the boardroom. I thank Chairman Pallone, Chairwoman Schakowsky, and the distinguished Members of the Committee on Energy and Commerce for convening this hearing, and for their dedication to this vital effort.

Sincerely,



MAXINE WATERS

MEMBER OF CONGRESS

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[3] Myers, B., Watercutter, A., Parham, J. and McMillan, G. (2019). *Women and Minorities in Tech, By the Numbers*. [online] WIRED. Available at: https://www.wired.com/story/computer-science-graduates-diversity/ [Accessed 5 Mar. 2019].

[4] *Id.*

[5] Brown, D. (2019). 2018 Google Diversity Report. [online] Static.googleusercontent.com. Available at: https://static.googleusercontent.com/media/diversity.google/en//static/pdf/Google_Diversity_annual_report_2018.pdf [Accessed 5 Mar. 2019].

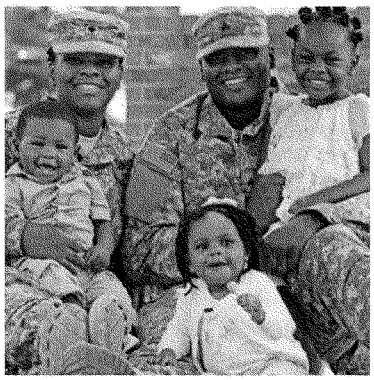
[6] Eaton-Cardone, M. (2019). There's an Economic Case for Diversity in Tech. Do You Know What It Is?. [online] Entrepreneur. Available at: https://www.entrepreneur.com/article/321516 [Accessed 5 Mar. 2019].

https://policy.charter.com/blog/expanding-apprenticeship-program-across-country-hire-veterans/

***Blog** February 27, 2018*

Expanding Apprenticeship Program Across the Country to Hire more Veterans

By Paul Marchand, Executive Vice President, Human Resources

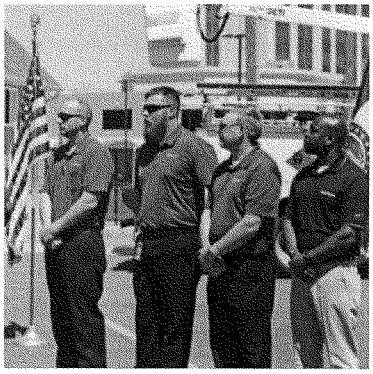


At Charter, we are proud of our progress to date in attracting, hiring and retaining veterans as we consider it to be critical to our success in developing a high-skilled, diverse and insourced workforce to serve our more than 26 million customers in 41 states.

Today, we employ nearly 12,000 veterans which represents almost 12 percent of our total workforce and we've committed to increasing our veteran hiring by five percent by 2020.

We're able to do this through a variety of initiatives and partnerships aimed at attracting and hiring men and women who have served in the armed forces at the end of their service or as they transition to civilian life.

One of our most promising strategies is our Spectrum Broadband Technician Apprenticeship Program which is why we are so pleased to announce has been nationally certified by the U.S. Department of Labor (DOL). This certification gives us the green light to move forward with our newly certified program that will allow us to expand the certification from the five states where it is currently available (North Carolina, South Carolina, Texas, Missouri and Nebraska) to all 41 states in our footprint. And this certification means qualified veterans can obtain their GI Bill benefits while receiving a paycheck from Charter helping ensure a smoother transition to civilian life.



We will begin our expansion efforts in states in which there are military bases located near the markets we serve and where local and regional leaders have expressed an interest in the program. Charter is also actively pursuing the opportunity to work with federal policymakers to leverage the Valor Act and eliminate the need to go state by state in order to roll out our national program more quickly. Our goal is to complete the rollout of the Spectrum Broadband Technician Apprenticeship program across our national footprint in 2020.

Veterans bring a mission-oriented mindset that helps Charter across all lines of business, at all levels of the company, including our executive team. We recognize and value the skills these individuals develop during military service, and our goal is to help them build on

their talents and translate them to a meaningful and viable career with us.

We are excited about what this will mean for veterans and also see opportunities to expand apprenticeships in other key areas of our workforce like engineering or sales. Spectrum customers will see even better service from us as a result of the high-quality employees we can attract through apprenticeship programs like the one we offer for broadband technicians. In the meantime, we are grateful for the new opportunities to work with key military bases and veteran organizations in states across our footprint as we implement the Spectrum Broadband Technician Apprenticeship program and welcome more veterans to our team.

https://policy.charter.com/a-commitment-to-veterans/

Case Study: A Commitment to Veterans

To highlight and help contextualize some off the economic impact findings presented in Oxford Economics" report on Charter

Charter recognizes and values the skills individuals develop during military service. The company's commitment to hiring military veterans has brought significant benefits to both the company and the communities it serves. Across its 41-state footprint, the company's workforce is comprised of nearly 12,000 veterans, totaling 13 percent of all employees.

Charter's goal is to help veterans build on their talents and translate them to a meaningful and viable civilian career within the company. Lisa Tate is a U.S. Navy veteran and Supervisor of Field Operations for the mid-west region at Charter and she has observed that military services sets "a higher expectation" and teaches veterans how to "adapt and overcome."

