EVALUATION REPORT

EVALUATION OF THE TECHWOMEN PROGRAM

August 2021

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TABLES

FIGURES

ACRONYMS

AEIF	Alumni Engagement Innovation Fund
ArabWIC	Arab Women in Computing
ECA	Bureau of Educational and Cultural Affairs
DoS	Department of State
EL	Emerging Leader
EQ	Evaluation Question
ET	Evaluation Team
FGD	Focus Group Discussion
ICT	Information and Communications Technology
IIE	Institute of International Education
IP	Implementing Partner
IRB	Institutional Review Board
IVLP	International Visitor Leadership Program
KII	Key Informant Interview
M&E	Monitoring and Evaluation
MEL	Monitoring, Evaluation, and Learning
MENA	Middle East and North Africa
SI	Social Impact, Inc.
SNA	Social Network Analysis
SOW	Scope of Work
STEM	Science, Technology, Engineering, and Mathematics
USG	United States Government

EXECUTIVE SUMMARY

BACKGROUND, EVALUATION PURPOSE, AND EVALUATION QUESTIONS

The U.S. Department of State (DoS) Bureau of Educational and Cultural Affairs (ECA) recognized the variety of cultural and institutional barriers for women in science, technology, engineering, and mathematics (STEM) globally and, to address this issue, began implementing the TechWomen program in 2011. This exchange program seeks to "empower, connect, and support the next generation of women leaders in STEM" by providing access to networks, resources, and knowledge to empower participants to reach their full potential. Over five weeks, program participants engage with female leaders in project-based mentorships at leading companies in Silicon Valley and the Bay Area, participate in professional development workshops and networking events, and travel to Washington, D.C., for targeted meetings and special events to conclude the program.

In early 2020, ECA contracted Social Impact, Inc. (SI) to conduct an evaluation of the TechWomen program's 2011–2019 cohorts of 722 alumnae. The evaluation aims to determine the strength and sustainability of the professional networks the program created and the extent to which alumnae have leveraged these networks for collaborations to enact change. The evaluation provides evidence to inform programmatic decision making by the ECA program team in order to inform the design and implementation of the TechWomen program for future cohorts. The findings also provide critical information to assist and provide accountability to the DoS, the U.S. Congress, and other stakeholders such as companies in Silicon Valley who have participated in the program. Using a mixed-methods approach including two surveys, 171 virtual key informant interviews (KIIs), and 22 focus group discussions (FGDs) in nine countries, and employing both social network analysis (SNA) and thematic analysis, this evaluation addresses the following evaluation questions, with additional sub-questions detailed in the main body of the report:

1. How are TechWomen alumnae establishing and maintaining networks with other TechWomen alumnae? By country, by region, and/or globally?
2. To what extent are TechWomen alumnae starting new networks of STEM women? To what extent are they plugging into existing networks of STEM women in their home communities?
3. To what extent are TechWomen alumnae establishing and maintaining networks with TechWomen mentors?
4. How connected are TechWomen alumnae to U.S. embassies?

FINDINGS AND CONCLUSIONS

EQ1: HOW ARE TECHWOMEN ALUMNAE ESTABLISHING AND MAINTAINING NETWORKS WITH OTHER TECHWOMEN ALUMNAE?

The structure of alumnae networks varies by country, with factors including geography, the current political situation, and alumnae participation affecting the structures of the in-country networks. Alumnae networks in each primary country were created and are maintained by

returning alumnae and have grown organically with each new cohort of TechWomen. The strength of the networks at the country level is determined by the participation of alumnae in informal and formal events; activities and collaboration in the networks are voluntary. Alumnae have successfully established regional alumnae networks and are maintaining both formal (professional) and informal (personal) relationships with other alumnae in their region, in person and virtually, and ongoing social connections are maintained through regional WhatsApp and social media.

The strongest relationships (both personal and professional) are cohort-specific. That stated, collaborations play a large role with participants maintaining relationships within their in-country networks, rather than cohort year. In short, most of the relationships established in the TechWomen program are by cohort, but actual collaborations among alumnae are driven by shared nation of origin. The collaborative network is held together by only a few alumnae, generally those who were highly satisfied with their time in the program and who have a longer history with the program.

The majority of alumnae the evaluation team (ET) spoke with did not receive any financial support from the TechWomen network. According to alumnae, the exchange of professional resources (i.e., webinars and online trainings) is the type of support being shared most often. The TechWomen Facebook page is commonly used to request and share resources, and the resources are provided by both mentors and alumnae. Qualitative data yielded little evidence of formal mentoring relationships between TechWomen alumnae. That stated, alumnae are involved in preparing future cohorts of TechWomen emerging leaders (ELs), encouraging them to apply and serving as initial mentors to the women before participation.

TechWomen alumnae are leveraging their networks to create change in their home communities, including through STEM-focused initiatives, through advocacy initiatives in their countries in the areas of STEM education or information and communications technology policies, and through impact projects/action plans that are developed in order to target socioeconomic challenges. Examples of the impact projects can be found in the body of the report.

Alumnae shared that they face multiple challenges in sustaining their country networks; however, their challenges are country-specific. Examples of these country-level challenges include geographic separation, a lack of embassy support (not endorsing a network or not organizing events involving the network), and the lack of freedom of movement. While the challenges may shape what the networks look like (i.e., levels of in-person engagement versus distanced engagement), the challenges do not have a noticeable impact on the strength of the networks, as the alumnae are dedicated to the sustainability of their networks despite these challenges.

Multiple alumnae shared that the provision of resources by ECA, both physical (space to meet) and financial (to organize gatherings and/or fund alumnae initiatives), would help to strengthen and sustain the country networks. Alumnae shared that funding for the implementation of initiatives by TechWomen would significantly strengthen and sustain these networks, as alumnae could focus on working collaboratively to implement projects rather than working individually to secure funding.

EQ1: CONCLUSIONS

Overall, TechWomen alumnae are both establishing and maintaining networks with alumnae from their cohorts most commonly, but also within their countries (outside of their cohorts) and regions to some extent. These alumnae networks are informal, and their structures and strength differ significantly by country and context, relying on alumnae themselves to create and grow these networks. Alumnae from the earlier cohorts established in-country networks when they returned from the TechWomen program, and networks grow as subsequent cohorts join. Alumnae primarily build and maintain relationships within their cohort but collaborate with alumnae from the same country with a few alumnae holding the collaborative network together. A higher level of communication is aligned with increased collaboration and network engagement. Social media platforms are a primary conduit for connecting across cohorts and countries for formal collaboration and professional and personal relationships with both alumnae and mentors. Alumnae maintain regional networks for both formal and informal relationships, meeting up both in person and virtually, with shared language as a key component. Challenges to sustaining country-level networks include the level of engagement by the embassy, geographic distance among alumnae, lack of freedom of movement, interpersonal relationship challenges within the country, and lack of time.

EQ2: TO WHAT EXTENT ARE TECHWOMEN ALUMNAE STARTING NEW NETWORKS OF STEM WOMEN? TO WHAT EXTENT ARE THEY PLUGGING INTO EXISTING NETWORKS OF STEM WOMEN IN THEIR HOME COMMUNITIES?

KIIs/FGDs suggest that most alumnae are not starting new networks of STEM women when they return from the TechWomen program. For those who do, these networks range from networks mirroring the professional and supportive community that alumnae valued during the TechWomen program to starting chapters/formalizing informal networks of existing STEM organizations in their countries. Other networks started by alumnae include Arab Women in Computing (ArabWIC), Gaza SkyGeeks, and Women TechMakers. Embassy representatives and the implementing partner (IP) shared that new networks created by alumnae help to identify future program participants, and the strength of connections between alumnae, influences if new networks are started.

Only a small number of alumnae shared examples expanding their networks to include other women from STEM fields, even though IP representatives interviewed were confident that this expansion is happening. A few alumnae mentioned that the tech/STEM communities in their home countries are so small that much of this community is made up of TechWomen. Rather, alumnae shared that their participation deepened their relationships with other women from their country who also participated in the program, with many relationships transitioning from a professional to personal nature. Alumnae shared many examples of leadership in non-TechWomen-specific networks and activities, some of which overlapped with activities in new and existing networks. Slightly more alumnae plugged into existing STEM networks where many already had connections than started new networks themselves. However, those who joined existing networks (global, regional, country, and city levels) and those who started new networks each represented less than 25 percent of the sample. Existing networks were mostly exclusive to women, but some were also open to men.

Multiple stakeholders spoke about alumnae sharing their TechWomen experiences when they returned. TechWomen share their own personal experiences and journeys with STEM women and girls and are strong advocates for program outreach and increasing applications to the program. Alumnae described helping applicants through the process and encouraging them to apply repeatedly if needed. Respondents most frequently described sharing their experiences through presentations, panels, and conferences in their home countries and other places of residence, but also used social media platforms, personal websites, and formal and informal platforms in their workplaces to share information about the program. More than 90 percent of survey respondents indicated they are mentoring women and girls in their home country, and nearly half of alumnae participants in KIIs/FGDs are mentoring girls in STEM formally (through a program) or informally (girls met through a network or activity, and in universities). Alumnae are mentoring girls through various established initiatives and are starting their own initiatives. TechWomen alumnae spoke about collaborations with women in the wider STEM network, in established STEM-related networks, and with collaborators who went on to become TechWomen themselves.

EQ2: CONCLUSIONS

Most alumnae are not starting new networks of STEM women, but those who do seek to either replicate the supportive community they experienced as ELs or to start chapters of existing STEM initiatives or formalize existing networks. A slightly higher number of alumnae are plugging into existing networks where they had connections before the TechWomen program, than are starting new networks of STEM women. With the exception of the TechAIM initiative in Kyrgyzstan and a few other initiatives in other program countries, alumnae are rarely expanding their networks to other women in STEM fields in their home countries. TechWomen alumnae share their personal TechWomen experiences, promote the program, and provide support to new applicants through a variety of platforms (e.g., presentations, conferences, social media). Alumnae are overwhelmingly mentoring women and girls in their home countries, both formally and informally, and most of these mentorships are with women and girls in STEM fields.

EQ3: TO WHAT EXTENT ARE TECHWOMEN ALUMNAE ESTABLISHING AND MAINTAINING NETWORKS WITH TECHWOMEN MENTORS?

Most mentors still interact with their mentees about once a year (18.4 percent) or several times a year (20.4 percent), but very few are in close, frequent contact. A handful of mentors "hold together" the network with a large number of ties, but the majority of mentors have far fewer ties. In general, these mentors were involved for two or more years and were highly satisfied with their mentee relationships. More than 44 percent of mentors are no longer in contact with their mentees.

Data from the SNA surveys showed that alumnae created a total of 2,293 mentoring relationships between the alumnae and their mentors. The data from the mentor survey showed there were 1,488 relationships established between mentors and alumnae. Given the lower response rate from the mentors, there are likely thousands of unreported relationships between alumnae and their mentors. Alumnae had an average of 6.85 relationships with mentors, and mentors reported an average of 10.78 relationships with alumnae, suggesting that each alumna and mentor maintains a healthy level of engagement in the network. Past network research in development

and civil society studies often report that individuals can only name four to six people from whom they receive advice and support, so the TechWomen program is higher than what research suggests.

The structure and intensity of alumna-mentor relationships vary greatly from one relationship to the next. The majority of the alumna-mentor relationships established recently tend to be of a more professional nature. Long-term alumna-mentor relationships persevere because a personal friendship has been built and nourished. Social media and opportunities to meet in person (in the United States or on delegation trips) both play a large role in maintaining connections. Some alumna-mentor relationships terminate after the alumnae's time in the United States due to mentor/alumna mismatches (personal or professional), a lack of initiative by one actor to maintain a connection, or through non-use of social media by the mentor or alumna. There is some evidence of new and/or continued collaboration between mentor/alumna after program completion but little evidence that these collaborative relationships are sustained long-term.

According to alumnae and mentors, delegation trips are greatly beneficial for in-country alumnae where the delegation trip takes place, for example, by giving credibility to the TechWomen program, elevating the status of TechWomen alumnae in their countries and industries, facilitating new relationships with government officials and leaders, and bringing attention to initiatives TechWomen are working on. The IP reports that delegation trips are in high demand by mentors, with many attending multiple delegation trips. A significant portion of mentors reported that the same mentors are selected for the annual trips, limiting opportunities for others.

Many mentors' main reason for attending delegation trips was to visit a new place and learn about a new culture, but trips also strengthened relationships with alumnae and other mentors and established new relationships with alumnae. Mentors described the relationships they have maintained with alumnae as based on deep personal connections. The ability to meet one-on-one and have in-person contact were also instrumental in forming sustained bonds. Mentors mentioned challenges to maintaining contact, including life events and general busyness, as well as a lack of formal structure for maintaining contact. Contact ranges from keeping up with professional accomplishments by seeing social media posts to maintaining group chats and catching up by phone. Only 10.1 percent of the ties between mentors and alumnae noted in the mentor survey resulted in a tangible collaboration. The bulk of these collaborative ties came from four mentors with high program engagement. This aligns with qualitative findings where few mentors described formal collaborations between themselves and alumnae, either new or continued. Of the mentors who did share examples of collaborations, none were tied to specific network or individual outcomes.[1]

EQ3: CONCLUSIONS

Sustained contact can be predicted to an extent from the personal bonds formed during the program itself, which are strongest when mentors and ELs, who are current participants in the TechWomen program, have contact one-on-one or in small groups. Professional mentors spend the most time with ELs, and this leads to stronger bonds in general though it does not necessarily

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[1] Network outcomes would reflect the contribution of collaborations to the TechWomen alumnae/mentor network overall, and individual outcomes refer to the alumnae specifically.

predict the longevity or deepness of a relationship after the program. Professional and personal contact between mentors and ELs is dependent on a variety of factors, many of which are beyond the control of the TechWomen program. In-person contact after the program is a key factor in maintaining relationships. None of the few formal collaborations reported were linked to specific network or individual outcomes.

EQ4: HOW CONNECTED ARE TECHWOMEN ALUMNAE TO U.S. EMBASSIES?

Some 109 alumnae said they remained in contact with embassy staff after the program, identifying a total of 175 embassy contacts, which were often unique to each respondent. When there are overlaps in embassy contacts, these contacts often seem to be shared by alumnae from the same nation. Embassy events are the most common way participants engage with the embassy, including through social events, STEM-related events, and serving on panels at alumnae events. Alumnae value the opportunity of attending embassy events for networking and sharing their TechWomen experience, and the majority had been to several events, while a few mentioned not receiving invitations or living too far away from the embassy to attend. Financial support in the form of grants is another common way that alumnae interact with embassies, with the Alumni Engagement Innovation Fund (AEIF) highlighted as the most common source of funding.

Alumnae shared different levels of participation in the embassy alumni network. To some extent, alumnae engagement is dependent on the extent to which embassies hold initiatives and activities and also dependent on an alumna's desire to establish connections with other alumni. Of the alumnae who shared information about the broader alumni network, a few had little to no contact with the network. The rest had engaged with alumni from the broader embassy network, with some connections developed outside of the embassy. There were few examples of collaborations within the broader alumni network.

EQ4: CONCLUSIONS

Less than one-third of survey respondents remain in contact with embassy staff, and while many have unique relationships with embassy staff, others in the same country share similar contacts. Alumnae engage with embassies most through a variety of social and STEM-related events, often collaborating with the embassy to put on programming, workshops, or to participate in festivals and to secure access to funding opportunities. Alumnae participation in the broader embassy alumni network is dependent on how active embassies are with the network, as well as alumnae desire to be involved. There are few collaborations within the broader alumni network.

RECOMMENDATIONS

Consider Providing Additional Funding and Support for TechWomen Alumnae: Alumnae suggested the greatest impacts would come from travel grants to increase in-person collaboration on projects, funding for meeting spaces, and funding for TechWomen alumnae to host workshops/seminars in their communities. An increase in the number and dollar amount of seed grants to implement impact projects as well as funding for larger STEM projects, were also suggested by alumnae. Additionally, increased embassy engagement with the TechWomen alumnae in all program countries, which could include invitations extended on an equitable basis for alumnae to attend embassy-sponsored events, requests for TechWomen participation in

panels and workshops, and increased involvement in the selection and preparation of future TechWomen emerging leaders, would strengthen TechWomen alumnae/embassy relationships and provide for additional opportunities for collaboration.

Consider Providing Support for Expansion of Country-Level STEM Networks: Consider providing support to TechWomen alumnae in program countries where the possibility exists to reach groups of women in small towns and rural areas who are excluded from STEM opportunities only available in capital or larger cities through a similar model being implemented by TechAIM in Kyrgyzstan. Financial, technical, and/or in-kind support to women and girls (for skill-building, networking, and education about paths to STEM fields, for example) in small towns and rural areas would allow for country-level STEM networks to be expanded significantly while providing opportunities for greater numbers of women and girls to pursue careers in STEM.

Explore Mentor Attrition Rate and Pursue Retention of High-Quality Mentors: The attrition rate for mentors is high and may be attributed to differences in expectations for the role of mentors, as well as additional issues that may be causing mentors to end their participation after one year.

The ET recommends the TechWomen team explore in-depth the individual reasons for mentors ending their participation in the program and pursue opportunities for retention, including increasing the type and frequency of recognition for mentors.

Utilize an Equity-Based Approach to Delegation Trips: A more equity-based approach needs to be utilized by the TechWomen team when selecting mentors for participation in delegation trips. This will allow for more diversity in the delegations and enable more mentors to lend their expertise in the program countries. Delegation trips could be organized, hosted, and promoted by the U.S. embassies in collaboration with TechWomen alumnae groups to allow for alumnae in more program countries to benefit from delegation trips in their home countries while providing opportunities for more mentors to participate. Financial support could be provided for alumnae to attend delegation trips to participate more fully in delegation trip activities in their home countries and enable alumnae to further solidify their relationships with other alumnae around the world.

Increase Virtual Opportunities/Programming: The shift to an online environment during the COVID-19 pandemic has highlighted the uncountable possibilities for virtual programming that would further strengthen the TechWomen program. The benefits of increased virtual programming include but are not limited to: allowing for mentors/alumnae to establish relationships and discuss expectations early in the mentoring relationship; providing opportunities for alumnae and mentors to attend forums, online workshops, discussions, and networking opportunities throughout the program; and allowing for larger events to be hosted. It is recommended that the TechWomen team increase the level of virtual programming and consider providing additional opportunities for virtual participation, even after the COVID-19 pandemic no longer affects the implementation of the program. However, potential challenges to implement this recommendation may include alumnae access to and quality of internet

connections, as well as mentor preference for in-person experiences and mentor burnout with virtual platforms.

TECHWOMEN EVALUATION INTRODUCTION AND BACKGROUND

TECHWOMEN PROGRAM BACKGROUND

Between 2015 and 2017, fewer than four out of every 10 graduates from science, technology, engineering, and mathematics (STEM) programs in 114 countries were female, reinforcing the narrative that STEM careers are primarily suited for men.[2] The U.S. Department of State (DoS) Bureau of Educational and Cultural Affairs (ECA) recognized the variety of cultural and institutional barriers for women in STEM and, to address this issue, began implementing the TechWomen program in 2011. At the time of the publication of this report, the TechWomen program is managed by ECA implementing partner (IP) the Institute of International Education (IIE). This exchange program seeks to "empower, connect, and support the next generation of women leaders in STEM" by providing opportunities for them to reach their full potential and become role models for women and girls in their communities.

TechWomen provides access to networks, resources, and knowledge to empower participants to reach their full potential. Through mentorship and exchange, the TechWomen program is designed to strengthen participants' professional capacity, increase mutual understanding between key networks of professionals, and expand women and girls' interest in STEM careers by exposing them to female role models. During the five-week program, participants engage with female leaders in project-based mentorships at leading companies in the Silicon Valley and Bay Area, participate in professional development workshops and networking events, and travel to Washington, D.C., for targeted meetings and special events to conclude the program. After their completion of the program, emerging leaders (ELs) and mentors have the opportunity to reconnect during delegation trips to program countries in Africa, South and Central Asia, and the Middle East, which focus on expanding networks of women in STEM fields, creating and strengthening partnerships, encouraging girls to pursue STEM careers, and ensuring the sustainability of mentor-alumnae relationships.

As of 2019, 722 alumnae from 22 countries have connected with over 900 mentors from 122 companies in the Silicon Valley and Bay Area.

EVALUATION PURPOSE AND AUDIENCE

ECA contracted Social Impact, Inc. (SI) in early 2020 to conduct an evaluation of the TechWomen program. The purpose of this evaluation is to determine the strength and sustainability of professional networks created by the program and the extent to which these networks have been leveraged for collaborations between alumnae to enact change. The evaluation provides evidence to inform programmatic decision making by the ECA program team, who are the primary users of the evaluation results, in order to inform the design and implementation of the TechWomen program for future cohorts, as well as make any necessary adjustments. The findings also provide critical information to assist and provide accountability

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[2] Wadhwa, Divyanshi. "There Are Fewer Female than Male STEM Graduates in 107 of 114 Economies." World Bank Blogs, May 17, 2019, blogs.worldbank.org/opendata/there-are-fewer-female-male-stem-graduates-107-114-economies.

to the DoS, the U.S. Congress, and other stakeholders, such as companies in Silicon Valley who have participated in the program. This evaluation will cover alumnae from the 2011 through 2019 cohorts (implemented by IIE), totaling 722 alumnae.

EVALUATION QUESTIONS

This evaluation addressed the following evaluation questions (EQs), drafted in the initial Statement of Work (SOW) by the ECA Evaluation Division, and finalized by the evaluation team (ET) in collaboration with ECA:

1. **How are TechWomen alumnae establishing and maintaining networks with other TechWomen alumnae? By country, by region, and/or globally?**
    a. What type of support are alumnae receiving from the TechWomen network (financial, exchange of resources, mentorship, etc.)?
        i. To what extent are TechWomen alumnae serving as mentors to other TechWomen (within cohorts and between cohorts)?
    b. How (if at all) are TechWomen alumnae leveraging these networks to create change in their home communities (country or region)?
    c. What challenges have TechWomen alumnae faced in sustaining these networks? How have environmental factors such as conflict, non-permissive environments, and the level of that country's tech sector shaped the TechWomen network(s)?
    d. What can ECA do to strengthen and sustain the networks?

2. **To what extent are TechWomen alumnae starting new networks of STEM women? To what extent are they plugging into existing networks of STEM women in their home communities?**
    a. To what extent are they expanding their networks to other women in STEM fields in their home country and region?
    b. How are they sharing their TechWomen experience with other women in STEM in their home communities?
        i. To what extent are they mentoring other women/girls in STEM fields?
        ii. To what extent are there any collaborations happening through these extended STEM women networks?

3. **To what extent are TechWomen alumnae establishing and maintaining networks with TechWomen mentors?**
    a. What is the effect of delegation trips on TechWomen alumnae networks?
    b. To what extent are mentors still connected with their former mentees? Are there any new or continued collaborations between mentors and alumnae?
    c. What role do they play in determining network or individual outcomes?

4. **How connected are TechWomen alumnae to U.S. embassies?**
    a. How involved are TechWomen alumnae in the broader embassy alumni network?

EVALUATION METHODOLOGY

The ET used a mixed-methods design, including a document review, quantitative surveys, key informant interviews (KIIs), and focus group discussions (FGDs). Data from these methods

were used to assess the strength of alumnae and mentor networks, to conduct social network analysis (SNA), and to develop country case studies as part of the evaluation findings. The ET conducted remote KIIs and FGDs in Washington, D.C., Silicon Valley/the Bay Area, and in nine countries. The countries were selected in close consultation with ECA: three primary countries—one from each TechWomen geographic region based on the results of the alumnae survey—and six additional countries (see Annex B: Detailed Methodology).

DATA COLLECTION

DOCUMENT REVIEW

To better understand the programmatic context and inform the evaluation design, the ET reviewed relevant program documents and data (e.g., program alumnae list, mentor list, past program reports, prior monitoring and evaluation [M&E] materials, data from previous surveys) identified in coordination with ECA and IIE staff. The ET organized its review findings by EQ and identified gaps to be filled through other data collection methods.

CONSULTATIVE INTERVIEWS

The ET conducted initial consultative interviews with ECA staff and IIE TechWomen staff separately in order to help inform the evaluation design report and data collection tools.

KIIS AND FGDS

In Fall 2020, the ET conducted virtual KIIs and FGDs with TechWomen alumnae, U.S. embassy officials overseas, current and former representatives from the TechWomen IP IIE, current and former ECA representatives, and representatives from the TechGirls IP Legacy International.

Figure 1: TechWomen Cohort Distribution, KIIs
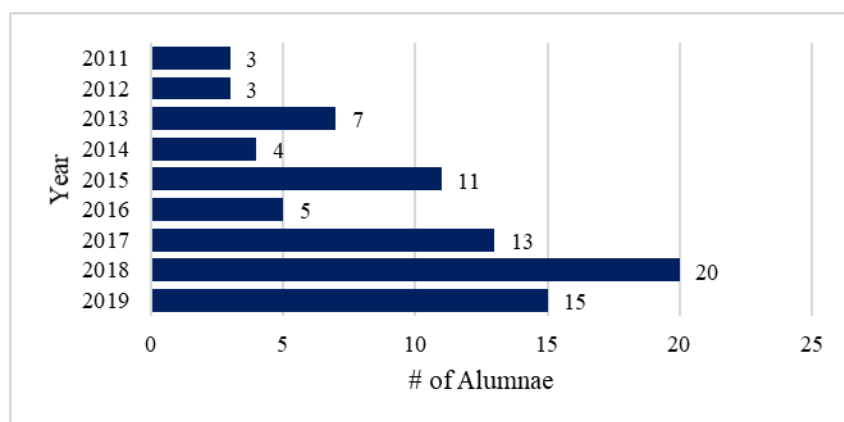
In Winter and Spring 2021, the ET conducted KIIs and FGDs with TechWomen mentors, TechWomen alumnae from Algeria, TechGirls participants in six countries, a current ECA representative, a representative from the IP, and U.S. embassy officials overseas.

Figure 2: Mentor Years of Participation, KIIs
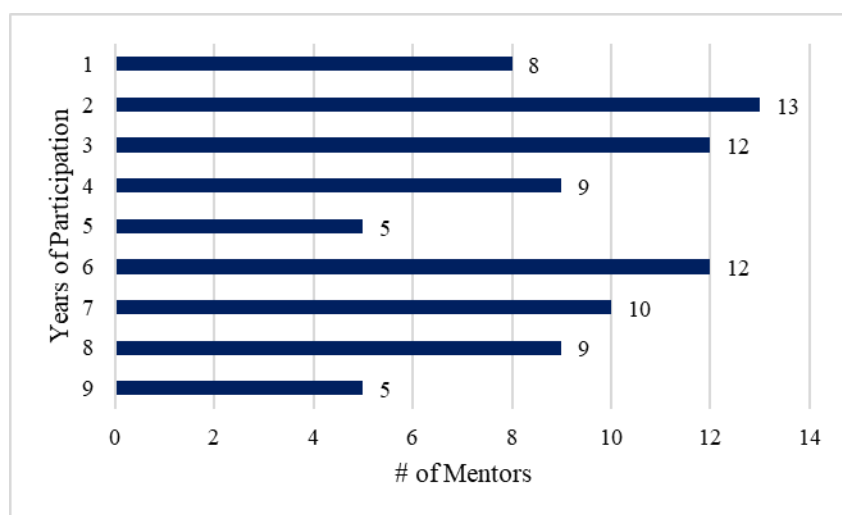
SURVEYS

The ET administered an online survey to all TechWomen alumnae from July to August 2020 and a separate survey for mentors from March to April 2021. The purpose of the surveys was to gather data on the network connections resulting from the TechWomen program, including the establishment and maintenance of networks by alumnae (EQ1); the support and collaboration networks resulting from the program (EQ1); continuation of networks among alumnae and mentors (EQ3); and the degree to which alumnae have engaged in mentorship in their home countries (EQ2 and EQ3).

