



WINS

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*Women in IT Networking at
Supercomputing
(WINS)*

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*Sustainability Report:
Building the Next Generation of
Diverse IT leaders*

Women in IT Networking at
Supercomputing (WINS) Sustainability
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 more than 30 women to participate in SCinet, which has turned into a small community that supports each other at the conference and post-conference. As a result, 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 general. However, while the program has been very successful, it has been challenging to effectively scale the WINS program due to limitations associated with the current program model, which is dependent on significant volunteer support, based on a single conference (Supercomputing) and time of year (November).

In 2019, the WINS management team identified these and other key challenges and opportunities associated with establishing a long-term sustainable WINS program and received supplemental funding from the NSF (NSF 1640987) to investigate options for developing and implementing a self-sustaining program. WINS used a combination of surveys, conference calls and in person interviews to collect input into the effectiveness of the current WINS program as well as areas for improvement, possible organizational structures, financial models, areas of focus and program components for a long term program. Specific recommendations for establishing a sustainable WINS program based on the results of the sustainability investigation include:

- Develop and fund a core WINS organization, including staff and solicit funding for travel and other non-core functions from outside organizations
- Develop mentorship, internship and leadership programs and activities outside of SC
- Expand the program in order to meet specific goals. Three areas have been identified:
 - Join conferences or experiences beyond SC and SCinet
 - Reach out to beyond early to mid-career women
 - Solicit a broader more diverse set of volunteers to promote more inclusivity

Based on these recommendations, a business model is proposed that requests 3 to 5 years from a funding agency such as the NSF for the WINS Program Office (WPO); secure supplemental funding to cover WINS travel costs for new and returning SCinet participants as well as for programs that help expand the program's reach; and expand the supplemental funding once the core funding is expended to cover the full cost of the program.

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), the program provides 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 management team is led by Principal Investigator (PI) Marla Meehl and hosted by her home organization University Corporation for Atmospheric Research (UCAR). Additional initial management team members include co-PI Wendy Huntoon (KINBER/consultant), Lauren Rotman, Kate Mace and Jason Zurawski (ESnet), with Rasha El-Jaroudi (UT Austin), Kate Robinson (ESnet) and Soledad Toledano (LBNL) added in recent years. Funding for the program comes from a combination of NSF grants, personnel and travel support from ESnet program funds along additional 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 included defining SCinet mentor and team assignments and protocols, 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 an infrastructure that could be replicated each year.

Program Accomplishments

Since its inception the WINS program has selected 34 women to participate in the program, including the WINS Awardees selected in 2020. Since its inception 29 women have participated in SCinet, most attended in person, one participated remotely deferring physical attendance to a later conference; and, the rest have participated virtually in SC20 with in person participation planned for SC21. 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 general. Specifically in 2007; 15 of the 105 SCinet volunteers were women, the largest group until 2015. In 2015, 17 of the 122 volunteers were women, with 5 of them from WINS. By SC19, 50 of the 209 volunteers were women with 15 of them from the WINS program. As indicated in Figure 1, the percentage increase in women participating in SCinet has grown to 26% from the 10% 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. For WINS, 15 of the 24 WINS SC15 to SC18 awardees, or 62%, have participated in SCinet at least twice. The WINS program has facilitated return participation by partially funding travel for 7 of the 15 returning WINS women. In addition, many of the returning WINS participants have taken on leadership roles: 1 in SC17, 4 in SC18, 6 in SC19 and 9 in SC20, as shown in Figure 2.

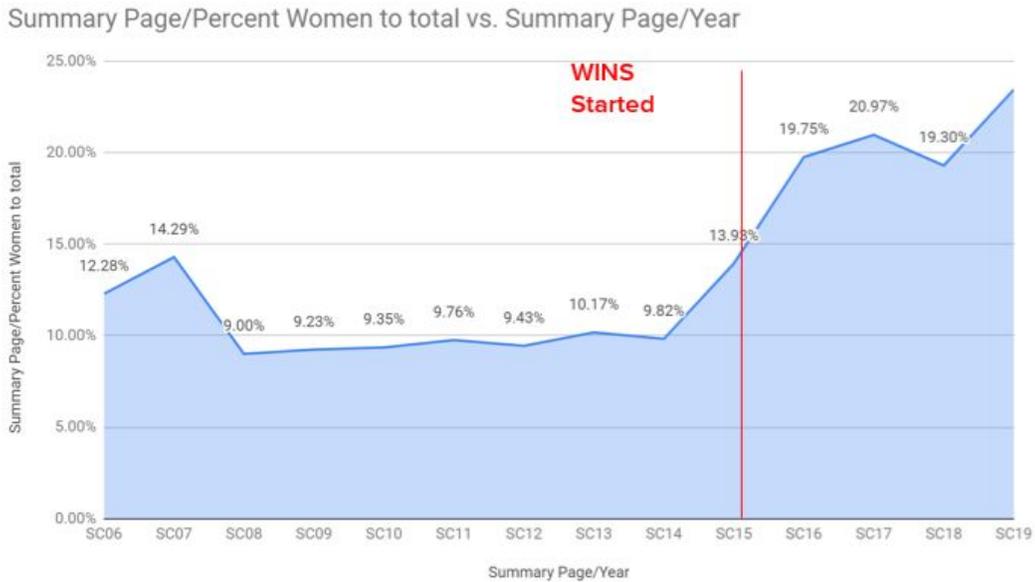


Figure 1: Percentage of Women to Total SCinet Volunteers by Year

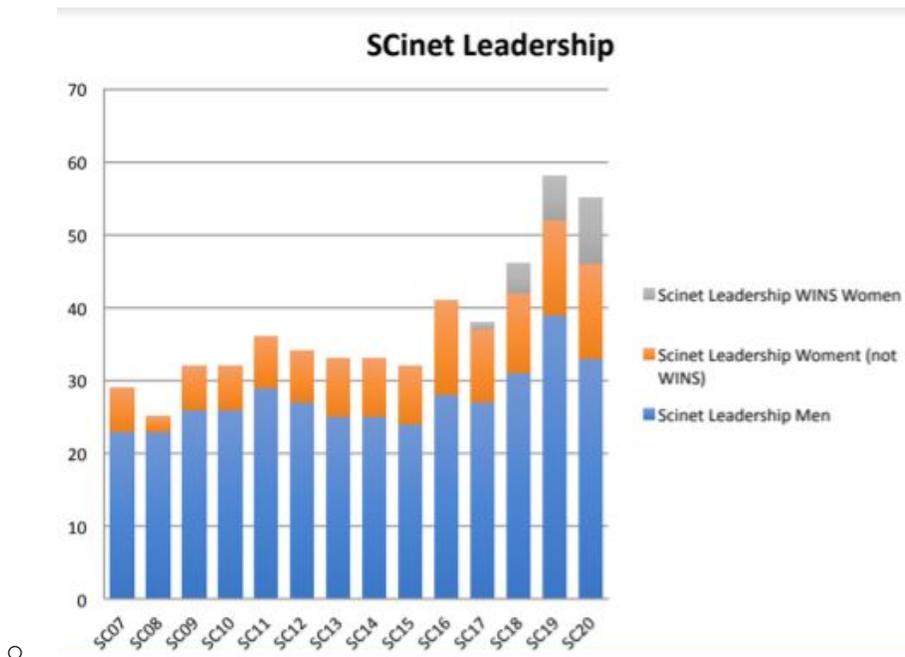


Figure 2: SCinet Leadership Roles by Year

WINS strives to have a diverse set of applicants, having received over 150 applications from 38 states with awardees coming from 18 states representing Higher Education and Community Colleges, tribal school system, DOE National Labs, R&E Networks and for-profit organizations. Through their participation in SCinet, the WINS recipients have developed new and expanded existing technical skills. 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 5 years of the program, 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.

Funded personnel support for the original program was limited to basic administrative functions associated with the project. Specific tasks performed included: travel arrangements for the program participants, processing travel expense forms and reports for all participant travel, with minimal support for the application and acceptance process and data metrics gathering. The WINS management team provides significant support for the program as part of their current WINS job responsibilities, leveraging existing activities associated with the high performance networking and computing community. There are currently six management staff from four organizations providing significant staffing support.

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. The following report provides the background on the project, reviews the strengths and challenges identified during project implementation, describes the sustainability project plan including results, and then provides a set of recommendations.

WINS used a combination of surveys (results in Appendix B), conference calls and in person interviews to collect input into the effectiveness of the current WINS program as well as areas for improvement, possible organizational structures, financial models, areas of focus and program components for a long term program. Results from the investigation are provided in the first section, followed by specific recommendations.

Results

Overall Program Effectiveness

By all accounts, the program was deemed successful in increasing the number of women participating in SCinet, including in leadership roles. The program's associated outreach activities, primarily presentations at conferences and workshops, was effective in raising awareness of the issue of fewer women going into the area of IT, including the field of networking, but was limited primarily to the research and education community and associated vendors. While these additional activities provide some year-round activities, the program's overall effectiveness has been limited by primarily focusing on a single conference (Supercomputing) and project (SCinet). Specifically, the number of yearly participants is limited by SCinet's capacity to accept and mentor the awardees and by funding. In addition, the timing of the conference, November of each year, limits participation to those who can devote at least three weeks of their time in the fall to the program.

Impact on Diversity

As indicated in Figure 1, 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. However, achieving the broader diversity has been challenging. While the WINS application review process attempts to take diversity into consideration, the WINS application does not specifically ask about racial or ethnic background. The program instead looks at geographic, organizational, skill set and background factors when selecting candidates. While this approach has diversified the set of WINS applicants (Figures 3 and 4), with WINS awardees, thus SCinet volunteers, now coming from a broader geographic area and a more diverse set of organizations, it has had limited impact on racial or ethnic diversity. The program has identified directed and expanded recruitment of applicants as the most significant factor in broadening diversity. Specifically, relationships established through regional activities and other NSF CC* grant activities have provided access to Native American organizations and resources. Establishing broader organizational and trust relationships in order to recruit applicants has proven challenging.

