

Women in IT Networking at
Supercomputing (WINS) Final Report:
Building the Next Generation of Diverse
IT Leaders

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Executive Summary

The Women in IT Networking at SC (WINS) program was developed in 2015 as a means for addressing the prevalent gender gap that exists in Information Technology (IT), particularly in the fields of network engineering and high performance computing (HPC). Since its inception the WINS program has enabled 45 women to participate in SCinet, which has evolved into a small community that supports each other both during the conference and post-conference. As a result, the percentage of women participating in SCinet has doubled since the WINS program started in 2015. This report highlights the most significant accomplishments of the program to date as well as plans and strategies to sustain WINS going forward.

Introduction

The Women in IT Networking at SC (WINS) program was developed in 2015 as a means for addressing the prevalent gender gap that exists in Information Technology (IT) particularly in the fields of network engineering and high performance computing (HPC). Initially introduced as a pilot program (NSF 144064) at SC15 and then funded through a multi-year grant from the NSF (1640987) and an NSF travel grant in 2021 (2129723), the program has provided mentorship and travel funding for talented early to mid-career women from diverse regions of the U.S. research and education IT community for a true “hands on” experience in the ground-up construction of SCinet, one of the fastest and most advanced computer networks in the world.

The WINS 2022 management team is led by Principal Investigator (PI) Marla Meehl and hosted by her home organization University Corporation for Atmospheric Research (UCAR). Current management team members include Scott Baily (UCAR), co-PI Wendy Huntoon (KINBER/consultant), Brenna Meade (IU), Kate Robinson (ESnet), Lauren Rotman (consultant), Kimball Sekaquaptewa (Santa Fe Indian School), and Jason Zurawski (ESnet). Funding for the program comes from a combination of NSF grants, personnel and travel support from UCAR, KINBER, ESnet, and contributions from supporting organizations (Appendix A).

In developing the program, the WINS management team focused on developing a rigorous and respected application review and finalist selection process. This process included defining protocols for SCinet mentor and team assignments, managing and supporting WINS recipients’ participation in SCinet and report-outs, refining the program based on each year’s experience, and collecting information and metrics in order to assess the program. By SC18, the WINS program had settled into a smooth routine, providing a solid framework that could be replicated each year.

Program Accomplishments

Since its inception, the WINS program has selected 45 women to participate in the program, including awardees selected for SC22. Most of these women have participated in SCinet in person; one participated remotely, deferring physical attendance to a later conference, and because SC20 was held as a virtual conference, the entire SCinet activity was virtual. The percentage of women participating in SCinet has increased significantly since the WINS program started in 2015, both in the number of women participating and the percentage of women on the SCinet committee. In 2007, 15 of the 105 SCinet volunteers were women, which was the largest number of female SCinet volunteers to date. In SC21, 35 of the 123 SCinet volunteers were women with 9 of them from the WINS program.

As indicated in Figure 1, the percentage increase in women participating in SCinet reached a high of 36%, compared to 14% participation the year the program started. WINS participants have a similar return rate as other SCinet volunteers. Using SCinet volunteer information for SC06 through SC19, roughly 53% of SCinet volunteers participate in SCinet at least twice. During the same period, 15 of the 24 WINS awardees, or 62%, have participated in SCinet at least twice. The WINS program has facilitated return participation by partially funding travel for 13 of the 19 returning WINS women. In addition, many returning WINS participants have taken on leadership roles: 1 in SC17, 4 in SC18, 6 in SC19, 10 in SC20, and 8 in SC21, as shown in Figure 2.