The primary goal of the surveys was to ascertain the social networks built as a result of the TechWomen program, including the structure of the networks, the quality of relationships among actors, and the number of ties to others. Participants were asked to name those alumnae and mentors with whom they maintained a relationship or engaged in collaborative activity. In total, fieldwork occurred for 24 weeks.

DATA ANALYSIS

QUANTITATIVE DATA ANALYSIS

The ET gathered alumnae survey data and mentor survey data using the network survey platform ONASurveys.com. The ET used this data to provide visual representations and undertake an analysis of the TechWomen network structure. The ET analyzed network data using UCINET, a software package specifically for the analysis of social network data and visualized with Gephi, an open-source network analysis and visualization software package. The network analysis seeks to identify prominent actors in the network via basic centrality measures like in-degree (the number of incoming ties to an actor) and out-degree (the number of outgoing ties from an actor). The ET used the E-I index to identify any patterns in relationship formation in the network, such as by program year or nation.

Metrics calculated included:

- In-degree centrality: The number of incoming ties received by an actor.
- Out-degree centrality: The number of outgoing ties sent by an actor.
- E-I index: How likely actors are to form ties outside an attribute like cohort year or nation.

QUALITATIVE DATA ANALYSIS

After the KIIs and FGDs, the team reviewed transcripts and notes for accuracy and updated with minor edits made in cases where the speaker or the topic was unclear.

All transcripts and notes were uploaded to Dedoose, with each alumna KII and mentor KII linked to a set of descriptors based on the team's codebook. The use of descriptors in Dedoose allowed the ET to analyze the qualitative data along with specific characteristics of the alumnae and mentors. The descriptors for the evaluation included TechWomen home country and cohort, mentor employer, mentor years of participation, TechWomen alumnae professional field, among others.

Following the completion of coding, the ET identified the codes applicable for each evaluation question and retrieved the excerpts associated with specific codes in order to review the content, identify trends, and draw conclusions.

BIASES AND LIMITATIONS

The ET would like to note the following limitations of this evaluation:

COVID-19 PANDEMIC

The COVID-19 pandemic had a significant effect on the ability of the ET to perform in-person data collection in nine of the 22 program countries. When selecting the nine countries for data collection, the ET took into consideration the ability for data collection to be conducted 100 percent remotely in each of the countries. The ET was able to mitigate this limitation by contacting the TechWomen alumnae via email and WhatsApp and conducting KIIs and FGDs between the hours of 8:00 a.m. and 9:00 p.m. in the alumnae's home countries.

Home community STEM colleagues and individuals mentored by TechWomen alumnae were two stakeholder groups intended to be included in the qualitative data collection. Due to the COVID-19 pandemic and the team's inability to travel and conduct in-person qualitative interviews, the ET eliminated home community STEM colleagues from the stakeholder group due to the difficulties in identifying a sufficient number of TechWomen STEM colleagues that could adequately answer the questions in the data collection instrument. While the alumnae survey indicated that 90 percent of TechWomen alumnae were mentoring women and girls in STEM, the qualitative data gathered during KIIs with TechWomen alumnae indicated low levels of mentorship between TechWomen alumnae and STEM colleagues. Therefore, the decision was made in concert with ECA to replace STEM colleagues/individuals mentored by TechWomen alumnae with TechGirls mentored by TechWomen alumnae.

RESPONSIVENESS OF STAKEHOLDERS

Despite repeated contacts by the ET and offers to conduct the FGDs in Arabic, no TechWomen alumnae from either of the sampled Palestinian Territories cohorts responded to the requests to participate in FGDs, and therefore no FGD from the Palestinian Territories took place. However, the ET was able to conduct KIIs with nine alumnae from the Palestinian Territories.

The response rate from mentors in the mentor survey was much lower than initially anticipated. Only 156 of the 808 mentors with viable email addresses provided by IIE responded to the survey, for a response rate of 19.3 percent. Fifty-eight percent of the respondents who received an invitation to participate did not open the survey link. While the response rate for the mentors was relatively low, the data was sufficient to create averages that should reasonably approximate the experience of mentors overall; though without a higher response rate, it is difficult to determine whether any outliers would have affected the averages.

KIIS WITH TECHGIRLS

As TechGirls FGDs were conducted remotely due to the COVID-19 pandemic, only TechGirls who were aged 18 and older were invited to participate. This eliminated the need for parental consent and Institutional Review Board (IRB) review for participation in the FGDs.

SELECTION BIAS

There is also the possibility for selection bias in the survey results given the low response rate to the mentor survey (19.3 percent). While there is insufficient data to determine why so many mentors did not respond to the survey, highly engaged mentors may have been more likely to reply—possibly positively skewing the results. Additionally, the possibility for selection bias also exists in the mentor KIIs as mentors who had participated in KIIs reached out to other mentors to encourage their participation in KIIs with the ET.

FINDINGS

EQ1: HOW ARE TECHWOMEN ALUMNAE ESTABLISHING AND MAINTAINING NETWORKS WITH OTHER TECHWOMEN ALUMNAE?

Summary: Networks are informal and differ significantly by country and context, relying on TechWomen alumnae themselves to create and grow these networks. Alumnae primarily build and maintain relationships within their cohort but collaborate with alumnae from the same country.

Friendships are strong within cohorts but decrease as time passes. Communication primarily takes place via WhatsApp or similar channels, and increased levels of communication are correlated with increased levels of collaboration and network engagement. The presence of impact projects and/or seed grants also increases the collaboration within countries and between cohorts.

RELATIONSHIPS AMONG ALUMNAE

According to the alumnae survey and resulting SNA, TechWomen alumnae are establishing and maintaining networks with other TechWomen alumnae universally. The results of the alumnae survey show that 4,349 relationships were built among the responding alumnae. Figure 3 represents the relationships alumnae identified with other alumnae, colored by year. The boldness of the lines represents more frequent communication. Notice the closeness of the 2019 cohort (in orange) and how interconnected that cohort is by frequent communication.

Figure 3: All Relationships among TechWomen Alumnae
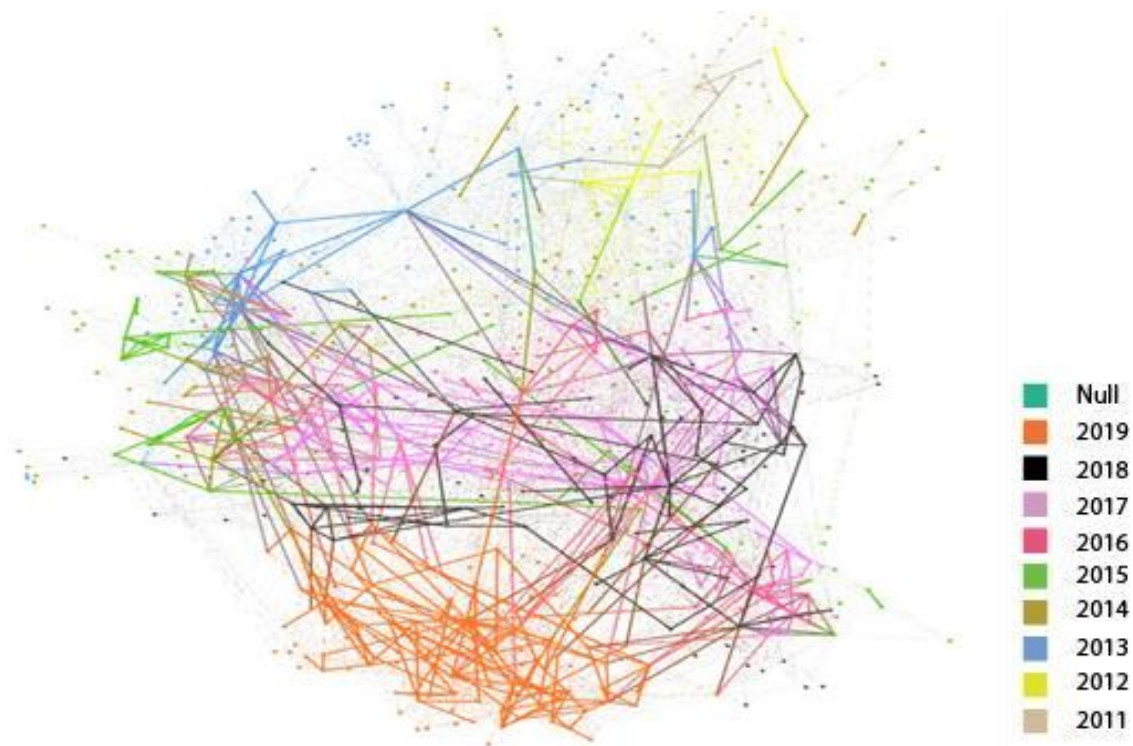
Thus, we can say that there is a dense clustering of relationships among the 2019 cohort—as are the cohorts of 2018 and 2017—though they are noticeably less dense. Indeed, the 2018 and 2017 cohorts are better connected to the previous cohort years than the 2019 cohort is. As the years recede, communication becomes less frequent and the density of ties drops. Network research shows that relationships will atrophy with time unless there is impetus to maintain ties, so the earlier cohorts of 2011, 2012, and 2013 may have less reason to maintain contact. Furthermore, there is no contact among the earliest cohorts of 2011 and 2012 and the 2018 and 2019 cohorts, meaning there are no relationships among the earliest and the most recent program alumnae. No discernable patterns of relationships among alumnae by nation could be determined. In interviews with alumnae, they shared that their relationships with other alumnae are not limited by country or limited to their specific cohorts. Alumnae are forming relationships with women from their home country who have participated in the TechWomen program before them and after them, as well as with women from other countries who have participated in the TechWomen program before as well as after them. The sections below on country, region, and global networks further explore the connections being made and relationships being established

among TechWomen alumnae. The ET defines formal relationships as those that are of a professional nature, while informal relationships are friendships. The team found numerous examples of these different types of relationships, which are further detailed next.

COLLABORATIONS AMONG ALUMNAE

The patterns of relationships built by the program change when considering actual collaborations among alumnae. The alumnae were asked to identify those alumnae with whom they have collaborated on a mutual project or initiative. The number of collaborative ties with other alumnae ranged from one to 33, with an average of 2.88 collaborations per alumna. In sum, 433 alumnae are involved in collaborative relationships for a total of 1,132 collaborative ties. Some of the most collaborative individuals include a 2013 alumna from Rwanda, a 2017 alumna from Algeria, and a 2017 alumna from Kyrgyzstan. No discernable pattern in numbers of collaborative ties by nation or year could be determined. That stated, frequency of communication and collaboration efficacy were highly correlated, meaning the more frequent communications between alumnae, the more often they collaborated, and with better-perceived results on the outcomes of their joint project. The collaboration ties are shown in Figure 4.

Figure 4: Collaborations among Alumnae
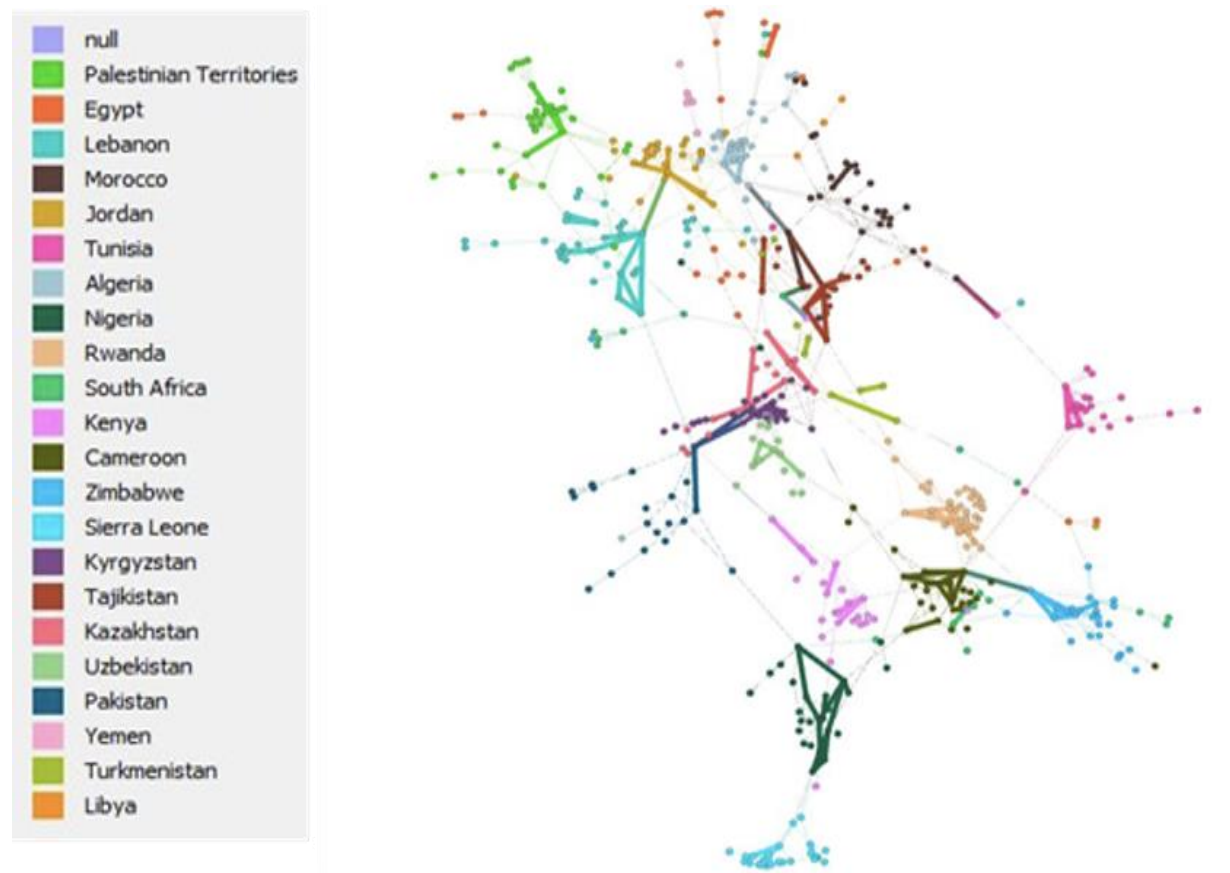
Noticeable on visual inspection of the plot is a loose clustering by region. For example, the top part of the plot includes loosely interconnected clusters of alumnae from the Palestinian

Territories, Egypt, Lebanon, and Jordan, among others. At the bottom of the plot are collaborations among alumnae from African nations like Zimbabwe, Sierra Leone, Cameroon, Kenya, and Rwanda.

COUNTRY NETWORK COLLABORATIONS
Collaborations play a large role in TechWomen maintaining relationships within their in-country networks, with the social network analysis suggesting collaborations primarily take shape among alumnae of the same nation, rather than cohort year. Collaborative clusters are almost entirely composed of alumnae of the same nationality, and the collaborative network is held together by only a few alumnae who perform a bridging function—holding together this sparsely interconnected network. The introduction of impact projects as part of the TechWomen program in 2015 has had a marked effect on alumnae relationships and the in-country alumnae networks as alumnae from the same cohort are working together on the impact projects while in the United States and then continuing the work upon return to their home country. The country teams who win one of the seed grants appear to have stronger relationships than country teams composed of other alumnae in their cohort as they have the funding to begin implementation of their impact projects. Groups of alumnae that did not win seed grants are more challenged due to the lack of funding and must devote time and effort to securing funding before they can begin project implementation. Alumnae that are implementing impact projects with or without seed grants often seek support from in-country alumnae from previous cohorts, further solidifying relationships of alumnae from different cohorts.

COMMON LANGUAGE AND PROJECT COLLABORATION WITHIN REGIONS
TechWomen alumnae shared that regional collaboration between alumnae is often due to sharing a common language. There is further evidence of this based on the collaborations of TechWomen alumnae, which include: Technovation Challenge, Arab Women in Computing (ArabWIC), and TechAIM. In the case of TechAIM, based in Kyrgyzstan, TechWomen alumnae from the region who speak Russian have served as speakers in their program.

FRIENDSHIPS AMONG ALUMNAE

Participants in the alumnae survey and KIIs/FGDs were further asked about friends they had made from the TechWomen program. When people consider themselves to be friends, relationships are more likely to be long-lasting and support mutual activities and exchange, though some friendships may still wane due to the passage of time. In all, 1,697 friendly ties were created, and 601 alumnae had made at least one friend, with an average of 4.8 friends per alumnae.

As can be discerned from Figure 5, some friendships are oriented around cohort years, with a particularly dense friendship network among the 2019 cohort (in orange). Further statistical examination by year suggests that alumnae from 2019 are all more likely to build friendships within their cohort. The 2018 cohort (in black) is also noticeably denser than previous years. The density of the 2019 and 2018 cohorts makes intuitive sense as they recently experienced the TechWomen program together and had time to form interpersonal bonds—and those bonds have not yet had time to naturally atrophy. As the years recede, friendships become more diverse, scattered across cohort years, and less dense, as Figure 5 visually illustrates. Again, among respondents there are no friendly relationships between the earliest and most recent cohorts, as

these alumnae likely had little opportunity to establish friendships across cohort years. The data for the friendship network indicates a modest likelihood for alumnae to build friendships within their own nation overall. In looking at specific nations, Morocco, Tunisia, Libya, South Africa, and Pakistan are statistically more likely to build friendships outside their home nation, while Yemen, Cameroon, Rwanda, Zimbabwe, and Kyrgyzstan are more likely to have friends within their own nation. Alumnae shared that some of their closest friends were other TechWomen alumnae, and their friendships were not limited to other women living in the same countries but extended to alumnae living all over the world.

> "My roommate was from Jordan, and for me it was the first time being closely engaged with someone from a Muslim community. It was very interesting. We had many discussions, and I felt we were more similar than we were different. I come from a country that has a very large Christian population, so I had never really engaged with someone from a different faith, but I enjoyed the time. We became friends and still remain friends now."
> –Alumna

> "My roommate and I are very close friends actually. I was so happy. I couldn't have had a better roommate than her. She's an amazing young woman and so smart and so open and helpful. We had a lot of fun. During preparation for the pitching, we really enjoyed working and staying in the same house, and when we went to Washington, D.C., we stayed together again. We were crying when we left each other."
> –Alumna

Figure 5. Friendships among Alumnae
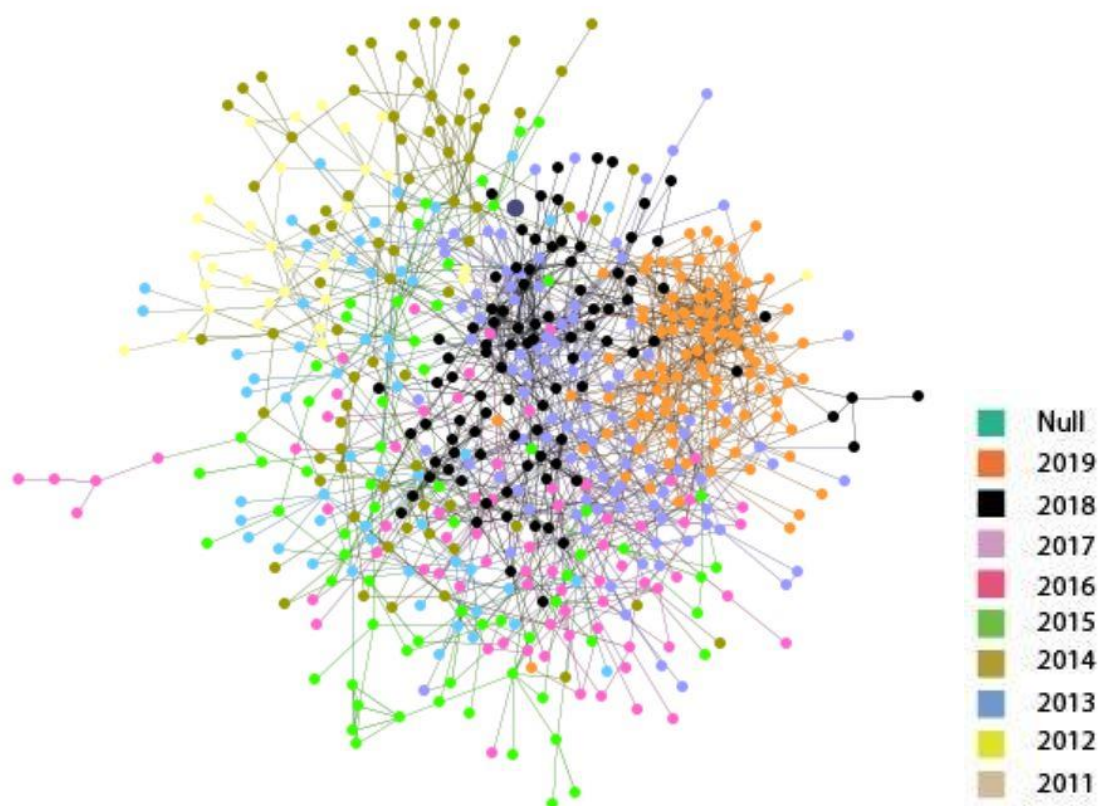
BY COUNTRY, BY REGION, AND/OR GLOBALLY?

COUNTRY NETWORKS

Structure of Country Networks

The structure of alumnae networks varies from country to country, with the factors affecting the structures of the in-country networks including geography, current political situation, and alumnae participation. According to the stakeholders we spoke with, the alumnae networks in each country were created by returning alumnae and have grown organically as each new cohort of TechWomen is chosen and subsequently joins the networks. The TechWomen in the nine primary countries shared that none of the networks had been formalized;[3] however, further research would need to be conducted in the remaining 13 countries to determine if any of the TechWomen networks had been formalized in those countries. As previously stated, the structure of networks varies from country to country. For example, in the Palestinian Territories, the alumnae network is divided into two parts, West Bank and Gaza, with alumnae engaged in-person with alumnae in their territory and little in-person engagement with fellows located in the other territory due to the restrictions of movement. In Kazakhstan, there are two alumnae groups, one in Nur-Sultan and one in Almaty as alumnae are generally located in one of the two

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[3] "Formalized" in this context means that they have been formally recognized by their governments and have formal structures with elected positions.

major cities in Kazakhstan. The two groups function separately due to the geographic distance (approximately 1,263 kilometers, or nearly 800 miles) between the two.

> "Because of distances and the cost of movement to do activities together, it was rather difficult for us, so we ended up more like decentralizing and ensuring people remain in their spaces, but we interact on social media."
> –Zimbabwe Alumna

Strength of Country Networks
The strength of the alumnae network is determined by the participation of alumnae in informal and formal events, activities, and collaborations, as participation in the alumnae networks is voluntary. These TechWomen alumnae events, activities, and collaborations are organized by the alumnae themselves with some support provided by the embassies, often in the form of meeting spaces to be utilized for the meetings. The majority of the alumnae events are informal and take place in coffee shops, restaurants, private homes, and other spaces, and are almost entirely initiated and managed by alumnae themselves. Events and activities may be attended by non-alumnae depending on the purpose of the event. Multiple fellows alumnae shared that their involvement in the in-country network was determined by their personal and professional responsibilities. This was further supported by the statements of other stakeholders that alumnae involvement in the network often changes depending on the stages they were in their personal and professional lives, with women who were recently returned being more involved and women who had recently become mothers less involved than other alumnae.

Establishment and Growth of Country Networks
Growth of the in-country network is by snowball effect with the in-country networks initially established by the first group of alumnae from a country and alumnae added to the network either upon beginning the TechWomen program or directly after completion of the program. For the most part, the onus has been on the TechWomen alumnae since the beginning to establish and grow their country networks, with the IP having provided some guidance and advice to the earlier TechWomen cohorts. The current belief, as noted by an IP respondent, is that it is not the partner's role to establish or grow the in-country networks (another IP staff member notes the contract language in the current award states that IIE's role is to "support the development of an international professional network" for women in STEM) but that the TechWomen have many tools available to them for connecting and growing their TechWomen alumnae country networks.

Personal and Professional Relationships
The strongest connections for in-country networks are by cohort. However, in cases where TechWomen fellows alumnae work professionally with other TechWomen alumnae, those relationships would be characterized as strong connections as well. In some cases, such as Kazakhstan, the TechWomen fellows alumnae knew each other personally or knew of each other professionally before participation in the TechWomen program. In other cases, such as with the Zimbabwe 2019 cohort, three of the TechWomen met for the first time because of their participation in the program and have gone on to maintain personal and professional relationships after completion of the program.

Country Network Communication
TechWomen alumnae are primarily maintaining communication through WhatsApp groups, with groups existing for the whole country and sometimes additional groups used by individual cohorts. Cohorts are often starting WhatsApp groups before they embark on their TechWomen experience in the United States and continuing their communication via the WhatsApp groups during their experience in the United States and upon return to their home countries. Facebook is also commonly used by women within the cohort to maintain relationships with other alumnae from their in-country cohort. Data gathered during this evaluation mentioned three of the program countries (Algeria, Lebanon, and Palestinian Territories) that have country-specific Facebook groups led by alumnae, with the purpose and level of use differing for each. However, IIE confirmed after data collection that there are currently a total of 10 country-specific[4] Facebook groups that are active.

REGIONAL NETWORKS

Regional Relationships Established and Maintained
TechWomen alumnae have successfully established regional TechWomen alumnae networks and are maintaining both formal and informal relationships with other TechWomen alumnae in their region, with meetups taking place in person and virtually and ongoing social connections maintained through regional WhatsApp groups, Facebook, and Instagram. As with the events taking place within the country networks, the events taking place within the regional networks are driven by the TechWomen alumnae and are happening organically.

Regional Travel by TW Alumnae
TechWomen alumnae shared that their regional networks with other TechWomen are often established and maintained through personal and professional travel to other countries in their region.

GLOBAL NETWORKS

Strongest Relationships are Cohort-Specific
TechWomen alumnae shared that they established strong relationships with other alumnae in their cohort during their time as ELs in the United States. The network data supports this finding. The results of the SNA survey suggest that, statistically, TechWomen are highly likely to build relationships characterized by frequent communication by cohort. The survey data suggests that cohorts are more likely than anything at the national level to drive relationships among TechWomen. Cohort alumnae maintain contact via a WhatsApp group used for communication during the U.S. portion of the TechWomen program. Alumnae shared that the WhatsApp group continues to be utilized post-program to share personal and professional information, including promotions, job changes, marriages, and births, as well as for requesting support or resources from other alumnae in their cohort.

Role of TechWomen Facebook Page
The TechWomen Facebook page, administered by IIE, holds a pivotal role in the development of alumna-alumna relationships across cohorts and countries. The Facebook page is a strong conduit for collaborations between alumnae of the same cohort and alumnae of different cohorts.

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[4]Algeria, Cameroon, Egypt, Jordan, Lebanon, Morocco, Pakistan, Palestinian Territories, Tunisia, and Zimbabwe.

According to alumnae and mentors, the TechWomen Facebook page serves as a platform for alumnae and mentors to share resources and events and provide support while also providing a space for others to request resources and support from TechWomen alumnae and mentors.

TechWomen Connect
TechWomen fellows shared that the recent TechWomen Connect 2020, an ongoing initiative facilitated by IIE for TechWomen emerging leaders and alumnae to connect online and in person, provided valuable opportunities to expand their networks and reconnect with alumnae from their cohorts globally as well as with current ELs in the current year's cohort. TechWomen Connect activities included: cohort reunions via Zoom, a series of TechWomen Connect challenges related to connecting with other alumnae and mentors that alumnae and ELs were encouraged to complete, a community corner which served as a virtual meeting space for TechWomen alumnae and ELs in the current year's cohort, as well as a call for alumnae and mentors to put together their own virtual meetups and share with the TechWomen community.

