NIH Partnership Summit: Reimagining Women in the Bioengineering, Technology, and Data Science Ecosystem

Executive Summary

May 11–12, 2022

Purpose

To generate novel ideas and approaches that will inform the future discussions and work of the Working Group on Women in Biomedical Careers (WgWBC) and other National Institutes of Health (NIH) components as we consider next steps to address contemporary challenges faced by women in science, technology, engineering, mathematics, and medicine (STEMM), especially midcareer women in the context of engineering, data science, technology, and similar fields.

Welcome and Introductions

Myra Derbyshire, Ph.D., an NIH staff scientist, welcomed the group and said the summit will focus on five themes: (1) women as innovators, inventors, and entrepreneurs; (2) women as educators; (3) cross-sector partnerships and precompetitive spaces; (4) allyship, mentorship, and sponsorship for women; and (5) bridging wealth and opportunity gaps.

Acting NIH Director Lawrence Tabak, D.D.S., Ph.D., shared that the WgWBC, which he co-chairs with Janine Clayton, M.D., FARVO, was created in 2007 to address the barriers to success that women in biomedical research and engineering face. The NIH UNITE initiative was established to identify and address structural racism within the NIH-supported scientific community and the greater scientific community. Cross-sector partnerships, including public–private partnerships, help remove barriers that typically impede interaction, help to develop new tools and solutions in biomedicine, and serve as environments free of obstacles to career mobility that often exist for women. Dr. Tabak emphasized the need to leverage these partnerships to create an ecosystem in which all scientists and engineers can emerge as innovators, problem-solvers, and leaders.

Dr. Clayton, Director of the NIH Office of Research on Women's Health (ORWH), compared the scientific workforce to an ecosystem, stating that there is no longer a straight pipeline for many women. The path to success in STEMM careers is like a braided river, with mentorship and holistic support in the underlying ground. To create a new ecosystem, we must address the underlying system. There is a need to acknowledge all contributions to science and increase the likelihood of women entering STEMM careers. This could be accomplished by adding family leave policies and entry/exit points along the STEMM career path, for example. Past data demonstrate that there is no strong representation of women in leadership positions in STEMM fields (such as provosts, deans, and CEOs). However, data show that females have constituted 40% or more of medical school enrollees over the past 25 years. These data demonstrate that women still are interested in these fields but lack representation in higher leadership positions. Dr. Clayton also shared data indicating that gender-heterogenous teams produce more influential scientific papers. She said a significant area of focus should be technology, where women hold less than a quarter of the industry's senior leadership roles. Since the start of the COVID-19 pandemic, satisfaction with work–life balance for women in the technology industry has dropped by 38%, and mental well-being has decreased by 36%. Positively, large technology companies are projecting an increase in women in their workforce. Dr. Clayton noted that to

better retain women employees, companies in the technology field are expanding family leave and care programs, creating flexible work and well-being programs, recruiting women from overlooked segments (such as those returning to work or changing sectors), and creating "returnships," which are like internships but for those who have left the industry and want to return.

Dr. Clayton highlighted that by bringing together government, academia, industry, and other sectors, we can design a scientific research ecosystem that maximizes opportunities and allows women to excel in multiple sectors. A new, multisector science and engineering ecosystem that allows for self-sufficiency could be designed, or we could modify the current ecosystem to better serve women. The WgWBC seeks to understand how conditions can change and what changes need to occur. The short-term goals of this group are to maximize the opportunities for women from all backgrounds, develop and sustain a highly talented workforce, and build teams across sectors to have women excel in cross-sector opportunities.

The remainder of this report is structured around the five themes rather than the meeting chronology. Each theme's section includes notes from the keynote presentation, breakout session, Day 2 all-attendees discussion, and comments received through anonymous responses. Finally, each section concludes with an illustration summarizing the Day 2 all-attendees discussion, which may not be all-inclusive.

Women as Innovators, Inventors, and Entrepreneurs

Keynote Presentation: Nola Masterson, M.Sc., Lead Investor, Portfolia's FemTech Fund

Nola Masterson, M.Sc., stated that to address women as innovators, inventors, and entrepreneurs, we must address the number of grants women receive compared with men.

According to NIH, principal funding is given to men twice as often as women. In 1998, 23% of research grants were given to women, and by 2021, it had only increased to 34%. From previous research, we know that diverse teams make better innovations, yet the money being given does not reflect that priority. Specifically, the number of Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants awarded to women has not changed markedly over the past 20 years.

Ms. Masterson emphasized that science drives innovation, and if the science is not getting funding, then innovation will not occur at a higher rate. There is room for growth in the women's health field, which needs to be fueled by more inclusive scientific breakthroughs. However, the ratio of women to men in engineering is 5-to-1. What holds women back? There are still a lot of social taboos that lead to investing and supporting men in such a male-dominated industry; advancing femtech is not high on doctors' lists of priorities; a lot more funding goes toward male-dominated products; and most products are tested on male preclinical models, with lesser representation of female preclinical models and little to no representation of women in clinical trials (Reference: *Improving Representation in Clinical Trials:*

Building Research Equity for Women and Underrepresented Groups). In addition, it is difficult for a group of women engineers to pitch to a roomful of men on femtech products, a problem that men will never experience. Ms. Masterson emphasized that to solve these problems, more women need to be at the table.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

Participants discussed key characteristics and opportunities of a new scientific ecosystem framework. Some of the needs, solutions, and next steps brainstormed include:

- Ensuring that more women, particularly those with wealth, are present at the table and in the venture level.
- Creating venture capital funding opportunities for women's health and providing women with money, mentorship, and scientific collaboration in incubator spaces.
- Encouraging entrepreneurship and idea sharing among women to build the next generation of companies.
- Understanding men's role in pregnancy and how we can support people and humanity in light of policy changes related to abortion access.
- Increasing endometriosis research to understand the cause of the disease and spur more endometriosis-related funding.
- Conducting NIH outreach to help women apply for grants.
- Providing women with follow-on grants after they have received an SBIR grant. (This problem is similar to the problem of women applying for an R01 but not applying for a renewal R01.)