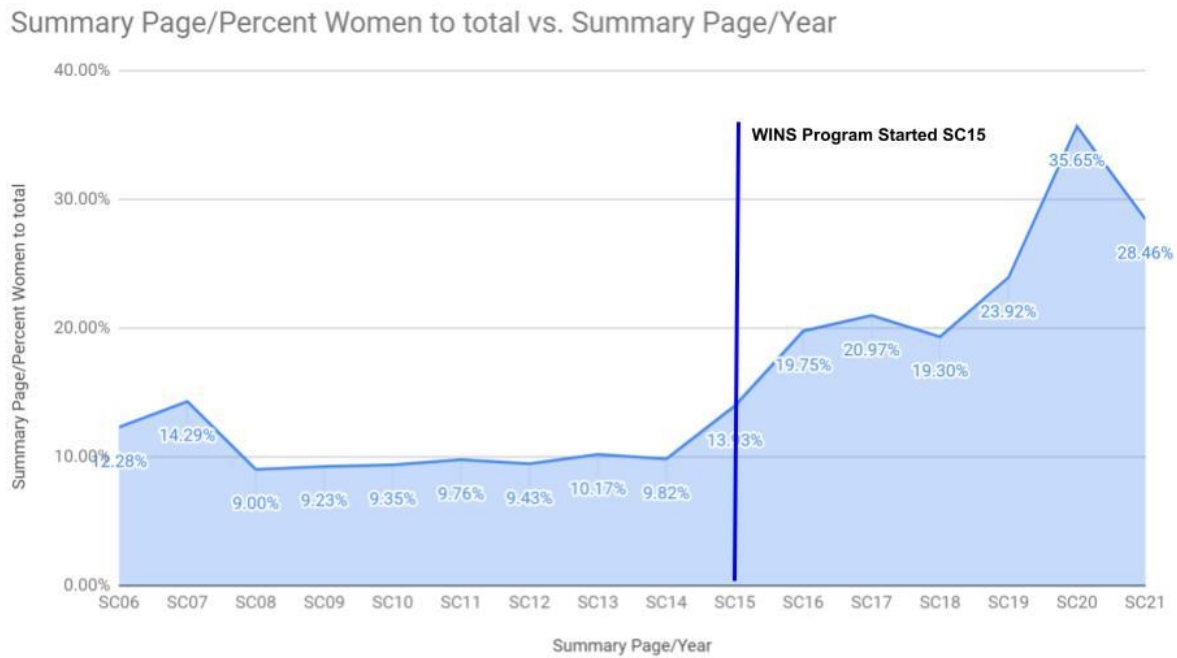


Figure 1: Percentage of Women to Total SCinet Volunteers by Year

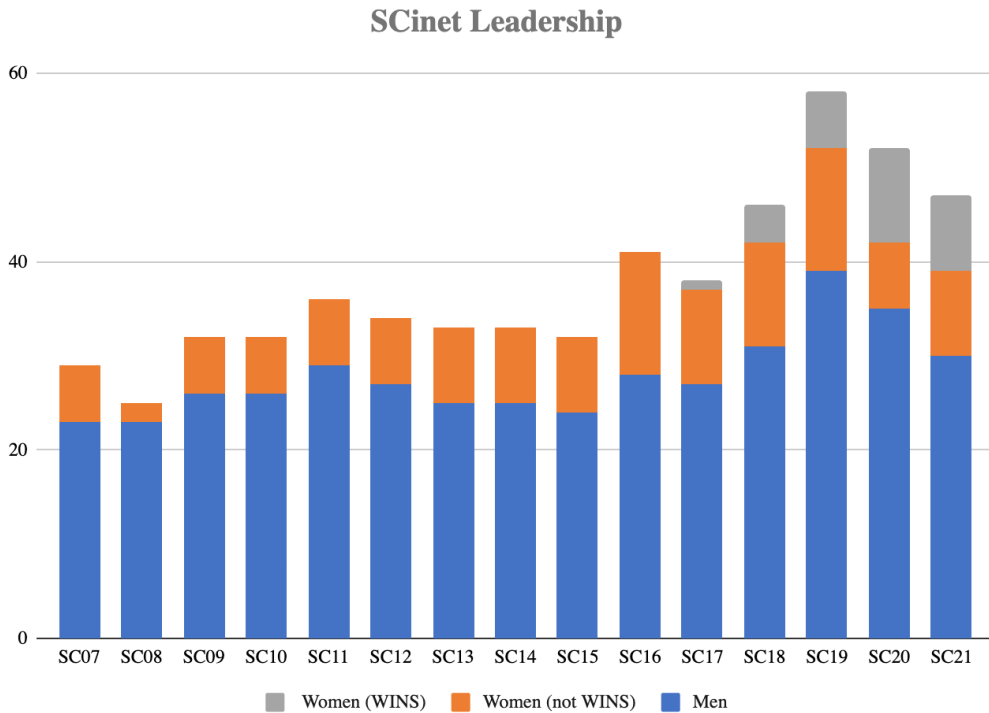


Figure 2: SCinet Leadership Roles by Year

WINS strives to have a diverse set of applicants, having received 188 applications from 43 states with awardees coming from 21 states representing Higher Education and Community Colleges, Tribal K-12 school systems, Minority Serving Institutions (MSIs), DOE National Labs, Research and Education Networks (RENs), and for-profit organizations. Through their participation in SCinet, the WINS recipients have developed new technical skills and greatly expanded existing expertise.. They have developed communication and presentation skills through the yearly report-out process. With over 20 report-outs on the program to date at a diverse set of regional and national conferences and workshops, the program has not only increased the awareness of the gender gap in IT, but also provided an opportunity for professional development for the WINS participants. The program has successfully partnered with Internet2 on their Inclusivity Initiative (I2I), with multiple WINS recipients granted I2I scholarships for the Internet2 Global Summit or Technology Exchange. Additionally, many RENs now have their own diversity initiatives at least partially inspired and informed by WINS.