> "I think the most powerful thing is seeing all these women from all over the world just in one place. If you had like this impossible wish in your list to make friends from all these different countries, it would not have come true unless you participate in something like that because you make them all in just one month. And learning about all that and seeing how everything they are doing everything that we're facing together, everything we share. All that is amazing. So even if I decide to go in on a trip to any African country, I know that I can reach out to one of the girls there and tell her that I'm coming, and we can plan things together. So now you know you have someone somewhere that will always be there for you when you need something. And that's very, very important."
> –TechWomen Alumna

EQ1A: WHAT TYPE OF SUPPORT ARE ALUMNAE RECEIVING FROM THE TECHWOMEN NETWORK (FINANCIAL, EXCHANGE OF RESOURCES, MENTORSHIP, ETC.)?

The majority of the TechWomen the ET spoke with did not receive any financial support from the TechWomen network. One alumna in Zimbabwe mentioned that mentors who attended the delegation to Zimbabwe offered seed support for some of the projects that the TechWomen alumnae were implementing; however, the ET did not receive any evidence of the level of financial support or the specific recipients of the seed funding.

Based on conversations with alumnae, the exchange of professional resources is the type of support being shared most often in the TechWomen network. Resources may take the form of webinars and online trainings that TechWomen or mentors or their colleagues are participating in, job referrals, or industry-specific resources and materials that are assisting TechWomen in carrying out their professional duties. The TechWomen Facebook page is used very commonly for women to request and share resources, and the resources are provided by both mentors and alumnae, usually to the whole network, via the platform.

EQ1A: TO WHAT EXTENT ARE TECHWOMEN ALUMNAE SERVING AS MENTORS TO OTHER TECHWOMEN (WITHIN COHORT AND BETWEEN COHORTS)?

Qualitative data yielded little evidence of formal mentoring relationships between TechWomen alumnae. Mentoring among TechWomen alumnae is on an informal basis, and often is a continuation of a mentoring relationship that was established prior to a mentee's participation in the TechWomen program. As an example, an alumna in Zimbabwe shared that she worked with two women in the same industry, and when the alumna returned to Zimbabwe after her time in the United States, the women became her mentees. They went on to become TechWomen themselves, and she still provides mentorship to them in their industry and also for the individual projects and initiatives they have started.

In addition, TechWomen alumnae have shared that they are involved in preparing future cohorts of TechWomen ELs, therefore serving as initial mentors to the women before they embark on the program in the United States. Some of the TechWomen shared that they applied for the program due to encouragement from TechWomen alumnae either at their place of employment or through a network of women in their particular industry.

EQ1B: HOW (IF AT ALL) ARE TECHWOMEN ALUMNAE LEVERAGING THESE NETWORKS TO CREATE CHANGE IN THEIR HOME COMMUNITIES (COUNTRY OR REGION)?

Alumnae are leveraging their networks to create change in their home communities, whether through STEM-focused initiatives such as TechAIM or Technovation, through advocacy initiatives in their countries in the areas of STEM education or information and communications technology (ICT) policies, or through impact projects/action plans developed to target socioeconomic challenges. Some of the impact projects shared with the ET by alumnae include:

- 2017 Jordan TechWomen: In partnership with the STEM Academy, alumnae held a bootcamp for 15 female orphans between 10 and 15 years old to support and prepare them for future careers. Alumnae described a scenario where orphans are released from the orphanage at age 18 and have few options outside of marriage because they do not have families to support them. During a bootcamp, alumnae supported the orphans to develop skills such as communication, public speaking, and teamwork. Alumnae also educated the orphans about their options for education and particularly STEM fields.
- 2018 Zimbabwe TechWomen: Responding to the challenge of girls in rural communities missing school each month during their menstrual cycles, alumnae taught young women and girls how to make sustainable, affordable, and reusable sanitary pads for women in poor communities. The team held a workshop focused on menstrual health and trained participants how to make the pads.[5]
- 2015 Tajikistan TechWomen: A telemedicine project for doctors working in the rural and remote regions of Tajikistan.
- 2018 Rwanda TechWomen: "Healing Together," a project supporting women who were survivors of the genocide in Rwanda.

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[5] Additional information can be found here: https://www.techwomen.org/impact-story/edith-mugehu-natsai-mutezo-nothando-ndlovu-prudence-kadebu-and-sandra-chipuka.

EQ1C: WHAT CHALLENGES HAVE TECHWOMEN ALUMNAE FACED IN SUSTAINING THESE NETWORKS? HOW HAVE ENVIRONMENTAL FACTORS SUCH AS CONFLICT, NON-PERMISSIVE ENVIRONMENTS, THE LEVEL OF THAT COUNTRY'S TECH SECTOR SHAPED THE TECHWOMEN NETWORK(S)?

TechWomen alumnae shared that there are multiple challenges they are facing in sustaining their country networks; however, their challenges are country-specific. While the geographic challenges and ability to connect via technology may shape what the networks look like (e.g., levels of in-person engagement versus distanced engagement, ability to use multiple tech platforms versus use limited to one tech platform, strong and wide internet connectivity versus limited internet connectivity), the challenges do not have a noticeable impact on the strength of the networks, as the TechWomen alumnae are dedicated to the sustainability of their in-country TechWomen networks despite the challenges they are faced with.

- In Zimbabwe, alumnae shared that sustainability challenges are due to hesitation by some alumnae to participate in a network that is not endorsed and supported by the U.S. embassy. The fellows in Zimbabwe are also separated geographically, with some alumnae living in Harare, but many alumnae living outside Harare. Therefore, getting together in person is a substantial challenge.
- In Algeria, alumnae shared that there are not many events organized by either the TechWomen alumnae or by the U.S. embassy for alumnae to meet and, therefore, the network is challenged with sustainability due to lack of connection through in-person events.
- In Kazakhstan, the geographic distances separating the TechWomen alumnae have proven to be a challenge in sustaining a single cohesive alumnae network. Therefore, the women maintain two separate alumnae groups, with one in Nur-Sultan and the other in Almaty.
- In Palestinian Territories, the lack of freedom of movement has also proved to be a challenge in sustaining a single cohesive alumnae network, and TechWomen alumnae have a very difficult time attending events at the U.S. Embassy in Jerusalem and accessing in-person support from the Palestinian Affairs Unit (separate from the embassy) located in Jerusalem. Therefore, the TechWomen alumnae in the Palestinian Territories have established alumnae networks in Gaza and the West Bank and operate with little support from the U.S. government.
- In Kyrgyzstan, the challenge in sustaining the networks is centered more around the interpersonal relationships of the alumnae, particularly the willingness of the older cohorts to relinquish leadership and the more recent cohorts to take over leadership.
- In Kenya, the challenge in sustaining the networks is also the geographic distances that separate the TechWomen alumnae. The TechWomen in Kenya are still taking the initiative to get together, but they are doing so at their own expense.
- The challenges in sustaining the networks in Rwanda, Tajikistan, and Jordan tend to be centered around the alumnae's personal and professional responsibilities and being able to find time to participate in TechWomen events in their respective countries.

EQ1D: WHAT CAN ECA DO TO STRENGTHEN AND SUSTAIN THE NETWORKS?

Multiple TechWomen alumnae shared that the provision of resources, both physical and financial, would greatly help to strengthen and sustain the country networks. While some of the TechWomen alumnae have access to the American spaces through the U.S. embassies to hold events, other fellows are not able to utilize the American spaces due to availability or location. Alumnae shared that provision of space, funding for in-person gatherings, and funding for the implementation of initiatives by TechWomen would also play a significant role in strengthening and sustaining country networks as alumnae could focus their time on working collaboratively to implement projects and spend less time working individually on securing funding.

EQ1: CONCLUSIONS

Overall, TechWomen alumnae are establishing and maintaining networks with TechWomen alumnae from their cohorts most commonly, but also within their countries (outside of their cohorts) and regions to some extent. TechWomen alumnae networks are informal and the structures and strength of the networks differ significantly by country and context, relying on TechWomen alumnae themselves to create and grow these networks. Alumnae from the earlier cohorts established in-country networks when they returned from the TechWomen program and networks grow as subsequent cohorts join. Alumnae primarily build and maintain relationships within their cohort but also collaborate with alumnae from the same country, with a few alumnae holding the collaborative network together. A higher level of communication in TechWomen networks is aligned with increased collaboration and network engagement. Social media platforms, Facebook and WhatsApp in particular, are the primary conduits for connecting across cohorts and countries for formal collaborations as well as professional and personal relationships with both alumnae and mentors. The TechWomen Facebook page is pivotal in the development of alumna-alumna relationships across cohorts and countries, and social media platforms connect ELs before they visit the United States.

At the country level, TechWomen alumnae maintain communication during their time as ELs, before and during their U.S. experience, and upon their return home via WhatsApp and Facebook. Groups exist for individual cohorts and alumnae country-wide, with different purposes and levels of use. Country-level collaborations, through impact projects with and without seed funding, appear to strengthen cohort relationships in-country as these alumnae continue to work together and further solidify relationships outside of the cohort if other alumnae are consulted and involved. TechWomen alumnae organically established and currently maintain regional networks for both formal (of a professional nature) and informal (of a friendship nature) relationships, meeting up both in person, often through personal and professional travel, and virtually using social media platforms. Sharing a common language contributes to establishing and maintaining networks regionally. The global network of alumnae is strongest within cohorts and is facilitated by connections via a WhatsApp platform and through the TechWomen Facebook page described above. TechWomen Connect 2020 events were valuable to many alumnae, allowing them to reconnect with alumnae from their own cohorts globally, current ELs, and mentors through formal and informal virtual spaces, including virtual meetups that they could create and share with the community.

There are a variety of challenges to sustaining networks that are country-specific, including the level of engagement by the embassy, geographic distance between alumnae, lack of freedom of movement, interpersonal relationship challenges within the country, and lack of time because of personal and professional commitments. ECA can support networks to be stronger and more sustainable by providing meeting spaces for events that are accessible to alumnae and considering providing funding support for TechWomen initiatives. Funding support would open up time to work collaboratively in the network because less time would be needed to secure funding for projects.

EQ2: TO WHAT EXTENT ARE TECHWOMEN ALUMNAE STARTING NEW NETWORKS OF STEM WOMEN? TO WHAT EXTENT ARE THEY PLUGGING INTO EXISTING NETWORKS OF STEM WOMEN IN THEIR HOME COMMUNITIES?

Summary: Less than 25 percent of alumnae reported starting new networks or plugging into existing networks of STEM women in their home communities. Most TechWomen alumnae are not starting new networks of STEM women when they return to their home countries, and the new networks they have started vary from replication of the TechWomen community to starting new chapters/formalizing informal networks of existing STEM organizations. Overall, slightly more alumnae plugged into existing STEM networks where many already had connections than started new networks themselves.

KIIs and FGDs with alumnae, the IP, and embassy representatives suggest that most alumnae are not starting new networks of STEM women when they return from the TechWomen program. For those who do, these networks range from networks mirroring the professional and supportive community that alumnae valued during the TechWomen program and wanted to replicate to starting chapters/formalizing informal networks of existing STEM organizations in their countries like Technovation, Girls in ICT, and Google Developer group. Other networks started by alumnae include ArabWIC, Gaza SkyGeeks, and Women TechMakers. Embassy representatives and the IP shared that new networks created by alumnae help to identify future program participants, and the strength of connections between alumnae influences if new networks are started.

Alumnae shared many examples of leadership in non-TechWomen specific networks and activities, some of which overlapped with activities in new and existing networks. Alumnae held (or still hold) leadership roles as Technovation Ambassadors, leading Lean-In discussions, Facebook Developer circles, teacher training and mentoring programs, hackathons, startups, and Wikipedia editing sessions. Alumnae also held leadership roles in the FIRST Global Robotics program, Technovation, the Expo program in Zimbabwe, Gaza Sky Geeks and TechAIM. Alumnae frequently mentioned initiatives supported by the Alumnae Engagement Innovation Fund (AEIF), and in one example an alumna applied for this funding with an International Visitor Leadership Program (IVLP) participant. Alumnae described projects they led or are leading as a group effort, starting with an idea and then taking action to apply for funding. Several of the activities mentioned had a rural geographical focus.

Overall, slightly more alumnae plugged into existing STEM networks where many already had connections than started new networks themselves. However, those who joined existing networks (global, regional, country, and city levels) and those who started new networks each represented less than 25 percent of the sample. Existing networks were mostly exclusive to women and encompassed a wide range of STEM focal areas, including:

- Gallup/UN,
- Girls in ICT,
- ArabWIC,
- She Tech,
- Meetup groups,
- FIRST Global Robotics, and
- Networks as part of universities, conferences, and social media platforms, some of which are open to male participants.

Closer to 25 percent of the sample are or were leading activities within the larger STEM network in their countries.

A small number of alumnae discussed country-level activities they founded or participated in prior to Tech Women, but two IP respondents emphasized that TechWomen are generally very well-connected when they arrive. This is also evident from discussions of alumnae background prior to participating in the TechWomen program. The majority of TechWomen alumnae were members of a network of women in STEM (formal or informal) and/or had existing relationships or connections with women in STEM prior to program participation.

> "Before joining TechWomen, I didn't understand the importance of a support system made up of women. Not only did we learn to contribute and give back, but we also learn from others. The wider your network the better. So, I kept on expanding my network and I'm still expanding."
> –Alumna in Rwanda

EQ2A: TO WHAT EXTENT ARE THEY EXPANDING THEIR NETWORKS TO OTHER WOMEN IN STEM FIELDS IN THEIR HOME COUNTRY AND REGION?

Only a small number of alumnae shared examples of how they expanded their networks to include other women from STEM fields. A few alumnae mentioned that the tech/STEM communities in their home countries are so small that much of this community is made up of TechWomen. A TechWomen alumnae from the 2015 cohort in Kazakhstan shared that she knew all five ELs from this year's (2020) cohort, either through working with them professionally or through personal connections. Alumnae shared that their participation in the TechWomen program served to deepen their relationships with other women from their country who also participated in the TechWomen program either in the same cohort or different cohorts, as relationships that were previously only of a professional nature transitioned to relationships that were also based on friendship and mutual respect.

EQ2B: HOW ARE THEY SHARING THEIR TECHWOMEN EXPERIENCE WITH OTHER WOMEN IN STEM IN THEIR HOME COMMUNITIES?

Multiple stakeholders (alumnae, IP, and donor representatives) spoke about alumnae sharing their TechWomen experiences when they returned. Not only do TechWomen share their own personal experiences and journeys with STEM women and girls, but they are strong advocates for program outreach and increasing applications to the program. Alumnae described helping applicants through the process and encouraging them to apply year after year if they were rejected. Respondents most frequently described sharing their experiences through presentations, panels, and conferences in their home countries and other places of residence. These events included embassy-sponsored events and others they were invited to participate in sponsored by other organizations and groups. Social media platforms, as well as personal websites, were frequently mentioned as avenues to share both TechWomen experiences and general information about the program for potential applicants. Alumnae also share their experiences in the workplace with colleagues both formally (employer-requested presentations) and informally (one on one). Other ways that alumnae share their experiences include through small events coordinated with other alumnae, within their home communities, and at events and trainings that may not be directly related to outreach for the program.

In the survey, the 382 responding alumnae were asked to identify whether they had participated in 10 different kinds of activities or achieved certain outcomes after the program. Seen in Figure 6, most alumnae had engaged in work discussions and informal discussions about content learned in the TechWomen program. Considerably fewer had achieved outcomes like writing newspaper articles or producing academic output.

Figure 6: Types of Networking Outcomes as a Result of Participation in the TechWomen Program
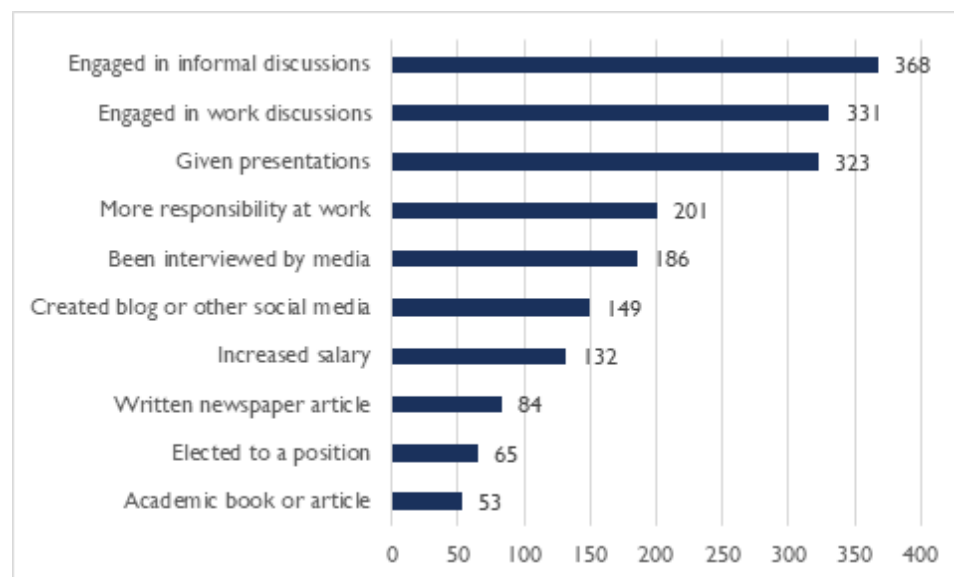
> "I almost feel like it's part of my identity. Now that I am a TechWoman, it's one of the hashtags I use constantly. It's a way I am able to inspire a wider audience."
> –Alumna in Zimbabwe

EQ2B: TO WHAT EXTENT ARE THEY MENTORING OTHER WOMEN/GIRLS IN STEM FIELDS?

More than 90 percent of survey respondents from the 22 program countries indicated they are mentoring women and girls in their home country. Nearly half of alumnae participants in KIIs/FGDs are mentoring girls in STEM formally (through a program) or informally (girls met through a network or activity, and in universities). TechWomen alumnae are mentoring girls through various established initiatives, including TechWomen-TechGirls Clubs, Technovation Challenge, and Global Robotics Challenge. Alumnae are also starting their own initiatives such as Mombasa Girls in STEM (Kenya), Girls Voices (Nigeria), Girls Discover STEM (Nigeria), Creating a Path to the Future (Sierra Leone), eSTEM Morocco (Morocco), HISTEM (Egypt), Taungana (South Africa), and Refugee Girls Need You (Rwanda).

TechWomen-TechGirls Clubs were launched in the Middle East/North Africa region in 2019 and in Central Asia in 2020. The level of mentorship between TechWomen and TechGirls varies across countries. The TechGirls in Tajikistan and Kyrgyzstan shared that before the launch of the TechWomen-TechGirls Clubs in 2020, TechWomen had been providing mentorship to the TechGirls through several avenues including: the Technovation Challenge, hackathons, coding and programming projects, workshops, career/education discussions, and one-on-one mentorship. The Jordan and Algerian TechGirls shared that they had pre-existing relationships with the TechWomen who were part of the club and had been receiving mentorship from the women for the past few years. The Kazakhstan TechGirls shared that one-on-one mentoring was taking place but was only being provided by a limited number of TechWomen alumnae.

> "Before the TechGirls program, I had some doubts about my future profession. But after, I became more confident. So, all of the TechGirls and TechWomen inspired me to continue my road into the IT sphere. Now, I am in an IT university. They inspired me to go further."
> –TechGirl in Kyrgyzstan

The TechWomen-TechGirls Club in the Palestinian Territories has struggled due to the restrictions on movement, the current political situation, and difficulties with communication. Though they are not gathering in person, they are receiving a significant amount of mentoring from some of the TechWomen in Lebanon, and this has been helpful in the TechGirls' academic studies and as they prepare to start careers in STEM. Overall, in the six countries where the ET spoke with TechGirls, the TechGirls shared that the mentoring provided by TechWomen has been very valuable for their current projects and in helping them to prepare for future careers in STEM.

EQ2B: TO WHAT EXTENT ARE THERE ANY COLLABORATIONS HAPPENING THROUGH THESE EXTENDED STEM WOMEN NETWORKS?

Very few TechWomen alumnae spoke about specific collaborations with women in the wider STEM network, and there were no trends about the nature of the type of collaboration. Alumnae that did mention collaborations shared a variety of activities that varied from a family member who began teaching at and organized substantial donations to support the schools that alumnae were already working with, to a fellow student from a U.S. university and a colleague with

whom an alumna collaborated on a white paper about ICT policy. As noted above, TechWomen alumnae have plugged into existing STEM networks to an extent, and also talked about these when asked about collaborations with other STEM women. A few alumnae shared that they met collaborators in STEM networks through the TechWomen program. One woman connected with a collaborator from her country during her time in the Silicon Valley, and they later worked together on projects in a children's museum. In another case, an alumna was introduced to a woman in STEM when she was in contact with a STEM academy during the implementation of her impact project, though no formal collaboration resulted. Alumnae also mentioned collaborators that went on to become TechWomen themselves. Two IPs generally commented on in-country STEM networks.

> "During the implementation of our impact project, we posted an invitation for our program at the STEM Academy. Through the impact project, I was introduced to the head of the school, and I am still in contact with her. Of course, if I'm going to implement any projects related to STEM, I'm going to get in contact with her."
> –Alumna in Jordan

EQ2: CONCLUSIONS

Most alumnae are not starting new networks of STEM women, but those who do start new networks seek to either replicate the supportive community they experienced as ELs or to start chapters of existing STEM initiatives or formalize existing networks. Alumnae hold leadership roles in these new networks and are leaders of non-TechWomen specific networks and activities. A slightly higher number of alumnae are plugging into existing networks where they had connections before TechWomen than are starting new networks of STEM women.

With the exception of the TechAIM initiative in Kyrgyzstan and a few other initiatives in other program countries, alumnae are rarely expanding their networks to other women in STEM fields in their home countries. This may be because the STEM communities in each country are small and are already made up of TechWomen or future TechWomen. While collaborations are happening in the wider STEM network, they were loosely defined and include family members, students, colleagues, and women in established STEM networks.

TechWomen alumnae share their TechWomen experience through work and informal discussions about the content learned in the TechWomen program, as well as through presentations, panels, and conferences in their home countries and other places of residence, sometimes at the invitation of the embassy and other organizations. Social media platforms and websites were common venues to share their experiences. Alumnae share their own personal experiences and journeys to become TechWomen with STEM women and girls, also providing direct support to new applicants even if they apply to the program multiple times.

Alumnae are overwhelmingly mentoring women and girls in their home countries, both formally and informally, and most of these mentorships are with women and girls in STEM fields. TechGirls-TechWomen clubs show a lot of potential based on the current mentoring activities taking place. Alumnae have a strong intention to mentor others; this intention is influenced by

how useful they found their own mentorship experience with U.S. companies during the program.

EQ3: TO WHAT EXTENT ARE TECHWOMEN ALUMNAE ESTABLISHING AND MAINTAINING NETWORKS WITH TECHWOMEN MENTORS?

Summary: Alumnae/mentor relationships were highly varied, with some highly connected individuals and impactful relationships and others for whom those did not exist or persist. Social media and the delegation trips have both proven to be instrumental, either in increasing communication and connection (via the former) or for providing credibility and access to resources (via the latter).

RELATIONSHIPS WITH ALUMNAE

According to the results of the mentor survey, a total of 1,488 relationships with alumnae were established, ranging from as few as one alumna up to as many as 104. Mentors had an average of 10.78 ties to alumnae. In terms of how frequently they communicate with their mentees, most mentors only interact with their mentees about once a year (18.4 percent) or several times a year (20.4 percent), and very few are in close, frequent contact. More than 44 percent are no longer in contact with their mentees.

Figure 7: Mentor-Alumnae Relationships
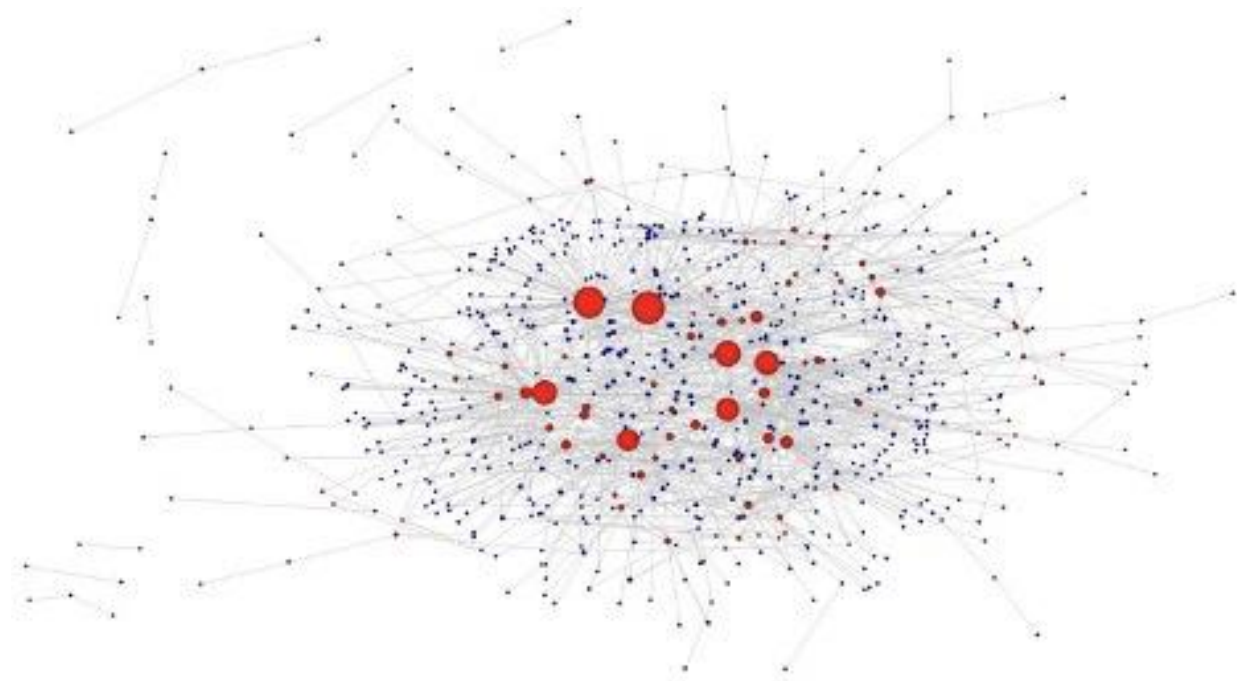
Note. Mentors are in red, alumnae in blue.

Figure 7 is a visual representation of the 1,488 ties established between the mentors (in red) and their identified mentee contacts (in blue). As seen in the center of the plot, a handful of mentors, most of whom have participated in several program years, "hold together" the network with a

large number of ties. The majority of mentors (typically only involved for a year or two), however, have far fewer ties and exist at the periphery of the graph.

According to the alumnae, a total of 2,293 mentoring relationships were built among the alumnae and the mentors. As noted above, the data from the mentor survey suggested there were 1,488 relationships between mentors and alumnae. Given the lower response rate from the mentors, there are likely still thousands of unreported relationships between alumnae and their mentors. From the data gathered, alumnae had an average of 6.85 relationships with mentors, and mentors reported an average of 10.78 relationships with alumnae, suggesting that each alumna and mentor maintains a healthy level of engagement in the network.

Based on conversations with various stakeholders, alumna-mentor relationships are not one-size-fits-all. The structure and intensity of alumna-mentor relationships vary greatly from one relationship to the next. The majority of the alumna-mentor relationships established recently tend to be of a more professional nature, with a few alumnae sharing that their relationships also included a personal component compared to many mentors reporting personal contact. Alumna-mentor relationships that have stood the test of time have done so because a personal friendship has been built and nourished over the years. Social media and opportunities to meet in person (in the United States or on delegation trips) both play a large role in alumnae and their mentors maintaining connections, and for pairings, which are predominantly of a professional nature, allow for continuous connection with low levels of personal investment.