Breakout Session

Co-Chairs: Heather Bowerman, CEO and Founder, DotLab; Belinda Seto, Ph.D., Deputy Director, NIH Office of Data Science Strategy
Moderator: Joan Greve, Ph.D., Program Director, SBIR Development Center, National Cancer Institute

Current State Assessment

Participants discussed a current state assessment disproving the myth that women do not serve as innovators, inventors, and entrepreneurs. History proves that women have operated in these roles across all sectors while lacking recognition and allyship. Despite 40% of new entrepreneurs in 2020 being women, only 2.3% of venture capital dollars went to women-founded companies, and 68% of venture capital to women-led companies that year focused on health care or information technology (IT). There is a lack of diversity on the investing and founder side of companies, as well as little female representation in executive-level positions. The current performance assessments of businesses owned by women and/or people of color often match or exceed those of men-owned businesses. Women-owned companies outperform men-owned companies in the overall venture capital market, exiting capital to investors 1 year faster on

average, and companies in the top quartile for ethnic and racial diversity in management are 35% more likely to have returns above the industry average, proving there is value in diversity. Even though women have more hours of caregiving on average, women founders report no more significant negative impact on their businesses' revenue from caregiving than men founders.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

It is essential to understand that women are likely to have an M-shaped career path, which should be embraced and built into the career path culture. It is critical to stop actively pushing women out of science, and there is a stark difference between not actively pushing women out of science and retaining women. Retaining and promoting women in science requires culture change. The idea of multiple ecosystems was discussed—wherein parallel but different ecosystems are built for women, allowing them to achieve the same career goals. This framework of parallel ecosystems would be an investment in women because certain conditions hinder women's success. For example, gaps in funding create "death valleys" where there is lost and wasted ideation. Also, the "sticky floor" phenomenon refers to when women get stuck in a specific career point. Overall, a new ecosystem needs to be constructed to focus on addressing health equity and social identity.

Participants discussed two options regarding changing the current ecosystem for women: (1) Work with what has already been invested in within the current ecosystem and identify acceleration points within the system to expedite change, or (2) design a new ecosystem that works for women and combats the problems with the current system. Participants envisioned that a new ecosystem would address health equity and social identity through autonomy to foster innovation and drive toward healthier populations. Policies would reinforce defined success metrics, and scientists from all backgrounds would have the support to seek a passionate career path.

Participants highlighted the need for people in life sciences to be innovative and have the freedom to explore opportunities to support this innovation. They also recommended requesting that every proposal discuss impacts on diverse populations. Additionally, blind peer review has been shown to be beneficial in minimizing bias and should be used more frequently. Proposal and future-based merit could help minimize the reliance on track records in peer review. Participants voiced the need to hold lawmakers accountable for making the system change, including calling on Congress to give more guidance to ORWH.

Day 2 All-Attendee Discussion

It is difficult for women faculty members to start companies with SBIR grants, given the requirement for the principal investigator (PI) of an SBIR grant to be primarily employed by the company. Women entrepreneurs who are faculty members can direct research as a chief science officer as long as they have a CEO or chief operating officer to cover the business side. At its core, the SBIR grant remains a science grant. Women need opportunities to take risks
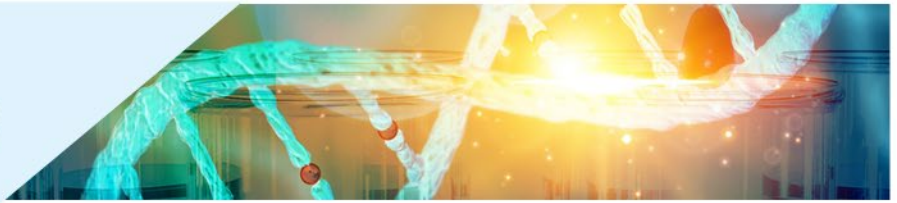
without having to completely abandon their current career path to pursue a new business idea. The ability to try a new business, fail, and recover without catastrophic consequences is important for the success of women, too.

The National Science Foundation (NSF) has a grant system called Grant Opportunities for Academic Liaison with Industry (GOALI), which is for academic liaisons. NSF and industry money go to the PI, and the small business is allowed to qualify for GOALI money, allowing for the opportunity at both ends to engage with the company on the business side. The grant money also allows the company to help fund the lab. This system embraces the M-shaped career path, meaning women who are invested in their careers may have to step away and return, whereas men in similar career positions are usually not burdened with the same responsibilities.

It can be challenging for scientists to work with SBIR, because scientists are trained in science, not as entrepreneurs and business owners. Informal and formal educational outreach opportunities have been discussed, but no conversations have been had about training people who are in underserved populations for board positions. Beyond NIH, many people feel they need a White man to be the face of a company. Also, it is critical to understand the dissimilar pathways for women of color versus White women and keep these differences in the forefront.