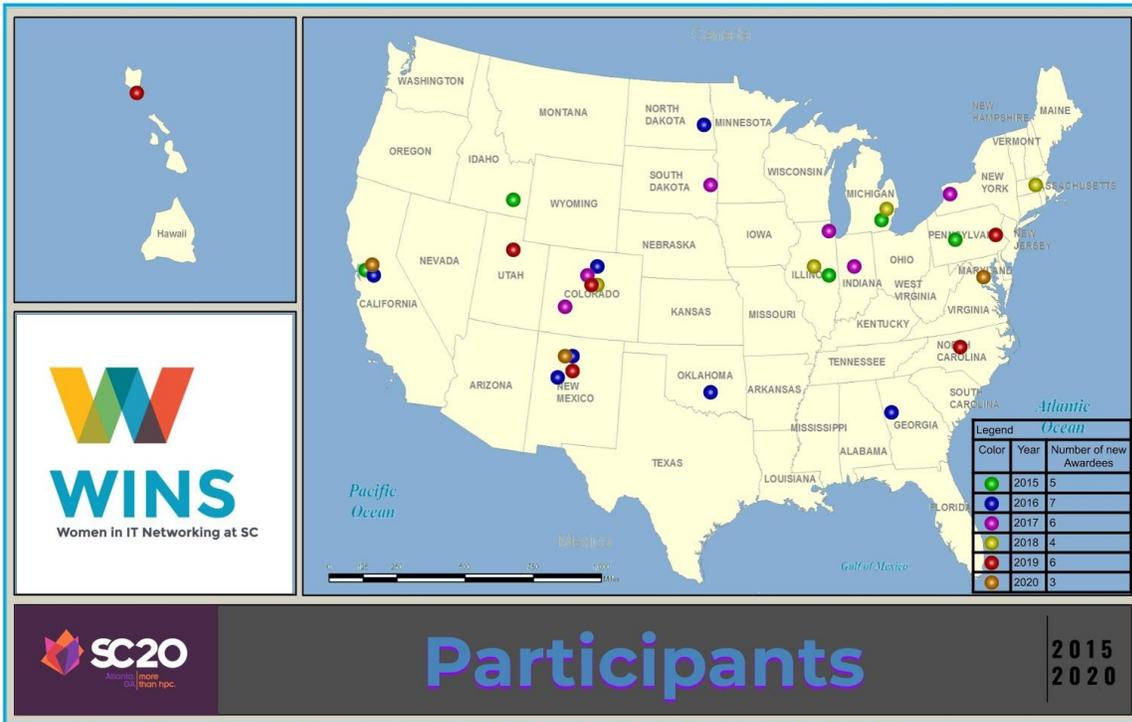


Figure 3: WINS Finalist Map

Organization Type - Finalists

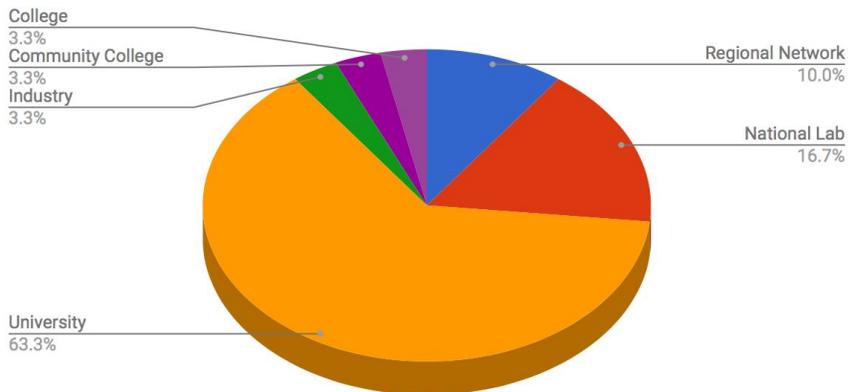


Figure 4: WINS Finalist Organization Type

Management and Administrative Support

Personnel support from the original grant funded only a small portion of an administrator to help with the travel arrangements for the WINS participants. As currently structured, program funds only cover administrative functions for supporting the travel logistics for the WINS awardees, but not other management or administrative functions. In 2019, we 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, Lauren Rotman/ESnet, Jason Zurawski/ESnet, Kate Mace/ESnet, Kate Robinson/ESnet, Soledad Toledano/NERSC, (and year one Mary Hester/former 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 for including 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 calls, award lunch, metrics, budget, and web page management.

The WINS management team indicated the WINS management team members collectively provide up to 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 cited in the survey include: management, administration, application review process coordination, and metrics collection 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, 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

participants and address any issues that may come up for the volunteers before, during, or after the conference. While not included in the original proposal, this position is critical and must be included in any sustainability plan.

A number of functions can continue on in a volunteer fashion, such as the selection committee, SCinet mentors, general SCinet support. However, core functions such as overall management, project management, including an onhand, easily accessible support resource at SCinet and comprehensive administrative support should be included in the project costs going forward.

Travel Funding

Through 2018, travel funding for WINS participants came from two sources, either the NSF project funds or the DoE through sponsorship of WINS awardee travel by ESnet. UCAR, as the administrator for the WINS project, managed the travel for the NSF sponsored WINS awardees and ESnet managed the travel for the DOE sponsored participants.

In 2019, as part of understanding long term sustainability options, travel funds were sourced through four different methods: carry over funding from the original NSF grant; funding from ESnet for two participants, one DOE and one university; funding from International Networks at Indiana University; and, funding from the SC Steering Committee. The program had three different travel and travel expense policies (UCAR, DOE and SC) covering the 2019 participants. While we learned that funding travel from multiple sources is achievable, we also learned that it required 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 was secured. These increased tasks were not covered by project funding. Finally, it was observed that the multiple travel policies increased complexity for WINS participants who are not always travel savvy. In follow up discussions with the contributing organizations, the Awardees and the WINS management team, it was recommended that going forward a single set of travel policies and management should be used for the WINS program if at all possible.

Host Organization

Input from the community 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 the 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. UCAR has agreed to continue to support WINS.

SCinet Participation

Timeline

The current program timeline is to solicit applications in March, review and select them in April and place them on the SCinet teams by the end of May. While this timeline has been sufficient, input from the SCinet team leads, WINS mentors, and the awardees indicate it would be more effective to select and assign the volunteers to the SCinet teams earlier in the SCinet process, providing more time for them to integrate into the teams as well as be part of the early planning process for SCinet. While most WINS awardees successfully supported SCinet activities, earlier placement on the teams would also allow 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 itself. For many awardees it was 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 was 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 required 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 stress and duress for support. 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.

While the rate of return of the WINS awardees is similar to that of other SCinet volunteers, it was repeatedly cited as a concern from 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 (31), 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 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 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.

A recurring comment in the sustainability surveys was a concern regarding commitment by the SCinet management team to diversity, including gender diversity, on its own management team. Specifically, there were direct comments in the sustainability surveys regarding the lack of women on the SCinet management team, a gender bias when listening to ideas at the team lead level, and a lack of opportunities for women to take a leadership role in technical presentations about SCinet and the SCinet experience outside of SC itself. Feedback came from WINS awardees, mentors, and SC leadership itself. For SCinet, while there are an increasing number of women in technical team leadership roles, they are still a minority within the core SCinet management team. Figure 5 below shows the SCinet Management Team membership to date.

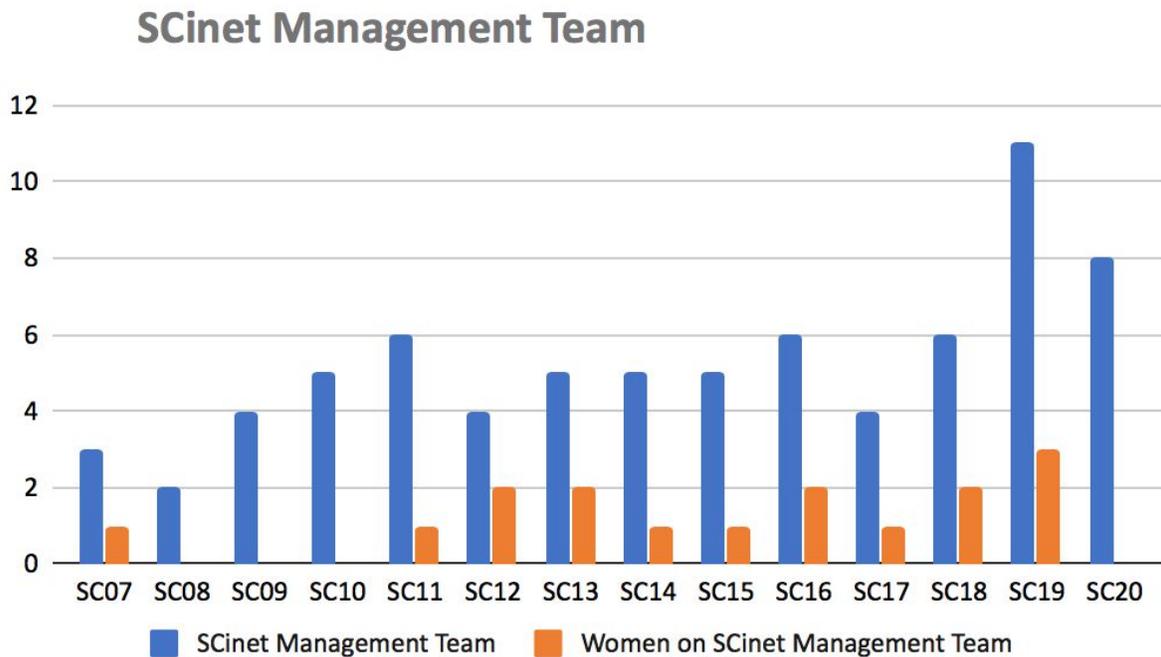


Figure 5: SCinet Management Team membership

Mentors

SCinet mentors, experienced SCinet team members who volunteer to work and are assigned a specific WINS awardee, 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 member and more effectively integrating the Awardees into the team. Since the mentors are assigned to the same team as their awardee, they help integrate the awardee 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 would improve the experience for the mentors, the awardee and SCinet itself. Beneficial structure identified through both the mentor and awardee surveys include: selecting mentors who have the time to support the WINS awardees, often not a team lead or deputy lead; 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 awardee and mentor; and, developing steps to integrate the WINS awardee into the team.

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 seven 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.

Challenges

Many of the WINS awardees 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. While the WINS onboarding process has grown

and improved since the program's inception, additional preparation with earlier integration into the SCinet teams including additional mentoring is needed.

To date, two WINS Awardees have deferred their attendance at SC for at least one year due to personal reasons. The WINS program has emphasized to the Awardees who have deferred that professional development, including participation in SCinet, is not a one time only opportunity but part of long-term career development. To that extent, WINS has begun developing activities, outside of SC itself, that provide skill and professional development. In addition, survey results suggested that WINS explore and develop opportunities outside of SC and SCinet to provide career expansion opportunities.

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 this year. The WINS 2020 awardees along with the two WINS 2019 awardees who deferred will be given the opportunity to participate in the virtual SC20 conference, join their assigned SCinet teams, and defer in-person attendance to SC21. In addition, WINS will be providing additional mentoring as well as professional and skill development opportunities in the next six months 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.

Recommendations

Based on the results from reviewing the WINS program to date and soliciting input from the community through the WINS Sustainability project, the following are recommendations for establishing a long-term, sustainable WINS program, with each recommendation discussed in greater detail below:

- Develop and fund a core WINS organization, including staff and solicit funding for travel and other non-core functions from outside organizations.
- Develop mentorship, internship and leadership programs and activities outside of SC.
- Expand the program in order to meet specific goals, including the three areas identified: to conferences or experiences beyond SC and SCinet; beyond early to mid-career women, and; solicit a broader more diverse set of volunteers to promote more inclusivity.