Others, like Scott Feltmeyer, who serves concurrently in the U.S. Army National Guard while working as a Spectrum Field Technician, feel that the military gives them a "sense of integrity…as well as a sense of duty."

Charter offers its employees the Field Technician Apprenticeship Program, which has been certified by the U.S. Department of Labor, and nationally approved by the Department of Veteran's Affairs for GI Bill benefits under the Valor Act.

Eligible veterans enrolled in the program can receive GI Bill benefits in addition to their regular paycheck from Charter. This combination ensures a smoother transition to civilian life.

Charter is also expanding its recruiting, training, and hiring efforts as part of a commitment to increasing its veteran hiring by an additional 5 percent by 2020.

HEARING BEFORE THE SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE OF THE COMMITTEE ON ENERGY AND COMMERCE U.S. HOUSE OF REPRESENTATIVES

RESPONSE TO ADDITIONAL QUESTIONS

Mark S. Luckie
Digital strategist and former manager at Twitter and Facebook
March 26, 2019

Congressman G. K. Butterfield

1. In your testimony you stated that tech companies often over rely on algorithms while ignoring input from communities of color. How do algorithms affect diversity? What methods would you recommend companies utilize in order to supplement the deficiencies in their algorithms?

Algorithms reflect the people who make them, their perspectives, and biases. When differing world views, abilities, or use cases are not taken into account, this can have an adverse impact on the users of those products.

For example, if a voice recognition device is less likely to understand female voices or those with accents, it may impair those users' ability to interact with the product. Similarly, if an algorithm for a social media product displays images based on what is most shared, this can also surface images of violence rather than positive moments which can have detrimental rippling effects.

These aberrations are more likely to affect demographics that differ from the majority population of tech. This includes women, ethnic minorities, people with disabilities, the elderly and more. There are several steps tech companies can take to counteract the blind spots of algorithms:

- Hire diverse employees with differing perspectives.
- Ensure that products with widespread adoption are tested with the most diverse subset of users possible.
- Introduce cognitive bias training for teams whose work relies on algorithms.
- Add sociologists to the staff to work alongside engineers. Create a path for them to communicate on an ongoing basis a greater understanding of the cultural implications of the work at hand.
- Create an in-product channel for users to report deficiencies and a correlating workflow for product teams to correct them.
- Acknowledge from the start that bias is a factor in algorithms.

Without holding the humans behind the algorithms accountable for their output, we risk creating a world where access to emerging technology is limited to a select few.

Attachment—Additional Questions for the Record

Dr. Joan Ferrini-Mundy, President, University of Maine and University of Maine at Machias

The Honorable Robert E. Latta

1. Dr. Ferrini-Mundy, I want to draw specific attention to your testimony where you speak about diversity powering the changing STEM workplace and how important diversity and inclusiveness are to solving complex problems.

   I recently heard from one of my constituents, Lynn Child, who is the President of CentraComm, an IT security and infrastructure provider in Findlay, Ohio. Drawing from her personal experiences running CentraComm, she indicated that it could be difficult to address emerging cyber threats to businesses and personal data if private companies and public sector officials are unable to explore diverse viewpoints. It is important to avoid groupthink and hire a workforce that can draw on their unique experiences to address problems.

   a. Dr. Ferrini-Mundy, can you talk more about how diversity in the STEM workplace can avoid this problem of groupthink so that we can address the most pressing issues facing our country?

The Honorable Richard Hudson

1. Dr. Ferrini-Mundy, in your testimony you referenced the National Science Foundation's research on "The Future of Work at the Human Technology Frontier". As technology continues to advance it is critical for our workforce to keep pace and evolve alongside technology. The NSF acknowledges the risk we run if the demand for skills is not met by current educational pathways. You cite the need for employers and universities to engage in joint planning to increase diversity in a way that will be mutually beneficial for both parties.
    a. In your experience, how have you been able to develop these relationships with employers to increase diversity and give students real world opportunities in STEM fields?

    b. What have you learned from these engagements that other institutions could take advantage of?

Responses to Congressman G.K. Butterfield

Dr. Nicol Turner Lee, Brookings Institution

Witness, Inclusion in the Tech Sector Hearing, March 6, 2019

1. **Please discuss the ways in which expanding broadband access to rural communities and communities of color influences diversity in STEM and promotes economic opportunity.**

   High-speed broadband access enables people in rural communities to engage the robust digital economy, especially in rural areas which improve quality of life for people of color. In rural communities, the availability of high-speed broadband networks can enable a plethora of applications, including distance learning through online courses and certifications, telemedicine and virtual workforce training. Internet access is also a game changer in the areas of employment and education. Broadband access can also facilitate more robust and real-time connections to caregivers, medical practitioners and others who are responsible for maintaining regular communications with local patients. Online job seekers can find and connect with more diverse job opportunities through telecommuting and videoconferencing, or other online freelance work.