Graphic Summary

Women as Educators

Keynote Presentation: Gilda Barabino, Ph.D., President and Professor of Biomedical and Chemical Engineering, Olin College of Engineering

Gilda Barabino, Ph.D., began her presentation by pointing out the blatant lack of women of color (WOC) in leadership positions. Two consensus studies suggest that progress for women in science is limited because of a lack of commitment from leadership and a lack of knowledge and/or consideration of intersectionality, which are highly detrimental to progress. In addition, WOC are more likely to be promoted to leadership positions when the risk of failure is high or in times of crisis, causing WOC to leave the technology field at higher rates. Dr. Barabino emphasized that it's time to make the invisible visible. People in underrepresented groups often report being hyper-visible in certain situations, such as taking on more responsibility, but invisible when it comes to promotions. Dr. Barabino also noted a degree of gatekeeping in the scientific community, structured by who is studied, what is studied, and who receives funding. The "invisible hand" phenomenon, the idea of a mentor or supporter who can open doors for someone to gain quicker access to success compared with that person's peers, often does not support WOC.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

Participants discussed key characteristics and opportunities of a new scientific ecosystem framework. Some of the needs, solutions, and next steps brainstormed include:
- Increasing WOC leadership to gain commitment to place WOC in positions of power to increase diversity, not only during times of crisis.
- Disaggregating data to understand the nuances of underrepresented WOC.
- Paying attention to the feelings of hyper-visibility and invisibility experienced by people in underserved groups in certain situations.
- Examining the socio-political factors that influence who succeeds in science (i.e., what is studied, who is studied, what is funded, etc.).
- Holding institutions responsible for change, even if it is challenging.
- Holding leaders accountable to support change and increase diversity; increased diversity in leadership increases sense of belonging and can lead to more positive outcomes for WOC.
- Creating a system approach for systemic change for women in science; the culture of science must change to reach untapped talent and promote the next generation of scientists.

Dr. Barabino emphasized that it's time to make the invisible visible, noting that an "invisible hand" can tap shoulders and open doors for others to gain access more quickly than their peers. She also noted the need for a systematic approach to changing the system for women in science.

Breakout Session

Co-Chairs: Barbara Boyan, Ph.D., Alice T. and William H. Goodwin Jr. Dean, College of Engineering, Virginia Commonwealth University; Patti Brennan, RN, Ph.D., Director, National Library of Medicine

Moderator: Rezarta Islamaj Doğan, Ph.D., Staff Scientist, National Center for Biotechnology Information, National Library of Medicine

Current State Assessment

The group identified that women are underrepresented across academia, particularly in computer science and STEMM fields. Overall, women receive substantially less startup funding and have lower gross earnings than men. A 2017 study found that the average male college graduate in his mid-40s earned 55% more than the average female graduate. The Matthew effect in science is prevalent, with women often not receiving proper credit for their contributions and being less likely to be accepted for academic publications and STEMM research awards.

The group highlighted that NIH now has the authority to require reporting of harassment and gender-based discrimination in STEMM workplaces and academia, which is a step toward fixing society and a workplace culture that restricts women. Many women scientists leave the field after having their first child because it is too difficult to reestablish themselves in the workforce. An NIH report said 73% of applications for extension of tenure had cited childbirth as the qualifying life event.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

Diversity, equity, and inclusion (DEI) should be the focus area across all levels and sectors. The ecosystem must shift how academics are judged on their outcomes and how their value is assessed. The group recommended using a variety of measures, including the h-index, inventions, and emotional intelligence. Participants said women need to be seen in leadership positions so they can set an example for other women and men and help advocate for other women. For them to attain these leadership positions, career development that encourages multiple pathways for midcareer women is needed. Examples from the group included creating companies and research centers, movement across sectors, and joint appointments between academia and industry.

Institutions must recognize that providing flexibility fosters the retention of midcareer women and men. Additionally, it can broaden their roles, develop their talents, and create a more welcoming workplace that fosters original contributions. The group agreed that education is key to keeping the perspective that women bring to society. Participants discussed social accountability and changing the concept of education to minimize the time commitment and allow students to enter the industry sooner. With recent events and the COVID-19 pandemic, we must prioritize defining how our ecosystem will adapt.

Participants discussed key characteristics and opportunities of a new scientific ecosystem framework. Some of the needs, solutions, and next steps brainstormed include:

- Rather than sending people into broken systems, focusing on fixing the system by embedding policies that will help underrepresented populations succeed.
- Avoiding pigeonholing women in STEMM who are in underserved groups into diversity roles. People should do the work they are passionate about; they should not simply be assigned work because of a need for representation.
- Learning how to place women who are in underserved groups into positions with growth opportunities and how to support the women while they are there.
- Avoiding tokenism—having only a few underrepresented voices in power. It is important to have young and midcareer voices to guide the workforce.
- Helping institutions understand the importance of midcareer women who have family responsibilities in addition to career responsibilities and the valuable contributions midcareer women have to offer.
- Understanding that time and flexibility, as well as money, are potential ways to compensate people.