Core WINS Organization

Program Office

Based on the results for the WINS Sustainability project, the recommendation is to establish and fund a WINS Program Office (WPO) at a not-for-profit organization. Since UCAR has been the lead on WINS, is a not for profit organization, receives NSF and DOE funding, and is committed to diversity, the recommendation is to house the WINS Program Office at UCAR. Further, the recommendation is for the WINS management team to apply for funding, such as an NSF Center of Excellence grant, to fund the core staffing components of the program for at least a three-year period. This funding would cover the staff needed to manage and administer the core program components. A proposed staffing plan is described more fully in the Business Model section below, but would consist of:

- One full-time Program Manager to oversee overall program, coordination and management.
- One full-time Administrative Assistant to manage travel for participants and WPO, coordinate meetings, manage metrics, surveys, documents, social media, and web page.
- 10% each of WPO Leads, initially to be Marla Meehl and Wendy Huntoon.
- 10% each of two “boots-on-the-ground” leads.

In addition, the WPO budget would fund travel for WPO staff and for two WINS Participants. Additional funds, as described below, would be used to cover other aspects of the WINS program such as community engagement and public relations activities.

Volunteer Support

Many of the WINS functions can continue in a volunteer fashion, such as the applicant selection committee, SCinet mentors and general SCinet support. However, these functions would be managed by the WPO Program Manager providing the necessary support and oversight as well as setting expectations for volunteer activities. In the first year of the WPO, the Program Manager will develop a more formal structure and processes for the various WINS volunteer roles, including job descriptions and specific expectations for each role.

Additional Funding Sources

In 2019 and 2020, WINS demonstrated it was able to build on the existing partnership with DOE and successfully solicit funds from other sources. In addition to WPO core funding, it is recommended that WINS secure, on a regular basis, funds from a range of groups to cover travel costs for WINS participants for staging, SCinet, SC, community engagement and report-outs as well as for public relations activities including the awardee lunch and WINS SWAG. Potential organizations include: SC, not for profits, for profits, and state/federal funding opportunities. The

WPO would invoice the organization for participating in WINS, removing complications such as having to use multiple groups to manage travel arrangements.

Application Process

WINS will continue the rigorous application process for each new WINS class. The WINS application review team will continue to be volunteer members from the community. The WPO will manage the application process including the soliciting of applications, collecting and collating the applications, coordinating the application review team, finalizing the selection and managing team assignments. In addition, the WPO will investigate and develop mechanisms for broadening the diversity of the WINS application pool with the expectation of it leading to additional diversity within the WINS awardees. The WPO will also establish an application process for funding WINS returnees guided by specific program goals, for example: unserved or underserved institutions, leadership development or specific geographic areas.

Metric Collection and Program Documentation

The WINS metric collection and program documentation process has evolved over time. Initially, with just a few applicants and awardees, collecting and tracking the information was fairly simple. Now with over 150 applicants and 34 awardees, a more streamlined process is needed. The WPO will codify the current data collection mechanisms, identify the information to be collected, standardize collection mechanisms and create a database, using existing tools that allows for easy access and effective communication of the information.

Advisory Committee

An Advisory Committee consisting of WINS stakeholders will be established to provide advice on program content and expansion, WPO organizational structure, and external funding opportunities. The Advisory Committee will be co-chaired by the WPO Leads and supported by the Program Manager. Representatives will be selected from the current WINS Management Team, WINS Review Committee, WINS Awardees, SC and SCinet, current and potential WINS host organizations and other community members. The Advisory Committee will meet up to four times a year and when possible at least one in-person meeting at a community meeting such as SC. Regular rotation 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. Ultimately, the goal is for WINS participants to have opportunities to become technical leaders in these arenas. In order to support this goal, the recommendation is for WINS to add a leadership track within the program, first focusing on SCinet activities and then broadening it to leadership within the community itself. Awardees would be valuable contributors to many community committees and efforts to refresh and build a succession pipeline and the next generation of IT leadership. This broadens technical and leadership development and skills, and is valuable to the home organization as well as SCinet.

As part of both career and leadership development, WINS has provided opportunities for public presentations at regional networking meetings or other outreach activities at national conferences and meetings. To date, these activities have focused singularly on the WINS program and not the technical knowledge and contributions from WINS Awardees directly. Both the professional development track and leadership track would provide opportunities to develop, design, lead, and participate in community activities, with a technical and not WINS-SC programmatic focus.

It is expected that additional funding sources, not the core WPO funding, would cover the WPO personnel costs, workshop or conference fees as well as any associated travel fees not covered by the WINS participants' home organization for these activities.

Program Expansion

While WINS will continue to focus on providing an opportunity for early to mid-career women to participate in SCinet, the recommendation is for the WPO to investigate other programs or areas, including other conferences or experiences. The detailed format still needs to be developed, but the concept is to develop a small set of controlled pilot projects aimed at addressing a specific need for professional development. The initial pilot projects to investigate and pursue will focus on areas that have been identified through the WINS Sustainability process as follows.

Supercomputing Based Expansion

Currently, WINS is specifically focused on enabling early to mid-career US-based women to participate in SCinet, providing an opportunity for professional development for women who have already committed to the network engineering or information technology field.

Each year WINS receives inquiries or actual applications from women who do not meet the US based program requirements. WINS has not accepted these applications due to current restrictions on program travel funds as well as the complexity of arranging non-US based travel. By modifying the WINS organizational and business model, the program could pilot inclusion of non-US based women into the program.

Broaden Diversity

WINS continues to struggle with attracting women applicants from underrepresented minority groups. The program has identified focusing and expanding the recruitment of applicants as the most significant factor in broadening diversity. The program has had some success through leveraging existing relationships including regional activities and the NSF CC* grant program. The recommendation is for WINS to establish relationships with a broader set of organizations representing a more diverse cross section of the US. In addition, WINS will document the WINS process and partner with other groups with related diversity efforts to pilot a program for increasing minority participation in SCinet without minimizing participation to women. While the initial focus of these activities will be on SCinet, if successful, they can be extended to other WINS program areas.

A critical issue in broadening diversity in STEM fields, is the lack of diversity in the pipeline itself, thus the recommendation is for WINS to establish a pilot program aimed at women undergraduate or graduate students in conjunction with the existing SCinet student program, PEARC, TACC, UCAR undergraduate and graduate student programs, and others.

Beyond Supercomputing

SCinet at Supercomputing has provided an excellent venue for exposing early to mid-career women to the IT opportunities within the high performance computing and networking industry. However, as we have seen in 2020 with the SC20 conference becoming virtual, focusing on a single conference with rigorous in-person travel requirements has limitations. Going forward, the recommendation is for WINS to expand the program to activities beyond just the US Supercomputing conference. Working with SCinet provides a unique opportunity to design, develop, implement and support a new high speed network over the course of one year. While these avenues are not expected to replicate the SCinet experience, they would be evaluated and then included as part of the WINS program in order to provide skill development or professional development opportunities outside of the awardees current work environment. Both national and international events will be considered, providing a broad set of experiences, including exposure to an internationally diverse collaborative environment. Possible workshops or conferences include: Internet2 Global Summit and Technology Exchange; PEARC; Grace Hopper Celebration; TAPIA Conference; and ISC High Performance.

The SC and SCinet volunteer program provides a first step for WINS to understand and address the pipeline issue for women in IT. However, as with the regular WINS awardees, there are still the challenges associated with the time commitment and timing associated with a single conference. Therefore, WINS will work with collaborating organizations on identifying options, such as internships or job shadowing, that provide exposure to information technology and network engineering careers.

Business Model

The recommendation is to establish a WINS Program Office (WPO) housed at UCAR with core funding for the WPO and supplemental funding for additional aspects of the program. An outline of a possible business model is provided below.

WPO Funding

Central funding for a three to five year period to establish the WINS Program Office would be pursued. Core WPO staff covered through the funding would include:

- 10% each of WPO Leads initially to be Marla Meehl and Wendy Huntoon
- 20%, either salary or stipend, to cover two WINS SCinet Leads, also referred to as “Boots-on-the-ground”
- One full-time Program Manager to oversee overall program, coordination and management.
- Equivalent of a full time Administrative Assistant where the position is split into two main areas of responsibility:
 - Manage travel for participants and WPO
 - Provide support for the WINS SCinet activities
 - Coordinate meetings, manage metrics, surveys, documents, social media, web page and support for areas of expansion

Core funds would also cover the following costs:

- Travel for WPO core staff including the WPO Program Manager as well as the WPO Leads for WINS associated activities.
- Travel funds for up to two WINS participants for staging and SCinet. Where possible this core funding would be used to broaden the diversity of the program.

Since housed at UCAR, WINS would leverage additional support, such as budget management, invoicing and HR from the host organization.

Base funding needed for the program is \$500,000 per year.

Supplemental Funding

The WINS management team, led by the WPO Program Manager, would secure on a regular basis funds from a range of groups to cover additional aspects of the project. Initially, \$60,000 per year would be needed to cover travel costs for up to four new and four returning WINS participants; travel associated with additional community engagement activities, such as report-outs; and public relations activities including the awardee lunch and WINS SWAG. Organizations to solicit include, but are not limited to: Supercomputing Conference; not for profits, including regional networks; for profits, such as SC vendors and exhibitors; and state or federal funding opportunities. The WPO would invoice the organization for participating in WINS, removing the complications and overhead such as having to use multiple groups to do travel arrangements.

Based on the level of interest, additional funding will be pursued enabling WINS to expand into new areas in a sustainable manner. This funding would cover a portion of the staff needed to manage the program expansion as well as the travel associated with the projects. Initially, funding would be sought to cover non-personnel costs for new programs. For example, travel costs for SCinet student volunteers, with the initial target being to solicit an additional \$40,000. Finally, if program expansion is successful, the WPO will investigate soliciting funds to cover personnel costs. These funds would initially be used to cover a half time project manager to manage the various expansion projects. Total cost per year for this position is estimated to be \$80,000 per year.

Long Term Sustainability

The long term goal for the WPO is to develop a sustainable and ongoing funding stream to cover the full cost of the WINS program. Total funding required, assuming both the core program and successful expansion, would be \$680,000 per year. Funding sources that would be evaluated include expansion of support from currently participating organizations (as described in the above Supplemental Funding section); state or federal funding; and foundation support. The WINS Leads will work with the Advisory committee to identify potential funding sources and then develop and implement a plan for long term funding of the program.

Conclusions

The WINS program has been very successful in its primary goals of increasing the number of women participants in SCinet, providing technical and professional skill development for the WINS volunteers and increasing awareness in the community regarding the gender gap in the fields of network engineering and high performance computing. By SC2019, women accounted for 26% of the SCinet volunteers, an increase from 10% when the program started in 2015.

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. However, 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, based on a single conference (Supercomputing) and time of year (November).

Based on the results from the WINS sustainability survey, 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. Based on these recommendations, a business model was identified to include core funding from funding agencies such as the NSF for the WINS Program Office (WPO); secure supplemental funding to partially cover WINS travel costs and expand the program's reach; and finally, increase the supplemental funding once the core funding is expended to cover the full cost of the program.