2. **Is there any evidence that a lack of broadband access for children can result in different outcomes with respect to education and job opportunities in adulthood?**

   Fourteen percent of school-age students have access to only one device at home, according to a study conducted by the ACT Center for Equity in Learning. Further, the majority of these youth come from under-served or historically-disadvantaged communities. When broken down by race and geography, 26 percent of American Indians/Alaskan Natives, 22 percent of African Americans, 19 percent of Latinos, and 14 percent of Native Hawaiian/Pacific Islanders have access to one device at home, compared to eight percent of whites and Asians, according to the same study. Among rural residents, 24 percent have access to only one device, compared to 14 percent of people who live in urban areas.

   Broadband access at any age matters and is correlated with educational achievement. Without access, students are not prepared for 21st century jobs, which now require an understanding of new technology. They also continue to reside in digital deserts because they are unable to exercise these skills within our communities due to the lack of opportunities.

   These statistics point to the widening homework gap, where students are disadvantaged because they do not have the critical technology to finish school assignments. Further, when a device is present within the home, there may be other family members seeking to use it, including other siblings. Thus, the trajectory toward poverty continues itself and gets worst because digital access is now equated with being self-sufficient.

   Finally, the quality of broadband service matters for students with in-home access. A report from the Joan Ganz Cooney Center (2016) found that while 94 percent of low-income families had access, they were also subjected to insufficient speeds and bandwidth or unable to maintain the monthly expenses for being connected.

For families who have to often choose between broadband and bread, this juxtaposition furthers inequalities and makes it harder for recovery, especially as digital access defines how individuals live, learn and earn.

3. **How does consistent access to broadband affect the likelihood that an individual will gain the skills necessary to become employed in the technology sector?**

A conversation on the future of work for people of color, especially those with limited online connectivity, is without merit if we don't first work to close the digital divide. According to the Pew Research Center, 13 percent of Americans are still not online, despite the growing adoption and use of online resources and tools. Broadband access allows for increased employment opportunities overall, in and out of the tech industry. Modern day technologies have the ability to import training courses to under-served communities, where there is a mismatch between updated workforce training and available opportunities. When digital access is limited or non-existent, there is a cost to digital inclusion, which maintains the systemic inequalities facing the poor and under-skilled.

4. **In your testimony, you spoke about the important role that historically black colleges and universities (HBCUs) have in preparing minority students for careers in STEM and the challenges that they face moving forward. How does the investment of resources in HBCUs expand the tech workforce pipeline?**

As mentioned in my testimony, it is imperative that Congress provide the relevant appropriations to fund HBCUs. Investments in these institutions not only brings the necessary infrastructure (e.g., computers, printers and internet) to their students, but also enables these institutions to offer more robust courses, which are speaking to existing and emerging job opportunities. HBCUs have been found to graduate more confident and agile students of color. These areas are important in technology fields which will require different task management and leadership skills. In other words, graduates from HBCUs will be in charge of creating, marketing, disseminating, evaluating and in some cases, revamping products and services birthed in the digital economy. As more consumers of color engage the online space, they need professionals, researchers, advocates and others who understand their consumer preferences, lifestyles and needs. Diversity matters in today's digital economy, especially in instances where the internet has dismantled barriers to entry, such as having high levels of capital.

HBCUs are in most need of funding in the areas of research and development, experimental technologies and even public policy, which can position them as a major source of recruitment for tech jobs. Moreover, faculty endowments may help to transform many of these institutions into exemplary centers of excellence, especially if they partner with the tech sector and effectively engage the philanthropic community.

Going to the source of diversity is the first step when filling vacant or under-represented tech jobs. But, expanding the capacity of HBCUs to have the premiere programs for research and design makes for a more spectacular incubator of talent for available digital jobs, especially those in the creator space.

FRANK PALLONE, JR., NEW JERSEY
CHAIRMAN

GREG WALDEN, OREGON
RANKING MEMBER

ONE HUNDRED SIXTEENTH CONGRESS
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Majority (202) 225–2927
Minority (202) 225–3641

March 21, 2019

Ms. Natalie Oliverio
Chief Executive Officer
Military Talent Partners
123 Kramer Dr
Clarksburg, West Virginia 26301

Dear Ms. Oliverio:

Thank you for appearing before the Subcommittee on Consumer Protection and Commerce on Wednesday, March 6, 2019, to testify at the hearing entitled "Inclusion in Tech: How Diversity Benefits All Americans." We appreciate the time and effort you gave as a witness before the Committee on Energy and Commerce.

Pursuant to Rule 3 of the Committee on Energy and Commerce, the hearing record remains open, primarily to permit Members to submit additional questions to the witnesses for their responses. Attached are questions directed to you from certain Members of the Committee. In preparing your answers to these questions, please address your response to the Member who has submitted the question(s) and include the text of the Member's question along with your response. In the event you have been asked questions from more than one Member of the Committee, please begin the responses to each Member on a new page.