Some alumna-mentor relationships terminate after the alumnae's time in the United States due to mentor/alumna mismatches (personality differences or a lack of similarity in professional focus areas), a lack of initiative by the mentor or alumna to maintain a personal or professional connection, or through non-use of social media by the mentor or alumna. In cases where the relationship has terminated, the majority of the alumnae had another unofficial mentor from the host company that they established a relationship with. Therefore, the alumnae devote their time and energy to maintaining these personal or professional relationships.

The survey results showed some evidence of continued collaboration after the program, though communication frequency between mentors and their former mentees is low. However, there is little evidence to support that these collaborative relationships will be sustained in the long term.

According to alumnae and mentors, the TechWomen Facebook page has been instrumental in facilitating new relationships between mentors and alumnae globally, and these relationships have grown and flourished, with the Facebook page serving as the conduit for the initial connection.

EQ3A: WHAT IS THE EFFECT OF DELEGATION TRIPS ON TECHWOMEN ALUMNAE NETWORKS?

According to alumnae and mentors, delegation trips are greatly beneficial for in-country alumnae where the delegation trip takes place. Alumnae are involved in the planning of the delegation trips, often hosting the delegates in their home communities and places of employment. The delegation trips have given credibility to the TechWomen program in-country, elevating the status of TechWomen in their countries and in their industries, often providing opportunities for

the women to establish new relationships with government officials and leaders in their respective industries. Media coverage has been a part of the TechWomen delegations in multiple countries, with events being covered through television and print, thereby increasing the visibility of the TechWomen and establishing their roles as changemakers in their communities.

Delegation trips also allow TechWomen to bring attention to initiatives they are working on in their home countries, attracting funding and resources from domestic as well as international sources. For example, one alumna noted that mentors who attended a delegation trip in her country offered financial support to a project they learned about while on the trip. Another example of resource provision took place during the delegation trip to Uzbekistan, when a mentor led a workshop utilizing a significant amount of hardware she had brought to Uzbekistan, and upon her departure she left the hardware to be used in future projects and workshops. Mentors participating in the delegation trips often visit the initiatives led by the TechWomen, encouraging their growth by leading workshops and seminars and donating much-needed resources.

According to the IP, the delegation trips are in high demand by mentors, and in recent years an application process has been instituted for mentors. The IP shared that mentors are responsible for funding their participation in the trip, which is either done with assistance from their employer or through self-funding. Many of the mentors attending the delegation trips have participated in previous TechWomen delegation trips to various countries, with the home country of their mentees not necessarily having a strong role in their decision to participate. The IP shared that the following is taken into account when selecting mentors for participation: mentor employers (with a preference for large companies) and the "right" companies, personalities, and strongest applications. While many of the mentors shared that their main reason for attending delegation trips was the opportunity to visit a new place and learn about a new culture, the delegation trips also provided opportunities for the mentors to strengthen relationships with alumnae, with other mentors, and to establish new relationships with alumnae that previously had not existed. A significant portion of mentors the ET interviewed shared that the same group of mentors appeared to be selected for participation in delegation trips every year, thereby limiting opportunities for other mentors to participate. Qualitative data validated this perception. Some of these mentors stated that they no longer apply to attend the delegation trips due to being rejected multiple years and the lack of satisfaction with the selection process.

A rough estimate by the ET of mentor attendance on delegation trips, based on data collected during interviews further affirms these findings. The ET understands that there have been 16 delegation trips thus far with an estimated maximum of 20 slots per trip for mentors with 320 slots estimated in total. Of the mentors interviewed (81), 46 accounted for 127 of these slots with many participating in multiple delegation trips. Approximately 40 percent (127/320) of the delegation slots available went to these 46 mentors. By this estimate, 46 of the 922 mentors between 2011 and 2019 (5 percent of all mentors) took 40 percent of the slots for delegation trips. Though this is still an estimate, the ET believes that the disproportionate number of mentors to potential slots warrants further investigation.

TechWomen alumnae from countries other than the site of the delegation trip shared that they would also like to attend, but due to their geographic location or financial situation, they are

unable to do so. They feel this puts them at a disadvantage as they cannot benefit from the relationships with mentors that are being formed between alumnae and mentors during the delegation trips. A request was made for financial support to be provided to TechWomen alumnae, so they may participate in the delegation trips and enjoy the same benefits as other TechWomen alumnae.

EQ3B: TO WHAT EXTENT ARE MENTORS STILL CONNECTED WITH THEIR FORMER MENTEES?

Mentors shared insights into the elements that they believed helped them establish and sustain relationships with former mentees and what leads to reduced contact after the program or over time.

Mentors described the relationships they have maintained with alumnae as based on deep personal connections forged during the ELs' time in Silicon Valley, with many of these networks strengthened by sharing personal and professional struggles both during and after the program. One-on-one contact, rather than in large groups, was also mentioned as key to establishing relationships with ELs. Mentors mentioned the value of inviting ELs to their homes, and visiting ELs' homes in some cases, in forming bonds that were sustained. Mentors also correlated lasting relationships with in-person contact after the program, such as when alumnae visited the United States on business and when mentors attended delegation trips. The bond established during the program and the extent to which mentors and alumnae had the same interests and/or worked in the same sector were also cited as influences in maintaining contact.

Mentors cited several challenges to maintaining contact with alumnae, including life events and general busyness, as well as a lack of formal structure for maintaining contact. A few mentors mentioned that not going on delegation trips and reconnecting with alumnae in person through this forum made it less likely for mentors to stay in contact.

Social media plays a large role in maintaining connections both at the surface level and deeper levels over time. Facebook and WhatsApp, followed by LinkedIn, are the most common social media platforms for keeping in touch with alumnae, according to mentors. Contact ranges from keeping up with professional accomplishments by seeing social media posts to maintaining group chats over Facebook and WhatsApp and making phone calls over WhatsApp. While mentors appreciate the TechWomen Facebook page, many also shared that they are not active on Facebook and would like a more structured and/or accessible communication format such as a dedicated TechWomen mentor/alumnae website with discussion forums that can be utilized during and after the program.

Overall, mentors shared positive feedback about TechWomen networking events during the program as a way to establish relationships with alumnae. Some shared that meeting in smaller groups was more effective in establishing connections. Mentors shared a variety of networking activities (defined broadly) that they found beneficial during and after the program, including: company events, kickoff events, cultural and social events, the Washington, D.C., trip, and delegation trips—all of which they described as forums to meet and build relationships with ELs and alumnae.

Respondents described relationship building and maintenance as slightly different for different mentorship roles. Cultural mentors described the differences in relationship building between the previous model of one-on-one cultural mentorship and the newer model of cultural mentorship within a pod. Mirroring other comments about relationship building across the program, cultural mentors who participated in both models believed the one-on-one cultural mentorship was better for building relationships and doing cultural activities in a pod made this more difficult. In contrast, a few shared that they felt relationships between alumnae and other mentor roles were stronger because alumnae spend more time with professional mentors and impact coaches. The extent to which cultural mentors keep in touch with cultural mentees varied, though it seemed to be based around variables previously described than anything related specifically to cultural mentorship.

Mentors who have held impact coach roles described post-program relationships that were both personal and professional, many of these related to continuing to mentor teams on their impact projects or checking in to see the progress of these projects. Former impact coaches described different experiences of establishing relationships, with some sharing that they developed close personal relationships with their cohort teams, others wanting to have more time to get to know team members one-on-one, and a few sharing challenging team dynamics that had to be overcome during the development of projects.

The professional mentor role is more closely connected with ELs than other mentor types, and mentors describe deep personal "sisterhood" and "family" connections and bonds forged during the program. However, contact after the program was similar to other mentorship types, varying from frequent and deep to surface level contact on social media. Professional mentors note that their door is always open to provide advice and connections, even if contact is not frequent, and many have ongoing professional discussions with alumnae. A few have even hired alumnae, and others spoke about meeting again in person both in and outside of the United States.

While no strong recommendations emerged across mentors about what could be improved to establish and maintain relationships with alumnae during or after the program, the most frequent suggestions were around creation of a more structured way to engage with alumnae after the program or ways for alumnae to engage with TechWomen professionally beyond the program timeline. Some examples included creating alumnae affinity groups by professional area, specific points of engagement or follow-up on their professional activities or impact projects, and annual or bi-annual forums online or in person to connect mentors and alumnae.

EQ3B: ARE THERE ANY NEW OR CONTINUED COLLABORATIONS BETWEEN MENTORS AND ALUMNAE?

The mentor survey asked mentors to identify any mentees with whom they had collaborated on a mutual project. Only 151 collaborative relationships were reported; this means that only 10.1 percent of the ties between mentors and alumnae resulted in a tangible collaboration. The bulk of these collaborative ties came from four mentors with high engagement in the program. As an example, one mentor (who had participated in the program for several years) listed 38 collaborations with alumnae (25 percent of the total number of collaborations). As seen in Figure 8, only seven mentors (in red) had four or more collaborations with TechWomen alumnae (in blue).

Figure 8: Collaborations between Mentors and Alumnae
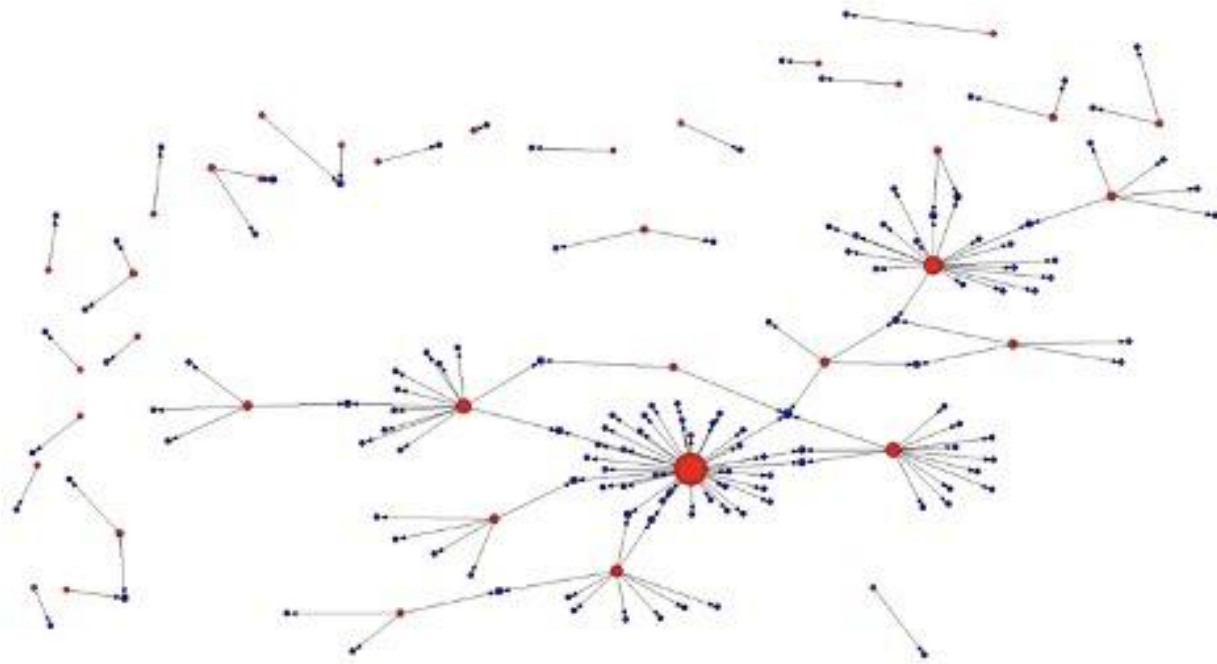
Note. Mentors are in red, alumnae in blue.

Few mentors described formal collaborations between themselves and alumnae, either new or continued. Many described providing advice and guidance as needed or introducing alumnae to people in their networks as needed (see EQ3b for more details about the nature of mentor-EL relationships post-TechWomen). Mentors also provided examples of support they were currently providing or had provided to post-program alumna projects outside of the impact projects, ranging from support in project planning to giving workshops as part of the project. One mentor shared that she had hired a TechWomen alumna part-time for a project, and another shared that her EL volunteered for the company to provide language translation of a product, something that had contributed to the alumna's career. Mentors also talked about being invited to speak at conferences and on panels in alumna countries, and one invited an alumna to speak on a panel. A few did not consider any of their interactions with alumna to be a "collaboration."

> "So, we stayed in touch for maybe six months and then the pandemic started. And since then, we have this collaboration out of the TechWomen program. It started with the program, but then we continued because she had the idea. So, the new nonprofit organization and trainings … because of my background in organization development, she wanted me to help her with some ideas on how to have a better structure for the program that she was developing."
> –Mentor

"She wasn't my EL, she was a friend's EL. But she was at a company across the street at another company, so we used to get lunch together. And now we've been on a couple delegation trips together. So, this EL was pulling together some entrepreneurial efforts, and I worked with her a little bit on that in the early stages. But nothing formal. It's just always been informal."
–Mentor

EQ3C: WHAT ROLE DO MENTORS PLAY IN DETERMINING NETWORK OR INDIVIDUAL OUTCOMES?

Network outcomes refer to the contribution of collaborations to the TechWomen alumnae/mentor network overall, and individual outcomes refer to the alumnae specifically. In the little data on any collaborations between alumnae and mentors, we did not encounter any specific contributions to either the network or individuals. As discussed in EQ3B, only about 10 percent of ties between mentors and alumnae resulted in a tangible collaboration, and interviewed mentors shared few examples of formal collaborations with alumnae after the TechWomen program. Impact coaches shared that they provided support to alumnae as they implemented their impact projects in-country, and many mentors continue to provide professional advice, references, and referrals to others within the mentor network on an ad hoc or on a more regular basis, depending on the relationship. (See EQ3B for more details about the nature of mentor-alumnae relationships and the extent to which collaborations are happening). Of the mentors who did share examples of collaborations, none were tied to specific network or individual outcomes.

EQ3: CONCLUSIONS

Sustained contact between mentors and alumnae can be predicted to an extent from the personal bonds formed during the program itself, which are strongest when mentors and ELs have contact one-on-one or in small groups. Professional mentors spend the most time with ELs, and this leads to stronger bonds in general, though it does not necessarily predict the longevity or deepness of a relationship after the program. Professional and personal contact between mentors and ELs is dependent on a variety of factors, many of which are beyond the control of the TechWomen program. In-person contact after the program is a key factor in maintaining relationships once the program is over, including through delegation trips. None of the few formal collaborations between mentors and alumnae were linked to specific network or individual outcomes. Delegation trips benefit host country alumnae by giving credibility to the TechWomen program, elevating the status of alumnae in their countries and industries, and facilitating relationships between alumnae and government officials and industry leaders. Delegation trips also strengthen relationships between mentors as well as between mentors and alumnae.

## EQ4: HOW CONNECTED ARE TECHWOMEN ALUMNAE TO U.S. EMBASSIES?

Summary: Alumnae engage with U.S. embassies primarily through embassy events and activities. However, the engagement varies depending on both the embassy and the individual's

interest in pursuing these types of relationships. While the relationships exist and alumnae valued the networking opportunity, few examples of this leading to collaborations or joint initiatives were found.

Alumnae were asked to identify if they remained in contact with embassy staff after the program. A total of 109 alumnae said they remained in contact with embassy staff, identifying a total of 175 embassy contacts.

Figure 9: Alumnae Contacts with Embassy Staff
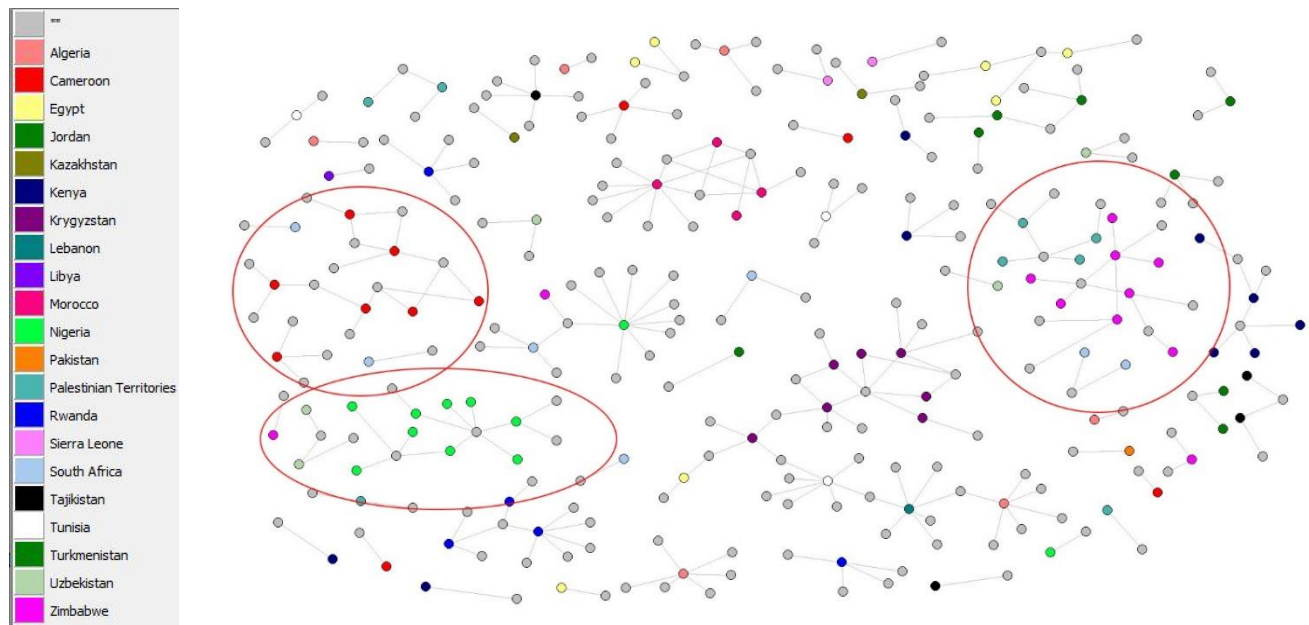
As seen in Figure 9, the embassy contacts identified by alumnae were often unique to each respondent. When there are overlaps in embassy contacts, these embassy contacts often seem to be shared by alumnae from the same nation. Notice, for example, the embassy contacts shared by alumnae from Cameroon (in red), Nigeria (bright green), and Zimbabwe (bright pink)

According to alumnae and embassy representatives, embassy events are the most common way participants engage with the embassy. This includes social events such as hiking, Independence Day celebrations, STEM-related events, and serving on panels at alumnae events.

Many alumnae mentioned the value and opportunity of embassy events for networking and sharing their TechWomen experience. Of those who discussed embassy events, the majority had been to several events. A few alumnae mentioned not receiving invitations or living too far away from the embassy to attend.

Financial support in the form of grants (ranging from a few thousand dollars to $40,000) is another common way that alumnae interact with embassies, either in applying for or securing U.S. government funding for projects. The AEIF was the most common source of funding (small alumni grants and impact project seed funding were also mentioned).

Collaborating with embassies in embassy programming as speakers and panelists to organize STEM fairs and festivals (e.g., Go Viral Festival in Kazakhstan) is a common type of alumnae engagement with embassies. A few respondents mentioned helping to select future ELs, and a small number shared their participation in other U.S. government programs, such as Fulbright.

EQ4A: HOW INVOLVED ARE TECHWOMEN ALUMNAE IN THE BROADER EMBASSY ALUMNI NETWORK?[6]

Alumnae shared different levels of participation in the embassy alumni network. To some extent, alumnae engagement is dependent on the extent to which embassies hold initiatives and activities, as well as an alumna's desire to establish connections with other alumnae. For example, while the Palestinian Affairs unit for the U.S. Embassy in Jerusalem described a very intentional process of engaging returning alumnae and bringing them into the larger group, alumnae in Jordan shared that invitations to embassy events were limited to a specific group of TechWomen alumnae, resulting in unequal opportunities for TechWomen alumnae to engage with and receive support from the embassy.

Of the alumnae who shared information about the broader alumni network, a few had little to no contact with the network. The rest of the alumnae interviewed shared they had engaged with alumni from the broader embassy network, with several having developed these connections outside of the embassy.

Overall, alumnae appreciate embassy events to connect them with alumni from other programs through networking. Still, while many had attended these events, there were few examples of collaborations within the broader alumni network.

Alumnae recommendations for improving this network varied across countries, but the most common responses were a call for more events to connect alumnae and to create an accessible database of alumnae to know what other alumni were doing and to connect with them.

EQ4: CONCLUSIONS

Less than one-third of survey respondents remain in contact with embassy staff, and while many have unique relationships with embassy staff, others in the same country share similar contacts. Alumnae engage with embassies most through a variety of social and STEM-related events, often collaborating with the embassy to put on programming and workshops or to participate in festivals. Alumnae also connect with the embassy to secure access to funding opportunities such as grants.

Alumnae participation in the broader embassy alumni network is dependent on how active embassies are with the network, as well as alumnae desire to be involved. Embassy events are a common way for alumnae to connect with the broader network, but there are few collaborations within the broader alumni network.

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[6] The broader embassy alumni network refers to alumni from all ECA/embassy programs, not only TechWomen alumnae.

ADDITIONAL FINDINGS OF INTEREST

FORMATION OF MENTOR-MENTOR NETWORK

One of the most significant yet unintended outcomes of the TechWomen program is the formation and growth of a strong mentor-to-mentor network.

According to the mentor survey, 1,349 relationships were established between mentors, suggesting a larger than expected network of relationships among the mentors themselves. The range of ties among mentors extended from just one tie up to 41 relationships with other mentors. An equally surprising 840 relationships among the mentors are characterized by mutual collaborations, meaning that 62 percent of reported ties among the mentors included a mutual collaboration. Participating mentors believed these collaborations to be highly effective in producing desired results, and they felt moderately close to other mentors.

Figure 10: Mentor-Mentor Collaborations
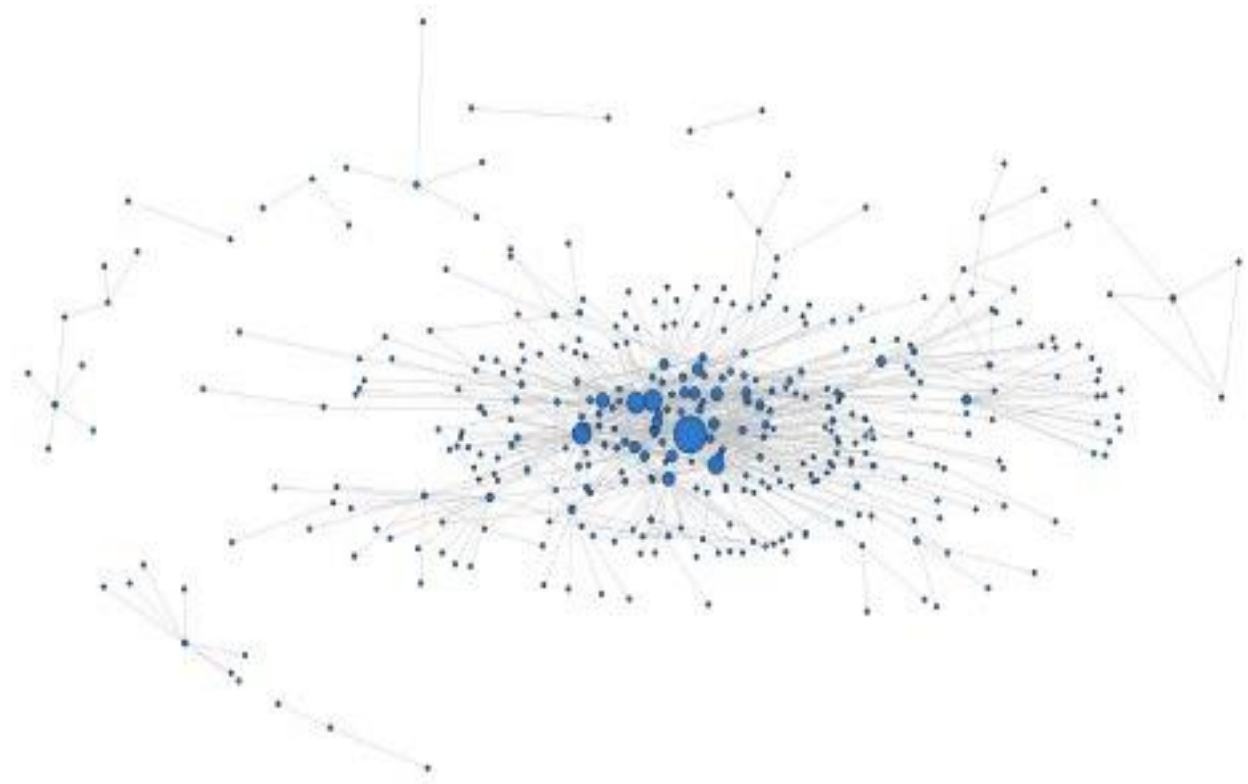
Figure 10 represents the 840 collaborations that occurred between mentors of the TechWomen program. Notice the large "main component" of interconnected mentors as well as the smaller clusters of disconnected mentor groups. This suggests, for the most part, that many mentors are part of a network who largely know one another. Those mentors in the center of the graph, sized by the number of collaborations, tended to have participated in three or more years of the program.

Many of the mentors the ET spoke with shared that the relationships they have developed with other women mentors are often stronger and deeper than the relationships with TechWomen alumnae. This can be attributed to a clear need for a support system in what has proven to be a challenging environment for women in the field of technology in the Bay Area.

Mentors shared that their relationships with other TechWomen mentors are varied in nature, with some relationships being of a strictly professional nature, while other mentors sharing that some of their closest friends are other mentors, with the relationships formed as a result of their participation in the TechWomen program and their shared desire to lift each other up. A few of the mentors shared that they joined the TechWomen mentoring community because of pre-existing personal and/or professional relationships with other TechWomen mentors. Mentors who attended delegation trips shared that they established new personal relationships with other mentors or their personal relationships with other mentors were strengthened due to their participation and shared experiences.

> "I've made friends in this program with women I wouldn't have met otherwise. We would not have crossed paths in our professional careers, even though we're all in tech. As you get to know people over time, the friendships become real."
> –Mentor

> "We talk a lot about the challenges of being a woman in engineering, and those are valuable conversations to be having. We have conversations about how to deal with common issues we face. It's important from an emotional standpoint to have those conversations, and professionally it's important to solve the problem."
> –Mentor

CO-MENTORING AS PROFESSIONAL MENTORS

Many professional mentors shared feedback on the benefits and drawbacks of co-mentoring. Co-mentoring was described both as a formal arrangement between mentors, often with one mentor in a coordination role, but co-mentoring also has happened informally. Through a co-mentoring model, mentors felt ELs could get multiple perspectives and broader exposure to a company or network. It was especially beneficial if the assigned mentor's background was not in the interest area of the EL—as the co-mentor could provide opportunities for the EL to explore their interest area, while also benefitting from being introduced within the co-mentor's network.

Co-mentoring benefitted both mentors and ELs, as ELs were not tied to one mentor's availability and expertise. Some mentors did not want to mentor alone or were new to the TechWomen program. Therefore, co-mentoring provided an introduction to this role and a more manageable time commitment.

Some of the mentors shared that the co-mentoring model was arranged by their company, and the ability to have co-mentoring is why the companies continue to participate in the TechWomen program. Last, co-mentors shared that through the co-mentoring process, their professional relationships with their co-mentor colleague grew stronger, they often learned new things or were introduced for the first time to their co-mentor's department or business unit, and they were

able to expand their own network and deepen their professional relationships within their company.