Appendix A: Supporting Organizations

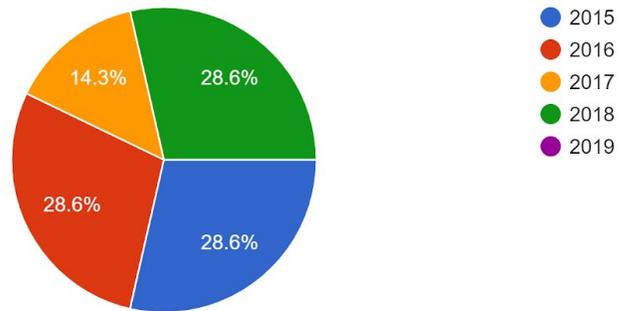
- NSF Grants 144064 and 1640987: core program and travel funding.
- ESNNet, Department of Energy: travel funding.
- International Networks at Indiana University: travel funding and outreach activities.
- Juniper Networks: funding for annual WINS lunch during SC.
- Ciena Corporation: funding for programmatic activities.
- Pacific NorthWest GigaPoP (PNWGP): funding for outreach activities during SC.
- Internet2: scholarships for attendance at Internet2 specific workshops and conferences.
- The Quilt and various regional networks: travel support for outreach activities at regional networking workshops and conferences.

Appendix B: WINS Survey Charts

WINS Sustainability Interview (Awardee) Charts

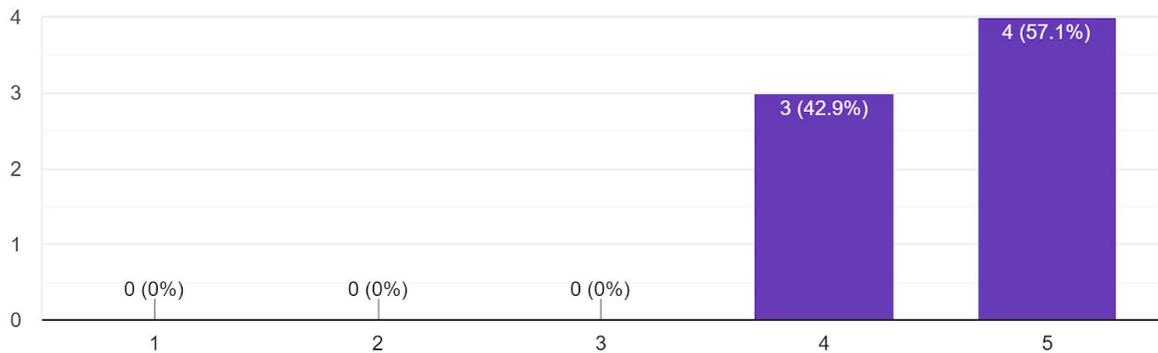
Year you were selected for WINS

7 responses



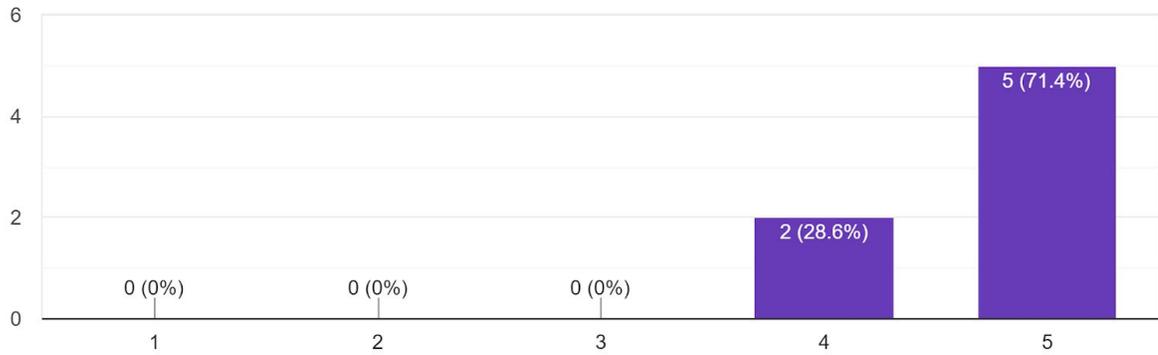
Overall, how effective do you think the WINS program has been for you personally ?

7 responses



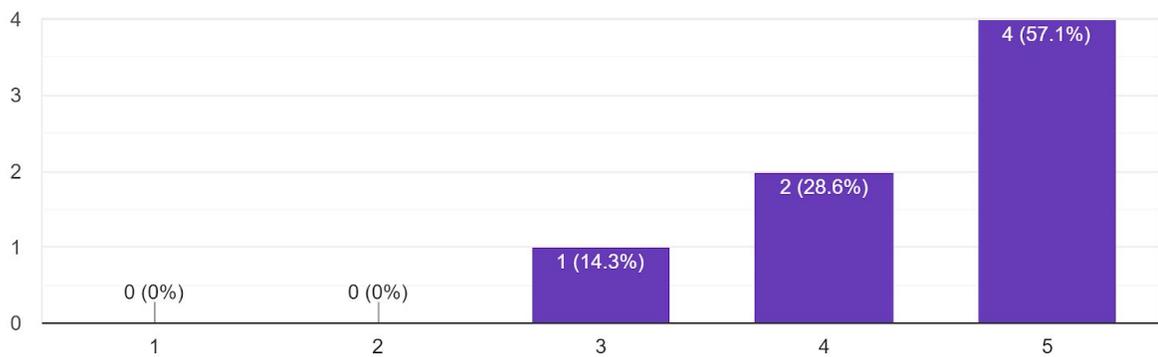
Overall, how effective do you think the WINS program has been in raising awareness of the issue of fewer women going into the area of IT, including the field of networking?

7 responses



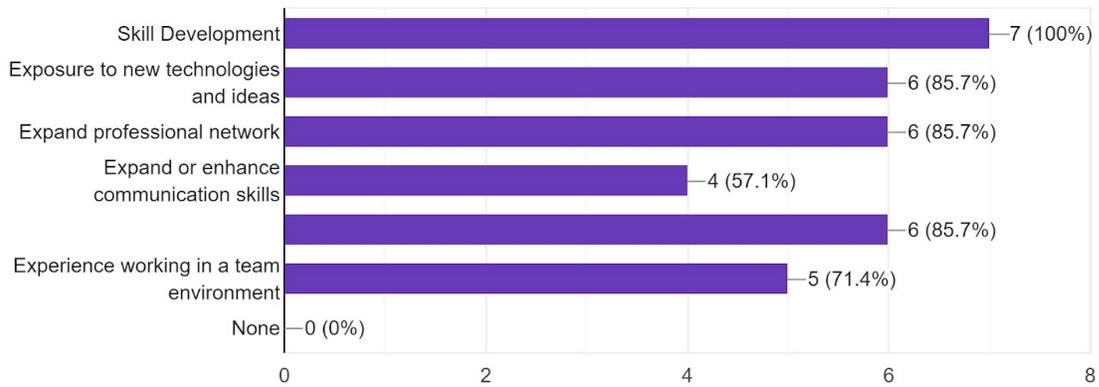
Overall, how effective do you think the WINS program has been in increasing and sustaining women's participation in SCinet?

7 responses



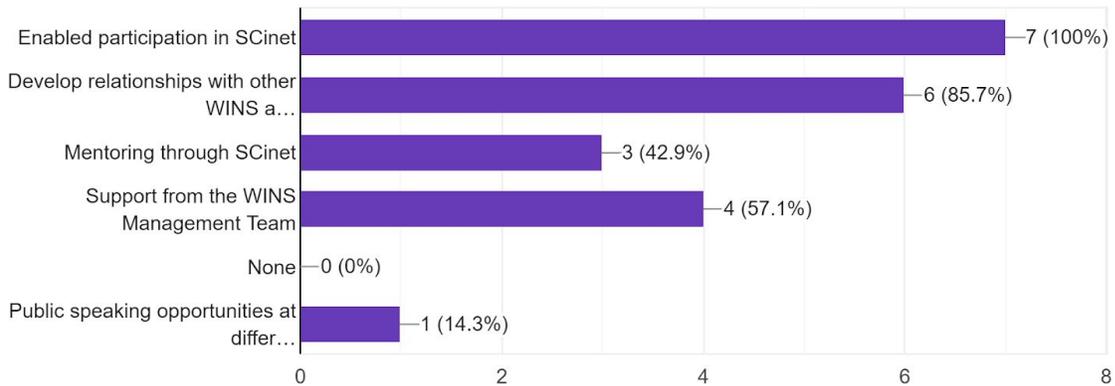
Please check the benefits you received from participating in SCinet. (Check all that apply.)

7 responses



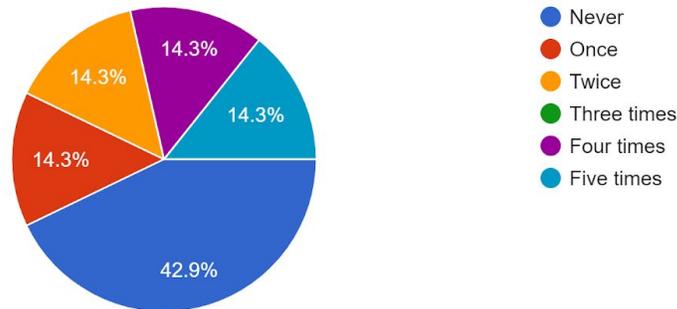
Please check the benefits associated with participation in the WINS program itself. (Check all that apply.)

7 responses



Number of times you returned to participate in SCinet, including planned participation in SC20?

7 responses



If you did not participate in SCinet after your initial WINS year, please indicate why?

4 responses



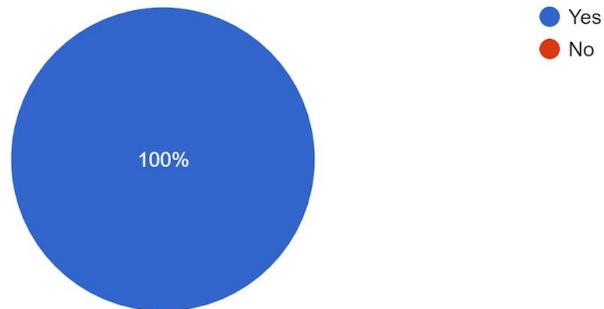
If you did participate in SCinet again, please indicate travel funding sources.

6 responses



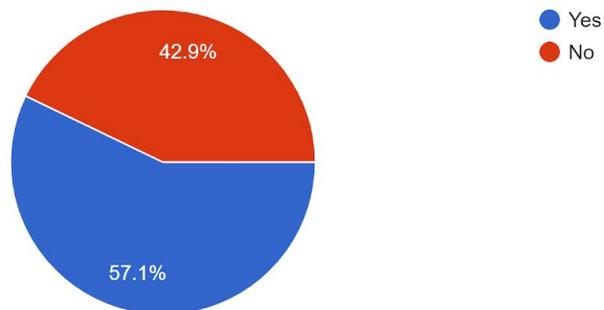
Do you work for the same organization you did when selected for WINS

7 responses



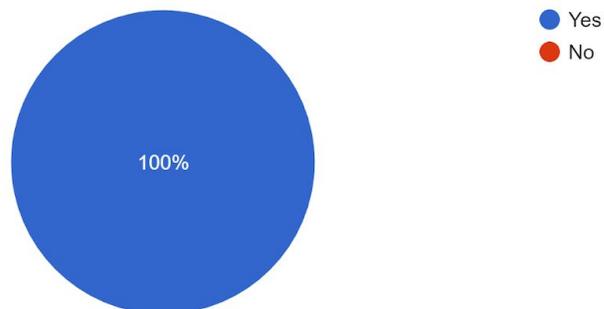
Has your job changed since you were selected as a WINS Awardee?