To facilitate the printing of the hearing record, your responses to these questions should be received no later than the close of business on April 4, 2019. As previously noted, this transmittal letter and your response(s), as well as the responses from the other witnesses appearing at the hearing, will all be included in the hearing record. Your written responses should be transmitted by e-mail to Chloe Rodriguez, Policy Analyst, at Chloe.Rodriguez@mail.house.gov. Please provide your responses in both Word and PDF document format.

Thank you for your prompt attention to this request. If you need additional information or have other questions, please contact Sharon Davis or Chloe Rodriguez with the Committee staff at (202) 225-2927.

Sincerely,

Jan Schakowsky
Chairwoman
Subcommittee on Consumer
Protection and Commerce

Attachments

cc: The Honorable Frank Pallone, Jr.
Chairman
Committee on Energy and Commerce

The Honorable Greg Walden
Ranking Member
Committee on Energy and Commerce

The Honorable Cathy McMorris Rodgers
Ranking Member
Subcommittee on Consumer Protection and Commerce

Attachment—Additional Questions for the Record

Natalie Oliverio, CEO, Military Talent Partners

The Honorable Richard Hudson

1. Ms. Oliverio, One of the greatest honors of my life is representing the 50,000 service members and their families who are stationed at the Epicenter of the Universe, Fort Bragg, North Carolina. You know very well the unique set of challenges veterans and their families face when transitioning from military service to civilian life.

   A group that I care deeply about is military spouses. I make a point when visiting Fort Bragg to connect with the spouses on each trip. Unfortunately, this group suffers from dramatically high unemployment rates. Between constant moves, navigating deployments, and managing family responsibilities it can be very tough to find reliable work even for highly educated and qualified individuals. This can also lead to difficulties in finding a job once their loved one leaves the service and they have a need to become a two-income household.

   a. In your experience working with spouses, what are some of these obstacles that they face and how can Congress foster a more inclusive environment for them?

   b. How do you think we can better prepare service members and spouses for civilian careers before they leave the military?

[Ms. Oliverio did not answer submitted questions for the record by the time of publication.]

3000 Potomac Avenue, Alexandria, VA 22305
800-706-2710 • info@DisabilityIN.org •DisabilityIN.org

April 4th, 2019

Congress of the United States
House of Representatives
Committee on Energy and Commerce

Jan Schakowsky
Chairwoman
Subcommittee on Consumer Protection and Commerce

Dear Chairwoman Schakowsky,

Thank you for inviting me to testify before the Subcommittee on Consumer Protection and Commerce of the Committee on Energy and Commerce at the hearing entitled, "Inclusion in Tech: How Diversity Benefits All Americans."

I'm grateful the subcommittee includes disability in the definition of diversity. I am happy to answer the follow-up questions for the record in the attachment therein.

If you, or the Subcommittee, has any additional questions, please contact Brian Horn, Executive Vice President of Disability:IN at Brian@DisabilityIN.org.

Sincerely,

Jill Houghton
President and Chief Executive Officer
Disability:IN

Attachments

Congresswoman Kathy Caster

1. How could the tech industry better integrate the needs of individuals with disabilities into their platforms?

Many technology companies are following the principles of "universal design", or put simply, one-size-fits-all. As technology companies, such as Facebook and Amazon, become increasingly ubiquitous, their teams are designing and developing so that the product is universally used. However, universal designs might not involve the participation of excluded communities.

Leaders in technology, such as Microsoft, Adobe, and Google, are integrating the needs of individuals through ***inclusive design***. As OCAD University's Inclusive Design Research Centre defines inclusive design as: "design that considers the full range of human diversity with respect to ability, language, culture, gender, age and other forms of human difference."

Inclusive design, contrary to universal design, was born out of digital environments. In order to implement effective inclusive design, we need designers and developers who have experienced barriers.

The technology industry as a whole should commit to building a culture of inclusion and belonging. Leading technology companies are moving away from a uniform set of individuals with specific competencies, and towards a group of individuals that can work as a team, that each can contribute a diverse perspective.

To start, technology companies should hire more individuals with disabilities. As we lean into April as Autism Acceptance Month, coalitions are forming such as the Autism @ Work Employer Roundtable, a collection of 16 companies sharing best practices on increasing hires of people on the autism spectrum. Companies recognize in order to drive innovation, their culture must be inclusive, and having hiring goals of people with disabilities is a good place to start.

Additional Resources:

"Autism @ Work | Employer Roundtable - Disability:IN." Disability:IN, disabilityin.org/what-we-do/autism-employer-roundtable/.

Holmes, Kat. "The No. 1 Thing You're Getting Wrong about Inclusive Design." Fast Company, Fast Company, 16 Oct. 2018, www.fastcompany.com/90243282/the-no-1-thing-youre-getting-wrong-about-inclusive-design.

The Honorable Robert E. Latta

2. Ms.Houghton, in your written testimony you spoke about inclusion and technological innovation. Can you discuss how different technologies, like self-driving vehicles, can help individuals improve their mobility and promote their inclusion in the community and the workforce?