WINS Sustainability Plan

A significant challenge associated with the program is how to effectively scale WINS volunteer participation, taking both new and returning WINS awardees into account. As discovered during

the first five years of the program, the WINS program structure must provide the necessary financial and managerial support while the SCinet management and mentors must be able to integrate and mentor the volunteers into the teams.

In 2019, the WINS management team identified key challenges and opportunities associated with establishing a long-term sustainable WINS program and received supplemental funding from the NSF to investigate options for developing and implementing a self-sustaining program. The focus of the supplemental funding was to identify, understand, and address the strengths and challenges, then implement an organizational, governance, and business model that will support the program going forward. A sustainability report was generated and provided to NSF later that year.

Overall Program Effectiveness

By all accounts, the program is successful in increasing the number of women participating in SCinet, including in leadership roles. The program's outreach activities, primarily presentations at conferences and workshops, are effective in raising awareness of the issue of fewer women going into the area of IT, including the field of networking, and the WINS program. WINS has also broadened leadership training, professional development activities, and professional network continuity..

Impact on Diversity

As indicated in Figure 3, project results clearly indicate that WINS has had a significant impact on improving the gender diversity of the SCinet teams. In addition, the program has strived to have broader underrepresented minority (e.g. black, hispanic, tribal) diversity within the WINS program itself. Achieving broader diversity has been challenging. In the last two years, WINS deliberately updated the Call for Participation language to encourage underrepresented minorities and those from underserved MSIs to apply, and actively reached out to MSIs to encourage applications. Applicants are now able to self-identify racial or ethnic background. The program considers geographic, organizational, skill set, background, and diversity factors when selecting candidates. This approach has diversified the set of WINS applicants with WINS awardees (see Figures 4 through 6) now coming from a broader geographic area and a more diverse set of organizations.

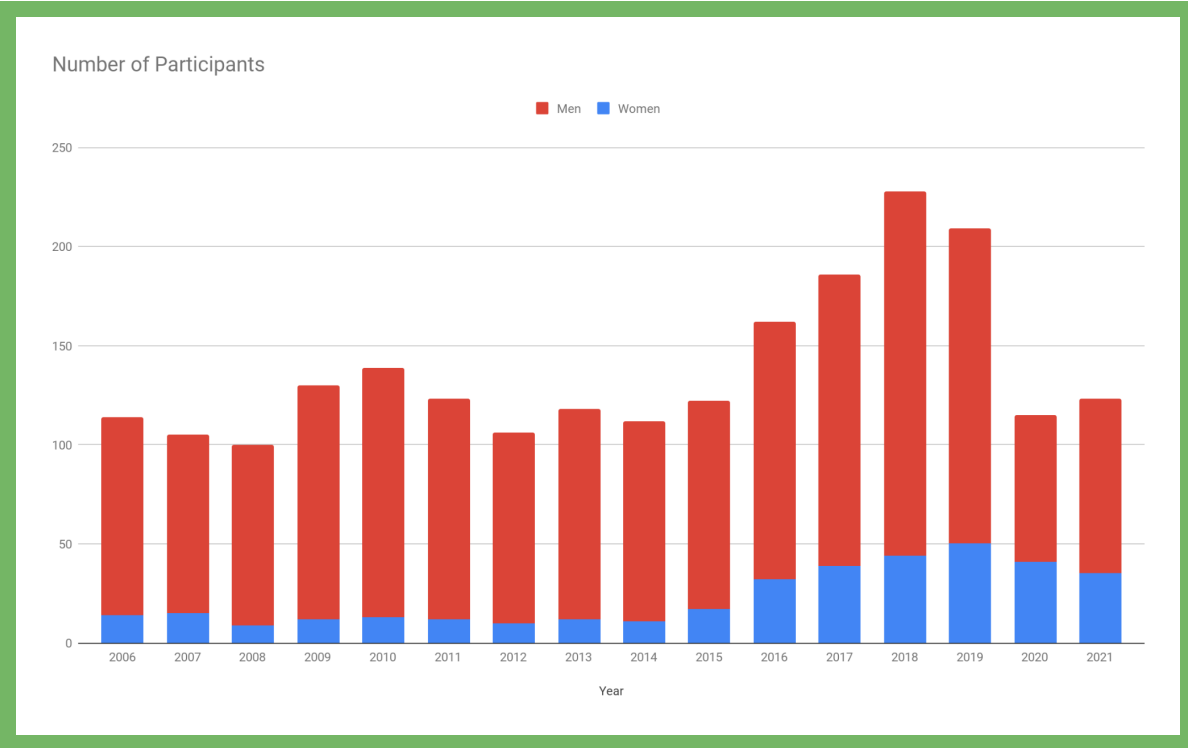


Figure 3: Gender diversity within SCinet. WINS started in 2015.