Day 2 All-Attendee Discussion

Participants shared that institutions can struggle to recognize DEI in promotions, but it is everyone's job to promote DEI. The notion that NIH is working to devise something equivalent to the h-index for education is creative. Unfortunately, education can be weaponized against women. For example, male leaders posit that women need more training or education to progress in their careers, creating a longer or more burdensome pathway for women than men. It is important that training not be offered as an alternative to leadership positions for women. When women are approached for leadership positions, they often say they are unsure of whether they are prepared for the positions. We need to empower women to overcome this type of response, and training and education are potential solutions. Participants shared that training and education should also be prescribed for males. Students today aspire to C-suite positions and to start companies, but female students worry they will not have time with their children or be able to achieve their academic goals, such as getting a Ph.D. However, they do not see their gender as an obstacle in achieving their professional goals. Though education is valuable, the skills inherent to leadership can be more valuable in a business setting, and this is another way in which education is weaponized against women. Additionally, there is a feeling among WOC that they have to show proof of their education and ability to execute leadership tasks.
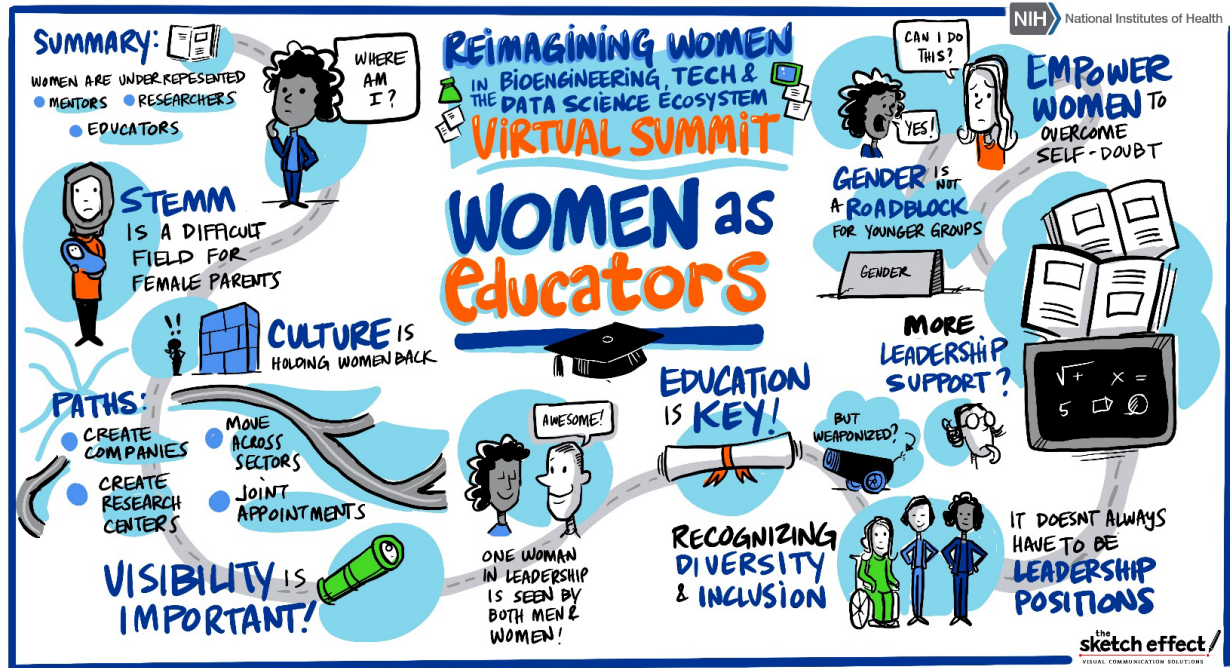
Cross-Sector Partnerships and Precompetitive Spaces

Keynote Presentation: Christine Grant, M.S., Ph.D., Program Director, Broadening Participation in Engineering, Division of Engineering Education and Centers, National Science Foundation; Inaugural Associate Dean of Faculty Advancement and Professor of Chemical and Biomolecular Engineering, College of Engineering, North Carolina State University

Christine Grant, M.S., Ph.D., noted the three main goals of her talk were defining change, developing strategies, and discussing exemplars. Women's health is often viewed as a marginal market in which little is being done or invested.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

- Institutions across different sectors (e.g., government, academia, and industry) can improve their value chain and benefit society. Making interconnected and mutually reinforcing recommendations in these cross-sector spaces is essential.
- One example is the National Academies Keck Futures Initiative (NAKFI), which held several conferences and created five lessons learned. (1) Systematic change can start at the grassroots level. (2) Content + container = serendipity by design (e.g., including different perspectives and how they are important to developing strategies). (3) Support for venture science promotes innovation and generativity. (4) A pluralism of

perspectives is more critical now than ever to tackle complex problems and achieve significant innovation. (5) The intentional creative destruction supported the evolution and relevancy of the Futures Model.

- Dr. Grant emphasized that groups must focus on increasing the diversity of the groups of individuals solving the problems in cross-sector partnerships and precompetitive spaces.
- Solving shared challenges can lead to high-value returns and change for the organizations and institutions involved.
- Partnerships have a strong impact on women, providing more opportunities and career networking connections.
- Technology has allowed for continued collaborations despite geographical distance; however, women need support in these settings to avoid frequent interruptions.

Breakout Session

Co-Chairs: Eline Appelmans, M.D., M.P.H., Director of Neuroscience Research Partnerships, Foundation for the National Institutes of Health; Michael Gottesman, M.D., Deputy Director for Intramural Research, NIH

Moderator: Holly Moore, Ph.D., Program Officer, Behavioral and Cognitive Neuroscience Branch, National Institute on Drug Abuse

Current State Assessment

The group began by outlining and defining "precompetitive space" as a virtual or physical space where collaborators and partners are traditionally viewed as competitors in a specific area of interest yet all recognize that a combined investment can lead to more success for all. Cross-sector collaborations allow people to find leadership roles that fit their competencies and foster change. To make these collaborations possible, we must address barriers—namely, lack of diversity and visibility, different value systems, linear career paths, and lack of sponsorship and diversity in cross-cultural teams.

Women are significantly underrepresented in leadership roles, with women accounting for only 5% of lab director positions in 2019. Women hold only 26% of STEMM leadership positions and 36% of non-STEMM leadership roles. Within the biotechnology sector, only 8% of CEOs are women, and only 23% of senior managers are women. Women of color are even further underrepresented, holding only 4% of STEMM leadership roles, only 2% of biotechnology CEO positions, and only 4% of senior management positions.

