Success Act Public Hearing at San Jose USPTO Office

June 3, 2019

Testimony of Hattie Carwell

Good Morning,

My name is Hattie Carwell and I am here to provide testimony that identifies the socioeconomic benefits of the Success Act and to provide concrete ideas to increase the participation of women, veterans and minorities, in particular, to apply and receive patents. Thank you for this opportunity to testify. I heard about the hearing just a few days ago from a dedicated USPTO employee.

I am Co-founder and President of the Coalition of Hispanic, African and Native Americans for the Next Generation of Engineers (CHANGES), and Executive Director of the Museum of African American Technology (MAAT) Science Village. I am a health physicist by professional training and I have worked nationally and internationally for the US Department of Energy, and the International Atomic Energy Agency. From 2010-2011, I also served as President of the National Technical Association (NTA).

The mission of CHANGES is to bring to bear the collective influence of Hispanic, African American, and American Indian in STEM and architecture to broaden participation of minorities in STEM and architecture; specifically by encouraging scientific and technical excellence, fostering workforce development and inclusion, and developing policies and programs that promote workforce diversity in science and engineering. CHANGES is a coalition of 15 minority technical professional organizations (MTOs) and its goals are two-fold:

1. To elevate the national visibility and influence of the member organizations in the development of STEM research, policy and educational programs.

2. To strengthen our member organizations' programs and finances in support of the next generation of scientists and engineers from diverse backgrounds, as well as the current population of under-represented minority technical professionals. More information about the organization can be found at (www.changescoalition.org).

The mission of the MAAT Science Village is to make available to the public information about the technical contributions of African American Engineers and Scientists. The Museum's goals are to make the public aware of the significance of the African American ingenuity and the impact it has had and continues to have on the economic development of the United States; and to increase the numbers of minorities in the STEM workforce through minority youth motivation to continue the legacy.

Both of these organizations are not strangers to the USPTO. For 10 years, I served on the Selection Committee which decided on inductees for the National Inventors Hall Fame.

USPTO is a major sponsor of the organization and houses the Inventors Hall of Fame Museum. I have nominated minority candidates who received the Presidential National Medal of Technology and Innovation. The USPTO oversees the review process. In addition, the USPTO has provided CHANGES meeting space. In 2016, the USPTO also served as the venue for the National Technical Association (NTA) 90th Anniversary celebration of member inventors. NTA is one of the member organizations of CHANGES. MAAT Science Village prepared the presentation on NTA inventors.

The purpose of my testimony is to express the urgent need for the Federal Government to intensify its efforts to expand the development of the human capital of women and veterans and minorities, in particular, in STEM fields through increased financial support of our programs designed to increase the numbers. The objectives of the Success Act fall within our purview. Because I only had a few days to prepare comments, my comments are limited. I will take advantage of the June 30th deadline for written comments to add to today's testimony as deemed necessary.

I will address the following issues in the Federal Registry Hearing announcement:

1. Sources available to identify minority inventors.
2. The impact of education and professional circumstances, and how socioeconomic factors facilitate or hinder the ability of women, minorities, and veterans to apply for and obtain patents or to pursue entrepreneurial activities.
3. The social and private benefits that result from increasing the number of patents applied for and obtained by women, minorities, and veterans, as well as small businesses owned by these groups; I will provide insights on the impact of educational, professional circumstances,. In addition, I will identify some institutions and entities that should play an active role in promoting the participation of minorities, in particular, women and veterans in the patent system and entrepreneurial activities.

Further my testimony will identify some public policies, funding needs for programs that the Federal Government should develop and implement to promote the participation of women, minorities, and veterans in the patent process and commercialization of products that fuel the US economic and increase its global competiveness.

Data available on Minority Inventors

The vast majority of the information available about minority inventors is contained in biographies or listed in tables found in books, presentations, or on internet sites. The information has been primarily generated by minorities themselves. The one historical study commissioned by the USPTO to determine the number African American patentees was researched and published by Henry Baker, an African American patent examiner in 1913. It is only in recent years that others have taken an interest in minority contributions to American ingenuity and economic growth and development. Continuing and expanding the African American legacy is vital and critical to secure America's economic future.

The number of publications which can be utilized to identify minority inventors is diverse, but the information is dispersed among many documents. Few studies other than the 1913 USPTO publications contain quantitative data. Some are minority technical publications that indicate names of inventors and some patent numbers. Such resources would require patent search by name to verify all patents obtained by an individual followed by consolidation of information collected across publications. Some inventors may have more than100 patents. For example Dr. Marian Croak has over 200 patents with others pending. It is not clear whether the number of inventors vs the number of inventions provide the best indicator of the level of participation of minorities in the patent system. Probably both types of data are needed to make the determination.

The frequency of the publications varies and the publications do not always include information on inventors. Information may appear as a special feature in a publication. Some publications are Award Recognition Programs and distributed at the time of the program event. Examples of such publications are: US Black Engineer Magazine; National Technical Association (NTA) Journal; National Society of Black Engineer Golden Torch Award Programs; National Organization for the Professional Advancement for Black Engineers (NOBCChE); Conference and Award Programs to name a few. Many minorities inventors are members are known by members of the 40+ minority technical societies (African and Native Americans and Hispanic). Often newsletters (hardcopy and electronic) report information about patents obtain by members. The collective membership these of these organization is over 100,000.