Self-driving cars open opportunities to people with disabilities and can provide critical transportation so that people with disabilities can find and keep jobs. According to a report released by the Ruderman Family Foundation in 2017, mitigating transportation related obstacles for individuals with disabilities would **enable new employment opportunities for approximately 2 million individuals with disabilities**, and **save $19 billion annually in healthcare expenditures from missed medical appointments.**

As manufacturers plan to build more self-driving cars it is important that they build in accessibility from the beginning. Henry Claypool, an expert on this topic, wrote in a 2018 New York Times Op-Ed, "of course, self-driving vehicles are not the answer to all the accessibility woes… Automakers know that people with disabilities will be important beneficiaries of driverless innovations. But without a mass-produced vehicle designed with universal accessibility features, history will repeat itself and millions will be cut out from the new innovation."

As these technologies rise to help individuals with disabilities that are mobility-related, it's important to guide the role of the private sector and the public sector in providing equitable opportunities. At present time, many public transportation systems, such as the New York City subway, still operate many inaccessible stations.

Should mobility technology such as self-driving cars rise, companies should be aware of access and accessibility. Although ride-sharing has grown considerably, many people with disabilities living outside of populated cities may not have physical access this as a transportation option. Also, if companies choose to price their transportation services higher, it may present financial barriers to people with disabilities. Finally, if mobility technology grows, the platform in which users interact with the company should be accessible itself.

As Miriam Heyman, Ph.D, Senior Program Officer at the Ruderman Family Foundation states: There are almost two million people with disabilities in this country report never leaving their home. We need to organize around our priorities for the design of self-driving cars, to make sure that they are being **designed with users with disabilities in mind**.

Additional Questions for the Record

House Committee on Energy and Commerce
Subcommittee on Consumer Protection and Commerce
Hearing on
"Inclusion in Tech: How Diversity Benefits All Americans"
March 6, 2019

David Lopez
Counsel, Outten and Golden; Co-Dean, Rutgers Law School

The Honorable G. K. Butterfield (D-NC)

1. In my work on diversity and inclusion, I have often spoken about the benefits of diversity, not only for communities of color but for the company itself. How are tech companies uniquely positioned to benefit by harnessing the value of diverseemployees?

RESPONSE: Tech companies provide products central to our daily lives. The largest tech companies leverage large data sets to make predictions about our behavior. These data sets are used for machine learning, predictive analytics and artificial intelligence.[1] Algorithms then process these data sets and information is outputted that is used to screen employees, allocate credit, make policing decisions, and even recognize faces.[2]

As a result of continuous innovation in the tech industry, very large data sets and sophisticated algorithms are being utilized more and more frequently that make observations and predictions about individuals and their likely behaviors, demographics, affiliations and socioeconomic status.[3] The predictive analytics and software created by the tech industry is used by businesses and other organizations to make quick and efficient decisions grounded in their ability to make predictions based on large amounts of data.[4] In certain cases, data is based upon actual demographic information—such as age or gender—and in other cases, companies can actually estimate race and other demographic information based on where individuals live, their online activities and other factors.[5] It is clear that there are many outcomes resulting from using these powerful datasets that are influencing our society, including politics, law, medicine, industry, markets for economic opportunity and our personal lives. They have the potential to expand opportunity for all Americans if used responsibly.

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1 Buolamwini and Gebru, "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification." 81 Proceedings of Machine Learning Research 1 (2018) Conference on Fairness, Accountability, and Transparency, available at https://www.media.mit.edu/publications/gender-shades-intersectional-accuracydisparities-in-commercial-gender-classification/ (last visited March 3, 2019).
2 Best-Rowden, Lacy and Jain, Anil, "Longitudinal Study of Automatic Face Recognition," 40 IEEE Transactions on Pattern Analysis and Machine Intelligence 148 (2017), available at https://ieeexplore.ieee.org/document/7815403 (last visited March 3, 2019).
3 Bogan, Miranda and Rieke, Aaron, "Help Wanted: An Examination of Hiring Algorithms, Equity, and Bias," Upturn (Dec., 2018), available at https://www.upturn.org/reports/2018/hiring-algorithms/ (last visited on March 4, 2019).
3 Bureau of Labor Statistics, "Occupational Outlook Handbook," available at https://www.bls.gov/ooh/computerand-information-technology/computer-and-information-research-scientists.htm (last retrieved March 3, 2019).
4 4 Stephens-Davidowitz, *Everybody Lies: Big Data, New Data and What the Internet Can Tell Us About Who We Really Are* (2017).
5 *Id.*

However, these digital tools present an even greater potential for misuse if they lock in and exacerbate our country's longstanding disparities based on race, gender, and other characteristics.[6] My written testimony, as well as that of other panelists provided numerous examples of these failed efforts likely resulting from the failure to leverage diverse teams. This highlights the need to examine algorithms and big data in the context of their effects on society and the need to have a framework in place that supports its ethical and just use. It illustrates why diverse teams are as important in tech as in any other industry.