7 responses



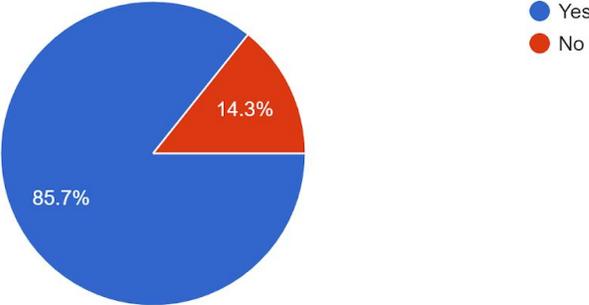
Should WINS continue as a program supporting women's participation in SCinet?

7 responses



Should WINS expand from SCinet to support women's participation in other community conferences or forums?

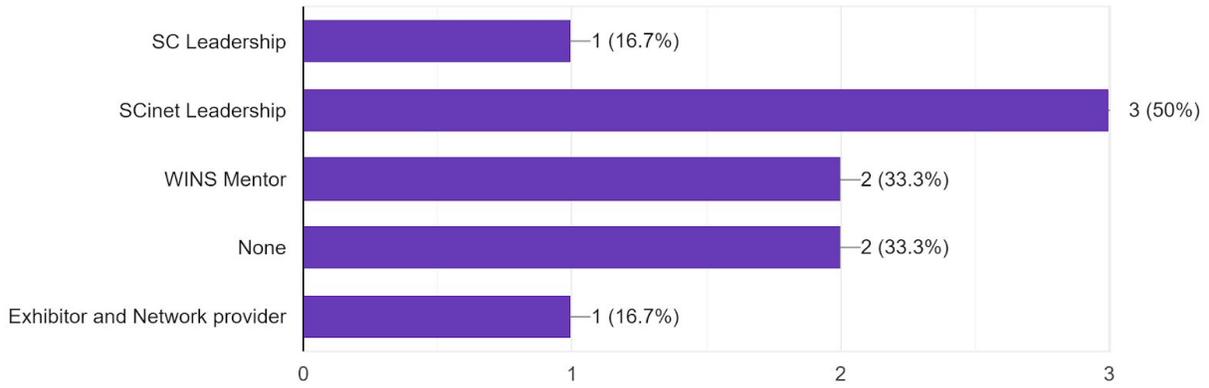
7 responses



WINS Sustainability Survey (SC and SCinet Leadership)

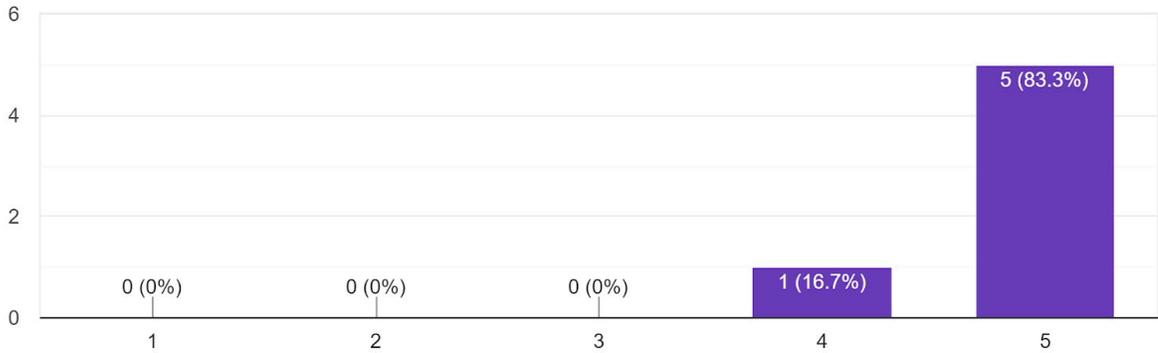
Role in SC or SCinet (Check all that apply)

6 responses



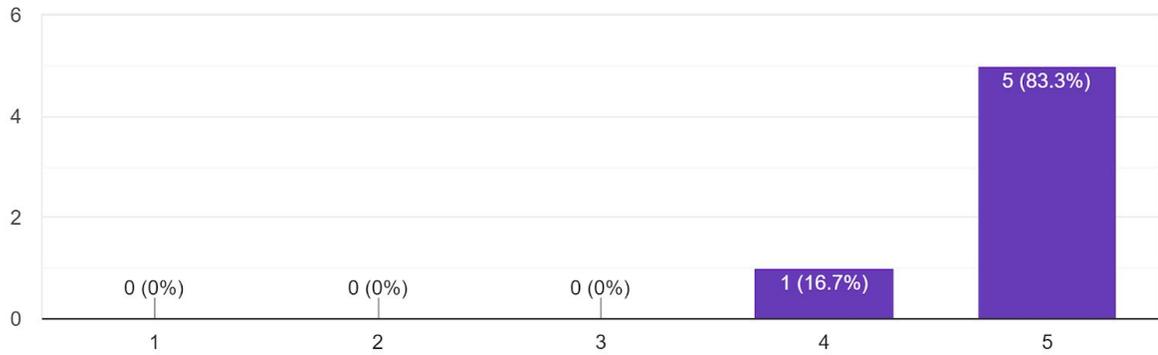
Overall, how effective do you think the WINS program has been in raising awareness of the issue of fewer women going into the area of IT, including the field of networking?

6 responses



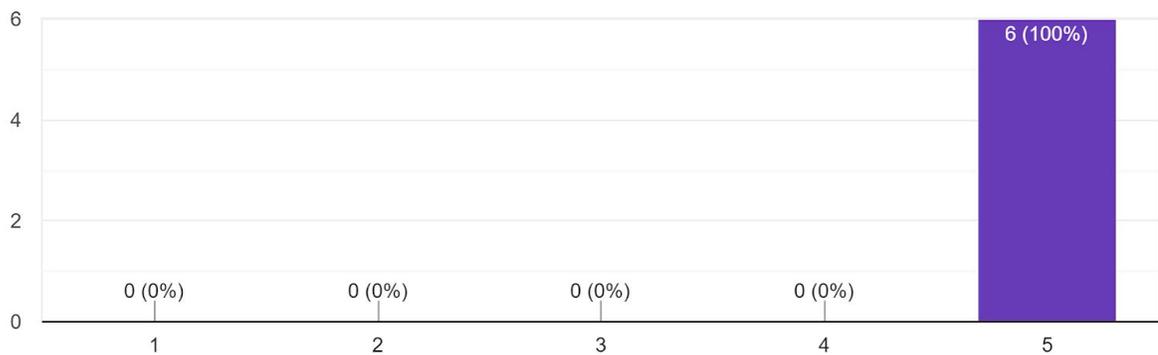
Overall, how effective do you think the WINS program has been in increasing and sustaining the level of women's participation in SCInet?

6 responses



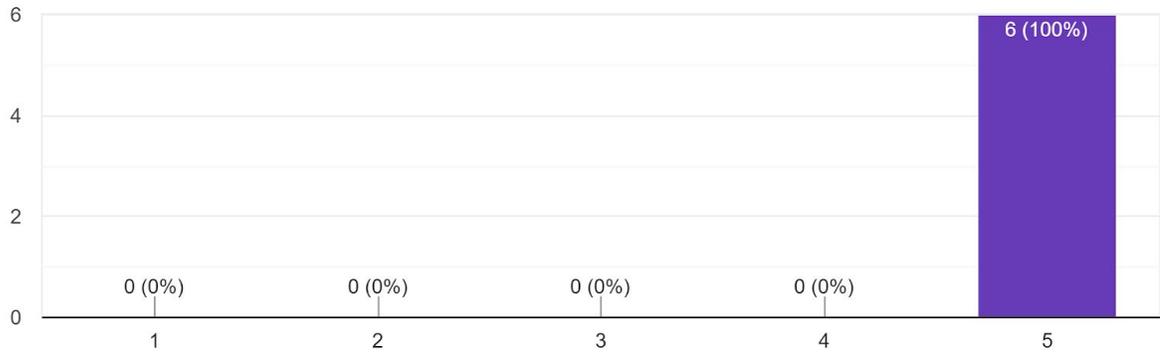
Have the WINS Awardees been effective contributors to SCInet ?

6 responses



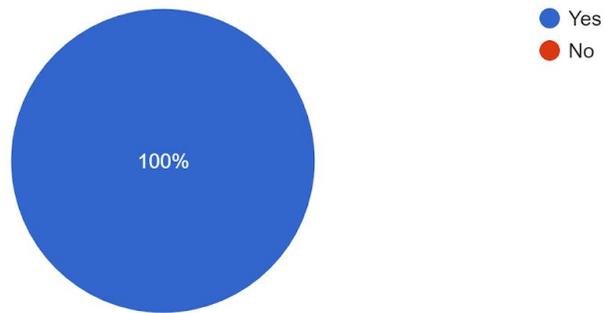
Has the WINS program been effective in supporting the WINS Awardees' participation in SCinet?

6 responses



Should WINS continue as a program supporting women's participation in SCinet?

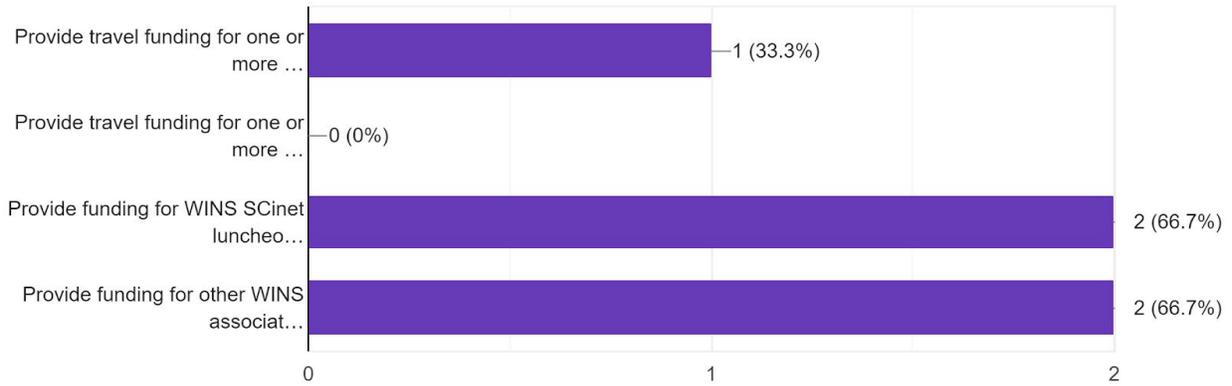
6 responses



WINS Sustainability Survey (Supporter)

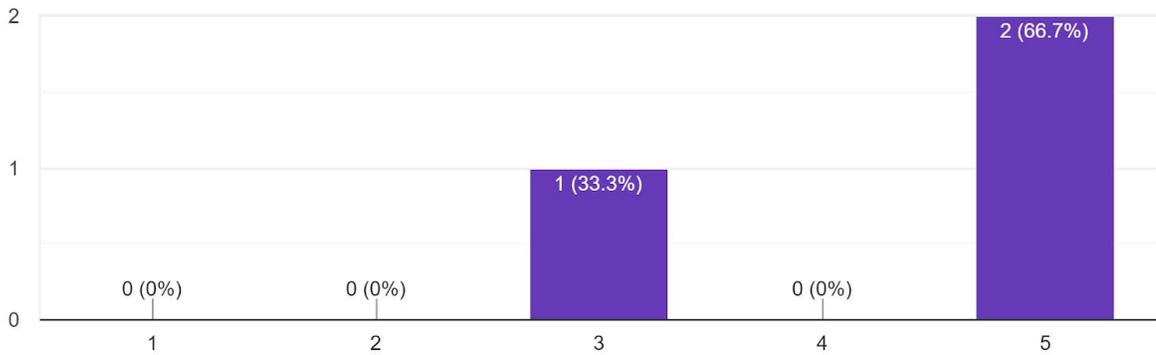
Role in supporting WINS (Check all that apply).

