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Dr. Alondra Nelson
Director
Office of Science and Technology Policy
1650 Pennsylvania Avenue
Washington, D.C. 20504

RE: Comments in Response to 87 FR 33786 “Request for Information to Make Access to the Innovation Ecosystem More Inclusive and Equitable,” FR Doc. 2022-11844.

Dear Director Nelson:

Invent Together appreciates the opportunity to submit comments to the Office of Science and Technology Policy (OSTP), on behalf of the National Science and Technology Council (NSTC) Lab-to-Market (L2M) Subcommittee, as it works to improve inclusive and equitable access to federal programs and resources.

Invent Together is an alliance supported by organizations, universities, companies, and other stakeholders dedicated to understanding the gender, race, and other diversity gaps in invention and patenting, and supporting public policy and private initiatives to close them.¹ We believe that everyone should have an opportunity to invent and patent, but that is unfortunately not the reality today.

The United States Patent and Trademark Office (USPTO) and leading researchers have found that women, people of color, and individuals with lower incomes patent inventions at significantly lower rates than their representation in the population:

- *The gender gap:* Less than 13% of all inventors who hold a U.S. patent are women.² Men-owned businesses are twice as likely as women-owned businesses to hold a patent.³ Women hold only 5.5% of commercialized patents.⁴
- *The race gap:* Black and Hispanic college graduates patent at half the rate of White college graduates.⁵ Patenting activity by Black inventors peaked in 1899 and has not recovered.⁶
- *The income gap:* Children in families in the top 1% of income are 10 times more likely to patent as adults than children in the entire bottom half of family income.⁷

Research has also found that America lags behind its global competitors in terms of gender diversity in patenting, ranking eighth behind Spain, Turkey, China, France, the Netherlands, Switzerland, and Israel.⁸

Greater diversity in invention and patenting would create significant opportunities for individuals and families. Inventors with patents earn higher incomes on average than inventors without patents.⁹ Patents also help businesses—especially small businesses and startups owned by women and people of color—access capital, attract customers and licensees, and create jobs. Startups that obtain a patent employ an average of sixteen more new employees after five years compared to startups that do not obtain a patent.¹⁰ Women-owned businesses with patents



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pending have average revenues more than sixteen times higher than women-owned businesses without any intellectual property (IP).¹¹

Diversity in IP is also crucial to the strength of the U.S. economy. The USPTO has determined that IP-intensive industries account for more than 40% of U.S. economic activity and support 63 million jobs—44% of the U.S. workforce. Increasing participation in inventing and patenting by underrepresented groups would increase annual U.S. GDP by almost \$1 trillion,¹² quadruple the number of American inventors,¹³ and result in new and different inventions.

Invent Together applauds the Administration for shining a light on the inequities that underrepresented communities face in accessing federal programs and resources. OSTP and NSTC each have an important strategic and coordinating role to play to ensure that the support and services federal agencies provide to inventors and entrepreneurs are accessible to everyone, including those from underrepresented communities. Below, we provide recommendations to improve inclusive and equitable access to federal programs and resources related to inventing and patenting.

1a. In your experience, what are barriers to participation in the innovation ecosystem?
1b. Do barriers exist that are unique to innovators from specific underrepresented backgrounds or underserved communities? If so, what are those barriers?

Women, people of color, individuals with lower incomes, and other underrepresented groups face numerous barriers to equitable participation in inventing and patenting. They include: a lack of exposure to inventing; insufficient access to education, mentorship opportunities, and capital; entrenched bias and discrimination; and “gatekeepers,” who hinder access. Overcoming these challenges will require a cultural shift and commitment by all stakeholders.

Exposure to Innovation. Lack of exposure to inventors inhibits invention and patenting. According to a study by Harvard researchers, “Children who grow up in areas with more inventors—and are thereby more exposed to innovation while growing up—are much more likely to become inventors themselves.”¹⁴ Indeed, children whose parents are inventors are nine times more likely to become inventors,¹⁵ and “children who grow up in a neighborhood or family with a high innovation rate in a specific technology class are more likely to patent in exactly the same class.”¹⁶ Children who eventually attend research universities also tend to patent at similar rates, suggesting “that factors that affect children before they enter the labor market, such as childhood environment and exposure to innovation, drive much of the gaps in innovation.”¹⁷

Access to Education. Access to high-quality STEM, invention, and patent education is crucial to help people develop the knowledge necessary to become inventors. While STEM education helps students develop technical skills, invention education helps students develop problem-identification and problem-solving skills, as well as an invention mindset. Patent education helps inventors learn how to protect and commercialize their ideas.