The group identified a lack of recognition of the value of having unorthodox experiences, such as unusual life paths and career transitions. The group noted that career advancement for women is too often confined by real or perceived limited geographical mobility and limited personal resources because of caregiving and other personal responsibilities. This makes it difficult for women to rise to an executive leadership position, especially when value systems

and incentive structures conflict among sectors. Women are often forced to turn down unpaid leadership opportunities because of family responsibilities, and women may be expected to continue leading DEI efforts when they get new responsibilities. Providing women the resources to succeed would limit burnout, which would in turn benefit the industry. There is a lack of mobility for people moving back to academia, especially for women. Eliminating the competitiveness among organizations could drive collaborative and collective success.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

To assist in transforming the current ecosystem, individuals need to be deliberate about DEI in decision-making spaces. The group recommended adopting flexible governance structures that adjust to different life cycle requirements. The goal is to build and sustain cross-sector collaborations that become growth environments within science and engineering and allow for a diverse membership. By creating and making cross-sector partnerships visible, we could lower the barriers to entry and make future opportunities visible in training and early-career processes. Cross-sector mobility would allow employees to accumulate competencies and provide new perspectives. We could also develop new definitions of success for personnel, organizations, and deliverables. Additionally, participants discussed the opportunity for M.D.s and Ph.D.s to collaborate with one another.

The group shared that to change the institution, we must change policies and procedures that outlive individual employment. Participants also discussed building allyship among White men to make important progress in DEI. The group hopes a future ecosystem will provide fluidity, equity, and respect for all vocations and support the roles staff members play outside of the workplace. That type of ecosystem would support diverse teams in taking risks while mitigating those risks for individuals and foster collaborative spaces rather than hierarchical ones. The ecosystem would provide autonomy, opportunity, and flexibility for work, including comfort for trainees going into nonacademic roles. Leadership structures would be more diverse and have more work in collaborative spaces, leading to a partnership multiplier effect, with sectors growing more quickly together than apart.

Day 2 All-Attendee Discussion

Industries are trying to diversify their workforces, and one outcome for success is to become an independent investigator. Concurrently, companies are trying to promote a collaborative model, with the understanding that there is not just one way to conduct science. A question to be answered is how to change the pattern of recognition to create mechanisms that productively model science and entrepreneurship. If NIH only provided collaborative work models, this would change the culture at the organization. Unfortunately, R01s are drivers of focused attention on individual accomplishments. An example of collaboration is Amazon Scholars. Amazon Scholars allows people to be detailed to Amazon but remain faculty members at universities. Increased virtual work may allow something similar to Amazon Scholars to occur at NIH.

Implementing a culture of growth, as opposed to elitism, foments collaboration. Equity among men and women in moving freely among different sectors and collaborating without penalty is

the goal. The metric to assess the success of this type of collaboration is the number of people who engage in the opportunity. Moving across sectors to simulate collaboration was discussed, as well, as it would be to the advantage of women and men to easily move from one sector to another.

The ecosystems of the future must incorporate flexibility and view everyone as an individual. People who are not actively publishing or advancing patient care still provide value. Another major issue is burnout. Burnout not only negatively affects people's well-being but also may cause women to leave the workforce entirely, resulting in a loss of talent for the field. Finally, cross-sectional partnerships should reflect the environment in which they were created. We must ensure partnerships serve women of underrepresented populations so the partnerships are seen as useful additions to other sectors. This is an opportunity to create a microorganism of what is possible and an opportunity for women to come together and lead government initiatives.

Graphic Summary
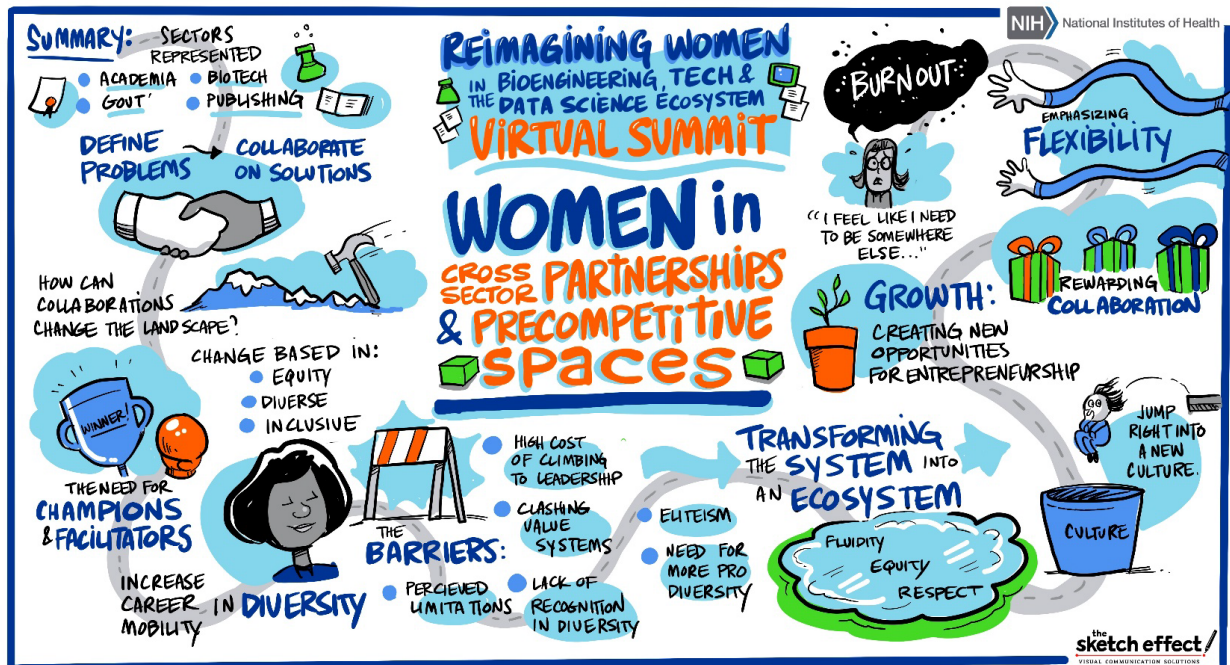
Allyship, Mentorship, and Sponsorship for Women

Keynote Presentation: David S. Wilkes, M.D., Dean Emeritus, University of Virginia School of Medicine; National Director, Harold Amos Medical Faculty Development Program, Robert Wood Johnson Foundation; Member, Board of Directors, Baxter International and Syneos Health