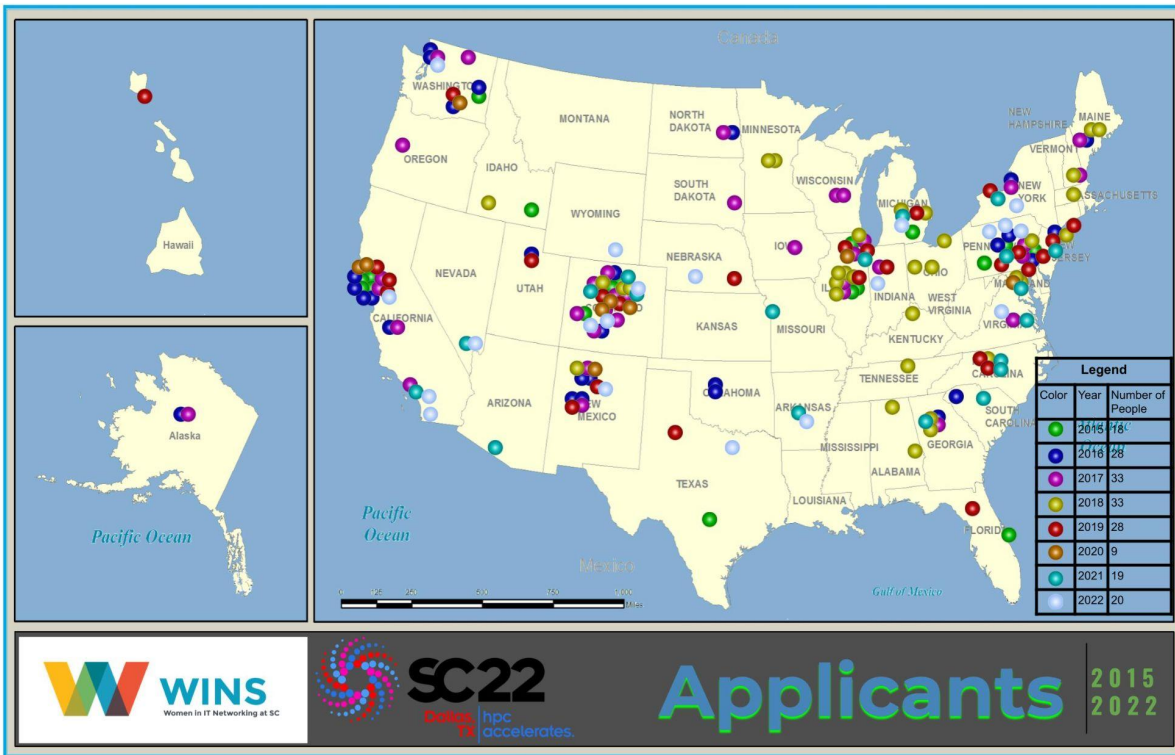


Figure 4: Geographic diversity of WINS Applicants

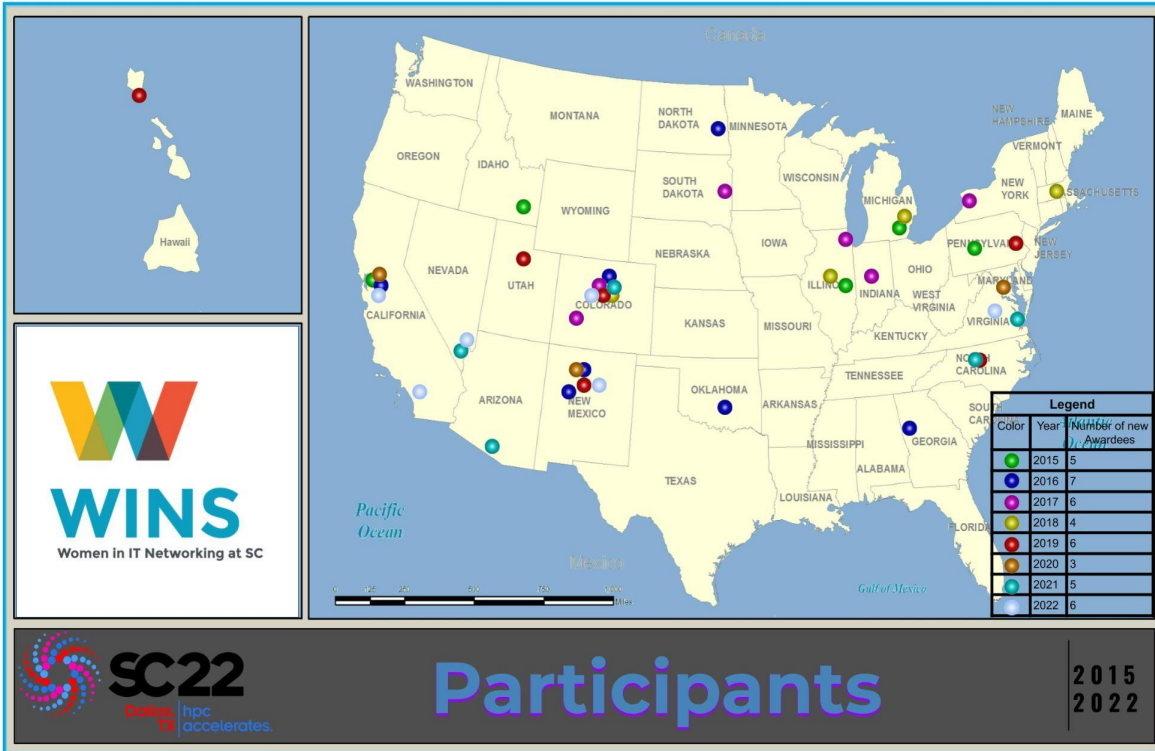


Figure 5: Geographic diversity of WINS Participants

Organization Type - Finalists

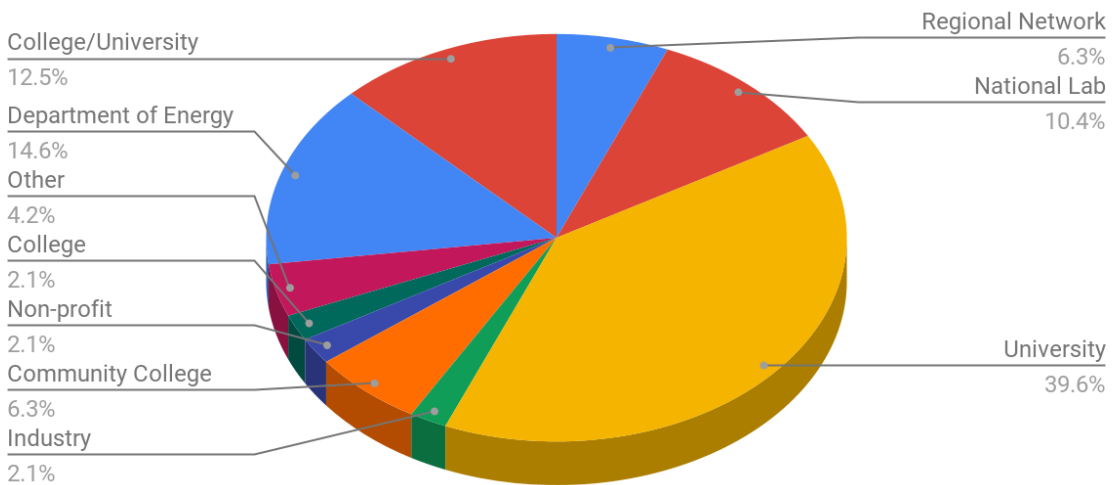


Figure 6: WINS Finalist Organization Type, SC15-22

Management and Administrative Support

Personnel support from the original grant funded only a small portion of an administrative assistant and a budget analyst to help with the travel arrangements for the WINS participants and to manage the WINS budget. As currently structured, program funds only cover travel for WINS awardees and donation funds cover a small portion of the Program Manager, but other management and administrative functions are funded by the home organizations or are donated time. In 2019, WINS tracked the level of volunteer support associated with the program as well as surveyed the management team at the end of the SC19 activities. In summary, support included:

- A dedicated team of program managers supported by their home organizations, Marla Meehl/UCAR, Wendy Huntoon/KINBER, Kate Robinson/ESnet, Lauren Rotman/ESnet, and Soledad Toledano/NERSC, Jason Zurawski/ESnet, who support all critical functions of the program.
- A dedicated volunteer selection committee that reviews the applications and meets virtually to discuss then recommend a final set of WINS participants.
- Dedicated SCinet mentors who, in addition to their volunteer activities for SCinet, take on the role of working with and mentoring one-on-one each of the WINS participants.
- SC and SCinet support the inclusion of the WINS participants in the appropriate SCinet team along with coordination with the WINS management and support team.
- Vendor support including support for the annual WINS luncheon during SC to introduce the WINS participants to others in the community.
- Research and Education Network (REN), Quilt, and Internet2 support including providing professional development and presentation opportunities at regional and national meetings as well as travel support to attend the meetings.
- Administrative support for WINS functions such as scheduling calls, coordinating the award lunch, updating metrics, budget management, and website management.

It is estimated that the WINS management team members collectively provide at least 100 hours per month (1200 hours per year - approximately a .6 FTE) in project support, not including any time dedicated to SC-specific functions. Primary functions included: management, administration, application review process coordination, travel coordination, web page management, solicitation and management of external donations, and metrics collection, presentation, and analysis. Additional responsibilities include: support during SCinet itself, mentoring WINS awardees, and vendor interaction, along with outreach and communications activities including regular presentations at conferences and workshops. These team hours did not include the time in support of SCinet and the Supercomputing Conference itself.

The success of the program depends on at least one member of the WINS management team being an active participant in SCinet. This person serves not only as a liaison with SCinet and SC Committee management including helping to select and coordinate the SCinet teams and mentors for the program, but also acts as “boots-on-the-ground” to be an easily accessible resource to the WINS participants and address any issues that may come up for the WINS volunteers before, during, or after the conference.

Travel Funding

Travel funding for WINS participants comes from multiple sources. We have realized funding travel from multiple sources is achievable; we now know it requires significant additional project management and administrative support including identifying the diverse funding streams, preparing and presenting the requests for funding to the various groups, and managing the relationship with the funding organizations once the funding is secured. These increased tasks are not covered by project funding. Multiple travel policies increase complexity for WINS participants who are not always travel savvy.

It is clear that biases in travel policies can limit the ability of candidates to travel. For example, the program’s or the participant’s home institution's inability to book and pay for large expenses can limit or complicate who can participate. This bias ties directly to the ability to engage the [“missing millions”](#).

WINS Host Organization

Input from the community during the preparation of the WINS Sustainability Plan indicated the WINS Program Office should be hosted as a standalone or part of an existing nonprofit organization. A number of organizations were considered for their commitment to diversity and inclusivity efforts, their organizational support scale and scope, and the commitment for long term continuity and support of WINS. UCAR has provided support for WINS since its inception in 2015. UCAR has a long and strong relationship with NSF and DOE. UCAR has an established commitment to diversity and inclusivity with many long standing and successful programs to increase diversity and inclusivity in science and technology. To date, UCAR has agreed to continue to support WINS.

WINS held two virtual retreats in 2022 with WINS supporters and experts in diversity. Valuable guidance and direction were received, some of which is being implemented and some would be implemented in the future. The retreat participants had a broader view on considering other organizational models for sustaining WINS that will be explored and considered.

SCinet Participation

Timeline

The timeline has been adjusted over the last two years with input from the SCinet team leads, WINS mentors, and the awardees to be more effective in integrating the WINS participants into the teams as well as participate in the early SCinet planning process. Earlier placement on their team allows the team leads and mentors to more effectively assess skill sets and interests, set expectations, assign projects and tasks, and assist in integration and bonding with the team sooner.

The biggest challenge for the program is the three week time commitment for the WINS awardees to participate in SCinet; one for staging and two for SC/SCinet set-up and show. For many awardees, it is their first significant business trip. Thus for some, given the lack of direct experience with managing travel, work and home activities as well as the new SCinet responsibilities, two long trips in a short time period is difficult. For small host organizations, not traditional SC attendees or contributors to SCinet, providing the release time (time away) for the awardees for the actual travel as well as the SCinet planning support during the rest of the year sometimes requires off-hours work on the part of the awardee and/or additional resource management by the host organization. Many small organizations have very limited IT staff, with little depth for back-up and coverage, and this causes substantial stress and duress for support teams and organizations. An additional challenge is that by focusing on the Supercomputing Conference, held each year in November, only women who are available for three weeks in the fall can participate in WINS.