Social Networks and Mentorship. Social networks and mentorship play significant roles in encouraging patenting. Social networks are key to helping inventors “evaluat[e] whether it



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would be worthwhile to pursue a patent” in the first place since an inventor is likely to first seek advice from his or her own peers.¹⁸ Moreover, the relative “exclusion from STEM fields” of women, people of color, and other underrepresented groups has led to limited available mentorship opportunities and less extensive networks.¹⁹ Because mentors tend to seek mentees who share similar backgrounds (and vice versa), and because there are fewer women and people of color in positions to act as mentors, it is harder for underrepresented inventors to find inventor mentors.²⁰

Access to Capital. According to estimates, female founders receive only 1% of all venture capital (VC) funding,²¹ and Black founders receive less than 2%.²² This massive funding gap penalizes women inventors and inventors of color, who are less likely to receive venture backing for their ideas than their White, male counterparts. Funding helps inventors research and develop their ideas, and eventually bring them to market. Patents are also important assets for attracting investment capital in potential businesses.²³ Disparities in patent rates, therefore, lead to disparities in investment rates, and vice versa.

Discrimination and Other Cultural Issues. Discrimination against women, people of color, and other underrepresented groups in the workplace, cultural inertia in academia and industry, and unconscious bias from gender and racial stereotypes all contribute to the inventor diversity gaps.

Gatekeepers. Research and interviews with inventors show that a greater number of diverse individuals will patent when they can use patent attorneys who look like them, understand them, and can relate to them.²⁴ However, only 20% of patent attorneys are women, 5% are people of color, and 2% are women of color.²⁵ In addition, only 28% of patent examiners are women.²⁶ The lack of diversity of patent examiners is similarly concerning and may have an impact on patenting rates among underrepresented communities.

1c. How can the Federal government identify the specific barriers, problems, or issues faced by innovators and emerging entrepreneurs from underrepresented backgrounds or underserved communities as they seek to engage with Federal programs and services?

To identify the specific barriers faced by underrepresented innovators, the federal government should collect data and conduct new research on the inventor diversity gaps, and enhance outreach to underrepresented communities.

Data Collection

Support the IDEA Act. Because the USPTO does not collect demographic data on inventors, researchers rely on name-matching software and other imperfect techniques to study disparities in patenting. Invent Together supports the IDEA Act, a bipartisan, bicameral bill that would direct the USPTO to collect inventors’ demographic data on a voluntary basis and make the information available to the public in the aggregate.²⁷ The bill would require the USPTO to keep demographic information separate from patent applications to mitigate implicit bias in the patent examination process. Reliable studies of both the patent gaps and their remedies require a current and comprehensive data source that the USPTO can create and publish to maintain accountability for equity.



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Designate the USPTO as a Data-Sharing Agency. The White House Office of Management and Budget (OMB) should designate USPTO as a data-sharing agency under the Confidential Information Protection and Statistical Efficiency Act (CIPSEA) to allow USPTO to share inventor demographic data with other federal agencies, provide access to critically needed information on the inventor-patentee population, and support cross-agency efforts to create linkages between disparate datasets. As President Biden acknowledged in his racial equity executive order, interagency information sharing is key to measuring and advancing equity.²⁸

Direct a Study by the Council for Economic Advisors (CEA). CEA should study and report on the inventor diversity gaps among women, people of color, and other underrepresented groups, and quantify the positive impact that greater access to invention and patenting would have on individual income, wage gaps, national GDP, and U.S. technological leadership.