Current State Assessment

David Wilkes, M.D., explained that there are four key challenges related to success for women in STEMM: a lack of appropriate role models; a critical need for allies, mentors, and sponsors; insufficient amounts of protected time; and a need to learn to say "no" to say "yes." In addition, women are more likely to be tasked with activities for the organization, as opposed to their own tasks.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

Participants discussed key characteristics and opportunities of a new scientific ecosystem framework. Highlights from this discussion are outlined below.
- Dr. Wilkes defined the critical differences between an ally and a mentor. He explained that mentors offer advice, whereas allies know you more personally and use their power and privilege to advocate for marginalized groups.
- Previous studies suggest that male allies supporting women are crucial and impactful because men are more likely to be listened to while delivering a message.
- Dr. Wilkes noted that allyship is a lifelong journey that comes from building trust with a specific group of individuals—in this case, women.
- Mentors should teach you to reach beyond your comfort zone and should expect dedication from their mentees.
- Mentors should also teach about protected time, including time management.
    o People should have protected time scheduled in their daily calendars—i.e., uninterrupted time to focus on developmental activities. Saying "no" is essential so you can say "yes" to things more directly important to your career development.
- The first steps to addressing the key challenges include identifying the correct mentors/sponsors, learning who has a record of allyship, learning how and when to say "no," knowing when to say "yes," and protecting women's time.

Breakout Session

Co-Chairs: Karla Shepard Rubinger, M.Sc., Ph.D., Vice President of Mary Ann Liebert Inc., Executive Director of the Institute for Professional Education, Executive Director of the Rosalind Franklin Society; Debara Tucci, M.D., M.S., M.B.A., Director, National Institute on Deafness and Other Communication Disorders
Moderator: Tiffani Lash, Ph.D., Health Scientist Administrator, National Institute of Biomedical Imaging and Bioengineering

Current State Assessment

The group began by reviewing the current landscape of allyship, mentoring, and sponsorship for women. In 2018, 22% of bachelor's degrees in engineering were earned by women; however, women held only 15% of engineering jobs in 2019. Studies have found that nearly 1 in 5 women in the U.S. do not have a mentor, and 52% of women say they have never had a mentor because they have never encountered someone appropriate. Women are less likely to be asked to be mentors, even though it has been shown that mentees sponsored by women are more satisfied in their jobs and have more of their ideas implemented. A Coqual report titled *Athena Factor 2.0: Accelerating Female Talent in Science, Engineering & Technology* found that women in science, engineering, and tech careers who have sponsors are 200% more likely to see their ideas implemented, 70% more likely to have their ideas endorsed, 37% more likely to ask for a raise, and 27% more likely to be satisfied with their rate of promotion.

Participants emphasized that women who come from a background in which their voices are not heard or valued may have difficulty approaching mentors and require additional encouragement and support. The group discussed COVID-19 and the impact of the pandemic. Participants noted that the flexibility that working from home allows is an asset for women with child care responsibilities. But though hybrid work environments have presented new opportunities, many women have assumed more responsibilities at home since the start of the pandemic, so support is still needed.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

The group agreed that organizations must move past a "check-the-box" mentality and create meaningful and sustained change to advance the mentoring space. This change could come from encouraging DEI positions with budgets and direct reporting lines to senior leadership. Organizations must gain commitment across all levels of their workplace structures when implementing these initiatives. Women need multiple mentors, allowing for an interdisciplinary approach and multiple viewpoints. Women also need support in learning how to seek out a mentor or sponsor and learning to prioritize that in their career paths.

Participants agreed that personalized mentorship—mentorship that is tailored to an individual's career goals—is key to a successful mentorship. Mentoring training is needed to help those in

positions to provide mentorship learn how to help people develop and meet their career goals. The group also identified the need for mentees to actively seek out mentorship and not wait for mentors to come to them.

Participants discussed key characteristics and opportunities of a new scientific ecosystem framework. Some of the needs, solutions, and next steps include:

- Defining "allyship" so everyone works with a consensus definition.
- Encouraging women to engage with potential mentors outside their university systems and networks.
- Addressing the "hidden taxes on women," including time, value, and caregiving.
- Leveraging conferences such as NIH's Vivian W. Pinn Symposium as opportunities for women to make professional connections.
- Providing support for women of color who request grants for studies focused on their communities and employing multiple approaches to implementing culture change that target all levels of institutions.

Day 2 All-Attendee Discussion

Team mentoring is important—and possibly more important for women than men. Team mentoring allows for an interdisciplinary approach—in which a person can work with various perspectives for career mentoring—and can enrich someone's career. Team mentoring should be thought of as a lattice and not a ladder. Women should have many opportunities to bring in people to support them. Women may require a personal mentor to help with career and work–life balance issues, and these are not conversations women may want to have with an adviser or superior. Also, providing training to mentors is valuable because it helps them help their mentees effectively. To place greater emphasis on mentees' future success, one idea is to build mentorship into performance evaluations and the incentive structure. It is important to bear in mind that not all people are suitable mentors.

Mentorship at the peer level—for example, participating in training with your peers—can be effective, too. Mentees must be proactive when looking for mentors. There are myriad ways to mentor, and when you are looking for a mentor, it is important to find someone whose style matches your preferences. It is also important to shift the culture to expose people to leadership opportunities. Supervisors must be aware of opportunities available to their employees. Women are often blocked from being nominated for programs for a variety of reasons. It is essential to build capacity and understand people's needs at different career points. Culture change in professional development is needed so faculty members see themselves as a nexus that connects to the community. If a faculty member understands an individual's desired career trajectory, the faculty member can help that person achieve their goals.