3 responses



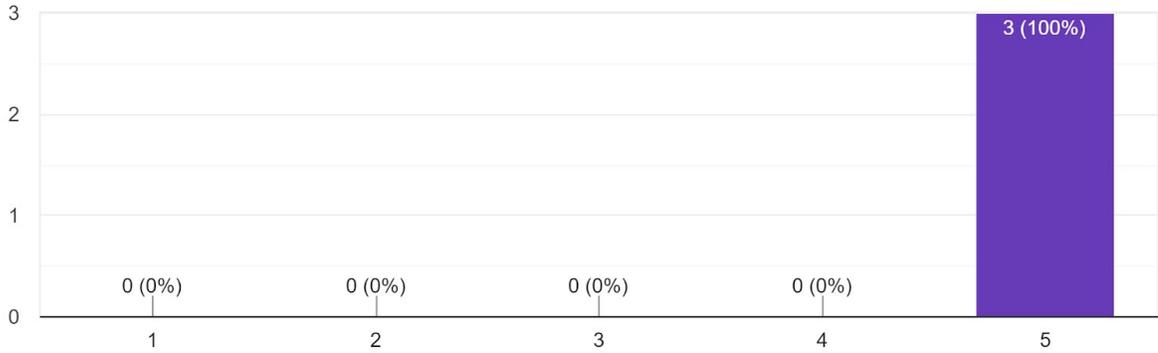
Overall, how effective do you think the WINS program has been in raising awareness of the issue of fewer women going into the area of IT, including the field of networking?

3 responses



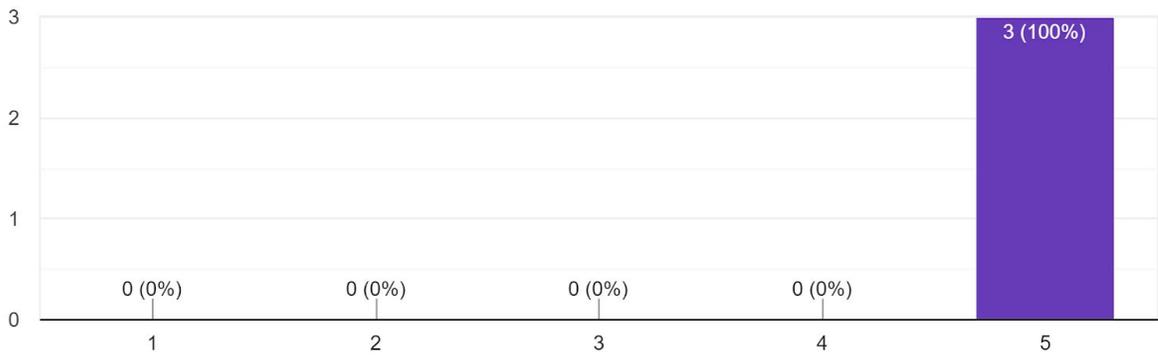
Overall, how effective do you think the WINS program has been in increasing and sustaining the level of women's participation in SCInet?

3 responses



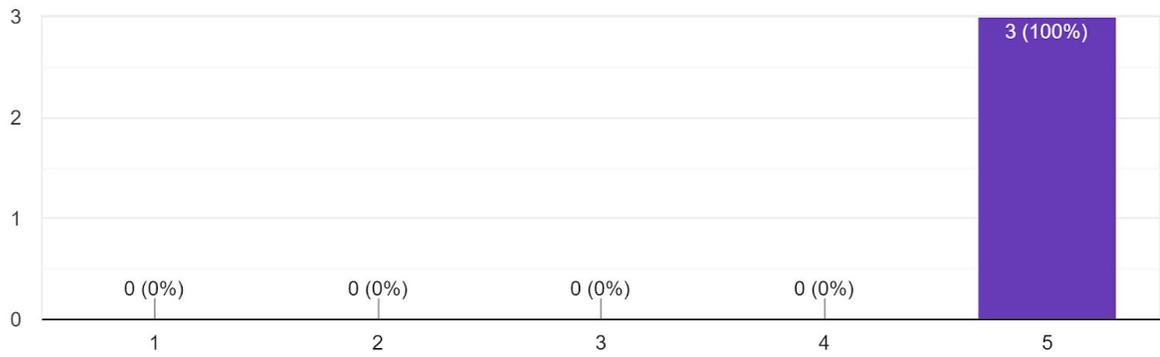
Have the WINS Awardees been effective contributors to SCInet ?

3 responses



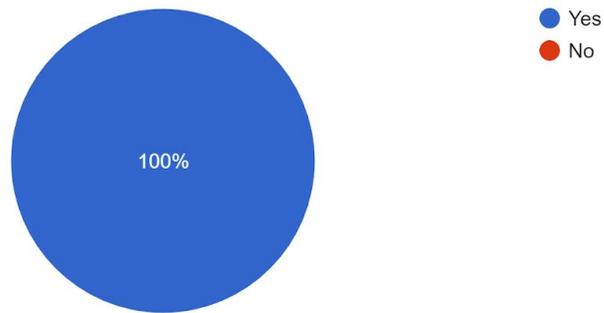
Has the WINS program been effective in supporting the WINS Awardees' participation in SCinet?

3 responses



Should WINS continue as a program supporting women's participation in SCinet?

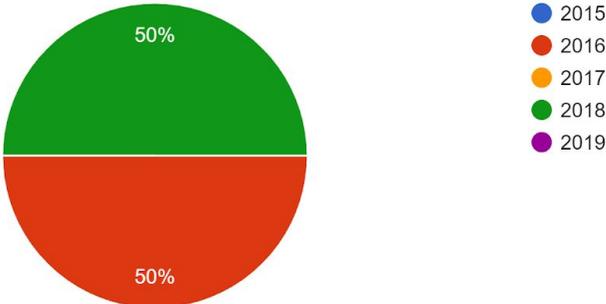
3 responses



WINS Sustainability Survey (Manager)

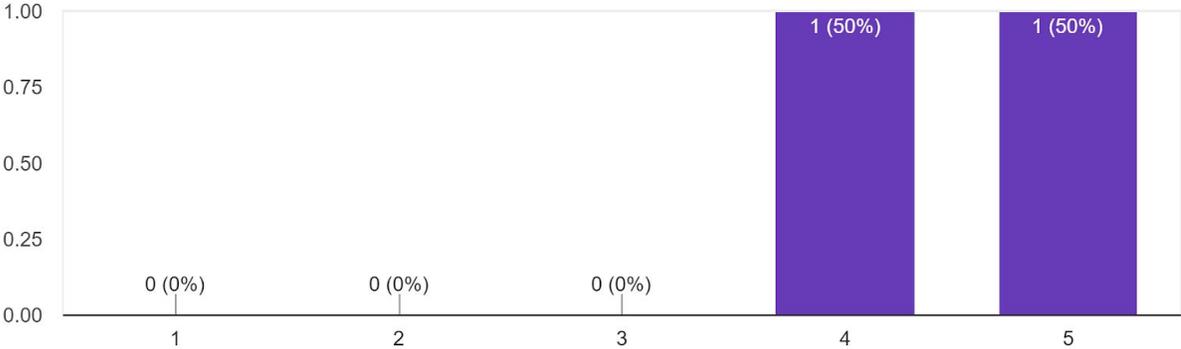
Year staff member was selected for WINS

2 responses



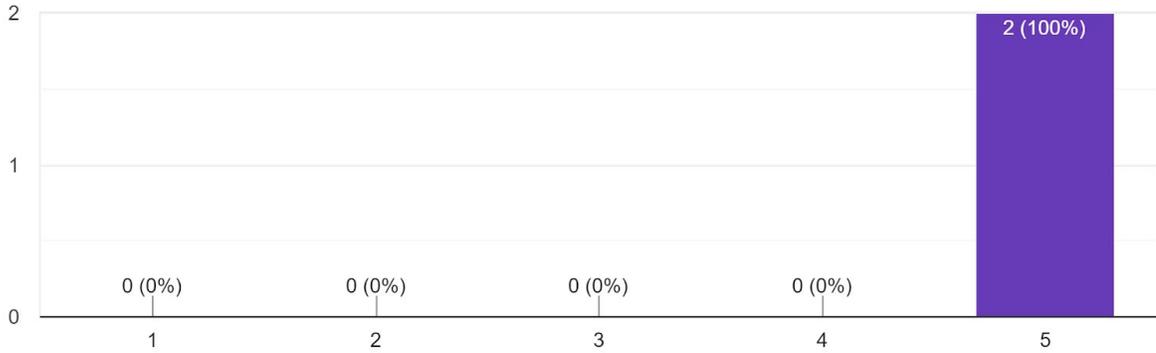
Overall, how effective do you think the WINS program has been in raising awareness of the issue of fewer women going into the area of IT, including the field of networking?

2 responses



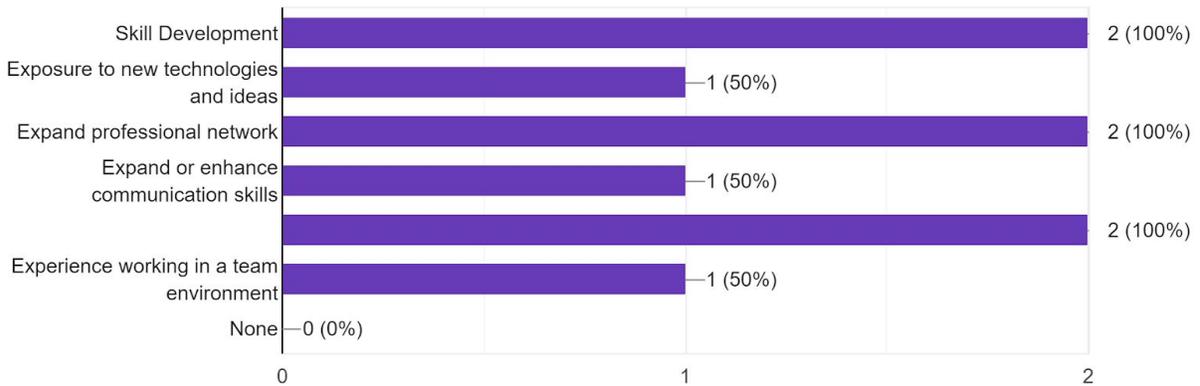
Overall, how effective do you think the WINS program has been in increasing the level of women's participation in SCinet?