Direct a Study by the Federal Reserve. The Federal Reserve should study and report on the positive impact that expanding the number of inventors of color and patents granted to inventors of color would have on existing racial economic gaps and U.S. economic growth and recovery in the wake of the pandemic. President Biden has said the Administration will strengthen the Federal Reserve’s focus on racial economic gaps.²⁹

Outreach

The USPTO, Small Business Administration (SBA), the Minority Development Agency (MBDA), National Institute of Standards and Technology (NIST), and other federal agencies that support inventors and entrepreneurs should continue to improve outreach to populations underrepresented in invention and patenting. Although agencies like the USPTO and SBA have robust public websites with resources for inventors and entrepreneurs, diverse inventors and entrepreneurs might not know where to look for help, particularly because they are less likely to have mentors and networks to guide them.

Federal agencies and programs can help address this problem by meeting diverse inventors and entrepreneurs where they are. For example, SBA supports a national network of Women’s Business Centers (WBCs) that provide women entrepreneurs with business training and other services, and the Minority Development Agency (MBDA) supports a national network of business centers that provide business owners of color with strategic business advice and other services. The USPTO should work with WBCs and MBDA Business Centers to train women and inventors of color at the local level on IP protection. In addition, federal agencies with programs or resources for inventors or entrepreneurs should hold more events at Historically Black Colleges and Universities and other Minority-Serving Institutions to spread awareness about the value of invention and patenting and how to access federal services and resources. On-the-ground discussions with diverse inventors and entrepreneurs will also help federal officials better understand their needs.

2. How can the Federal government increase participation in the innovation ecosystem by innovators from backgrounds and communities underrepresented in the current ecosystem? In your response, please provide your definition of “underrepresented” or “underserved.”



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As discussed above, women, people of color, and individuals with lower incomes are underrepresented in the current invention ecosystem. We define “underrepresented” populations as groups who invent and patent at rates lower than their representation in the population. Data collection (as discussed in our response to Question 1), is an important part of identifying underrepresented groups.

The federal government can also increase participation in the invention ecosystem by: expanding access to education; ensuring equitable allocation of innovation funding; providing greater pro bono legal assistance; and promoting the diversity of patent gatekeepers.

Expand Access to Education and Training. The federal government should support STEM and invention education by (1) recognizing model curricula and programs for schools and community organizations to adopt; (2) funding public and private programs that deliver STEM and invention education; and (3) conducting national studies on the efficacy of STEM and invention education programs. As one example, South Korea has demonstrated that these efforts are possible at the national level by including invention education in their standard curricula.³⁰ Additionally, federal agencies that support inventors and entrepreneurs should coordinate with the USPTO to provide IP education. As noted in our response to Question 1, such training could be delivered through programs specifically designed to reach women entrepreneurs and entrepreneurs of color, such as WBCs and MBDA business centers.

Ensure Innovation Funding is Allocated Equitably. Federal agencies involved in the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs should do more to support diverse innovators and thereby achieve the programs’ stated goal of “foster[ing] and encourag[ing] participation in innovation and entrepreneurship by women and socially or economically disadvantaged persons.” To advance the SBIR/STTR program goals and ensure innovation funding is allocated equitably, the federal government should ensure that the SBA and all SBIR/STTR participating agencies expand outreach to underrepresented groups, provide greater pre-application assistance to first-time and underrepresented applicants, and engineer bias out of the application process. To engineer bias out of the application process, the National Academy of Sciences should study SBIR/STTR application and appeals processes, including the demographics of SBIR/STTR program applicants and awardees, to identify and make recommendations to address potential biases or barriers to participation. For a more equitable application review, participating agencies should also increase the diversity of application reviewer pools and conduct blind reviews of technical merit sections of applications when feasible.

Provide Greater Pro Bono Legal Assistance. The patenting process is not only complex, but also expensive. To help defray the costs of patenting for under-resourced inventors and small businesses, the federal government should strengthen and expand successful legal assistance programs like the USPTO’s Patent Pro Bono Program and the Law School Clinic Certification Program.

Increase Diversity Among Patent Gatekeepers. To increase diversity among patent counsel, the USPTO should regularly review its scientific and technical qualification requirements for the patent bar examination to ensure that they do not exclude qualified, diverse



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individuals. Unlike patent counsel, patent examiners are federal employees, and the federal government has an important role to play in promoting diversity among the federal workforce, including the recruitment and retention of diverse patent examiners.