Graphic Summary
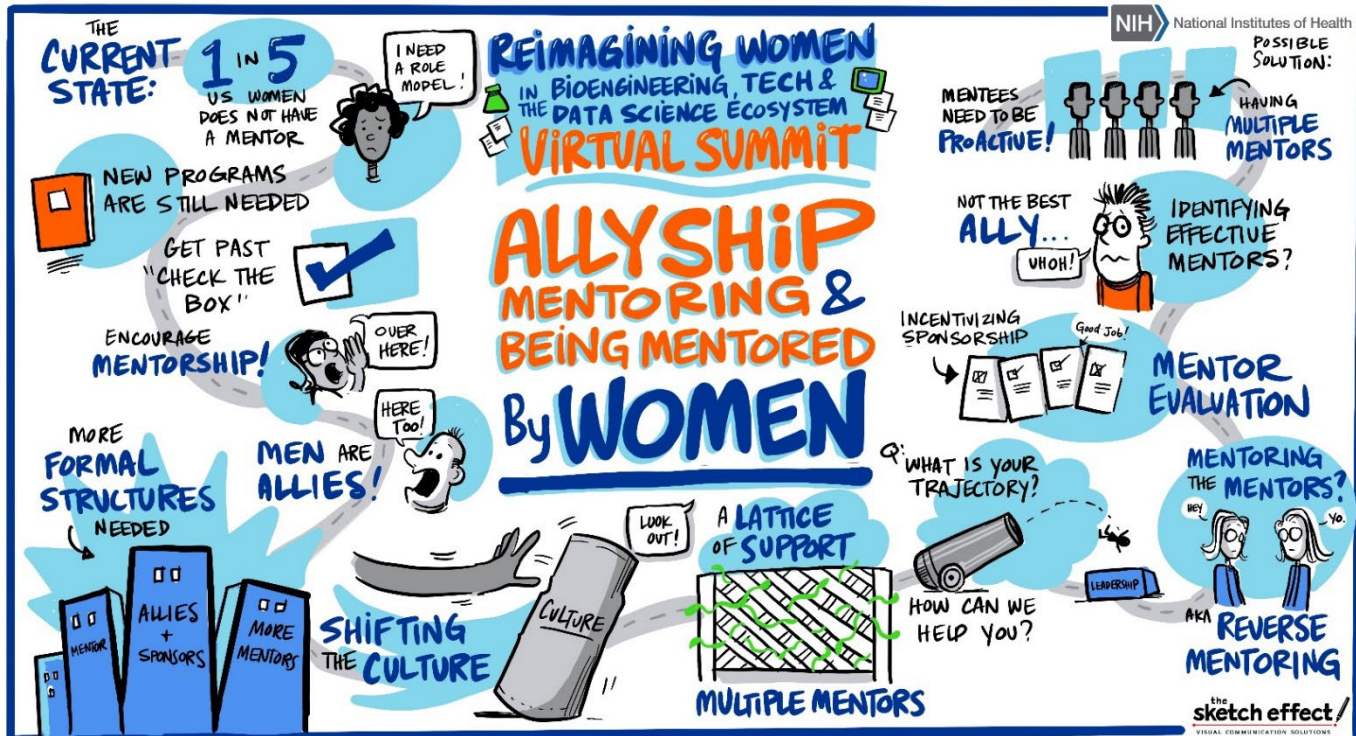
Bridging Opportunity Gaps

Keynote Presentation: Wendy Chun-Hoon, M.A., M.P.A., Director, Women's Bureau, U.S. Department of Labor

Wendy Chun-Hoon, M.A., M.P.A., shared that the Biden administration has made equity the center of the governmental approach. The role of the U.S. Department of Labor's Women's Bureau is to keep a laser focus on the way identities intersect and create further marginalized groups. The Women's Bureau is focused on disrupting occupational segregation to improve DEI in STEMM; improving investments in the care structures (disability care, child care, elder care, etc.); and eliminating discrimination based on gender, sexual orientation, and gender identity that results in pay and promotion inequities. Regionally, it is working with femtech in Massachusetts and California to increase diversity in STEMM. Nationally, the Women's Bureau has a program, Women in Apprenticeship and Nontraditional Occupations (WANTO), designed to recruit, retain, and train more women pursuing nontraditional occupations. Ms. Chun-Hoon shared that the Equal Employment Opportunity Commission (EEOC) and the U.S. Department of Labor's Office of Federal Contract Compliance Programs joined together to reimagine hiring and recruitment practices in ways that advance equal employment opportunities and help provide access to good jobs for workers from underrepresented communities, creating the Hiring Initiative to Reimagine Equity (HIRE). Ms. Chun-Hoon noted that while pay in STEMM is often higher than that of other industries, STEMM unfortunately lags behind other fields when it

comes to DEI initiatives.

Breakout Session

Co-Chairs: Jennifer Friel Goldstein, M.B.A., M.S.E., Managing Partner for Life Science and Healthcare, SVB Capital; Jennifer Webster-Cyriaque, D.D.S., Ph.D., Deputy Director, National Institute of Dental and Craniofacial Research; Josh Gordon, M.D., Ph.D., Director, National Institute of Mental Health.
Moderator: Jamie White, M.S., Health Science Strategy and Relations Lead, ORWH

Current State Assessment

The group summarized that when discussing pay gaps, there must be thought about how wealth is generated and how wealth connects to opportunity, time, and resources. Most wealth created in the U.S. is generated not from personal salaries but from investments and property. Success means being aware of opportunities, and females are taught to be calm and reserved, whereas males are encouraged to take risks. This builds on women's feeling intimidated about advocating for and investing in themselves. Society should encourage women to invest in their career building just as much as it encourages men. Women too often are compensated less than men with similar experience levels and receive less investment funding. Participants discussed the variance across generations regarding people's comfort levels with talking about their salaries and personal finances. The younger generations are more comfortable discussing pay structure among their peers, which allows them to be more informed and advocate for promotion.