As the tech industry is a sector of the labor market that is rapidly increasing in size and influence, it is imperative that it provide significant opportunities for students and workers today and in the future. According to the Bureau of Labor Statistics, an agency within the Department of Labor, computer science jobs are projected to grow 19 percent from 2016 to 2026, much faster than the average for all occupations.[7] There is a huge demand for talent leading to a remarkable opportunity to expand the ranks of people of color and women in the tech industry.[8] As a result, careers related to data science, machine learning, and artificial intelligence offer some of the best opportunities for students.[9] It is difficult to imagine future career paths that would not benefit from an education in collecting, analyzing, summarizing and applying data using computation.

Of course, the ideas of living discrimination free and with equal opportunity are bedrock principles in our society central to social mobility and the American Dream. The elimination of arbitrary barriers based on race, sex, national origin, religion, and disability ensure that hard work matters - that investing in your dreams matters. Diversity and inclusiveness takes us out of our bubbles and destroys stereotypes. It is the right thing to do. Diversity and inclusiveness is good business that could only benefit, not hinder, the tech industry.

2. When tech companies fail to diversify their leadership and workforce, does that affect their likelihood of success?

RESPONSE: Yes. To further flesh out the answer to number 1, tech companies that operate in a bubble lose out on the benefits diversity brings to the decision-making process. As discussed in my written testimony, it is well established that racial, gender and other types of diversity in the workplace has a positive influence on teams.[10] Teams that are made up of individuals of diverse backgrounds are more innovative and generally make more error-free decisions.[11] These

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6 Angwin, Julia, et al., "Machine Bias," ProPublica (May 23, 2016), available at https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing (last visited March 3, 2019).
7 Bureau of Labor Statistics, "Occupational Outlook Handbook," available at https://www.bls.gov/ooh/computerand-information-technology/computer-and-information-research-scientists.htm (last retrieved March 3, 2019).
8 EEOC, "Special Reports, Diversity in High Tech," available at: https://www.eeoc.gov/eeoc/statistics/reports/hightech/ (last retrieved March 3, 2019).
9 Chin, "AI Is the Future—But Where Are the Women?," Wired (Aug. 17, 2018), available at: https://www.wired.com/story/artificial-intelligence-researchers-gender-imbalance/ (last visited March 3, 2019).
10 Hunt, Laton and Prince, "Why diversity matters," McKinsey & Company Jan, 2015), available at: https://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters (last visited March 3, 2019).
11 *Id.*

benefits are particularly relevant in the science, technology, engineering, and mathematics (STEM) fields.[12] Further, there is convincing evidence that increasing diversity in the workplace leads to both higher revenues and increases in innovation. One important study shows that ethnically diverse companies are 35% more likely to outperform their less ethnically diverse competitors and gender diverse companies are 15% more likely to outperform their less gender diverse competitors.[13] Despite this evidence, white men continue to be overrepresented in the technology industry at greater rates than the private sector as a whole.[14]

3. A recent study showed that underrepresented men and women of color are most likely to leave tech jobs due to unfairness. How can companies in the tech sector change their workplace culture to foster an environment that allows their minority employees to thrive?

RESPONSE: It is correct that employee happiness and a sense of fairness are key determinants for retaining talented employees. This is acutely so for diverse employees. A recent national study examined why employees voluntarily leave their jobs in tech.[15] Tech employees from all backgrounds said that their perception of unfairness was the most important factor that drove them to leave a position.[16] The perception of unfairness speaks directly to the culture of the organization. Turnover in any workplace affects the bottom-line but turnover due to perceived unfairness in tech costs the industry $16 billion a year.[17] This factor of perceived unfairness as the impetus for leaving a job was even more profound in minorities and women.

- Underrepresented men of color were most likely to leave due to unfairness (40%);

- Women of all backgrounds experienced and saw considerably more unfair treatment overall than men;

- Unfairness is most prominent in the tech industry: employees in tech companies were considerably more likely to leave due to unfairness than technical employees in other industries (42% vs. 32%). [18]

As also set forth in my written testimony, unfairness in the workplace, even if indirect, will make employees feel unwelcome. A former employee of Google, who is an advocate for the underrepresented, describes her reasons for leaving Google after eleven years as tied into

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12 Godsil, Rachel, "Why Race Matters in Physics Class," 64 UCLA L. Rev. Disc. 40 (2016), available at: https://www.uclalawreview.org/race-matters-physics-class/ (last visited March 3, 2019).
13 Hunt, Laton and Prince, "Why diversity matters," McKinsey & Company Jan, 2015), available at https://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters (last visited March 3, 2019).
14 *Id.*
15 Kapor Center, The 2017 Tech Leavers Study, available at https://www.kaporcenter.org/the-2017-tech-leaversstudy/ (last visited March 3, 2019).
16 *Id.*
17 *Id.*
18 Kapor Center, The 2017 Tech Leavers Study, available at https://www.kaporcenter.org/the-2017-tech-leaversstudy/ (last visited March 3, 2019).

multiple factors of unfairness.[19] She describes a pattern at Google where "management would overstep, rank and file workers would point out how to avoid harm to users, and we'd have a constructive internal dialogue about how to proceed."[20] In addition, she felt she was not promoted in a way that was consistent with her responsibilities. She also describes an escalation of harassment, doxxing, and hate speech in Google internal communications that were silently tolerated.[21]

As discussed in my written testimony, there are several steps employers can take to foster an environment of inclusiveness and genuine opportunity. Yes, there is much to do on issues of infrastructure to ensure a diverse pipeline into high tech and develop the next generation of tech entrepreneurs, engineers, and employees to tackle amazingly complex work with serious attentiveness to the values of fairness, opportunity, privacy, and competition. At the same time, the need to develop the pipeline must not be an excuse for companies to ignore the critical need for companies to act now on issues of opportunity and fairness.