> "It's fun because everyone gets to know each other better. I think the EL might have a better experience too because she gets to meet more people, see more jobs, understand more about the organization. I prefer it actually."
> –Mentor

> "A couple of times I had the opportunity to try to bring other mentors in the program or help them be more interested in situations where people are little unsure about the commitment or time effort. Bring people in as a co-mentor to enrich the experience for the ELs but also to get other women in on the opportunity to participate."
> –Mentor

MENTOR RETENTION AND ATTRITION

During the deployment of the mentor survey, the ET became aware of the high attrition rate of mentors within the TechWomen program. More than 50 percent of the over 950 mentors only mentored for one year and never mentored again. Less than 6 percent of the mentors had mentored for at least six of the nine program years.

Mentors shared the reasons they mentored for multiple years or why they only mentored for a short time. Many mentors returned for multiple years in a variety of roles, both as mentors and participating as facilitators and Mentor-Alumnae Council members. Mentors returned because of the personal relationships built both within the mentor community and with the ELs themselves, many sharing the personal fulfillment and inspiration they have received from helping ELs. Other mentors described their own personal growth (e.g., developing leadership skills, overcoming imposter syndrome) and learning because of the program, as well as a feeling of connectedness and increased awareness of the cultures and realities outside of U.S. borders.

A few long-time mentors shared that sufficient positive recognition for mentor participation is lacking, and while this impacts their participation minimally, as they are not participating for the purpose of receiving recognition, this may factor into the decision of new mentors to continue their participation after their initial year.

Of the few that only mentored for a short time and were willing to speak with the ET, life changes such as job changes, moving outside of the Bay Area, and limited time were shared as reasons for attrition. The vast majority of mentors that served as a mentor for one year did not respond to the multiple requests to participate in the mentor survey or speak to the ET. This can most likely be attributed to a lack of personal investment in the program. The ET did not delve into this area further, as it was outside the scope of the evaluation; however, the ET recommends exploring this area further.

One long-time mentor described a large attrition of African-American mentors after one program year, recalling conflicts between white and African-American mentors and speculating about potential issues centered around race or recruitment. Additionally, the same long-time mentor

shared that differences in expectations related to culture and relationships among African American mentors and ELs from Africa may have been a potential factor impacting African American women's continued participation as mentors. Though anecdotal, this theme may warrant further exploration for future programming. Several mentors also mentioned not participating in the virtual TechWomen program due to the lack of interest in a model that was not face-to-face or general burnout with online meetings due to the remote environment caused by the COVID-19 pandemic.

> "I used to say it was the best and most fulfilling thing I did every year. The best use of your time and the greatest impact . . . was worth it because I had access to resources to help others."
> –Mentor

ADDITIONAL FINDINGS: CONCLUSIONS

The mentor-to-mentor network has had a significant impact on the success of the TechWomen program, with many mentors stating that their continued participation in the TechWomen program was heavily influenced by their relationships with other mentors. The TechWomen mentor-to-mentor network serves as an important support system for U.S.-based women working in STEM.

Co-mentoring, while not experienced by all mentors, has proven to be beneficial for both the mentors and the ELs, with some mentors sharing they would not be able to participate had it not been for the co-mentoring option. Mentors shared that the ability to share responsibility for mentoring with a colleague ultimately provided more opportunities for ELs to explore their area of interest and grow their network.

Mentor retention is an area that needs to be explored further, as the attrition rate is high. This is particularly worrying when combined with the fact that a small number of mentors who have been with the program for a long time are instrumental and central to the network itself. Along with mentor retention, diversity among mentors needs to be further explored in order to identify any issues that are having an impact on a mentor's decision to continue mentoring or end their participation as a mentor in the TechWomen program.

OVERARCHING CONCLUSIONS

Overall, TechWomen alumnae are both establishing and maintaining primarily informal (of a friendship nature) networks with TechWomen alumnae from their cohorts most commonly, but also within their countries (outside of their cohorts) and regions to some extent. Alumnae primarily build and maintain relationships within their cohort but collaborate with alumnae from the same country, with a few alumnae holding the collaborative network together. A higher level of communication in TechWomen networks (at the country, regional and global levels), primarily through social media, is aligned with increased collaboration and network engagement. At the country-level, impact projects strengthen cohort relationships, and TechWomen alumnae organically established and currently maintain informal and formal (professional) regional networks. Challenges to sustaining these networks at the country level include the level of embassy engagement, geographic distance between alumnae, lack of freedom of movement, interpersonal relationship challenges, and time commitments. Meetings spaces and funding support are common requests from alumnae for additional support.

Most alumnae are not starting new networks of STEM women, but those who do seek to either replicate the supportive community they experienced as ELs or to start chapters of existing STEM initiatives or formalize existing networks. More alumnae are plugging into existing networks of STEM women where they had connections prior to the TechWomen program. Apart from the TechAIM initiative in Kyrgyzstan, and a few other initiatives in other program countries, alumnae are rarely expanding their networks to other women in STEM fields in their home countries, possibly due to the size of these networks. Collaborations in these networks are loosely defined. TechWomen alumnae share their TechWomen experiences and personal journeys through a variety of forums including work and informal discussions, presentations, panels, and conferences, sometimes at the invitation of the embassy and other organizations, as well as through social media platforms and websites. Alumnae also provide direct support to new applicants even if they apply to the program multiple times. Alumnae have a strong intention to mentor others, influenced by their own mentorship experiences, and are overwhelmingly mentoring women and girls in their home countries, both formally and informally. Most of these mentorships are with women and girls in STEM fields, with TechGirls-TechWomen clubs showing a lot of potential.

Sustained contact between mentors and alumnae can be predicted to an extent from the personal bonds formed during the program itself, and since professional mentors spend the most time with ELs, this leads to stronger bonds in general though it does not predict the longevity or deepness of a relationship after the program. Professional and personal contact between mentors and ELs is dependent on a variety of factors, and in-person contact after the program is a key factor in maintaining relationships once the program is over. None of the few formal collaborations were linked to specific network or individual outcomes.

Less than one-third of survey respondents remain in contact with embassy staff. Alumnae engage with embassies most through a variety of social and STEM-related events and connect with the embassy to secure access to funding for projects. Alumnae participation in the broader embassy alumni network is dependent on how active embassies are with the network, as well as alumnae desire to be involved.

RECOMMENDATIONS

Based on the analysis of the data collected during the evaluation, the ET makes the following recommendations presented in order of priority (high to low) that the ET believes will lead to a stronger and more sustainable TechWomen network.

1. CONSIDER PROVIDING ADDITIONAL FUNDING AND SUPPORT FOR TECHWOMEN ALUMNAE

TechWomen alumnae return to their home countries highly motivated to both contribute to their communities and continue engaging with each other and the larger DoS alumnae network as time and resources allow. Provision of financial and other resources, as well as increased engagement and communication from the embassies would contribute to a more sustainable TechWomen network.

Financial Resources
Numerous alumnae, every embassy interviewed, and many other interviewed stakeholders asked for additional funding from DoS to be allocated to alumni grants for impact projects and to support alumnae programming. Alumnae specifically shared that funding in the form of travel grants so alumnae could get together to collaborate on projects in-country and within their regions, for meeting spaces, and for TechWomen alumnae to host workshops/seminars in their communities would allow them to have greater impacts in their countries and home communities.

The seed grants given to TechWomen country teams are not enough (both the number of grants given and the dollar amounts) for all the impact projects the women developed during the program and are capable of implementing upon their return. DoS should consider increasing the number of seeds grants and the dollar amount of these grants to enable implementation of more impact projects, which require less time and effort on the part of alumnae to do additional fundraising. While the ET did not collect information specific to the dollar amounts needed to implement projects, program records from IIE, as well as AEIF, granted to TechWomen alumnae may be sources of data to determine a potential increase to seed funding. Another source of information may be direct engagement with past alumnae specific to what was required to implement their impact projects.

Additionally, many of the alumnae need funding to implement large-scale STEM projects and other social change projects that they start in the years following their participation in TechWomen. This funding could potentially be provided by DoS.

Embassy Engagement
Many alumnae expressed a desire to be more engaged with the embassies in their home countries. Increased embassy engagement with the TechWomen alumnae in all program countries, with invitations to participate extended to all alumnae (rather than a select few) regardless of their current or previous participation in embassy events, would strengthen TechWomen alumnae/embassy relationships, and provide for additional opportunities for collaboration. Per discussions with alumnae, embassy staff currently reach out to alumnae (albeit inconsistently among alumnae) to request attendance at an event or participate in an

embassy-led workshop/panel/initiative. Alumnae generally reach out to embassy staff for funding and resource assistance. Both groups are reaching out to each other, but for different reasons. Providing advance notice of events is particularly key in engaging alumnae who do not live in capital cities.

2. CONSIDER PROVIDING SUPPORT FOR EXPANSION OF COUNTRY-LEVEL STEM NETWORKS TARGETING AREAS OUTSIDE OF THE CAPITAL

In many TechWomen countries, the STEM community, and opportunities to engage in STEM education and careers, are limited to capital or larger cities. DoS provision of financial or other support to TechWomen alumnae in program countries, specifically to implement projects in smaller towns and more rural areas where women and girls may be excluded from STEM networks, would allow for country-level STEM networks to be expanded significantly while providing opportunities for more women and girls to pursue careers in STEM. In each TechWomen country, alumnae who are already engaged in STEM networks may be best placed to identify specific areas (financial, technical, in-kind) of support that can best aid alumnae in their existing efforts to expand country-level networks.

TechAIM in Kyrgyzstan is a solid example of TechWomen alumnae expanding their country-level STEM network, mirroring the model of the global TechWomen program but on a country level. Particular to TechAIM is its focus on expanding the STEM network to women and girls who are living outside of Bishkek in the smaller cities and rural areas of Kyrgyzstan. By expanding the network into these areas, TechAIM is providing diverse opportunities (skill building, networking, educating women and girls about paths to entering into the STEM field, providing spaces to share and develop ideas) in STEM for women and girls who generally would not be able to participate due to their location.

3. EXPLORE MENTOR ATTRITION RATE AND PURSUE RETENTION OF HIGH-QUALITY MENTORS

The attrition rate for mentors is high and may be attributed to differences in expectations for the role of mentors and additional issues that may be causing mentors to end their participation after one year. The departure of high-quality mentors equates to a departure of high-quality and often high-level professional knowledge from the TechWomen program. A mentor's departure from the program may also affect other potential mentors' decisions regarding their participation in the program.

The ET recommends two ways to address mentor attrition. First, the TechWomen team should explore, in depth, the individual reasons for mentors ending their participation in the program. If resources are available, DoS may consider working with the TechWomen IP to conduct exit interviews with mentors annually, as well as sending out a short survey including questions about their desire to continue mentoring and any suggestions for improvement. Second, the TechWomen team should pursue opportunities for retention, including increasing the type and frequency of recognition for mentors. Mentors suggested types of recognition such as certificates of participation/appreciation for not only their mentorship contribution, but for attending delegation trips. Another mentor suggested developing awards for mentors who have been engaged for many years (i.e., a "founder's award") and/or have gone above and beyond.

4. UTILIZE AN EQUITY-BASED APPROACH TO DELEGATION TRIPS

Given both the feedback about access to delegation trips for alumnae and mentors, and the importance of connecting in person to sustaining relationships in the network, the ET recommends three actions to integrate an equity-based approach.

Review delegation trip selection criteria and practices. The TechWomen team should use a more equity-based approach when selecting mentors for participation in delegation trips, focusing on allowing a greater percentage of mentors to attend trips, and considering providing financial resources to those not sponsored by their companies. This will allow for more diversity in the delegations and enable more mentors to lend their expertise in the program countries.

Develop a playbook for planning and hosting delegation trips. The TechWomen team might consider developing a step-by-step guide to host delegation trips, based on the learnings from past trips. Delegation trips could be organized, hosted, and promoted by the U.S. embassies in collaboration with TechWomen alumnae groups based on a "playbook" or guide for planning and hosting delegation trips. This playbook would include the steps to organize a trip, ideas for activities, troubleshooting for travel issues, and any best practices and lessons learned. The playbook could be developed by mentors and alumnae who were part of 16 official and an unknown number of unofficial delegation trips over the years. Having a guide would support alumnae in planning delegation trips, giving greater access to this event, and allow alumnae in more program countries to reap the benefits of the delegation trips in their home countries while providing opportunities for more mentors to participate. TechWomen could implement this together with DoS.

Consider providing financial support to alumnae to attend delegation trips. DoS could provide financial support for alumnae to attend delegation trips in their home countries and other program countries. This would enable alumnae to participate more fully in delegation trip activities in their home countries and enable alumnae to further solidify their relationships with other alumnae around the world.

5. INCREASE VIRTUAL OPPORTUNITIES/PROGRAMMING

The shift to an online environment during the COVID-19 pandemic has highlighted the uncountable possibilities for virtual programming that would further strengthen the TechWomen program. The benefits of increased virtual programming include but are not limited to:

- Allowing for mentors/alumnae to establish relationships and discuss expectations early in the mentoring relationship;
- Providing opportunities for alumnae and mentors to attend forums, online workshops, discussions, and networking opportunities throughout the program; and
- Allowing for larger events to be hosted, with time allocated for smaller breakout groups or one-on-one meetings to help establish one-on-one relationships.

The ET recommends that the TechWomen team increase the level of virtual programming and consider providing additional opportunities for virtual participation, even after the COVID-19 pandemic no longer affects the program's implementation. This also aligns with suggestions

from mentors for a more structured way to interact with alumnae after the program is over to maintain relationships with alumnae.

Some examples of virtual programming opportunities to consider post-program as suggested by individual mentors are:

- Using virtual forums to create alumnae affinity groups by professional area,
- Identifying specific points of engagement or follow-up in alumnae professional activities or impact projects, and creating an online space for mentors and alumnae to engage with each other, and
- Annual or biannual forums online or in person to connect mentors and alumnae.

Potential challenges to implement this recommendation may include EL/alumnae access to and quality of internet connections, as well as mentor preference for in-person experiences and mentor burnout with virtual platforms.

ANNEXES

ANNEX A. SOCIAL NETWORK ANALYSIS AND SURVEY RESULTS

To help understand the networks built among TechWomen mentors and alumnae, two surveys were employed: one targeting mentors and the other alumnae. The primary goal of the social network surveys was to ascertain the social networks built as a result of the TechWomen program. A social network is made up of individual actors that are tied together by certain kinds of relationships. Social network analysis helps to identify the structure of a "network" of actors, the quality of relationships among them, and the number of ties to others. Participants were asked to name those alumnae and mentors with whom they maintained a relationship or engaged in collaborative activity. From these data, network graphs can be visualized, showing individuals as dots or "nodes" and the relationships among them represented by lines. Each node is placed in the graph based on the number of connections to similar others—meaning, the closer a node is in a graph, the more relationships they have in common. Similarly, the nodes with more lines connecting them represent alumnae or mentors who are more connected to others in the network.

MENTOR SURVEY

A survey to assess mentor's overall satisfaction and levels of engagement with the TechWomen program was designed and launched on the ONASurveys platform in late March 2021. After several reminders, the mentor survey was closed after five weeks, in late April 2021. The primary goal of this survey was to ascertain the social networks that mentors built with both alumnae and other mentors as a result of their engagement with the TechWomen program.

SAMPLE CHARACTERISTICS

Respondents by participating year
2011 = 9
2012 = 18
2013 = 33
2014 = 45
2015 = 47
2016 = 59
2017 = 75
2018 = 86
2019 = 95

Of the 808 mentors with viable email addresses, a total of 156 responded to the survey for a response rate of about 19 percent. Fifty-eight percent of the respondents who received an email invitation to participate did not open the survey link. In terms of age, 37 participating mentors identified as 25-34, 40 as 35-44, 42 as 45-54, and 29 as between 55-64 years of age. Four identified as 65+ and four chose not to respond. One hundred and fifty mentors identified as female, four as male, and one as non-binary. One chose not to respond. The table to the right lists the year(s) in which responding mentors participated in the TechWomen program. Sixty-two of the respondents had only participated in one year of mentoring, followed by 20 at two

years. Six mentors had participated all nine years of the TechWomen Program. The average years of participation was close to three (M = 2.99, *SD* = 2.41). Thirteen mentors had participated in a total of 20 delegation trips.

When asked to estimate the numbers of women they had mentored, responses ranged from 1 to 100, with an average of 9.97 mentees (SD = 14.32) and a mode of 2. One hundred and four identified themselves as having co-mentored a mentee.

OVERALL MENTOR-MENTEE SATISFACTION

Participating mentors were asked to respond to a series of questions measuring their overall satisfaction with the relationships they built with their mentees. Answers ranged from Strongly Disagree (1) to Strongly Agree (7). Six items were combined to measure overall mentor satisfaction with their mentee relationships (a = .84). On average, mentors were moderately satisfied with their mentee relationships (*M* = 5.66, SD = .85), with a mode value of 6.17. See Figure 11 to note the overall positive distribution of responses. Reponses to overall relationship satisfaction were positively skewed, meaning that most mentors had a good overall relationship with their mentees.

Interestingly, the amount of time spent as a mentor in years was not significantly correlated with overall mentor satisfaction, **meaning that long-time mentors were no more likely to be more satisfied in their relationships with mentees than those mentors who only participated for a year or two.** Intuitively, long time mentors were more likely have a higher number of mentee contacts.

**Figure 11: Distribution of Mentor Satisfaction Scores**
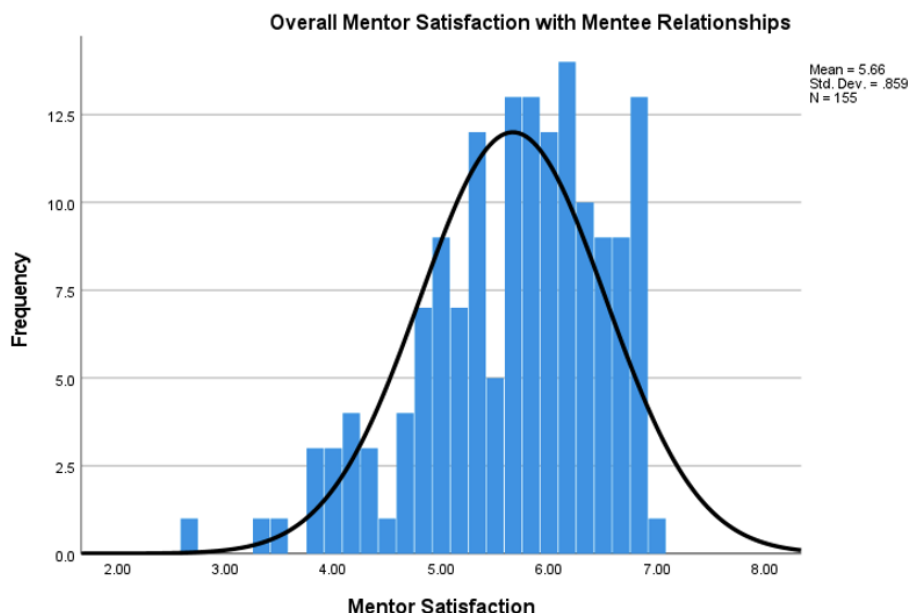
SOCIAL NETWORK ANALYSIS

After answering demographic and overall satisfaction questions, mentors were presented with a list of TechWomen alumnae and asked to identify any alumnae whom they had mentored, provided advice or information. Once identified, mentors were asked follow-up questions about the nature of each relationship.

RELATIONSHIPS WITH ALUMNAE

According to the responding mentors, a total of 1488 relationships with alumnae were established, ranging from a few as one alumna, up to as many as 101 and 104. Mentors had an average of 10.78 ties to alumnae ($SD = 19.41$). The large standard deviation reflects the large number of alumnae noted as mentees by some respondents. In terms of how frequently they communicate with their mentees, most mentors only interact with their mentees about once a year (n = 272) or several times a year (n = 299), and very few are in close, frequent contact. Just over 44 percent of mentors are no longer in contact with their mentees at all.

Figure 12: Mentor-Alumnae Relationships
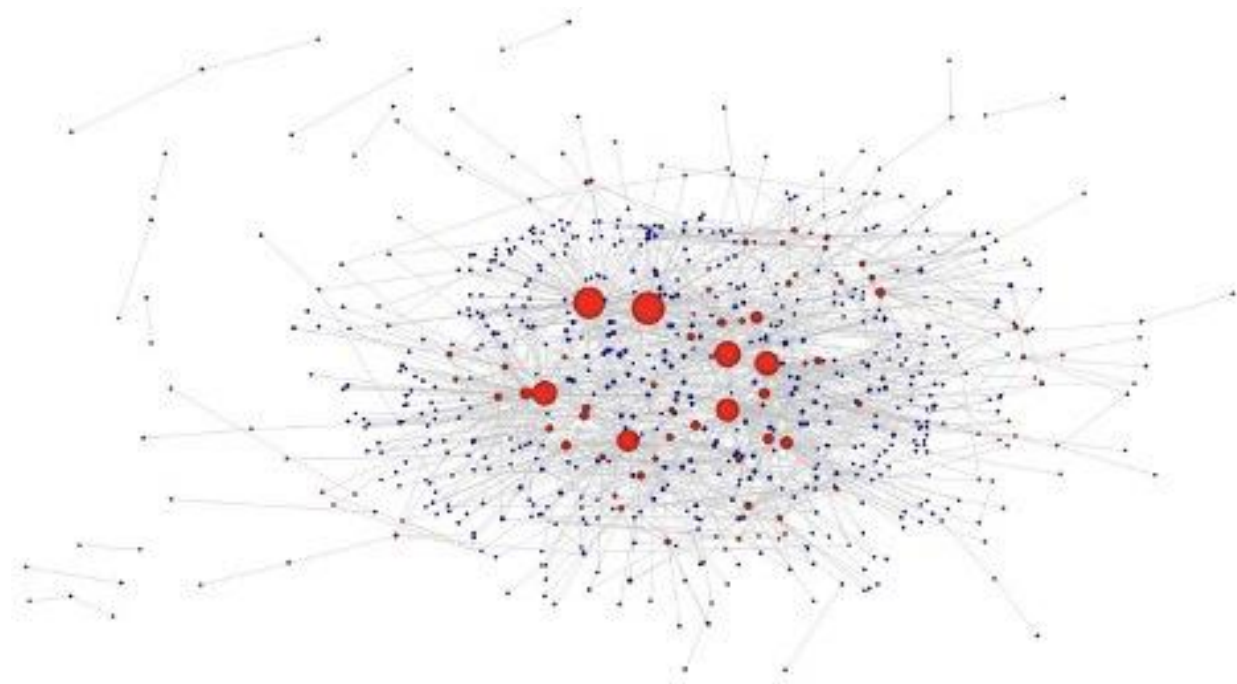
Note. Mentors are in red, alumnae in blue.

Figure 12 is a visual representation of the 1,498 ties established between the mentors (in red) and their identified mentee contacts (in blue). As seen in the center of the plot, a handful of mentors, most of whom have participated in several program years, "hold together" the network with a large number of ties. The majority of mentors (typically only involved for a year or two), however, have far fewer ties and exist at the periphery of the plot.

As a way to gauge the overall strength of the relationship between mentors and mentees, respondents were asked to describe "how close" they felt to each identified contact on a 7-point scale. In sum, mentors felt moderately close to their alumnae contacts ($M = 4.82$, $SD = 1.66$). Mentors were likewise asked to rate, on a 7-point scale, how effective they believed their

relationships with each identified mentee to be, how satisfied they were with each relationship, and the extent to which they believed both parties benefitted from the relationship. They thought their mentoring relationships with alumnae were moderately effective ($M = 5.75$, $SD = 1.23$), were moderately satisfied with the relationships they developed ($M = 5.83$, $SD = 1.27$), felt that both benefited from the relationship ($M = 5.97$, $SD = 1.17$) and that they had been effectively utilized as a mentor ($M = 5.82$, $SD = 1.27$). Overall, those mentors who gave higher scores on these measures were more likely to hold central positions in the network.

COLLABORATIONS

Mentors were also asked to identify any mentees with whom they had collaborated on a mutual project. Only 151 collaborative relationships were reported; this means that only 10 percent of the ties between mentors and alumnae resulted in a tangible collaboration. The bulk of these collaborative ties came from four mentors with high engagement in the program. As an example, one mentor (who had participated in the program for several years) listed 38 collaborations with alumnae. As seen in Figure 13, only seven mentors (in red) had four or more collaborations with TechWomen alumnae (in blue).

Figure 13: Collaborations between Mentors and Alumnae
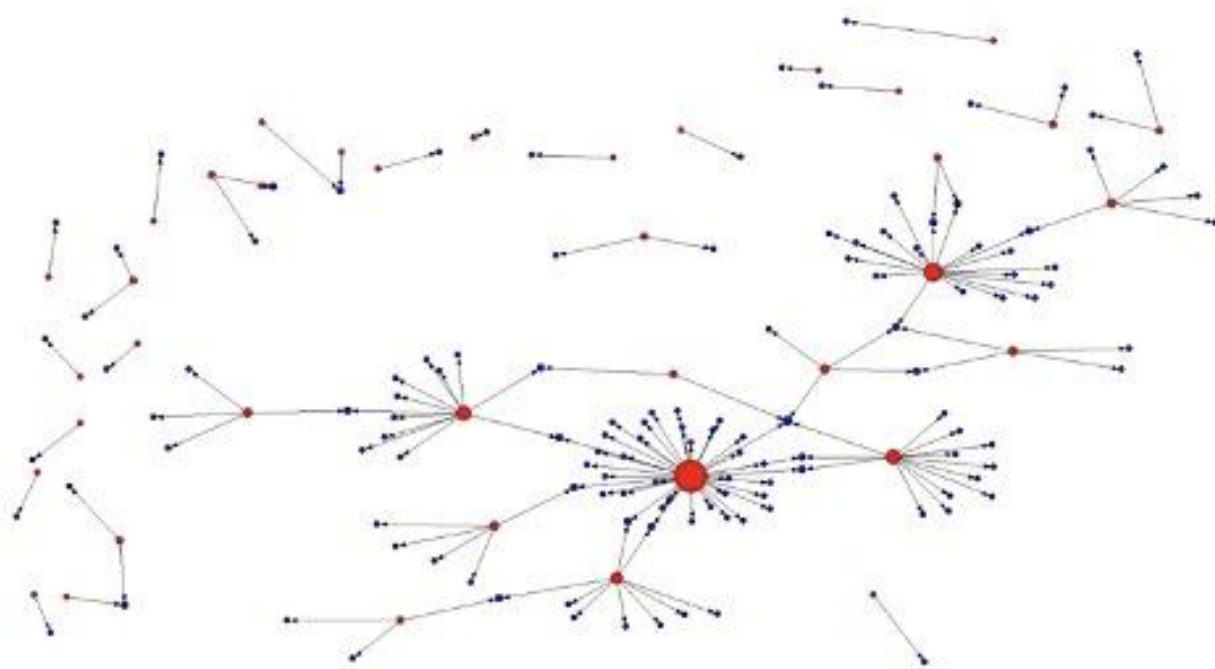
Note. Mentors are in red, alumnae in blue.

Most collaborations are maintained with low communication frequency, about once a year (n = 30) or several times a year (n = 32). Forty-three believed that this collaboration had been "very effective" in producing desired results, with a high mean ($M = 6.19$, $SD = .93$). Mentors felt moderately close to their alumnae collaborators ($M = 5.80$, $SD = 1.23$).

RELATIONSHIPS WITH OTHER MENTORS

Interestingly, 1,349 relationships were established between mentors, suggesting a larger than expected network of relationships among the mentors themselves. The range of ties among

mentors extended from just one tie up to 41 relationships with other mentors. An equally surprising 840 relationships among the mentors are characterized by mutual collaborations, meaning that 62 percent of reported ties among the mentors included a mutual collaboration. Participating mentors believed these collaborations to be highly effective in producing desired results (M = 6.04, SD = 1.19), and they felt moderately close to other mentors (M = 5.13, SD = 1.33).