3. How can the Federal government meet the specific needs (e.g., training, support, other) of innovators and emerging entrepreneurs from backgrounds and communities underrepresented in the innovation ecosystem by either improving existing government programs or initiatives, or by offering new government programs or initiatives?

In addition to the suggestions included in our response to Question 2, the federal government should support the work of the Council for Inclusive Innovation (CI²), including the development and implementation of its national strategy for expanding American innovation.³¹

The federal government should also leverage the voices of President Biden, Vice President Harris, Commerce Secretary Raimondo, USPTO Director Vidal, SBA Administrator Guzman, and other senior officials in the Administration to highlight the importance of an inclusive innovation economy and celebrate the role of diverse inventors in U.S. innovation. These voices are crucial to promoting broad participation in invention and patenting.

4. Are there examples of programs that have seen success in supporting innovators from underrepresented backgrounds and underserved communities in the innovation ecosystem? What are the critical success factors of these programs?

A number of government programs have been successful in supporting innovators from underrepresented backgrounds. The USPTO hosts several informative event series focused on specific underrepresented groups.³² And financial assistance programs like the USPTO's Patent Pro Bono Program and Law School Clinic Certification have had success supporting innovators from underrepresented groups by addressing the high costs of patenting. While these programs need to be strengthened and expanded (as discussed in our response to Question 2), they have found success by identifying a specific barrier to entry and adopting concrete plans to address it. It is clear that more programs are needed across the Administration to support diverse inventors.

* * *

Thank you for the opportunity to share our views on how to make federal agency programs and resources more responsive to the needs of America's diverse communities. Invent Together looks forward to continuing to work with the Administration to ensure that inventors of all backgrounds can participate fully in inventing and patenting.