While the rate of return of the WINS awardees is similar to that of other SCinet volunteers, it was repeatedly cited as a concern by SCinet leadership and mentors. From the outset, a major goal of the WINS program was to create a sustainable pipeline of women volunteering for SCinet. The perception that the WINS volunteers return at a lower percentage than other SCinet volunteers may have to do with the small size of the WINS volunteer pool (45), and the fact that the program has been in place for a relatively short time period, thus analyzing the rate of return over multiple years is difficult. While WINS provides some level of support for first and second year returnees, the expectation is that the home organization, realizing the benefit of SCinet participation by its employees, will pick up the travel funding for subsequent years. Awardees have cited both the required time commitment and the lack of home institution financial support as the biggest factors in their decision not to continue to participate in SCinet. This is not unique to WINS.

SCinet Management

Without the support of the SCinet management team, the WINS program would not have been possible or successful. However, the yearly change in SCinet management requires that the WINS program establish (or reestablish) a relationship with the new SCinet Team. This factor holds true with the SC Executive Committee as well. While both the Supercomputing and SCinet management have been very supportive of the program, if a significant change in management directives resulted in a lack of support of the program or its goals, it could have a negative impact on the program. For SC21 and SC22, the WINS Management Team has held regular meetings with SCinet leadership, which has proven very effective in streamlining the program integration with SCinet and improving communication between SCinet and WINS. SCinet also engaged and supported a policy to cover any hotel and per diem expenses should a WINS participant be taken ill such that travel was extended beyond planned dates. This was extremely helpful in enabling safe and supported travel during the COVID pandemic.

Mentors

SCinet mentors, experienced SCinet team members who volunteer to work and are assigned a specific WINS participant, are a critical part of the program. While not formally instituted in the first year of the program, it has evolved over time as a way of reducing the responsibilities for the “boots-on-the ground” WINS management team members and more effectively integrating the WINS participants into the team. Since the mentors are assigned to the same team as their WINS mentee, they help integrate the WINS participant into the team, provide skill assessment and technical support for assigned tasks, and work with the SCinet WINS lead (s) on any issues. While the mentor program has been very successful, additional structure and training could improve the experience for the mentors, the mentee, and SCinet itself. Beneficial structure identified through both the mentor and WINS participant surveys include: selecting mentors who have the time to support the WINS mentee, often not a team lead or deputy lead of a SCinet team; providing a brief description of the mentor responsibilities developed jointly by the WINS team and the SCinet team(s); clearly articulating the team reporting structure to both the mentee and mentor; and, developing steps to integrate the WINS participant into the team.

In 2022, a one-hour mentoring training session will be offered twice in hopes of maximizing participation of not only WINS mentors but for all SCinet participants. In addition, a broad presentation providing an overview of SCinet architecture is being developed for WINS and all SCinet volunteers, per the recent suggestion during a WINS alumni call, to provide a big picture view of SCinet and how each team fits into the overall architecture.

Awardees' Experience

Professional and Skill Development

Surveys of the WINS awardees indicate the program has provided significant opportunities for technical skill development, general professional development, and career advancement for its participants. The majority of WINS awardees developed new technical skills, gained exposure to technologies or equipment outside their standard work environment, added to their professional network, and improved their collaboration and communication skills. At least half of the women surveyed were able to apply skills developed during SCinet at their home institution. For the women responding to the sustainability report survey, over half indicated they had received a job promotion in part due to the skills and experience developed through WINS. For example, one awardee has been promoted three times in the last five years since her initial participation in WINS. Her manager indicated she was a stronger candidate each time as a direct result of her ongoing experience with WINS and SCinet. The Quilt and KINBER supported Jennifer Kim, a WINS participant, to take part in the 2022 Quilt MOR program. Initial indications are that this has been a very positive experience for Jennifer, and KINBER has suggested that this should be an ongoing program that they may be willing to support.

Challenges

Many of the WINS participants indicated the most significant challenge with participating in WINS and SCinet was the overall time commitment and/or the timing of the conference. The majority indicated that participation in the program was worth the sacrifice, but they wished they had been better prepared during their first year to manage the travel and life balance including transition back to normal life demands at the end of SC.

The WINS program has emphasized to the participants that they have the choice to defer in-person attendance at SCinet if desired. Those who have deferred can participate in WINS professional development activities, including participation in SCinet virtually, and WINS is not a one time only opportunity but part of long-term career development. To that extent, WINS has continued to develop and expand activities outside of SC itself that provide skill and professional development. WINS implemented monthly WINS alumni calls this year, which have been well attended and covered various topics both technical and professional development.