First, embedding equality into the core values of a company, means ensuring employment practices, from recruitment to hiring and promotion, reinforce this value. This always starts with leadership at the top. Assess current obstacles. Often barriers can be subtle, so it is essential to collect and analyze data to see if seemingly neutral policies may disadvantage certain demographic groups. Be willing to rethink how the company works to increase flexibility, invest in skill development to ensure pathways to advancement, and create mentoring, sponsorship, and support networks.

What leads employees to believe that they can be successful in advancing to the highest levels of an organization? Research shows that it is workplace culture and practices. Does the company authentically value diversity? Does maternity leave undermine advancement? Are different leadership styles embraced? These external factors at a company weigh twice as heavily in a woman's confidence she will reach top management, compared to individual initiative, such as communicating one's own ambitions, asking for promotions, and seeking out opportunities.[22]

Organizational leadership matters. When organizational leaders create systems for hiring, setting pay, or promotions that focus managers on the job-related skills and behaviors needed for success, they ensure all talent is used fully. Corporate diversity task forces can also be used to promote social accountability. These task forces would be comprised of department heads and members of different minorities and they would be tasked with promoting events to bring awareness to diversity and inclusion in the workplace, engaging teams in diversity and

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19 Fong-Jones, Liz, "Google Workers Lost a Leader, But the Fight Will Continue," Medium (Feb. 13, 2019) available at https://medium.com/s/story/google-workers-lost-a-leader-but-the-fight-will-continue-c487aa5fd2ba (last retrieved March 4, 2019).
20 *Id.*
21 *Id.*
22 Dwyer Gunn, "These five tech companies are trying to solve Silicon Valley's diversity problem," The Guardian, Jun 6, 2016, available: https://www.theguardian.com/sustainable-business/2016/jun/06/silicon-valley-diversityproblem-tech-industry-solutions.

inclusion conversation, and reviewing and proposing policies and procedures to promote workplace diversity and inclusion.[23]

Research shows that team diversity leads to greater innovation and better decisionmaking. Studies have also established a correlation to stronger company performance. Female directors change boardroom conversations in other important ways. A Harvard survey found they are more likely than their male counterparts to say that social issues such as human rights (38% vs. 25%), climate change (27% vs. 13%), and income equality (22% vs. 14%) should play a role in corporate strategy.[24] Female directors may also be better positioned to reflect the views of the women who make up a large percentage of customers, shareholders and employees.[25]

Additionally, organizations should cast a wide net in the search for talent. Many top companies now hire from only certain select universities, and are tapping into only 1% of the talent pool. Many students who may not have the "perfect" resume from a top university, have overcome significant obstacles and have the grit and experience to contribute great value.

Notably, female and non-white directors now joining corporate boards have notably different backgrounds than their white male peers. They are more likely to be serving for the first time and less likely to be current or former CEOs. New women directors tend to have more finance, technology and consumer experience than male directors, according to Spencer Stuart's 2018 Board Index.[26] To recruit more diverse candidates, boards have had to cast a wider net and focus on skills and experience rather than the titles candidates have held.[27]

Look also at whether your hiring practices create opportunities for workers with disabilities as well as older workers. Think of how subjective and informal networks create opportunities for hire and advancement, and evaluate whether these networks might work against underrepresented communities without the same access.

Companies should consider providing training to improve employees' attitudes toward diversity. Perspective-taking exercises, for example, ask participants to mentally walk in somebody else's shoes. Goal adapting exercises ask participants to set specific goals related to diversity in the workplace like challenging inappropriate comments that are overheard and response training for such incidents.[28] Companies should also create formalized mentoring programs can provide a mechanism for managers to work directly with an assigned employee which can help minorities who may need greater assistance finding a mentor.[29]

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23 Andrea K. Douglas, *Diversity in Tech, What Employers Can Do Now,* The National Law Review, June 1, 2018, available at https://www.natlawreview.com/article/diversity-tech-what-employers-can-do-now.
24 Paula Loop, Paul DeNicola, *You've Committed to Increasing Gender Diversity on Your Board. Here's How to Make it Happen,* Harvard Business Review, available at https://hbr.org/2019/02/youve-committed-to-increasinggender-diversity-on-your-board-heres-how-to-make-it-happen.
25 *Id.*
26 *Id.*
27 *Id.*
28 Andrea K. Douglas, *Diversity in Tech, What Employers Can Do Now,* The National Law Review, June 1, 2018, available at https://www.natlawreview.com/article/diversity-tech-what-employers-can-do-now.
29 *Id.*

Last, companies should evaluate whether the benefits appeal to all demographic groups. Perks like free dinner might be appealing for a young single person, but a parent who prioritizes meals at home may place greater emphasis on retirement savings options. Do parental leave policies allow both women and men to take the same amount of time off to bond with a new child? Are leave and telework policies in place to support parents, other caregivers, as well as people with disabilities?