The group noted that many women are stuck in careers because certain types of research don't transfer well across sectors, making transitioning to a different job a significant risk. They also identified a disproportionate burden of caregiving responsibilities placed on women, causing them to juggle multiple responsibilities. The National Heart, Lung, and Blood Institute–funded Women's Health Initiative, which has transformed to being an excellent opportunity for women to gain experience in leadership, is a great start to addressing some of these barriers.

Solutions, New Directions, and Key Characteristics of a New Ecosystem

The group found the need for discussion around financial literacy and creating opportunities to teach people, particularly women, about taking accountability for their finances. The group also discussed the need to demystify the risks, make opportunities more accessible and less intimidating, and promote the idea that everyone has the freedom to choose a career and follow that career. The group identified that relationships, resources, and recognition are vital to creating a sense of belonging and driving success. Participants agreed that women must be present when decisions are being made. Men should be involved in the conversation and hear what women say so they can help support and advocate for women. Additionally, women

should be encouraged to make their own career decisions and know that those decisions are valued.

The group recommended fellowships as an opportunity for midcareer women to learn, network, and explore different sectors while still making money. The group also recommended a cultural shift to provide flexibility and resources to women who start families and have the additional burden of child or elder care. When looking at diversity in the workplace, participants emphasized the need for leadership to have specific goals and strategies that embody the entire U.S. population, not just the immediate local population.

Day 2 All-Attendees Discussion

Participants resonated with the idea of culture change when talking about wealth, because wealth is dominated by men, particularly White men. The culture of wealth can be intimidating, but as people discuss how to shift the culture, men need to be included in the conversations. Everyone needs to come together to help empower women. Although pay is not directly related to wealth, pushing for legislation to disclose salaries would help with culture change, especially for underserved populations. Younger generations seem more comfortable discussing salary amounts and talking to their managers about their salaries, and this may be an opportunity for organic culture change. Pay equity and salary are important for employees who will not receive inheritances and rely upon their salaries to build wealth. Pressuring companies that purport to be in forward-leaning or equitable spaces to publish proprietary salary data could help improve salary discrepancies.

People need outlets to learn how their salaries compare with salaries of people working similar jobs. For example, some people can afford to do a fellowship with low pay, whereas other people cannot afford a fellowship opportunity. Understanding pay levels is an additional step in helping people explore career paths. Few people are taught financial literacy, and increasing financial knowledge could help employees learn to think strategically about money.

Graphic Summary
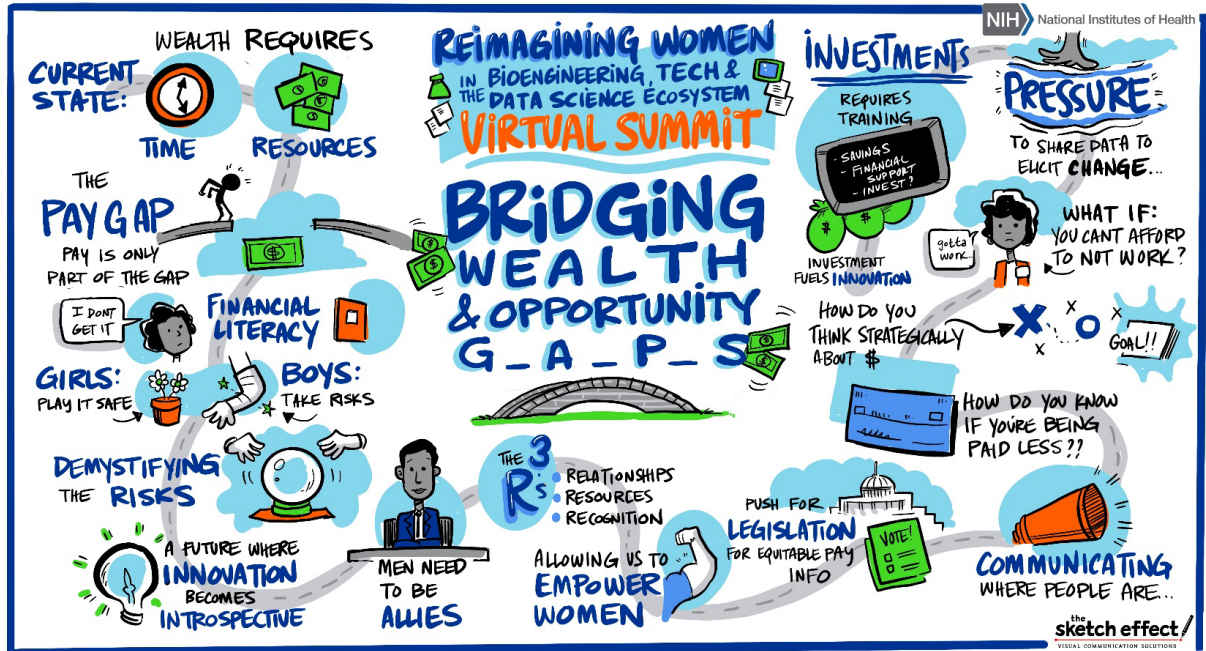
Next Steps

The WgWBC Partnership Summit was a productive event, and the breakout session yielded concrete recommendations for change. The graphic summaries provide excellent overviews on the ideas discussed during the summit. Listed below are the major topic areas to focus on moving forward.

- Culture change in all areas
- Empowering women to take risks and overcome self-doubt
- Improving salary disclosure for equitable pay
- Increasing financial literacy
- Navigating the M-shaped career path
- Addressing the "sticky floor" for women in STEMM
- Increasing the numbers of women, especially women of color, in leadership and power positions