COVID-19

WINS followed its normal timeline for recruiting applicants and selecting the WINS awardees for SC20. As expected, due the uncertainty associated with COVID-19 during the application period (March 1 - April 30, 2020), the total number of applications (9) was significantly lower than in previous years. Three women were selected, joining the two women who had deferred from SC19. At the end of July 2020, SC20 announced a virtual conference, with SCinet not

being constructed in 2020. The WINS 2020 awardees along with the two WINS 2019 awardees who deferred were offered the opportunity to participate in the virtual SC20 conference, join their assigned SCinet teams, and defer in-person attendance to SC21. In addition, WINS provided additional mentoring as well as professional and skill development opportunities as a means of offsetting in-person SCinet participation. The pandemic, specifically the cancellation of an in-person conference and physical SCinet, has reinforced the limitations associated with the primary focus for the program on a single, yearly event.

Advisory Committee

An Advisory Committee consisting of WINS stakeholders has been established to provide advice on program content and expansion, the future organizational structure, and external funding opportunities. The Advisory Committee will be co-chaired by the members elected during the first meeting and will be supported by the Program Manager. Confirmed WINS Advisory Committee members are:

- Sana Bellamine - CENIC
- Eli Dart - ESnet
- Forough Ghahramani - NJEdge
- Gwen Jacobs - University of Hawaii
- Scott Kohlert - Ciena
- Nathaniel Mendoza - TACC
- Jennifer Schopf - Indiana University
- Lawrence Williams - Internet2
- Linda Winkler - ANL

The Advisory Committee will meet twice a year. Regular two-year rotations, staggered for continuity, of the committee members will ensure broad representation and fresh input and ideas.

Mentorship, Internship and Leadership Programs

Career development opportunities have been cited by the awardees, their managers, the SCinet Mentors and SCinet Leadership as one of the most significant benefits of the program. However, these benefits are currently provided on an ad hoc basis (based on team and task assignments), limited to only those who can attend SC and with limited opportunities beyond SC itself. The recommendation is to make professional development, on its own, a central component of the program. For the WINS participants, a process would be created to identify skill sets to be developed and provide opportunities to continue growing those skill sets and professional development outside of SC. The program would leverage its relationship with other groups within the academic, high performance computing and regional networking community to provide career development opportunities and activities.

To date, WINS has been very successful with participants taking on leadership roles on SCinet teams and within their home organizations. The most notable achievement in that regard is the election of Angie Asmus (SC16) as the SCinet Vice Chair in 2023 and SCinet Chair in 2024. Ultimately, the goal is for all WINS participants to have opportunities to become technical leaders in these arenas.

Post-Grant Plans

- Pursue other funding sources to facilitate the continuation of WINS. Possibilities include an NSF Workforce Development Grant, private foundation grants, or other opportunities as they present themselves
- Apply lessons learned from SC15-22 to future SC conferences, continually improving the WINS program
- Maintain and improve the WINS mentoring program
- Promote the WINS alumni group as a valuable networking asset for WINS participants and continue monthly calls
- Continue to provide and expand professional development opportunities outside of SC

Conclusions

The WINS program has been highly successful in its primary goals of increasing the number of women participants in SCinet, providing technical and professional skill development for the WINS volunteers, helping women build a professional network, and increasing awareness in the community regarding the gender gap in the fields of network engineering and high performance computing. By SC21, women accounted for 28.5% of the SCinet volunteers, an increase from 14% when the program started in 2015. WINS is sending three new, three deferred, and five returning WINS women to SC22.

To date, this program has had a steady number of applications, demonstrating an ongoing demand for this kind of opportunity. WINS continues to receive accolades and strong support from the high-performance networking community including SC, SCinet, RENs, research labs, higher education organizations and vendors. While the program has been very successful, it has been challenging to effectively scale the WINS program due to the limitations associated with the current program model, which is dependent on significant volunteer support and limited budget.

Based on the results from the WINS sustainability survey and the two WINS retreats in 2022, specific recommendations for establishing a sustainable WINS program were identified. The recommendations include: develop and fund a core WINS organization; establish mentorship, internship and leadership programs and activities outside of SC; and carefully expand the program to meet specific goals.

Appendix A: Supporting Organizations

- NSF Grants 144064, 1640987 and 2129723
- Ciena Corporation
- Energy Sciences Network (ESNet), Department of Energy
- Facebook/Meta Platforms Sponsorship
- International Networks at Indiana University
- Internet2
- Juniper Corporation
- Keystone Initiative for Network Based Education and Research (KINBER)
- Northern Tier
- Pacific NorthWest GigaPoP (PNWGP)
- The Quilt
- University Corporation for Atmospheric Research (UCAR)