HBCUs Records on Patents obtained from Research and Development work

HBCUs, especially those with science entrepreneurship and innovation programs have records on inventions resulting from their programs. The White House Initiative on HBCUs Program should be helpful in identifying the HBCUs to contact**.** Also, the data on the top HBCUs federally funded for Research and Development are readily available at NSF website https://www.nsf.gov/awardsearch/advancedSearch.jsp and NIH:https://projectreporter.nih.gov

A 2017 review of the eleven (11) HBCUs which are Carnegie-Classified as 'R2 –High Research Activity' found that there were 92 patents granted to those institutions to date, which pales in comparison to majority research institutions of higher education with the same Carnegie classification (from the Carnegie Classification of Institutions of Higher Education)

Biographical References;

Examples- Who's Who Among African Americans; African Americans in Science and Medicine; books by Patricia Sluby –Creativity and Inventions: The Genius of Afro-

Americans and Women in the United States and their Patents. The Genius of African Americans: Patented Ingenuity (2004); The Entrepreneurial Spirit of African American inventors (2011). Sluby is a former registered patent agent; former patent examiner of USPTO and former President of the National Intellectual Property Law Association.

Suggestion for Generation of Data in the Absence of Available Data

In the absent of existing publicly available data on the numbers of women, minorities, and veterans who have received patents, data can be generated by writing a computer program to match names in the US Patent database with names from the 2010 Census Database that have been sorted by race, ethnicity or gender. This approach would not capture information on the number of applications. According to the computer programmer whom I consulted, the program can be written within a week and the data desired can be obtained within a day. It is recognized that the available census data would be 9 years old. However, going forward, adding questions to the 2020 US may be a way to capture the needed information.

The impact of education and professional circumstances, and how socioeconomic factors facilitate or hinder the ability of women, veterans and minorities, in particular to apply for and obtain patents or to pursue entrepreneurial activities

The degree of technical know-how, skill and experience determines the level at which anyone can participate in technical innovation. It will dictate the extent a person's creativity can be applied. Unfortunately, many creative people: minority, woman and veterans lack the educational background, skill and experience needed and are not sure how to acquire the appropriate preparation. They may not even be aware of opportunities. I heard many minorities say that they only became aware of technical opportunities as a result of military service. That is when they discovered their aptitude for technical work. They are at a disadvantage. Their talent and contributions are not developed and do not materialize or are under-developed. They lose out on chances to realize their full potential and a chance to maximize their contributions to the growth of the nation and share the wealth generated by innovation. Far too often minorities, women and veterans fall into this situation. Many times even with education, skill, professional circumstances are not conducive to maximize productivity. Opportunities to perform and gain experience have to be afforded to minorities, women and veterans. Workforce environment must be diverse and inclusive. Currently substantial improvements are needed. One major need is more diversity in management and policymakers who are culturally sensitive, and understand how to nurture employee development.

We know that the cost of getting a patent can be major. The cost of the application fees can be daunting for low to middle income people, especially for young professionals who are minority; who are first generation college graduates without a financial nest egg. The same is true for women and veterans that do not have access to financial assistance. Often, college and university debts dissuade, the ability to pay for the application fees and expenses of attorneys and cost of development of products and the

cost to move them from the pilot phases to commercialization. Good ideas should not die because of the lack of money. Just like talent should not go undeveloped or underdeveloped because of the lack of finances. The playing field must be leveled to those who do not have the necessary money.

The USPTO must acknowledge that difficulties exist beyond obtaining a patent. Obstacles that hinder bringing products to market should be considered as a part of the Success Act because without removing these issues the desired economic growth will not be realized. It is useless to obtain a patent without a pathway to commercialization. Inclusion of the issue partially justifies the mandate that the study include consultation with the SBA.

Many minority, women or veterans have to forego this step or end up consigning rights to the patent to someone else. The patent originator receives limited financial benefit. Minorities represent a growing demographic in the workforce and are a largely untapped source of intellectual human capital. The underrepresented minority population will become the majority in the US by 2050. In some segments of the Unite States this situation already exists. The US runs the risks of not having sufficient human resources to maintain and expand its technically based economy if it fails to take action to increase efforts to develop the technical capabilities of minority, women and veteran sectors of the population. Currently, collectively minorities are less than 20% the STEM population. Women are 51 per cent of the general population, but only 30 per cent of STEM populations. For 3 decades, the National Science Foundation and American Association for the Advancement for Science have been forecasting a STEM workforce shortfall and the number of people trained in STEM has not kept up with the forecast. In fact, the numbers have remained flat and in some demographics show a decline. The situation is growing to a point it threatens national security.