2 responses



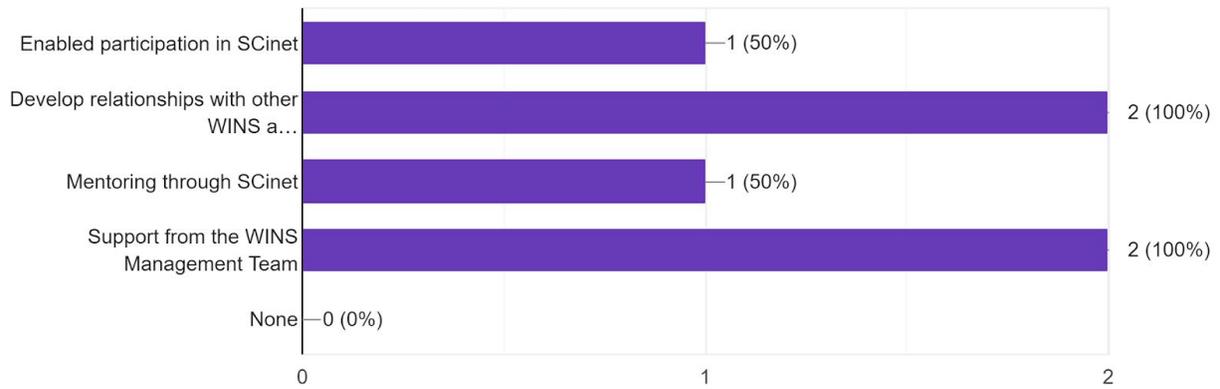
What value did having a staff member participate in SCinet bring to your organization? (Check all that apply.)

2 responses



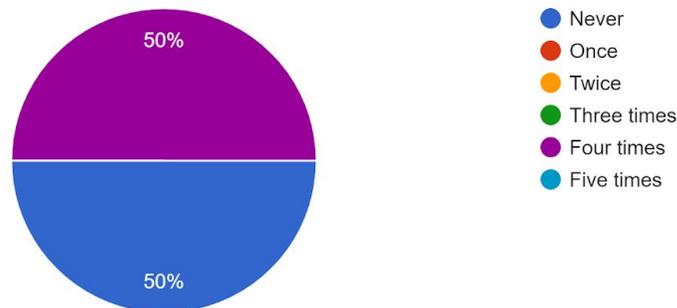
Please check the benefits associated with participation in the WINS program itself. (Check all that apply.)

2 responses



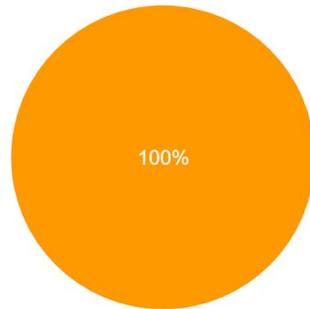
Number of times your staff member returned to SCinet, including planned participation in SCinet20.

2 responses



If your staff member did not participate in SCinet after the initial WINS year, please indicate why?

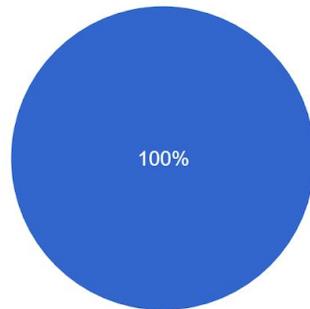
1 response



- No interest in returning
- Funding not available from home organization or WINS
- Could not support the time commitment either professionally or personally

If your staff member returned to SCinet, what was the source of funding?

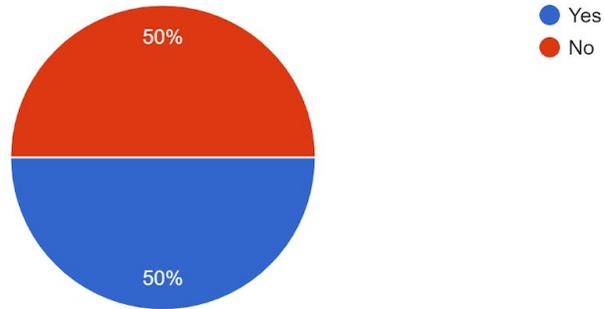
1 response



- Home organization
- WINS
- Combination of WINS and home organization

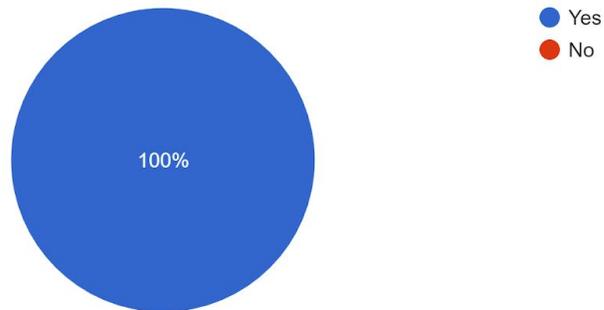
To your knowledge, if your staff member did return to SCinet did they take on any leadership roles ?

2 responses



Should WINS continue as a program supporting women's participation in SCinet?

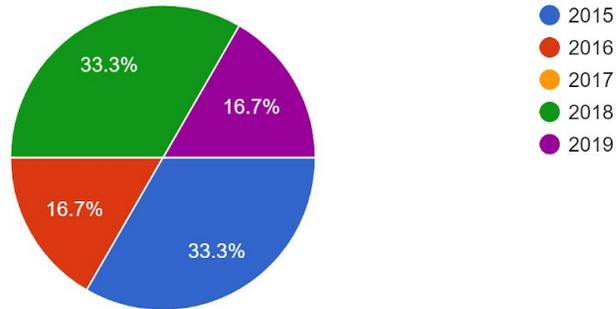
2 responses



WINS Sustainability Survey (Review Committee)

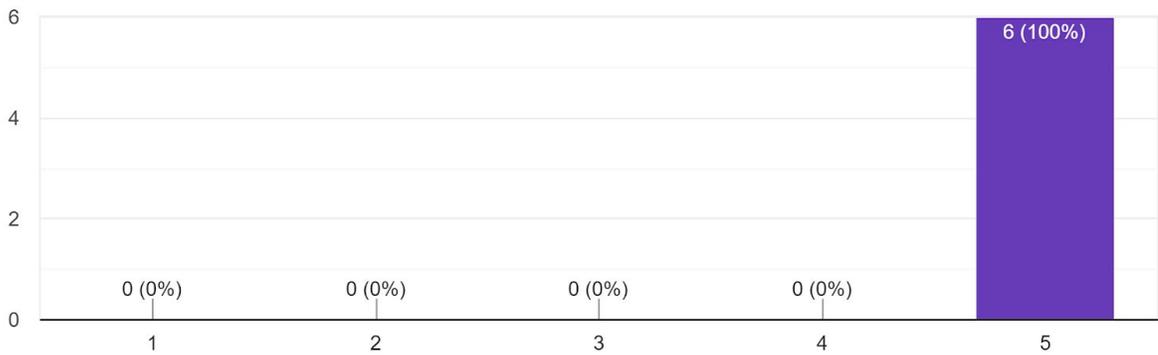
First year you served on the WINS Application Review Committee.

6 responses



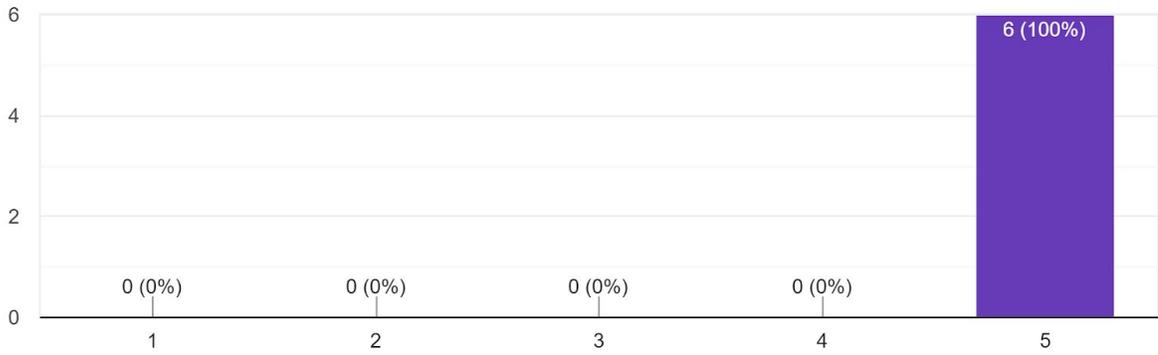
Overall, how would you rate your experience in participating on the review committee?

6 responses



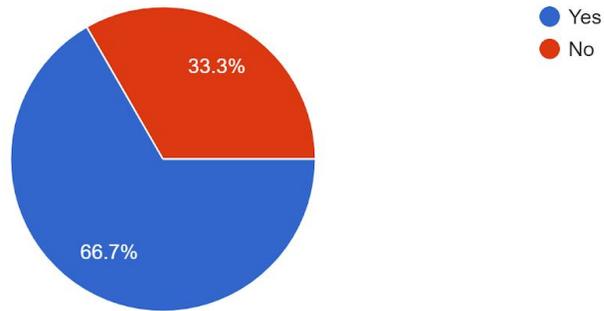
Based on your experience rate the application review process itself.

6 responses



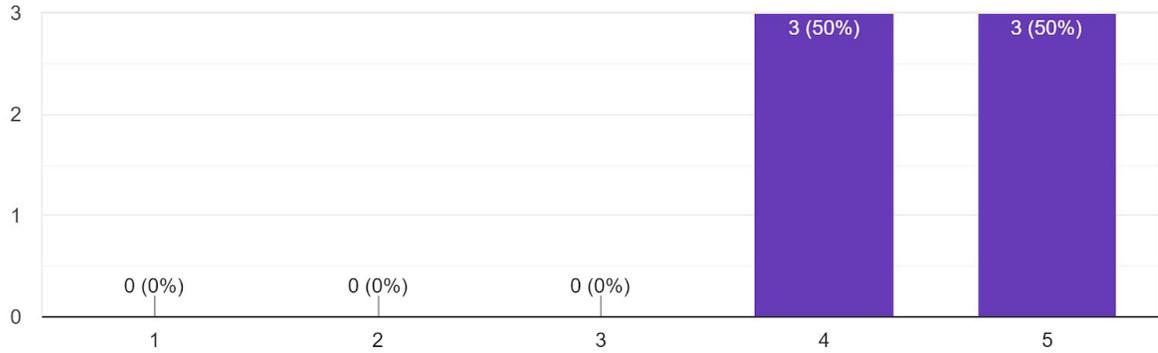
Based on your experience on the review committee, do you think the applicant pool represents the right set of candidates for the program?