Figure 14: Mentor-Mentor Collaborations
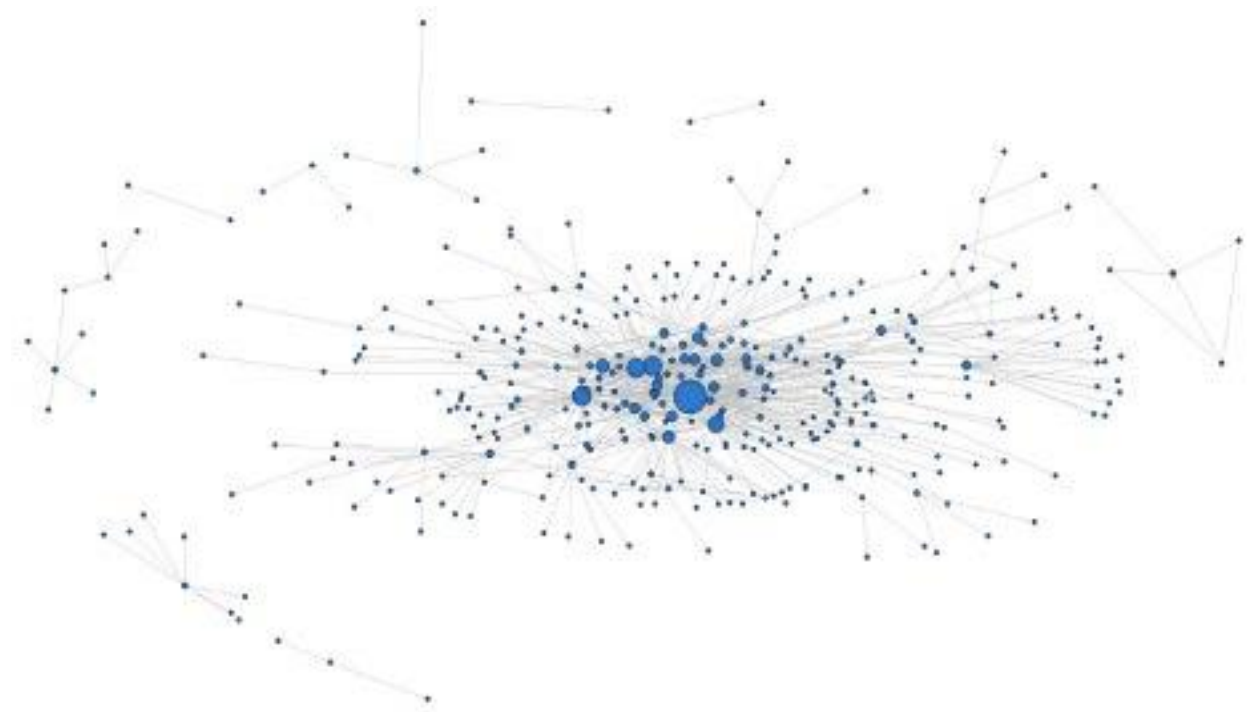
Figure 14 represents the 846 collaborations that occurred between mentors of the TechWomen program. Those mentors in the center of the plot, sized by the number of collaborations, tended to have participated in three or more years of the program. However, many of the mentors with high levels of collaboration with other mentors were also likely to be highly satisfied with their *mentee relationships.*

COMBINED DATASETS

Figure 15 represents a merging of the dataset from the Alumnae Survey in 2020 and the more recent mentor survey. When combining the two datasets together, the results show that—just from the responding mentors (in blue) and alumnae (in red)—that the TechWomen program created 11,085 relationships between (and among) mentors and alumnae.

Figure 15: Complete TechWomen Network
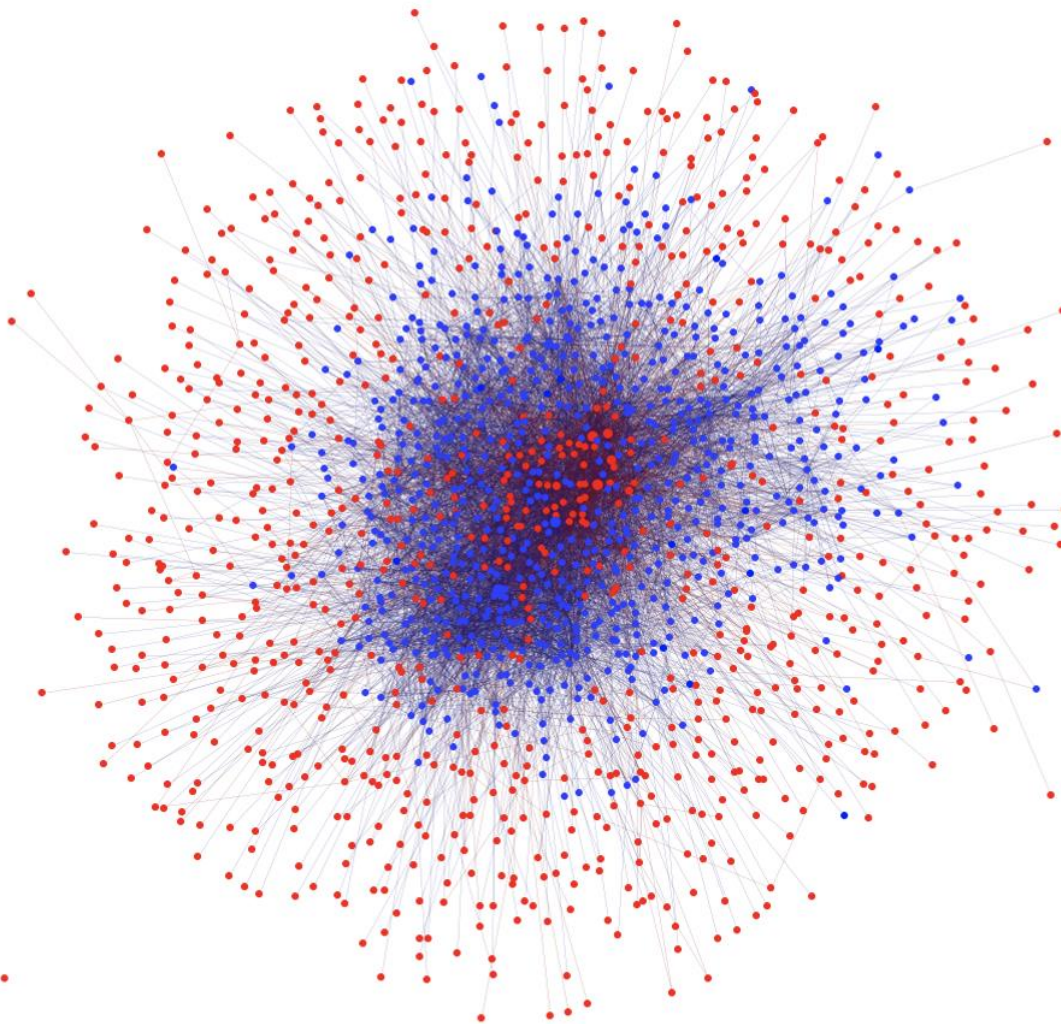
Note. Mentors are in red, alumnae in blue.

The overall network centralization of the TechWomen network is high, meaning that only a relative few actors (compared to the more than 1,600 actors in the network) hold a great number of ties in the center of the graph. This means that a select few mentors and alumnae were highly engaged in the program, with a great number of ties, while most had far fewer ties.

EVALUATION REPORT: TECHWOMEN

Respondents by Cohort year
2011 = 9
2012 = 13
2013 = 28
2014 = 22
2015 = 45
2016 = 41
2017 = 65
2018 = 69
2019 = 90

In total, there were 1,888 Nodes in the TechWomen network, inclusive of the 722 alumnae, 946 mentors, and an additional 220 nodes identified by the respondents as other professional contacts or relations with embassy staff. To be clear, just because a node was included in the study does not mean that they had ties with other actors. Indeed, only 1,468 of the total 1,888 nodes were cited in the alumnae survey as having a tie with the respondents. In all, the results of the alumnae survey show a total of 8,193 ties were established by the TechWomen program.

There are two kinds of ties: incoming and outgoing. The number of outgoing ties is also called out-degree centrality and represents the number of ties an actor says they have a relationship with another node in the network. In-degree centrality is the cumulative number of ties other nodes say they have with a focal node. The range of degree centrality scores (numbers of outgoing ties) was three to 211. Meaning, at minimum, TechWomen alumnae said they built three notable ties all the way to 211 relationships at maximum, with an average of 31.8 ties per alumnae. The in-degree centrality scores (number of incoming ties) ranged from 1 to 84, with an average of 8.11 ties per alumnae.

Responses by Country			
Algeria = 26	Kyrgyzstan = 18	Palestinian Territories = 24	Turkmenistan = 12
Cameroon = 19	Lebanon = 21	Rwanda = 20	Uzbekistan = 13
Egypt = 20	Libya = 5	Sierra Leone = 18	Yemen = 5
Jordan = 14	Morocco = 17	South Africa = 15	Zimbabwe = 25
Kazakhstan = 13	Nigeria = 25	Tajikistan = 18	
Kenya = 23	Pakistan = 13	Tunisia = 18	Total = 382

RELATIONSHIPS AMONG ALUMNAE
According to the alumnae survey and resulting SNA, TechWomen alumnae are establishing and maintaining networks with other TechWomen alumnae universally. In sum, **4,349 relationships were built among the responding alumnae.** Figure 16 represents the relationships participants identified with other alumnae and are colored by year. There is a dense clustering of relationships among the 2019 cohort, as are the cohorts of 2018 and 2017—though they are noticeably less dense. Indeed, the 2018 and 2017 cohorts are better connected to the previous

cohort years than 2019. There is no contact among the earliest cohorts of 2011 and 2012 and the 2018 and 2019 cohorts. No discernable patterns of relationships among alumnae by nation could be determined.

Figure 16: All Relationships among TechWomen Alumnae
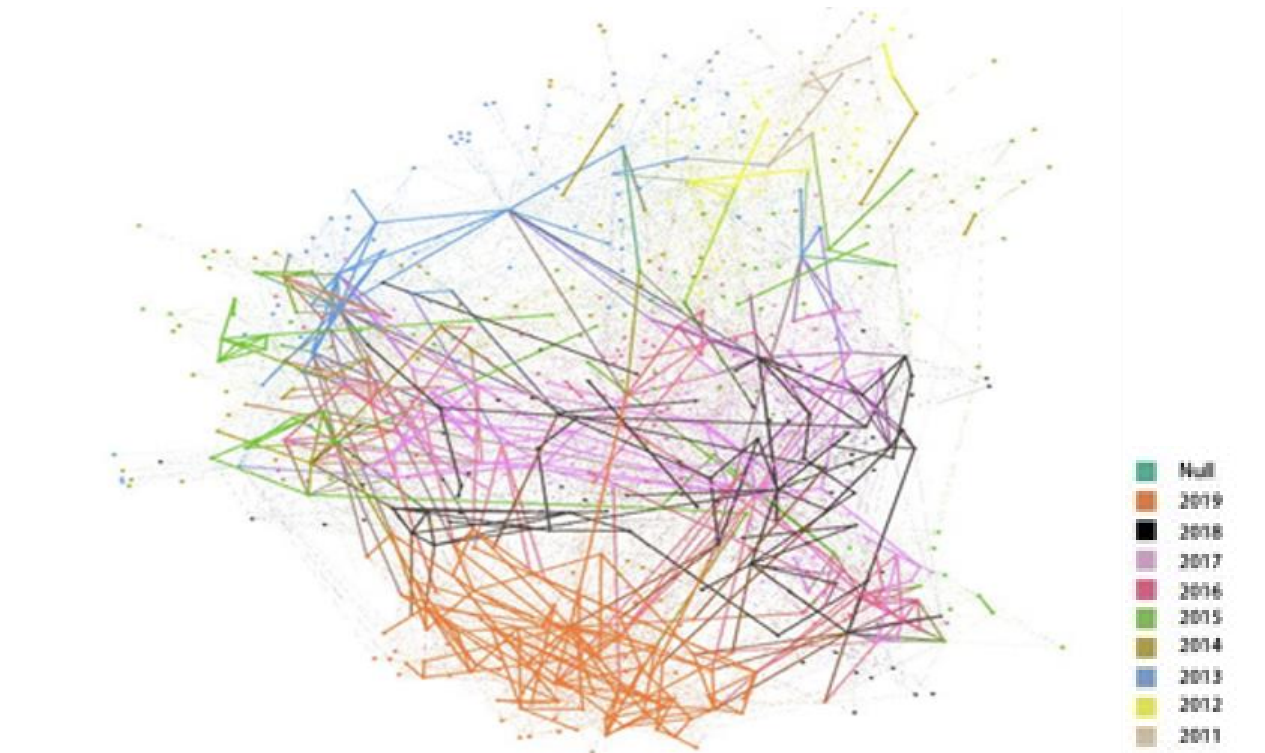
Alumnae were asked about the extent to which they felt the relationships they built during the TechWomen program were as strong now as they were during the program. Across the sample, relationships were described as moderately strong. No significant difference in perceived relationship strength could be found across nations nor across program year, meaning the quality of relationships did not vary significantly by nation or cohort.

To further assess the extent to which alumnae were likely to build relationships with those from their own cohort year or nation, the network was examined using the E-I index—a measure that compares the numbers of ties within groups (such as a nation or cohort year) and between groups. The index ranges from -1 (all ties are internal to the group) to +1 (all ties are external to the group). The overall E-I index for the alumnae relationships by nation is .64, indicating a sizeable propensity to build ties with others from outside their own nation.

The E-I index can also be used to examine particular subgroups in networks, in this case nations and cohort years. Individual E-I indices by nation revealed that those nations particularly likely to build external ties are Egypt, Morocco, Yemen, Libya, South Africa, Kazakhstan, Turkmenistan and Pakistan. When examining the network by cohort year, however, the E-I index is .23, exhibiting only a modest propensity to build ties outside of the cohort group. The individual E-I indices for 2019 and 2018 are negative (-0.46 and -0.12, respectively), indicating a

propensity to build ties within the cohort year. The years 2014 and 2012 have larger positive scores (0.76 and 0.54, respectively), meaning they build ties from without their cohort year. Finally, human relationships are stronger when they are reciprocated—that is, when both parties agree they have a tie to one another (A says B is a partner, and B says A is a partner). Reciprocal relationships are more likely to be strong and result in outcomes like collaboration. When accounting for reciprocal relationships, **the TechWomen program created 1,190 reciprocal relationships among the responding Alumnae.**

Finally, the greater the degree centrality (i.e., the more ties alumnae built) the more likely they were to believe their career was successful, and the more likely they desired to mentor others in the future, and the stronger their self-efficacy.

COLLABORATIONS AMONG ALUMNAE

The patterns of relationships built by the program changes when considering actual collaborations. The participants were asked to identify those alumnae with whom they have collaborated on a mutual project or initiative. Unlike the above networks, the relationships of collaborations primarily take shape among alumnae of the same nation, rather than cohort year. Indeed, visual inspection of Figure 17 suggests collaborative clusters are almost entirely composed of alumnae of the same nationality, and the collaborative network is held together by only a few alumnae who perform a bridging function—holding together this sparsely interconnected network. Neither the year nor nation predicted the likelihood of fulfilling these bridging functions.

Figure 17: Collaborations among TechWomen Alumnae
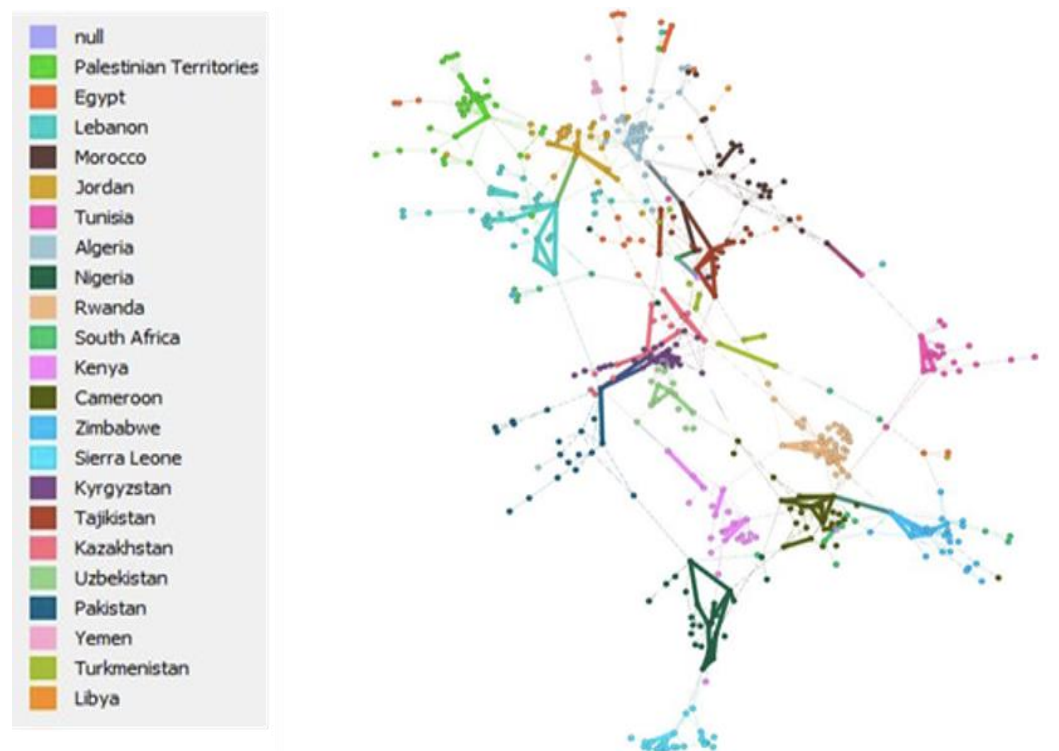
The number of collaborative ties with other alumnae ranged from one to 33, with an average of 2.88 collaborations per alumnae. In sum, 433 alumnae are involved in collaborative relationships for a total of 1,132 collaborative ties. Some of the most collaborative individuals include a 2013 alumna from Rwanda, a 2017 alumna from Algeria, and a 2017 alumna from Kyrgyzstan.

The E-I index for the overall collaboration graph by nation is 0.003, indicating a slight tendency toward building ties within nation. Indeed, all the nations had negative E-I indices, save Jordan (0.14), Morocco (0.20), Tunisia (0.02), Cameroon (0.03), which had mild positive tendencies toward external tie building, and South Africa (0.43), which had stronger positive scores. Some of the most collaborative individuals include a 2013 alumna from Rwanda, a 2017 alumna from Algeria, and a 2017 alumna from Kyrgyzstan.

Visual inspection of the graphs illustrates South Africa's more interconnected collaborative relationships. Also noticeable on visual inspection is a loose clustering by region. For example, the top part of the graph includes loosely interconnected clusters of alumnae from the Palestinian Territories, Egypt, Lebanon, and Jordan, among others. At the bottom of the graph are collaborations among alumnae from African nations like Zimbabwe, Sierra Leone, Cameroon, Kenya, and Rwanda.

Frequency of communication and collaboration efficacy were highly correlated, meaning the more frequent communications between alumnae, the more often they collaborated and with better results. The collaboration ties are superimposed over a world map in Figure 18.

Figure 18: Geographic Representation of Collaborations among Alumnae

EVALUATION REPORT: TECHWOMEN

Visual inspection of this map shows the diversity of South African alumnae's collaborations, and the strong collaborative ties between North African countries and those in Central Asia.

Participants were asked to identify how frequently they communicated with their collaborative partners and reflect on the efficacy of those collaborations. Frequency of communication and efficacy were highly correlated, meaning the more frequent communications between alumnae, the more often they collaborated.

There are also significant differences in the mean number of collaborative ties by year. One-way analysis of variance test reveals a significant difference between the 2013 and 2019 cohort in number of collaborative ties built. What this test implies is that 2013 was a particularly productive year in terms of producing collaborative ties among alumnae, as can be seen in Figures 19 and 20.

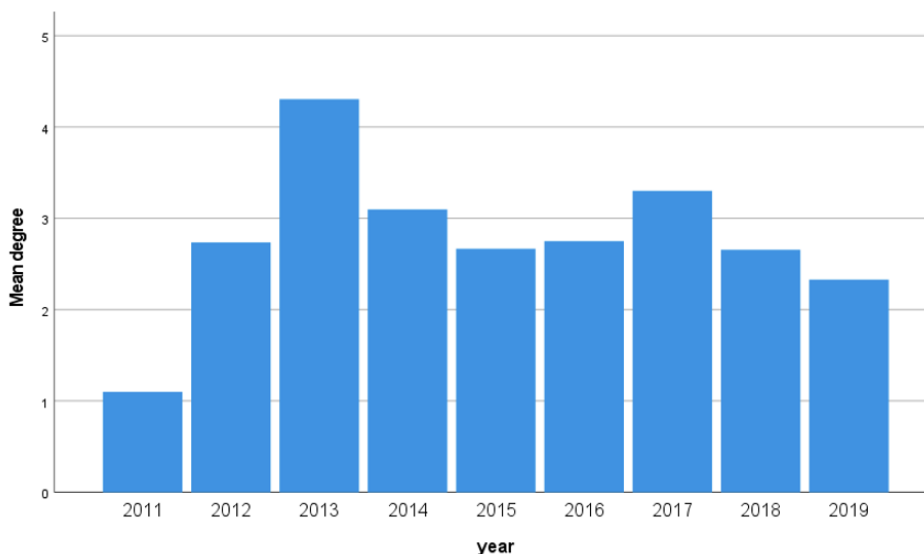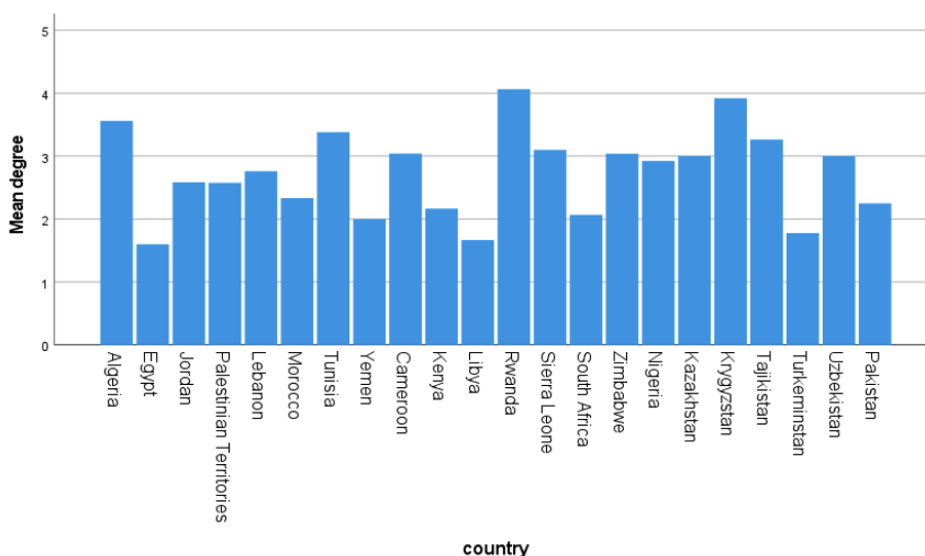**Figure 19: Collaborative Ties by Year**

Figure 20: Collaborative Ties by Nation

FRIENDSHIPS AMONG ALUMNAE

In addition to naming professional contacts, participants were further asked about friends they had made from the TechWomen program. When people consider themselves to be friends, relationships are more likely to be long-lasting and support mutual activities and exchange. In all, 1,697 friendly ties were created, and 601 alumnae had made at least one friend, with an average of 4.8 friends per alumnae.

As can be discerned from Figure 21, some friendships are oriented around cohort years, with a particularly dense friendship network among the 2019 cohort.

Further examination by year suggests that alumnae from 2019 are all more likely to build friendships within their cohort. As the years recede, friendships become more diverse and less dense. The data for the friendship network indicates a modest likelihood for alumnae to build friendships within their own nation overall. In looking at specific nations, Morocco, Tunisia, Libya, South Africa, and Pakistan are statistically more likely to build friendships outside their home nation, while Yemen, Cameroon, Rwanda, Zimbabwe, and Kyrgyzstan are more likely have friends within their own nation. The thickness of the lines represents the frequency of communication between two alumnae. As can be seen, the 2019 cohort is more likely to be in close and frequent contact with their friends. Further examination of this network shows that the E-I score for the overall friendship network by year indicates only a small propensity for tie building outside cohort year—a negligible .02. Alumnae from 2019 (-.64), 2018 (-.30), and 2017 (-.11) are all more likely to build friendships within their cohort. **As the years recede, friendships become more diverse and less dense.**

Figure 21: Friendships among Alumnae

Participants were asked to identify if they remained in contact with embassy staff after the program. A total of 109 alumnae said they remained in contact with embassy staff, identifying a total of 175 embassy contacts.

Figure 22: Alumnae Contacts with Embassy Staff
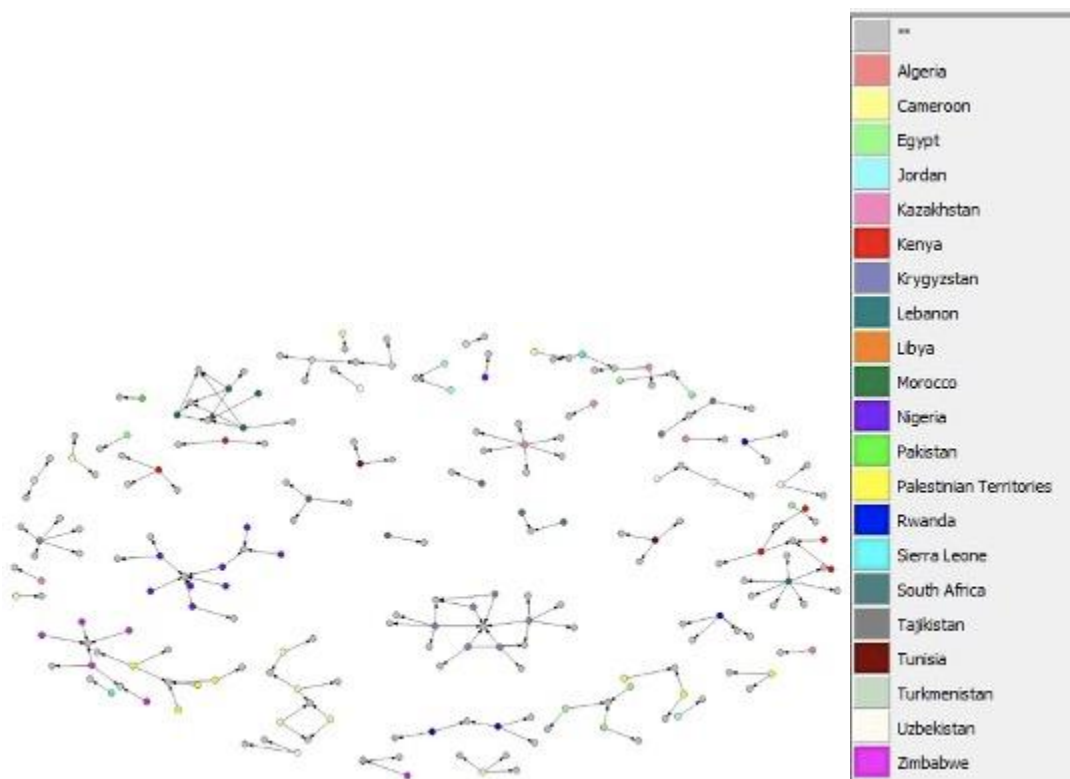
As seen in Figure 22, the embassy contacts identified by alumnae were often unique to each respondent. When there are overlaps in embassy contacts, these embassy contacts often seem to be shared by Alumnae from the same nation. Notice, for example, the embassy contacts shared by alumnae from Kyrgyzstan (in light purple) and Nigeria (dark purple).