According to the National Academies of Sciences, Engineering, and Medicine 2019 Report, based on the research findings on the Committee on Closing the Equity Gap: Securing Our STEM Education and Workforce Readiness Infrastructure in the Nation's Minority Serving Institutions; Board on Higher Education and Workforce; Policy and Global Affairs: "Research suggests that the cultural diversity of a nation's workforce is a key factor in its ability to innovate and compete in a global economy. This report on the role of Minority Serving Institutions (MSIs) in creating a diverse science, technology, engineering, and mathematics (STEM) workforce is motivated by the realization that the United States is unlikely to maintain its competitive advantage in STEM without the contributions that these institutions are uniquely positioned to make."(Reference: *National Academies of Sciences, Engineering, and Medicine 2019. Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce. Washington, DC: The National Academies Press. https://doi.org/10.17226/25257.) Note that MSI's are historically black colleges and universities, and other minority serving institutions that predominantly serve Hispanics and America Indians.*

According to the 2013 White Paper prepared by the Coalition of Hispanics, African And Native Americans for the Next Generation of Engineers and Scientists (CHANGES), one

of the organizations I represent, "Minority technical organizations are eager to share the responsibility with other STEM leaders to inspire, motivate, and prepare the next generation of scientists, engineers, and architects who are essential to achieve American's innovation and competiveness goals. Additionally, these organizations directly support both the scientific pipeline and the future viability of the Nation. They directly support initiatives such as Educate to Innovate, science education initiatives, the Reauthorization of Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act, and now the SUCCESS Act. Moreover, as global economies and communities become more closely interwoven due to concerns about global warming to high performance buildings, our minority architects, engineers, and scientists willl support ongoing related Federal initiatives concerning renewable energy, climate change and urban agriculture. These executive-level efforts make it clear that we must have a national priority to increase science literacy and move minority students to the head of the technical pack. It is a national imperative to expand the education and career opportunities for underrepresented minorities, women and veterans in STEM to fully meet the Nation's challenges. Several of our organizations have established links with technical institutions and industries in Africa, Central and South America. They are valuable resources that can help solidify our nation's global efforts. CHANGES is a critical stakeholder that seeks to have a stronger voice and visibility at the STEM development and policy-making table when it comes to successful capacity building of minority technical talents. It is a vital link to a third of the population that our nation envisions as the STEM-capable citizenry of the future. We are uniquely positioned to positively impact strategies for science teaching, learning and innovation. Recent research indicates that learning science is more than the recall of facts and science concepts. Culture, personal experience, and the presence of role models play a vital role in how youth relate to science and apply science. Members of CHANGES who embrace science and technical careers can testify that the goal of achieving cultural sensitivity and equitable treatment in the workforce is just as challenging as increasing the numbers. It is with these factors in mind and knowledge of the many workforce and innovation challenges that lie before us, that the leaders of CHANGES recommend greater national support for its member organizations' activities and MSI institutions that have proven to be effective in increasing minorities in STEM. Increased involvement by the coalition at the Federal level in the development of solutions to the STEM issues such as those encompassed in the SUCCESS Act is paramount. Effective solutions to increase participation of minorities, women and veterans require inclusion of input from those who have walked the paths of the targeted populations and have succeeded in becoming productive STEM contributors. They are living proof of what is needed to succeed. It is obvious that they are resources that should not be overlooked.

"CHANGES" recommends the following:

1. Support for CHANGES, MTOs and other MSI Institutions to become full partners that implement of the SUCCESS Act so that strategies developed are the best fit for Hispanics, African Americans, and American Indians, women and veterans.

2. Solicit CHANGES' help to diversify the senior level Federal positions that implement the SUCCESS Act, policymaking Advisory Boards and Councils to ensure effective implementation of the Act. "CHANGES" is available to assist in the identification of highly qualified candidates for these positions.

3. Include in the Success Act Report recommendations of practices that accommodate cultural differences, educational and economic differences;

4. Promote development of Federal initiatives designed to lessen the barriers to recruitment and retention of minorities in STEM majors and professions.

5. Recommend a review of the patent process to identify opportunities to streamline processes to save time and costs; simplify language and instructions to become more user friendly and less intimidating to increase the numbers of minorities, women and veterans that apply and obtain patents.

6. Collaborate with other agencies and community groups to get the USPTO message out.

7. Collaborate with the National Science Foundation's (NSF) I-Corps program which promotes researchers to understand better business needs and customer discovery. (CHANGES) asks that NSF expand its I-Corps program to develop and participate in listening sessions at HBCUs and other MSIs to encourage innovation and technology commercialization. Increased appropriations to NSF's HBCU programs would greatly enhance this opportunity.

8. USPTO review the February 2019 report by the National Academies entitled: Minority Serving Institutions: *America's Underutilized Resource for Strengthening the STEM Workforce*. This report gives a great overview of the research contributions of MSIs and recommendations from which USPTO can position initiatives to increase MSI/HBCU patents.

General Comment: A better job needs to be done to reach stakeholders to capture their input. Greater use of social media such as twitter, instagram, webinars, etc. to ensure the affected audience is reached is essential. Direct contact with a database of community leaders and strong community relations are also essential. Relationships also need to be ongoing. If the input from minorities, women and veterans is not captured in the Study, results and recommendations may be seriously flawed. Most minorities, women and veterans cannot afford to take time off from work to attend hearings during the day and rarely visit the USTPO website or read the Federal Register. Thank you for your time.

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