Sincerely,



Holly Fechner
Executive Director
Invent Together



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- ¹ A list of Invent Together’s partners can be found here: <https://inventtogether.org/about/>.
- ² USPTO, Progress and Potential: 2020 Update on U.S. Women Inventor-patentees (July 2020) at 3, <https://www.uspto.gov/sites/default/files/documents/OCE-DH-Progress-Potential-2020.pdf>.
- ³ Institute for Women’s Policy Research, Closing The Gender Gap In Patenting, Innovation, and Commercialization: Programs Promoting Equity and Inclusion (2020), (“Closing the Gender Gap”), https://iwpr.org/wp-content/uploads/2020/10/C471_Programs-promoting-equity_7.24.18_Final.pdf.
- ⁴ Jennifer Hunt et al., Why Don’t Women Patent, National Bureau of Economic Research Working Paper No. 17888 (2012), at 1, <https://www.nber.org/papers/w17888>.
- ⁵ Institute for Women’s Policy Research, Equity in Innovation: Women Inventors and Patents (2016) (“Equity in Innovation”), <https://iwpr.org/wp-content/uploads/2020/12/C448-Equity-in-Innovation.pdf>.
- ⁶ Lisa D. Cook, Violence and Economic Growth: Evidence from African American Patents, 1870 to 1940, *Journal of Economic Growth* (June 2014), at 221–257, https://lisadcook.net/wp-content/uploads/2014/02/pats_paper17_1013_final_web.pdf.
- ⁷ Alex Bell et al., Who Becomes an Inventor in America? The Importance of Exposure to Innovation (“Who Becomes an Inventor in America?”) (November 2018), http://www.equality-of-opportunity.org/assets/documents/inventors_paper.pdf.
- ⁸ World Intellectual Property Organization, Patent Cooperation Treaty Yearly Review 2022 The International Patent System (2022), <https://www.wipo.int/edocs/pubdocs/en/wipo-pub-901-2022-en-patent-cooperation-treaty-yearly-review-2022.pdf>.
- ⁹ USPTO, REPORT TO CONGRESS PURSUANT TO P.L. 115-273, THE SUCCESS ACT (Oct. 2019) (“SUCCESS Act Report”), <https://www.uspto.gov/sites/default/files/documents/USPTOSuccessAct.pdf>.
- ¹⁰ Joan Farre-Mensa et al., What Is a Patent Worth? Evidence from the U.S. Patent ‘Lottery’, *Journal of Finance*, July 9, 2019, <https://ssrn.com/abstract=2704028> or <http://dx.doi.org/10.2139/ssrn.2704028>.
- ¹¹ Institute for Women’s Policy Research, Innovation and Intellectual Property among Women Entrepreneurs: A Report on Women’s Business Ownership (2018), https://iwpr.org/wp-content/uploads/2020/10/C472_Report-Innovation-and-Entrepreneurship-9.6.18-clean.pdf.
- ¹² Lisa D. Cook, Economic and Social Implications of Racial Disparities, June 8, 2020, <https://bcf.princeton.edu/wp-content/uploads/2020/11/Combined-Slides-10.pdf>.
- ¹³ *Id.*
- ¹⁴ Alex Bell, Comments before the USPTO, SUCCESS Act Hearings (2019), at 7.
- ¹⁵ See Alex Bell et al., Who Becomes an Inventor in America?, at 17–18.
- ¹⁶ *Id.* at 1.
- ¹⁷ Alex Bell, Comments before the USPTO, SUCCESS Act Hearings (2019), at 8.
- ¹⁸ IWPR, Equity in Innovation, at 22.
- ¹⁹ *Id.* at 23.
- ²⁰ See *id.* at 22.
- ²¹ Emma Hinchliffe, Female founders’ share of venture capital funding shrank to 2.2% in 2020, *Fortune*, Feb. 8, 2021, <https://fortune.com/2021/02/08/female-founders-venture-capital-funding-2020/>.
- ²² James Norman, A VC’s Guide to Investing in Black Founders, *Harvard Business Review*, June 19, 2020, <https://hbr.org/2020/06/a-vcs-guide-to-investing-in-black-founders>.
- ²³ IWPR, Equity in Innovation, at 15.
- ²⁴ Elaine Spector, 5 Hiring Strategies for Diversifying the Patent Bar. *Law360*, Mar. 1, 2021, <https://www.law360.com/articles/1359154/5-hiring-strategies-for-diversifying-the-patent-bar>; Institute for Women’s Policy Research, Tackling the Gender and Racial Patenting Gap to Drive Innovation: Lessons from Women’s Experiences (2021), https://iwpr.org/wp-content/uploads/2021/07/Tackling-the-Gender-and-Racial-Patenting-Gap_FINAL38.pdf; How I Built This with Guy Raz, *Spanx: Sara Blakely* (2017), <https://podcasts.apple.com/us/podcast/spanx-sara-blakely/id1150510297?i=1000396023160>.
- ²⁵ Elaine Spector, Ensuring Women and Diverse Candidates in the Patent Bar: We Must Address the Root of the Problem, *IPWatchdog*, Mar. 15, 2021, <https://www.ipwatchdog.com/2021/03/15/ensuring-women-diverse-candidates-patent-bar-must-address-root-problem/id=130896/>.
- ²⁶ Deepak Hedge and Manav Raj, Does Gender Affect Work? Evidence from U.S. Patent Examination, *NYU Stern School of Business*, Feb. 21, 2019, <https://ssrn.com/abstract=3339555> or <http://dx.doi.org/10.2139/ssrn.3339555>.
- ²⁷ S. 632/H.R. 1723, 117th Cong. (2021).



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²⁸ Exec. Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Jan. 20, 2021), <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>.

²⁹ Joe Biden, *The Biden Plan to Build Back Better by Advancing Racial Equity Across the American Economy* (last accessed June 23, 2022), <https://joebiden.com/racial-economic-equity>.

³⁰ Hyuksoo Kwon, Eunsang Lee & Dongkuk Lee, Meta-Analysis on the Effectiveness of Invention Education in South Korea: Creativity, Attitude, and Tendency for Problem Solving, *Journal of Baltic Science Education*, Feb. 15, 2016, <https://www.proquest.com/openview/45cf53d28e0349ae7cf528cc8e1d0f0/1?pq-origsite=gscholar&cbl=4477238>.

³¹ COUNCIL FOR INCLUSIVE INNOVATION (CI2), <https://www.uspto.gov/initiatives/equity/ci2>, (last visited June 30, 2022).

³² Office of Innovation Outreach, <https://www.uspto.gov/about-us/organizational-offices/office-chief-communications-officer/office-innovation-outreach>, (last visited July 1, 2022).