MENTOR RELATIONSHIPS

According to the alumnae survey a total of 2,293 mentoring relationships were built among the fellows and the mentors. A range of one to 88 undirected ties were built among 917 individuals. The 382 respondents had ties with 535 mentors. An average of 4.99 relationships per individual in this network. At most, a fellow had 60 outgoing ties to mentors (Morocco, 2019), followed by 52 (Egypt, 2012), and 36 (Rwanda, 2013), with an average of 6.85 per alumnae. The highest number of incoming ties any particular mentor received was 81, with an average of 3.93 mentees.

Figure 23: Alumnae to Mentor Relationships
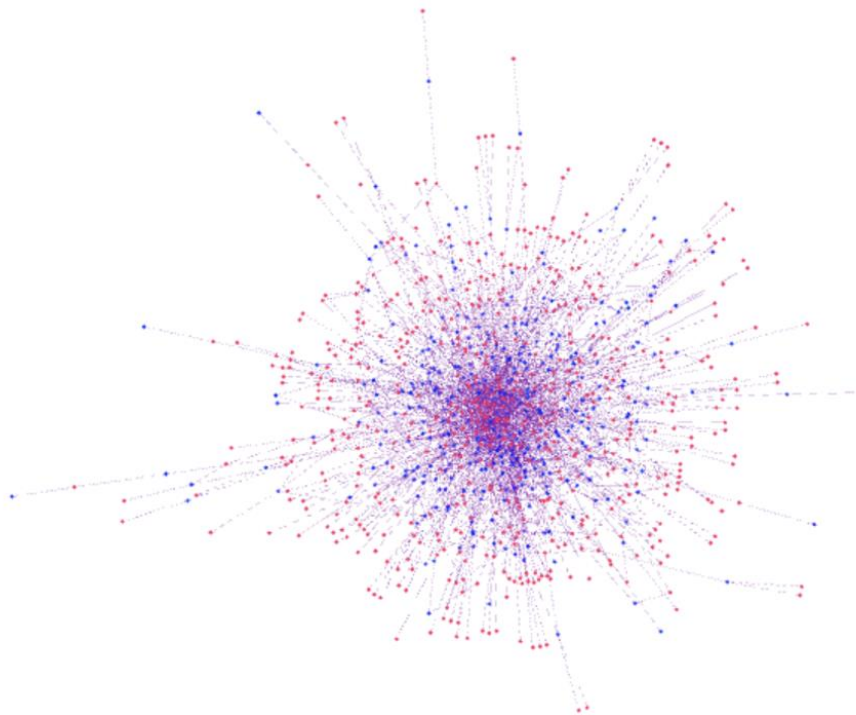
Figure 23 represents the alumnae-mentor relationships that were established, with the mentors in blue and alumnae in red. The network shows that some mentors were highly connected, leading to the creation of a "star" network, with highly connected mentors in the middle, and more loosely involved mentors at the periphery. **The fact that many alumnae are also clustered in the middle of the network shows that some mentors were connected to many of the same alumnae, and vice versa.** However, less than a third of all mentor relationships can be described as being in the "core" of the network--the central, dense part of the graph. This means that while some alumnae and mentors are densely interconnected, most had looser, more infrequent contacts with mentors.

Figure 24 is a zoomed-in snapshot of the dense core of this large network. The nodes are sized by degree centrality, or the number of relationships they hold in the network. The figure illustrates how tightly interconnected the inner core is compared to the periphery of the network in which alumnae are more loosely tied to mentors.

Figure 24: Alumnae to Mentor Relationships (Detail)
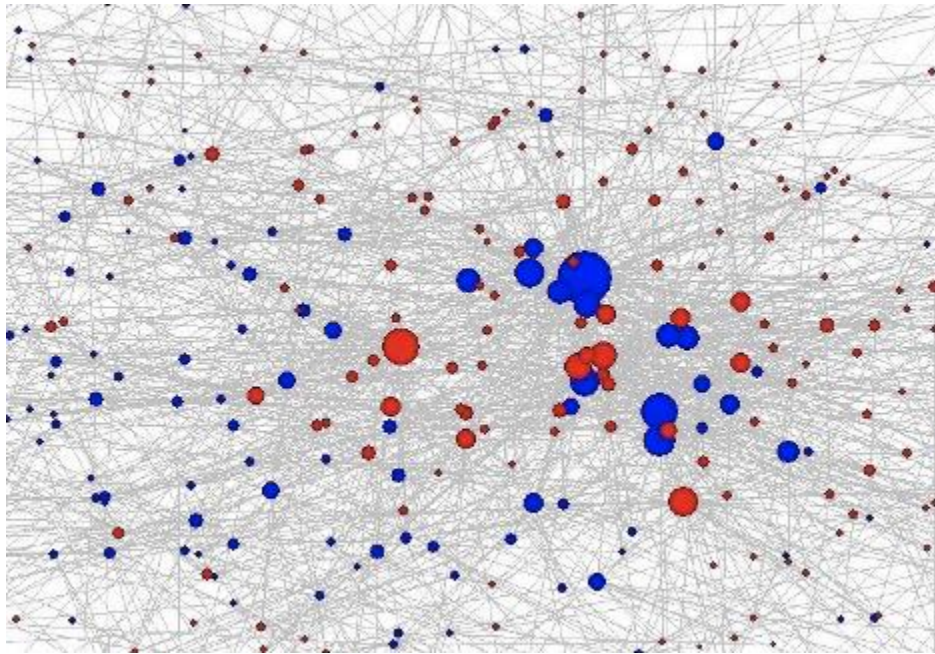
Figure 25 zooms in even further to show the ties by the mentor and alumnae with the highest degree centralities. Even when only accounting for these two actors, the total network of overlapping ties is 461 relationships between alumnae and mentors, or just over 20 percent of the total alumnae to mentor ties. Once again, this illustrates how tightly concentrated the center of the network is, and points to the looseness of the larger network structure.

Figure 25: Alumnae to Mentor Relationships (Further Detail)
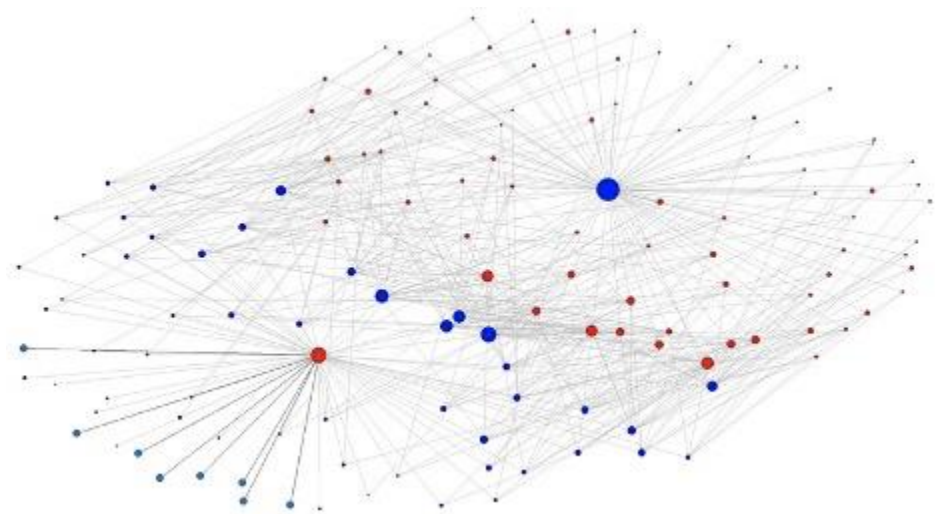
Seven items measured alumnae's perceived satisfaction with their mentors. These seven items were highly interrelated and combined into one index of mentor efficacy ($M = 5.24$, a $= 0.90$). The more frequent an alumnae communicated with their mentor, the more likely they were to be satisfied with their mentor. Participants were also asked if they had collaborated with their mentor on a mutual project *after* the conclusion of the TechWomen fellowship. In total, 385 collaborative ties between mentors and mentees were established.

RECIPROCAL RELATIONSHIPS

Human relationships are stronger when they are reciprocated—that is, when both parties agree they have a tie to one another (A says B is a partner, and B says A is a partner). When accounting for reciprocal relationships, the TechWomen program created 1,190 reciprocal relationships among the responding alumnae.

 However, as the purpose of the TechWomen was to build long-lasting networks of support, the network can be examined further in this regard to account for what are called Simmelian ties. The definition of Simmelian ties is ties that are reciprocated and reciprocally connected to at least one third person. Simmelian ties are also called "sticky ties" in that these sorts of relationships tend to stick, be robust, and last longer.

Figure 26: Simmelian Ties by Nation
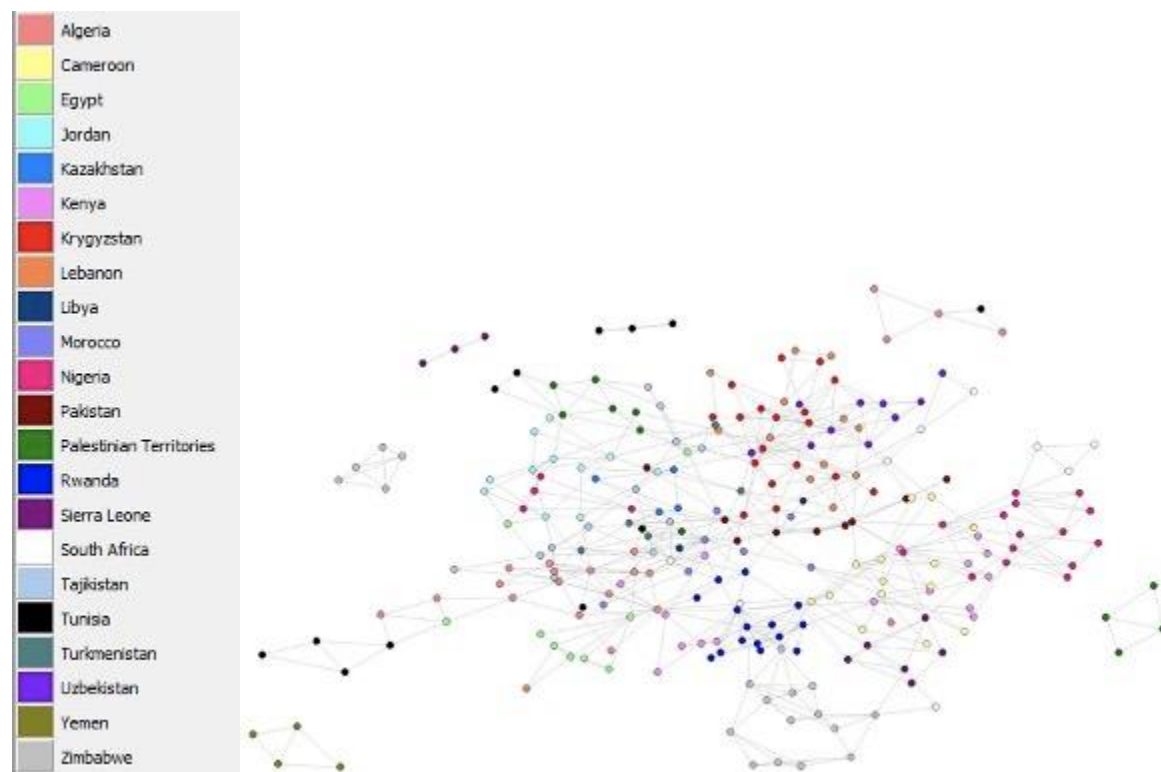
Figure 27: Simmelian Ties by Year
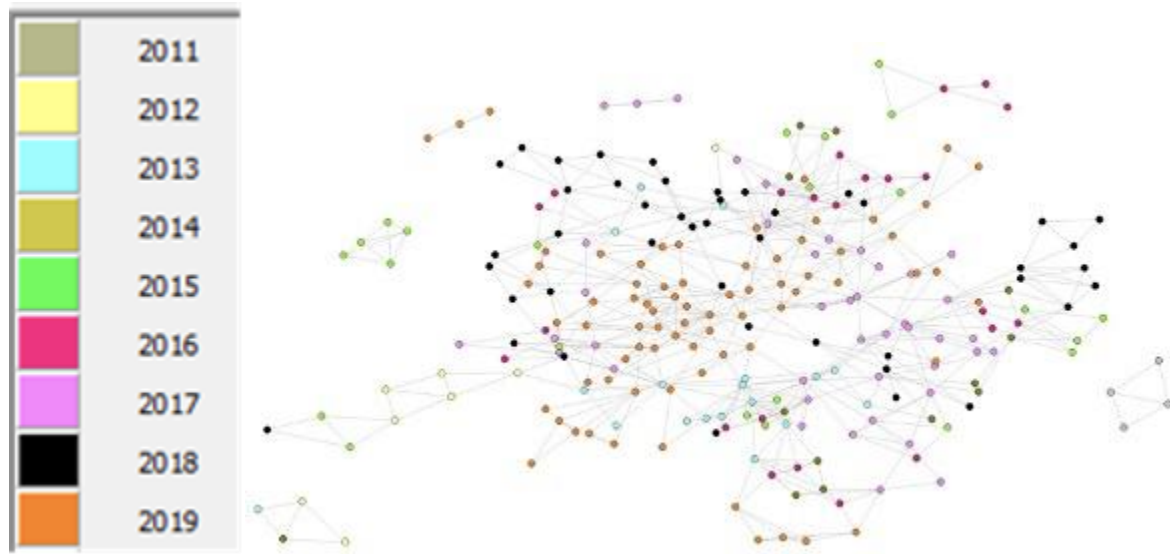
From the examination of Figures 26 and 27 of relationships by nation and year, it is clear that most Simmelian ties occur among alumnae of the same cohort, particularly 2019.

Kinds of support. Participants were asked to identify the kind of support they had received from others identified in the "most valuable relationships," "mentor relationships" and "relationships with embassies" questions. Of the various kinds of support surveyed, emotional support at 9.1 percent (n = 1089), brainstorming ideas at 8.7 percent (n = 1036), expanding my network at 8.5 percent (n = 1010), financial assistance at 0.4 percent (n = 48), access to professional information at 11 percent (n = 1315), technical advice or assistance at 5.7 percent (n = 679).

ANNEX B. DETAILED METHODOLOGY

The ET used a mixed-method design including a document review, quantitative surveys, key informant interviews (KIIs), and focus group discussions (FGDs). Data from these methods was used to assess the strength of Alumnae and Mentor networks, to conduct social network analysis (SNA), and to develop country case studies as part of the evaluation findings. The ET's approach prioritized ECA's utilization of recommendations to maximize the reach and impact of the TechWomen program. The ET conducted remote KIIs and FGDs in Washington, D.C., Silicon Valley/the Bay Area, and in nine countries. In total, fieldwork occurred for 24 weeks.

DATA COLLECTION

DOCUMENT REVIEW
To better understand the programmatic context and inform the evaluation design, the ET reviewed relevant program documents and data (e.g., program Alumnae list, Mentor list, past program reports, prior monitoring and evaluation (M&E) materials, data from previous surveys) identified in coordination with ECA and IIE staff. The ET organized its review findings by EQ and identified gaps to be filled through other data collection methods.

A complete list of documents reviewed can be found in Annex E.

CONSULTATIVE INTERVIEWS
The ET conducted initial consultative interviews with ECA staff and IIE TechWomen staff separately in order to help inform the evaluation design report and data collection tools.

KEY INFORMANT INTERVIEWS AND FOCUS GROUP DISCUSSIONS
In fall 2020, KIIs and FGDs were conducted with TechWomen alumnae U.S. embassy officials overseas, current and former representatives from the TechWomen IP Institute of International Education, current and former ECA representatives, and with representatives from the TechGirls implementer Legacy International.

Figure 28: TechWomen Cohort Distributions, KIIs

Number of TechWomen Alumnae
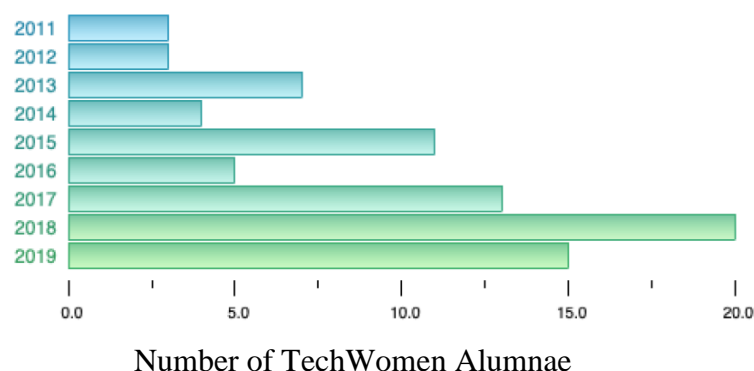
In winter and spring 2021, KIIs and FGDs were conducted with TechWomen Mentors, TechWomen alumnae from Algeria, TechGirls participants in six countries, a current ECA representative, a representative from the IP, and U.S. embassy officials overseas.

Figure 29: Mentor Years of Participation, KIIs

Number of Mentors
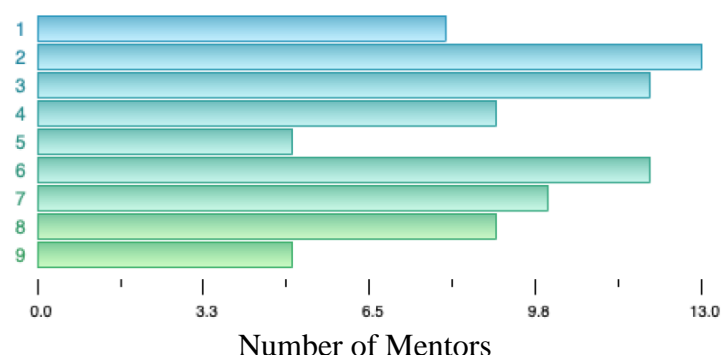
Table 1: Alumnae KII Participants

Country	Alumnae
Algeria	9
Jordan	9
Palestinian Territories	9
Kazakhstan	9
Tajikistan	10
Kyrgyzstan	8
Kenya	10
Rwanda	9
Zimbabwe	8
TOTAL	**81**

The ET conducted individual KIIs with 81 TechWomen alumnae from nine of the 22 program countries (see Table 1), currently living in 16 different countries, in order to explore the 'why and how' behind the alumnae survey results. KIIs were conducted using the *TechWomen KII Alumnae* tool and varied in length from 20 minutes to over 90 minutes, dependent on the availability of the TechWomen fellow and the strength of the fellow's mobile or internet connection. KIIs were conducted remotely via the Microsoft Teams platform, Zoom, or WhatsApp due to the COVID-19 global pandemic.

Verbal or written permission was granted for conversations to be recorded on iPhones or directly with the Otter transcription application. In cases where permission to record was not given, a second evaluation team member took notes during the conversation. To schedule KIIs, an evaluation team member reached out to all fellows via email who had expressed an interest in participating in a key informant interview.

Fellows in the Middle East and North Africa (MENA) were generally responsive to emails, while fellows in Central Asia and Sub-Saharan Africa were much less responsive to email. Fellows in Central Asia and Sub-Saharan Africa were highly responsive when contacted via

WhatsApp to schedule a KII and shared a preference for the KIIs to be conducted via WhatsApp audio due to unstable internet access, which posed a challenge for video calls via Microsoft Teams and Zoom. **Many fellows in Sub-Saharan Africa also expressed a preference for WhatsApp audio calls due to the high cost of internet access and lack of stable internet access in their home countries.** Fellows in the MENA region expressed a preference for video calls and experienced fewer problems with internet access and internet stability than the fellows in other regions.

After the KIIs were conducted, the ET reviewed the transcripts produced by Otter against the recordings for accuracy with minor edits made in cases where the speaker or the topic was unclear. Once transcripts and notes were reviewed and finalized, the ET uploaded them to Social Impact's secure SharePoint site for coding.

MENTOR PARTICIPANTS
The ET conducted individual KIIs with 82 TechWomen Mentors in order to explore the 'why and how' behind the mentor survey results. KIIs were conducted using the *TechWomen KII Mentor* tool and varied in length from 20 minutes to over 90 minutes, dependent on the availability of the TechWomen mentor. KIIs were conducted remotely via the Microsoft Teams platform, Zoom, or via mobile due to the COVID-19 global pandemic.

Verbal or written permission was granted for conversations to be recorded and or for notes to be taken by a second evaluation team member. To schedule KIIs, the ET reached out to all mentors via email who had expressed an interest in participating in a key informant interview, as well as to mentors who were recommended by other mentors for participation. Calendly was used as the primary platform for scheduling KIIs with mentors.

OTHER STAKEHOLDER PARTICIPANTS
KIIs were also conducted with the following stakeholders:

- Two U.S. Embassy Officials in Zimbabwe and Algeria;
- Two current ECA Monitoring and Evaluation Specialists and one current ECA official;
- Three previous ECA officials;
- Four current IP representatives from IIE;
- Three former IP representatives from IIE; and
- Two representatives from Legacy international.

Each KII lasted approximately 60 minutes and, with permission, was recorded and transcribed by Otter with the transcription uploaded to SI's SharePoint after being reviewed and finalized.

FOCUS GROUP DISCUSSIONS

Table 2: FGD Participants

Country	Alumnae
Algeria	2
Jordan	3
Palestinian Territories	0
Kazakhstan	2
Tajikistan	3
Kyrgyzstan	2
Kenya	5
Rwanda	3
Zimbabwe	8
TOTAL	**26**

The ET conducted focus group discussions in eight of nine data collection countries and in five of the nine cohorts (see Table 2). Focus group discussions were conducted via Microsoft Teams, Zoom, or WhatsApp, dependent on the preference given by the focus group participants and directly related to internet access and stability. FGDs were conducted using the *TechWomen FGD Alumnae* tool and lasted approximately 60 minutes in length, with some participants in attendance for the duration and others participating for shorter periods of time due to difficulties with internet access.

Participants granted verbal or written permission to record conversations on iPhones or directly with the Otter transcription application. In cases where permission to record was not given, a second evaluation team member took notes during the conversation. After the FGDs were conducted, transcripts produced by Otter were reviewed against the recordings for accuracy with minor edits made in cases where the speaker or the topic was unclear. Once transcripts and notes were reviewed and finalized, they were uploaded to Social Impact's SharePoint.

Focus group discussions were conducted with the following stakeholders: Seven FGDs with DoS Embassies in Tajikistan, Kyrgyzstan, Palestinian Territories, Jordan, Kazakhstan, Kenya, and Rwanda.

TECHGIRLS KIIS AND FOCUS GROUP DISCUSSIONS
The ET conducted KIIs and focus group discussions in six countries where there are TechGirls Clubs: Palestinian Territories, Jordan, Algeria, Kyrgyzstan, Kazakhstan, and Tajikistan. KIIs and focus group discussions were conducted via Microsoft Teams or Zoom, dependent on the preference given by the focus group participants and directly related to internet access and stability. FGDs were conducted using the *TechGirls Focus Discussion* tool and lasted approximately 60 minutes in length, with some participants in attendance for the duration and others participating for shorter periods of time due to difficulties with internet access.

Participants granted verbal or written permission to record conversations on iPhones or directly with the Otter transcription application. In cases where permission to record was not given, a second evaluation team member took notes during the conversation. After the FGDs were conducted, transcripts produced by Otter were reviewed against the recordings for accuracy with minor edits made in cases where the speaker or the topic was unclear. Once transcripts and notes were reviewed and finalized, they were uploaded to Social Impact's SharePoint.

SAMPLING
The ET employed a purposive sampling for KIIs and FGDs in close consultation with ECA. When selecting the nine countries for data collection, the ET took into consideration the ability for data collection to be conducted 100 percent remotely in each of the countries.

KII Sampling
The evaluation undertook purposive sampling in each country of the nine countries designated for data collection (alumnae), as well as in the United States (mentors). The team ensured participation in KIIs from individuals from the following groups:
- Alumnae of the TechWomen program
- Staff of U.S. Embassies in TechWomen countries
- ECA staff (current and former)
- IIE program staff (current and former)
- Professional Mentors
- Cultural Mentors
- Impact Coaches
- Legacy International Staff

FGD Sampling
The ET conducted focus group discussions with:
- Alumnae of the TechWomen program
- TechGirls mentored by TechWomen Alumnae
- Staff of U.S. Embassies in TechWomen countries

Criteria Used for Participation in KIIs and FGDs
- Respondents to Alumnae survey or Mentor survey
- Recommendations from other mentor participants
- Willingness to participate
- Various cohorts (Alumnae)
- 9 different countries participating in TechWomen program (Alumnae)
- Various number of years of participation in TechWomen program (mentors)
- Minimum of 10 different host companies (TechWomen mentors)
- Recommended by Alumnae (home country STEM colleagues and individuals mentored by Alumnae)
- Recommended by donor and/or implementer

SURVEYS
The ET administered an online survey to all TechWomen Alumnae from July to August 2020 and a separate survey for mentors from March to April 2021. The purpose of the surveys was to gather data on the network connections resulting from the TechWomen program, including: the establishment and maintenance of networks by Alumnae (EQ1); the support and collaboration networks resulting from the program (EQ1); continuation of networks among Alumnae and mentors (EQ3); and the degree to which Alumnae have engaged in mentorship in their home countries (EQ2 and 3).

The primary goal of the surveys was to ascertain the social networks built as a result of the TechWomen program. A social network is made up of individual actors that are tied together by certain kinds of relationships. Social network analysis helps to identify the structure of a "network" of actors, the quality of relationships among them, and the number of ties to others. Participants were asked to name those Alumnae and mentors with whom they maintained a relationship or engaged in collaborative activity. From these data, network graphs can be visualized, showing individuals as dots or "nodes" and the relationships among them represented by lines. Each node is placed in the graph based on the number of connections to similar others—meaning, the closer a node is in a graph, the more relationships they have in common. Similarly, the nodes with more lines connecting them represent Alumnae or mentors who are more connected to others in the network.

DATA ANALYSIS

QUANTITATIVE DATA ANALYSIS
The ET gathered Alumnae survey data and Mentor survey data using the network survey platform ONASurveys.com. The ET used this data to provide visual representations and undertake an analysis of the TechWomen network structure. The ET analyzed network data using UCINET, a software package specifically for the analysis of social network data, and visualized with Gephi, an open-source network analysis, and visualization software package. The network analysis seeks to identify prominent actors in the network via basic centrality measures like in-degree (the number of incoming ties to an actor) and out-degree (the number of outgoing ties from an actor). The ET used the E-I index to identify any patterns in relationship formation in the network, such as by program year or nation.

Metrics calculated included:

- In-degree centrality: The number of incoming ties received by an actor
- Out-degree centrality: The number of outgoing ties sent by an actor
- E-I index: How likely actors are to form ties outside an attribute like cohort year or nation.

QUALITATIVE DATA ANALYSIS
After the KIIs and FGDs were conducted, the team reviewed transcripts produced by Otter and notes taken by evaluation team members for accuracy and updated with minor edits made in cases where the speaker or the topic was unclear.

All transcripts and notes were uploaded to Dedoose with each Alumnae KII and Mentor KII linked to a set of descriptors based on the team's codebook. Use of descriptors in Dedoose enables a mixed-methods approach to the study and allowed the evaluation team to analyze data based on a set of specific characteristics.

Following the completion of coding, the ET identified the codes applicable for each evaluation question and retrieved the excerpts associated with specific codes in order to review the content, identify trends, and draw conclusions.