6 responses



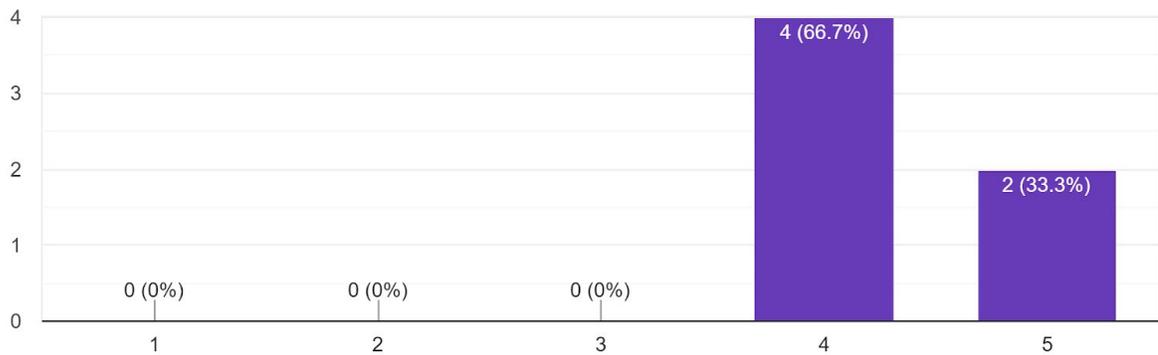
Do you think the program is effective in attracting candidates from a diverse set of organizations and geographic areas ?

6 responses



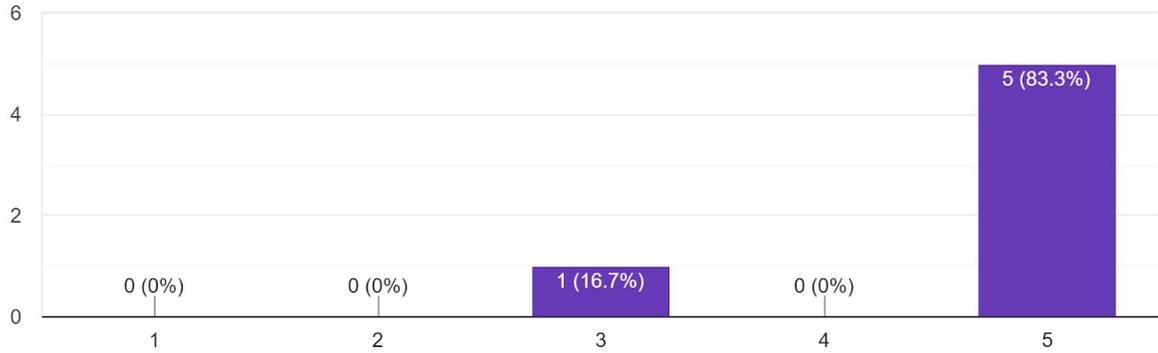
Overall, how effective do you think the WINS program has been in raising awareness of the issue of fewer women going into the area of IT, including the field of networking?

6 responses



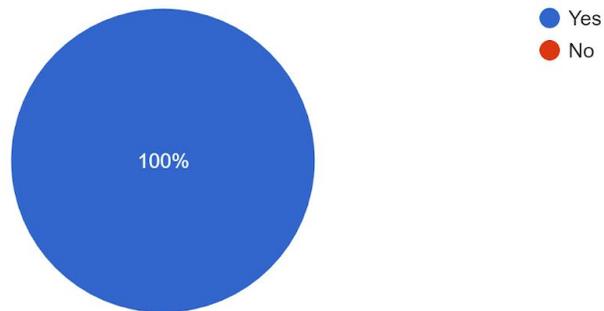
Overall, how effective do you think the WINS program has been in increasing and sustaining women's participation in SCinet?

6 responses



Should WINS continue as a program supporting women's participation in SCinet?

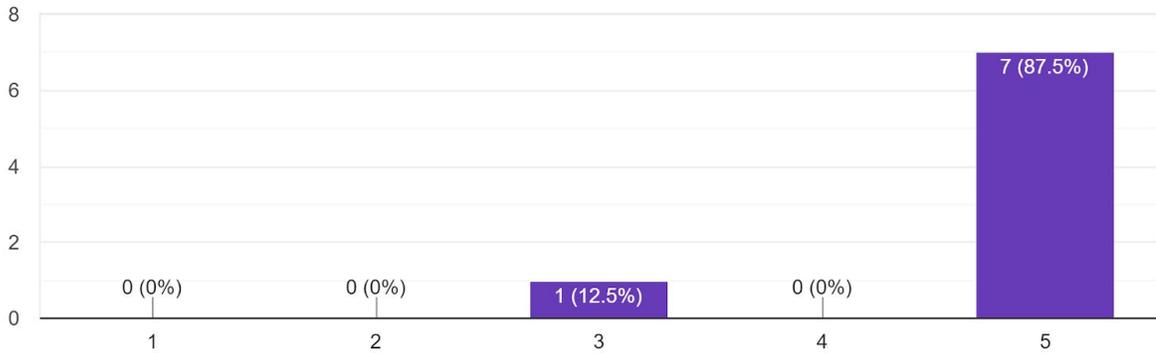
6 responses



WINS Sustainability Survey (WINS Management)

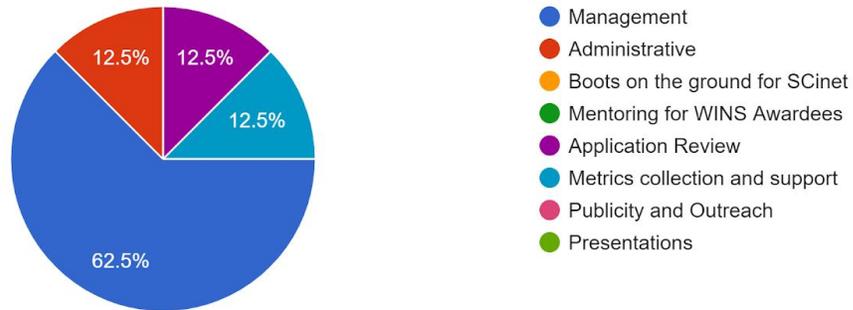
Overall, how effective do you think the WINS program has been in raising awareness of the issue of fewer women going into the area of IT, including the field of networking?

8 responses



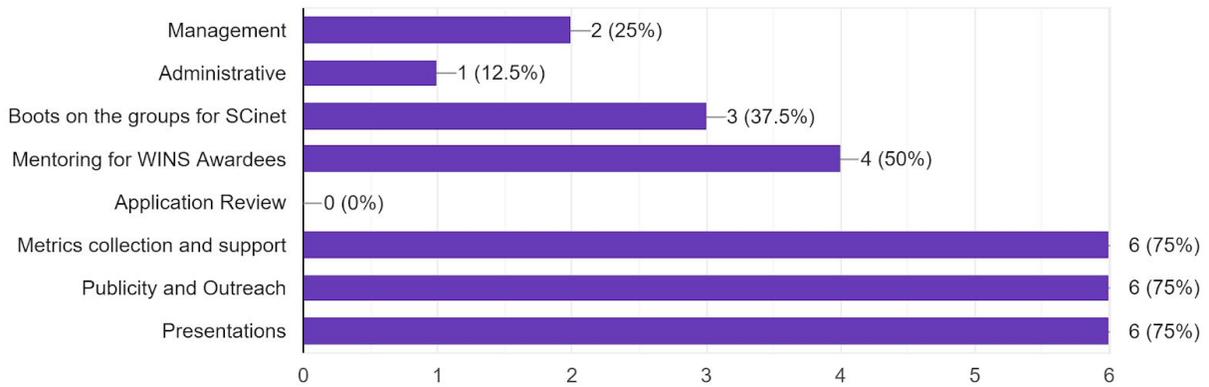
Please indicate your major role in supporting the WINS program. (Check one)

8 responses



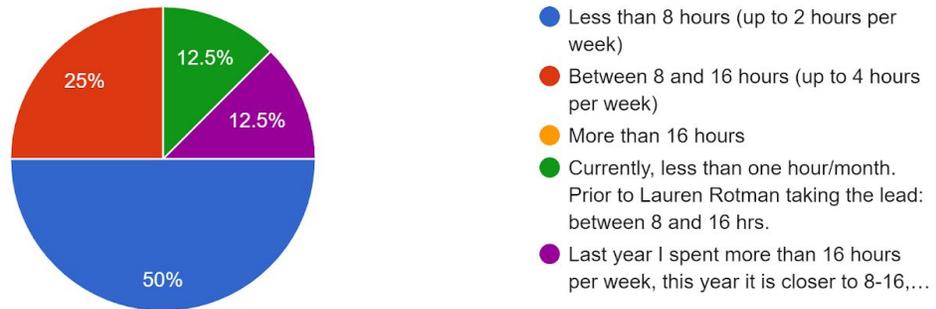
Please indicate any secondary roles in supporting the WINS program (Check all that apply).

8 responses



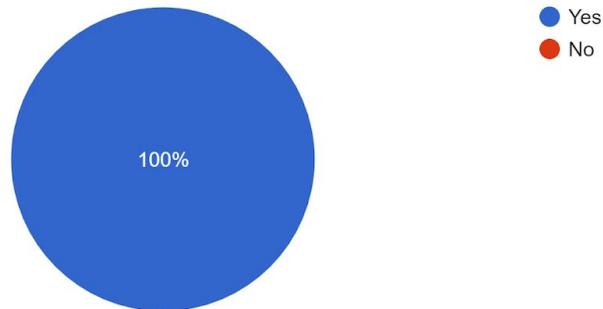
Except for SCinet specific activities, how much time per MONTH (on average) do you spend on WINS?

8 responses



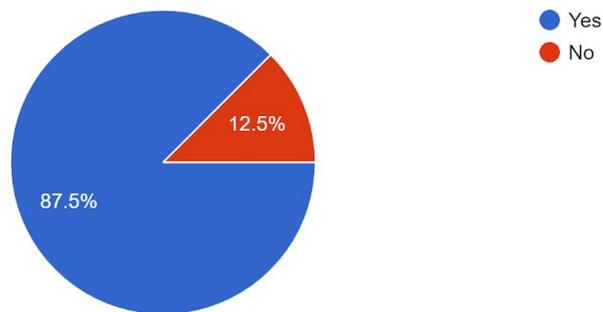
Should WINS continue as a program supporting women's participation in SCinet?

8 responses



Should WINS explore expanding support women's participation in other community conferences or forums in addition to its support for SCinet?

8 responses



Should WINS explore non-gender based diversity efforts?

8 responses