4. What role does implicit bias play in shaping the culture of tech companies? How does implicit bias affect the likelihood of advancement for minority employees in the tech sector?

RESPONSE: Despite many large tech companies actively trying to increase the diversity of their workforce, there are still factors at play leading to sub-optimal results that need to be discovered and ameliorated. Most of the factors identified so far that help with understanding why lack of diversity remains a problem point to the problem of the less conscious type of bias, "implicit bias" in the hiring and employment context.

The science of implicit bias is recognized as the automatic associations of stereotypes or attitudes about particular groups. In our current society where overt efforts have been made to eliminate more obvious forms of discrimination, implicit bias has emerged in the public discourse to explain more subtle types of discrimination. People can have conscious values that are still betrayed by their implicit biases. Implicit biases are frequently better at predicting discriminatory behavior than people's conscious values and intentions.[30] One study demonstrated implicit bias by showing that resumes with more "White" names received requests for interviews 50% more frequently that the same resume with a more "African-American" name.[31] Continued implicit bias offers one explanation for the continued lack of diversity in many high-tech companies despite their attempts to increase diversity.

Additionally, a number of recent studies suggest that isolation and bias influence women leaving STEM careers. Often, it is not simply the choices that employees make that influence career advancement, but it is the workplace environment that drives access to opportunity.

Training and awareness about the role of implicit bias can be an important first step. But more needs to be done. It cannot be a one-off. Efforts to advance diversity cannot be just a check box for legal compliance – equality must be a fundamental value of the organization. To have a tangible impact in expanding opportunity, it takes leadership and a coherent series of actions and systems to drive inclusive behaviors. And we see the most progress when there is leadership diversity as well as a commitment to hiring from a broad range of backgrounds.

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30 Godsil, Rachel et. al,, ADDRESSING IMPLICIT BIAS, RACIAL ANXIETY, AND STEREOTYPE THREAT IN EDUCATION AND HEALTH CARE, THE SCIENCE OF EQUALITY, VOLUME 1 (Nov. 2014) , available at http://perception.org/wp-content/uploads/2014/11/Science-of-Equality.pdf (last visited March 3, 2019).

31 Bertrand and Mullainathan, "Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination," 94 The American Economic Review 991 (Sep., 2004), available at https://www2.econ.iastate.edu/classes/econ321/orazem/bertrand_emily.pdf (last visited March 3, 2019).

The following are some ways to reduce implicit bias in the workplace. Employers should try to standardize the interview process and minimize bias by employing, for example, interview scorecards that grade candidates' responses to each question on a predetermined scale.[32] Structured interviews where each candidate is asked the same set of defined questions helps to minimize bias by focusing on the factors that impact performance.[33] Employers can also give work sample tests to mimic the kinds of tasks that candidates will be doing as this would be the best indicator of future job performance.[34] Using a blind, systematic process for reviewing applications and resumes that perhaps hides names, could also help in finding the best candidates without the implicit bias that comes associated with names or last names.[35] Lastly, companies should set out diversity goals and at the end of every hiring process, they should track and assess how well they have performed in their effort to reach these goals.[36]

It is important to recall bias often occurs along a spectrum and, not a day passes without the smart phone documenting some other racist rant going viral with the help of social media. As civil rights practitioners know, this raises questions as to where an act may fall on the spectrum of unconscious bias to overt but unspoken discrimination and stereotypes. These data points open the door for a broader, sometimes difficult, discussion about the critical steps we should take as a society to counter harmful and hateful stereotypes, overt and unconscious.

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32 Iris Bohnet, "How to Take the Bias Out of Interviews," Harvard Business Review, April 18, 2016, available at: https://hbr.org/2016/04/how-to-take-the-bias-out-ofinterviews?utm_campaign=harvardbiz&utm_source=twitter&utm_medium=social.
33 *Id.*
34 John Bateson, Jochen Wirtz, Eugene Burke, and Carly Vaughan, When Hiring, First Test, and Then Interview, Harvard Business Review, Nov. 2013, available at: https://hbr.org/2013/11/when-hiring-first-test-and-theninterview.
35 Jack B. Soll, kathering L. Milkman, and John W. Payne, "Outsmart Your Own Biases," Harvard Business Review, May 2015, available at https://hbr.org/2015/05/outsmart-your-own-biases.
36 Rebecca Knight, "7 Practical Ways to Reduce Bias in Your Hiring Process," Harvard Business Review, June 12, 2017, available at https://hbr.org/2017/06/7-practical-ways-to-reduce-bias-in-your-hiring-process.