ANNEX C. EVALUATION SCOPE OF WORK

Statement of Work
Evaluation of the TechWomen Program

Under Functional Area 3: Diplomacy, Media and Cultural Affairs Programs of the Department's Performance Management and Evaluation Services IDIQ, the Evaluation Division in the Bureau of Educational and Cultural Affairs (ECA) in the U.S. Department of State (DOS), seeks evaluation services for an independent evaluation of ECA's TechWomen Program.

1. BACKGROUND AND CURRENT STATUS OF THE EFFORT

TechWomen empowers, connects and supports the next generation of women leaders in science, technology, engineering and mathematics (STEM) from Africa, Central and South Asia, and the Middle East by providing them the access and opportunity needed to advance their careers, pursue their dreams, and inspire women and girls in their communities. Since 2011, more than 700 women from Algeria, Cameroon, Egypt, Jordan, Kazakhstan, Kyrgyzstan, Kenya, Lebanon, Libya, Morocco, Nigeria, Pakistan, the Palestinian Territories, Rwanda, Sierra Leone, South Africa, Tajikistan, Turkmenistan, Tunisia, Uzbekistan, Yemen and Zimbabwe have participated in TechWomen.

TechWomen provides participants access to networks, resources and knowledge to empower them to reach their full potential. Through mentorship and exchange, the program is designed to strengthen participants' professional capacity, increase mutual understanding between key networks of professionals, and expand women and girls' interest in STEM careers by exposing them to female role models. During the five-week program, participants engage with female leaders in project-based mentorships at leading companies in the Silicon Valley and Bay Area, participate in professional development workshops and networking events, and travel to Washington, DC for targeted meetings and special events to conclude the program. After the program, emerging leaders and mentors have the opportunity to reconnect during delegation trips to program countries in Africa, South and Central Asia and the Middle East which focus on expanding networks of women in STEM fields, creating and strengthening partnerships, encouraging girls to pursue STEM careers and ensuring the sustainability of mentor-fellow relationships.

The Experience

Each Emerging Leader is paired with a Professional Mentor who works closely with her to carry out a project at the host company. Before the participant arrives in California, she is in close contact with her Professional Mentor. Together, they work to design a project of mutual interest. The Emerging Leader is hosted at the Mentor's

company for two weeks. The Professional Mentor offers guidance and support throughout the mentorship. The Emerging Leader also participates in professional enrichment activities that include seminars, workshops, tech talks, and networking events.

Each Emerging Leader also has the opportunity to explore the Bay Area with Cultural Mentors who facilitate activities to deepen mutual understanding. Cultural Mentors take participants to local attractions, art exhibits, sporting events and local universities, among other local activities. Participants also have the opportunity to explore San Francisco and tour national landmarks while in Washington, DC.

Action Plans

In 2015, TechWomen introduced a new component to turn into action participants' passion to effect change in their home countries and foster continuity in TechWomen's programming. Integrating knowledge and skills developed in TechWomen's workshop series and leveraging collective experiences and ingenuity, Emerging Leaders form teams to design action plans to make an impact in their respective communities. Impact Coaches will strategically advise groups for success in terms of content and design, and they will help connect the dots for groups to meet criteria and understand what makes a successful plan for potential seed grant funding.

Upon return to their home countries, TechWomen Alumnae become members of both the U.S. Embassy and ECA's Alumni networks.

2. PURPOSE OF THE EVALUATION

The purpose of this evaluation is to determine the strength and sustainability of professional networks created by the program and the extent to which these networks have been leveraged for collaborations between Alumnae to enact change. The evaluation will provide evidence to inform programmatic decision-making to the ECA program team, who will be the primary user of the evaluation results, in order to inform the design and implementation of the TechWomen program for future cohorts as well as make any necessary mid-course adjustments. The evaluation will be completed by May 2021 to incorporate lessons for the launch of the second decade of TechWomen.

The findings will also provide critical information to assist the Department of State, the U.S. Congress, and other stakeholders such as tech companies in Silicon Valley who have participated in the program. This evaluation will cover Alumnae from the 2011 through the 2019 cohorts (implemented by the Institute of International Education (IIE)), totaling 722 Alumnae.

3. EVALUATION QUESTIONS

The evaluation should answer the following overarching questions:

1. How are TechWomen alumnae establishing and maintaining networks with other TechWomen alumnae? By country by region, global?
   - What type of support are alumnae receiving from the TechWomen network? (financial, exchange of resources, mentorship, etc.)
     - To what extent are TechWomen alumnae serving as mentors to other TechWomen (within cohort and between cohorts)?
   - How (if at all) are TechWomen Alumnae leveraging these networks to create change in their home communities (country or region)?
   - What challenges have TechWomen Alumnae faced in sustaining these networks? How have environmental factors such as conflict, non-permissive environments, the level of that country's tech sector shaped the TechWomen network(s)?
   - What can ECA do to strengthen and sustain the networks?
2. To what extent are TechWomen alumnae starting new networks of STEM women? To what extent are they plugging into existing networks of STEM women in their home communities?
   - To what extent are they expanding their networks to other women in STEM fields in their home country and region?
   - How are they sharing their TechWomen experience with other women in STEM in their home communities?
     - To what extent are they mentoring other women/girls in STEM fields?
     - To what extent are there any collaborations happening through these extended STEM women networks?
3. To what extent are TechWomen Alumnae establishing and maintaining networks with TechWomen mentors?
   - What is the effect of delegation trips on TechWomen alumnae networks?
   - To what extent are Mentors still connected with their former Mentees? Are there any new or continued collaborations between Mentors and Alumnae?
   - What role do they play in determining network or individual outcomes?
4. How connected are TechWomen Alumnae to U.S. Embassies?
   - How involved are TechWomen Alumnae in the broader Embassy Alumni network?

4. EVALUATION DESIGN AND DATA COLLECTION METHODS

This evaluation will seek to answer the four evaluation questions through a mixed methods design. Below are suggested methodologies for data collection that may be appropriate for this evaluation. These suggestions should not be considered a final or complete list. **In developing the final evaluation design, the ECA Evaluation Division will work closely with the contractor to determine the best methodologies and approaches required to meet the needs of this evaluation.**

Document Review and Initial Interviews
As a first step, the Evaluation Team will undertake a review of existing program documentation. This will include initial interviews with ECA and Implementing Partner program staff. The Evaluation Team should plan to conduct 2-3 interviews with both ECA and the Implementing Partner, with each lasting approximately one hour and conducted in person where possible (and via teleconference or zoom if remote interviews are required). This initial research will help inform survey and interview questionnaire development.

Note: The ECA Program Team will be responsible for providing contact information for all relevant Implementing Partner staff and making any necessary introductions.

Survey
For initial data collection, the Evaluation Team will send a survey to all Alumnae. The ECA Evaluation Division will manage the survey from Qualtrics, including using the platform for sending email invitations and reminders to Alumnae. The survey will be open for four weeks, and after the initial invitation, anyone who has not completed the survey will receive email reminders as deemed necessary.

Note: The ECA Program Team will take primary responsibility for obtaining necessary contact information for TechWomen Alumnae from the Implementing Partner.

Interviews and/or Focus Group Discussions
Key stakeholders that may be considered relevant during data collection include the following:
- TechWomen Alumnae
- TechWomen Mentors
- IIE staff
- USG stakeholders (ECA and Embassies)
- U.S. Community Members (Host Companies, Mentors, etc.)
- TechWomen colleagues and STEM professionals in home countries
- Legacy International staff (Implementing Partner for TechGirls)

Data collection should include **both** domestic and overseas fieldwork. The

Evaluation Team should plan to travel in person for all domestic fieldwork, while all overseas fieldwork should be conducted with the assistance of local independent contractors/sub-contractors.

Social Network Analysis

The evaluation design should incorporate a social network analysis to determine the extent to which the program successfully creates and sustains networks of professionals in the STEM field, and examine what factors—including those outlined in the evaluation questions, such as such as conflict, non- permissive environments, the level of development of home country tech sectors—contribute to programmatic success and identify areas of improvement toward that end. The evaluation will examine the dynamics of the networks created by the program, the extent to which those networks are sustained, and then to the extent possible elucidate the positions and functions of various stakeholders within those networks—such as mentors, other STEM professionals, U.S. embassies, and the alumnae themselves. The evaluation will utilize previously collected data to the extent that it is available, in order to map and analyze the broader network(s) of TechWomen stakeholders, which includes the key stakeholders listed above, from a national, regional, inter-regional, and global perspective.

Note: The ECA Program Team will be responsible for obtaining relevant data from the Implementing Partner.

5. EVALUATION TEAM

The Contractor should propose a team with a combination of qualifications as outlined in this SOW to provide the best possible product. Requested skills of key and non-key personnel are outlined below. ECA expects Evaluation Team members to have relevant prior experience in the three regions the program operates in, familiarity with international exchange programs, and prior evaluation/assessment experience. In addition, at least one proposed team member should have prior experience with Social Network Analysis.

The Contractor's Evaluation Team will be supplemented with two M&E Specialists from the ECA Evaluation Division with experience in mixed methods evaluations.

5.1 Key Personnel

Key personnel will include, at least one team member shall have prior experience with Social Network Analysis:

Evaluation Team Leader (1)

This person (can be senior- or mid-level) should have served as a team leader in the past (preferably with a USG agency and ideally with cultural exchange

programs), be comfortable with collecting and analyzing qualitative and quantitative data, and has research design expertise.

Evaluation Team (multiple)
The team may also consist of mid-level evaluation consultant(s). Combined, these individuals should have experience working with international exchange program evaluations, ability to analyze quantitative data, and strong qualitative (with a preference for experience with virtual data collection) analytical capabilities.

The Evaluation Team will be expected to be available for the entire period of performance. **The ECA Evaluation Division must approve any key personnel change in writing**.

5.2 Non-Key Personnel
The team may also wish to include Junior-level Research Assistants to properly support the key personnel. These Research Assistants should consist of individuals with experience working with mixed methods (qualitative and quantitative), large data sets, have strong data visualization know-how, and demonstrate strong analytical skills.

It is expected that, for this evaluation, some level of support staff will be required. It is expected that either a Program Manager or Administrative Support person support this evaluation. This person will assist in copyediting the report, designing and developing infographics, and support in the overall management of the evaluation. Alternatively, if these roles can be filled by the evaluation personnel above for added cost savings, the ECA Bureau would find that acceptable (and preferable).

5.3 Use of Locals/Sub-Contractors
The contractor should include documentation of institutional capacity and staff experience for the potential sub-contractors and local consultants listed.

The ECA Evaluation Division strongly encourages the use of local consultants or local sub-contractors, as they can offer budgetary advantages during the implementation of the evaluation. In-country partners enable the evaluation team to locate Alumnae and can facilitate the interaction between the evaluation team and study participants. To the extent possible, the offeror's proposal should include information pertaining to potential sub-contractors.

5.4 ECA Evaluation Division Staff Travel
The ECA Evaluation Division will travel with the team to participate in the fieldwork, assist with the evaluation and facilitate interactions with representatives

of the USG, implementing organizations, and other key personnel. The cost of these individuals will be borne by ECA.

5.5 Roles and Responsibilities

The following outlines the division of tasks for both ECA Evaluation Division staff and the Contractor. The Contractor will be primarily responsible for the writing of the interim and final reports, however ECA Evaluation Division M&E Specialists working on the evaluation will contribute to both reports. **The contractor will take full responsibility for fieldwork implementation** (i.e. preparation for fieldwork and data collection logistics), however ECA Evaluation Division M&E Specialists will participate and conduct select interviews and meetings during data collection.

Evaluation Tasks and Deliverables	ECA M&E Specialists	Contractor	ECA Program
7.1 Regular Communication with the ECA Evaluation Division	X	X	
7.2 Kick-off Meeting	X	X	X
7.3 Program Document Review	X	X	
7.4 Evaluation Plan	X	X	
7.5 Monthly Reports		X	
7.6 Data Collection Instruments Development and Administration			
Development	X	X	

Evaluation Tasks and Deliverables	ECA M&E Specialists	Contractor	ECA Program
Data Map	X	X	
Scripts		X	
Instruments Pre-Test	X	X	
Survey Administration		X	
Reporting		X	
Data Sets		X	
Transcripts		X	
7.8 Updated Alumnae Contact Lists		X	

Evaluation Tasks and Deliverables	ECA M&E Specialists	Contractor	ECA Program
7.9 Translated Data Collection Instruments		X	
Data Collection			
7.10 Overseas Data Collection	X	X	
Recruit and train local independent contractors/sub-contractors		X	
Data Collection		X	
Interviews and/or Focus Groups	X	X	
7.11 Interim Report	X	X	
Analyze data	X	X	
Interpretation	X	X	
7.12 Domestic Field Work	X	X	
Data Collection		X	
Interviews and/or Focus Groups	X	X	
Reporting and Dissemination			
7.13 Evaluation Report Outline	X	X	
Analyze data	X	X	

Evaluation Tasks and Deliverables	ECA M&E Specialists	Contractor	ECA Program
Interpretation	X	X	
7.14 Initial Draft of Final Report	X	X	
7.15 Final Briefing		X	
7.16 Evaluation Final Report	X	X	
7.17 Evaluation Summary		X	
7.18 Infographic Brochure Report		X	

6. PERIOD OF PERFORMANCE

The Contractor will be expected to present a delivery timeline in their technical proposal based on the tasks and deliverables outlined in Section 7 below. While the period of performance for this evaluation is estimated to be 14 months from the date the contract is signed, the contractor should propose the timeline to which they feel they can best commit.

That said, the Contractor must be responsive to ECA needs and remain flexible with regard to possible delays or prolonged timing. All work must start within two weeks of contract award.

7. WORK REQUIREMENTS – TASKS & DELIVERABLES

Below is a detailed summary of all tasks and deliverables required under this contract:

	Description
7.1	**Regular Communication with the ECA Evaluation Division** Provide status meeting notes that summarize discussions, decisions and result in actionable items. Upon award, the ECA Evaluation Division internal evaluators and the contractor external evaluators shall communicate on a regular basis (i.e. weekly, bi-weekly, monthly as deemed necessary).
7.2	**Kick-off Meeting** Meet with ECA to discuss the mechanics of the evaluation before data collection begins. *The ECA Evaluation Division will provide direction in terms of meeting with other offices or outside agencies and grantees.*
7.3	**Program Document Review** Upon award the evaluation team will begin preliminary research and review of the TechWomen program, and the ECA Evaluation Division website to review previously evaluated work to gain a better understanding of the program, and begin developing the evaluation plan.

7.4	**Evaluation Plan**
	
	The contractor will work in close collaboration with the ECA Evaluation Division to develop a final evaluation plan that includes the following elements:
	    1. Data collection methods
	    2. Quality Assurance Plan (which should consist of: participant contact information management plan, cognitive-test plan for data collection instruments, translation plan, survey administration plan, and a quantitative and qualitative analysis plan)
	    3. Planned analysis techniques
	    4. Timeline
	
	NOTE: The ECA Evaluation Division must approve any changes in the evaluation plan.

7.5	**Monthly Reports** Monthly Progress Reports include status of on-going and completed tasks, brief summaries of significant meetings or briefings held during the month reported on, next steps to be undertaken by the contractor, and any pending actions to be taken by the ECA Evaluation Division. Monthly reports should also highlight any delays or expected delays based on the timeline (i.e. when a benchmark or deliverable was <u>not</u> met) as well as remedies or significant challenges which impede the timeline.
7.6	**Data Collection Instruments Development and Administration** **Development:** The evaluation team will draft and submit data collection instruments (e.g. survey questionnaires) to the ECA Evaluation Division for approval. *The contractor will revise all draft data collection instruments (e.g. survey questionnaires) in collaboration with the ECA Evaluation Division. All instruments must be approved by the ECA Evaluation Division prior to finalization and use.* **In some cases, the Program Office and U.S. Embassy may want to review and approve data collection strategies and/or instruments.** **NOTE:** Due to the U.S. audience as parts of this evaluation's data collection efforts, some data collection instruments will require OMB approval as part of the Paperwork Reduction Act (PRA). After the instruments have been developed, the ECA Evaluation Division will work to submit through the approval process (*see Section 9.3 & 10 for more details regarding the requirements*, *and regarding the contractor's role during this process*). It is anticipated that this will be <u>at least </u>a seven (7) month turnaround. The contractor should remain flexible with the timeline, and the ECA Evaluation Division will keep the contractor informed on the progress/status as well as when requirements related to this task will be needed.

| 7.7 | **Data Map:** The contractor will be required to submit a data map of the data collection questions (items on survey questionnaire) to the evaluation questions listed in Section 3. This will be submitted with the data collection instruments.

Scripts: The contractor will draft and submit the initial introductory contact/cover letters/e-mails/scripts as well as any follow-up or reminder correspondence language related to all data collection instruments, as well as any contact or script language related to the location verification of Alumnae to the ECA Evaluation Division for revision and approval.

Instruments Pre-Test: The contractor will conduct a pre-test(s) of data collection instrument(s). *Any subsequent revisions must be reviewed and approved by the ECA Evaluation Division.*

Survey Administration: The contractor will provide the ECA Evaluation Division with a survey administration plan with details on strategies to regularly monitor survey response rates and methods to increase response rates. Methods to reach survey respondents may include but are not limited to reminder e-mails, postal mailings, domain adjustments, phone calls, etc. Survey response rates of 75% or less than necessary to conduct a robust social network analysis given the number of alumnae targeted, are deemed inadequate and contractors will be required to demonstrate attempts to maximize response rates. The ECA Evaluation Division will give the contractor access to its survey platform Qualtrics to administer the survey. The contractor will be responsible for building the survey.

Second, the contractor will be required to perform diagnostics to ensure adequate survey coverage of key groups is represented in the study population (e.g. gender, program year, program language, and host country). The contractor will work closely with the ECA Evaluation Division to determine key groups and the ECA Evaluation Division will sign off (approve) on the threshold of representation of the agreed to key groups.

Reporting: Upon completion of the use of each data collection instrument (survey questionnaire, for example), or completion of the evaluation project, the contractor must report on the use of survey instruments. The contractor will be required to report the following information:

- The actual number surveys distributed and/or the actual number of people interviewed or participating in focus groups (respondents).
- The actual number of surveys/interview requests returned/undeliverable/declined, etc. |

		• The percentage of total number of responses that were collected electronically (e.g. via email or web-based instruments). • The total average time (in minutes) it took all respondents to complete the survey or instrument. See Section 9.4 for translation requirement related to any instruments used for overseas stakeholders. **Transcripts:** The contractor will be required to submit cleaned and translated (where applicable) transcripts of all interviews and focus groups conducted under this contract. All files must be submitted in an email to the ECA Evaluation Division prior to the conclusion of the contract.
	7.8	**Updated Alumnae Contact Lists** Upon contract award, the ECA Evaluation Division will provide a list of program Alumnae, as is, to the contractor. This list will consist of information the ECA Evaluation Division is able to collect from within the Department of State, namely from the ECA Alumni Archive only. This will not represent the most up-to-date information for all Alumnae. The contractor will be fully responsible for finding, securing updated/current contract information for Alumnae involved in this study, and verifying to the greatest extent possible beyond what is initially provided. This includes, but is not limited to, contacting implementing organizations for their Alumnae records for the period covered by the SOW and merging with the DOS contacts provided by the ECA Evaluation Division. Additionally, the firm will need to determine where there is any duplicate information due to some Alumnae having been on the program more than once. Methods to reach alumnae may include but are not limited to e-mails, postal mailings, phone calls, scanning of social media sites, address directory searches, etc. The contractor should provide a short description of the evaluation process to share with program alumnae, host organizations, and implementing partners prior to contacting the alumnae. All Alumnae contact information must be provided as a deliverable to the ECA Evaluation Division at the completion of the evaluation. This should include an Alumnae contact inventory which outlines the number of program participants / Alumnae with contact information and type (e-mail, phone etc.) as well as the number of Alumnae without contact information. Differences in contact

	information by group (e.g. Demographics: fiscal/program year, gender, thematic focus, country, etc.) should also be noted in the inventory.
7.9	**Translated Data Collection Instruments** It is the expectation that not all key informants outside of the U.S. who may have interacted with the Alumnae during the program will speak English well enough to complete a survey or participate in an interview, etc. Therefore, the contractor should expect to have all approved/finalized overseas data collections instruments translated into relevant and submitted to the ECA Evaluation Division.
7.10	**Overseas Data Collection** See Section 9.4 for translation requirement related to any instruments used for non-U.S. stakeholders. **NOTE:** This task requires data collection through international travel. International fieldwork should include travel to three countries. Travel may be multi- region (e.g. one country in each of the program regions) or regional (e.g. three countries in one program region). Trips can be to a single or multi-country depending on concentrations of Alumnae and the feasibility of travel between countries. Countries for data collection will be determined in consultation with the TechWomen Program Team and the Evaluation Division after the contractor is onboarded, with consideration to the Program Team's requirements and data collection feasibility. **Remote data collection:** The Contractor should also plan to utilize remote data collection methods as a means of engaging with Alumnae and Alumnae STEM connections from countries where the contractor is unable to travel in person. All countries are subject to change, contingent on security conditions, other events, or State Department interests that require selection of a different country. The ECA Evaluation Division can amend the selection of fieldwork countries, at any point during the evaluation, and the Offeror should remain flexible at all times. Once study countries are finalized, the ECA Evaluation Division will work with Embassies in selected countries, to facilitate field work initiation. **The contractor will take full responsibility for fieldwork implementation** (i.e. preparation for fieldwork and data collection logistics) as deemed appropriate by the ECA Evaluation Division, and at the discretion and preferences of the U.S. embassies. The offeror

	should expect a minimum of 5-10 *business* days in the field <u>per site visit </u>depending on number of cities visited. In some particular cases, a site visit may extend up to 15 *business* days (e.g. geographically large countries where Alumnae are dispersed or countries with very large participant populations etc.) **In country debrief:** for each fieldwork country, the contractor should plan on a one-hour in-person debrief with the U.S. embassy to outline preliminary findings from the fieldwork. **Please see Section 11.2 on information to estimate the travel costs for this contract**.
7.11	**Interim Report** The Interim Report should present the preliminary or initial evaluation findings from the Overseas Data Collection. The Interim Report should be submitted by **August 2020**. The interim report should be no more than 15 - 20 pages. The summary should include the following: • Title of the evaluation • Date the report was submitted • Purpose of the evaluation and questions addressed • Current status of the evaluation • Methodology • Preliminary Findings • Lessons learned
7.12	**Domestic Field Work** **NOTE:** This task requires data collection through domestic travel. Fieldwork in the U.S. should include site visits to the implementing partner in and Mentors' companies in Bay Area and Silicon Valley. The offeror should expect a minimum of 10 *business* days in the field depending on the number of interviews, and focus groups conducted. A total of 800 mentors from 122 companies in the Bay Area and Silicon Valley have participated in the program.
7.13	**Preliminary Briefing of Field Work** After all field work has been concluded, the contractor will be expected to provide presentation(s) on preliminary findings covering all in-country field work to the Evaluation Division and other ECA stakeholders, as deemed necessary, and at the

	discretion of Evaluation Division. Depending on the timing for when all field work has concluded, this will occur as either: • One (1) presentation covering all fieldwork (*Only if all domestic and international fieldwork wraps up within about a month of each other*), or • Two (2) presentations with two separate briefings (one focusing on internationally findings, and the second on domestic findings) **NOTE:** Prior to the briefing, the contractor will be required to submit the presentation and any associated materials to the Evaluation Division for review and approval. Briefing materials should be a stand-alone presentation (i.e. with appropriate slide notes/script) which can be used by the Evaluation Division after the completion of the Evaluation.
7.14	**Evaluation Report Outline** Prior to drafting the Evaluation Report, the contractor will be required to first submit a detailed draft report outline for approval by the ECA Evaluation Division.
7.15	**Initial Draft of Final Evaluation Report** As part of the report review process, the contractor should expect multiple drafts of the Evaluation Report, and adequate time shall be incorporated into the project schedule. Below is an outline of the expected review/approval process: 1. ECA Evaluation Division review 2. Program Office and ECA/P manager review 3. ECA senior management (DAS level) final approval The contractor should expect each round of revisions and approvals to require no less than a two-week turnaround by ECA, and that the bulk of review/revision time occurring during the ECA Evaluation Division review phase. The contractor must remain flexible should more or less time be required to gain the appropriate approvals. **The final report draft will be sent to the ECA Assistant Secretary for situational awareness before publication.**

7.16	**Final Briefing**
	After approval of the draft version of the Evaluation Report, the contractor will be expected to present a briefing (most likely format will be 45-60 minutes of presentation; 30-45 minutes of questions) of the report findings to key stakeholders identified by the Evaluation Division. Stakeholders may include members of the Office of Policy and Evaluation, Program Offices in ECA, staff from other Offices in the U.S. Department of State, ECA senior leadership, or staff from implementing organizations.
	NOTE: Prior to the briefing, the contractor will be required to submit the PowerPoint presentation and any associated materials to the Evaluation Division for review and approval. Briefing materials should be a stand-alone presentation (i.e. with appropriate slide notes/script) which can be used by the Evaluation Division after the completion of the Evaluation.
7.17	**Evaluation Final Report**
	The Final Evaluation Report should include a review of the evaluation and the TechWomen program, an Executive Summary that includes key findings, and a detailed analysis of the data collected, as well as any recommendations and/or lessons learned for the program. As per DOS evaluation guidelines, the final report should be between 25-35 pages (not including appendices). Detailed information on analysis, data, or research instruments can be placed in appendices. DOS officials are usually not conversant with academic jargon and technical expressions; therefore, if they are used, they should be explained in the text. The report should be organized around evaluation questions. For each major evaluation question, the report should have a separate section presenting findings and conclusions. The ECA Evaluation Division will provide further guidance to the contracting firm.
	Language in the Final Report should be clear and easily understandable by a lay audience. The Evaluation Report should follow the U.S. Government Printing Office Style Manual (www.gpo.gov).
	Electronic copies in Microsoft Word and PDF of these documents will be submitted in an e-mail to the ECA Evaluation Division prior to the conclusion of the contract. A single file must include the executive summary and the full report, with any relevant appendices (plus a cover sheet) in a separate file. Additionally, the contractor will be expected to deliver five (5) colored, bound hardcopies.

7.18	**Evaluation Summary**
	Upon completion of an approved final Evaluation Report the contractor will be expected to develop an evaluation summary. The evaluation summary should be brief, approximately two to four pages. The summary should include the following:
	- Title of the evaluation - Date the report was submitted - Purpose of the evaluation and questions addressed - Methodology - Key Findings - Recommendations/Lessons learned
	Contractor should review the African Women's Entrepreneurship Program and Gilman evaluations on the ECA Evaluation Division website: https://eca.state.gov/impact/evaluation-eca/evaluation-initiative/completed-evaluations
	Electronic copies in Microsoft Word and PDF of the approved final evaluation summary will be submitted by e-mail to the ECA Evaluation Division prior to the conclusion of the contract.
7.19	**Infographic Brochure Report**
	After the Final Evaluation Report has been submitted and approved, the contractor will be expected to meet with the ECA Evaluation Division, and possibly other ECA stakeholders (e.g., the Program Office) to determine which specific data points from the Final Report will be shared with which audiences and for what purpose. These data sets will be included in a brief infographic style report, etc. This report should be no more than ten (10) pages.
	The data points used in this infographic will be used solely at the discretion of ECA. The infographic report provided by the contractor should reflect these discussions, and should be visually appealing and accessible by a variety of different audiences. This Report should utilize minimal text and shall convey the data through infographics.
	Contractor should review the Gilman example on the ECA Evaluation Division website: https://eca.state.gov/impact/evaluation-eca/evaluation-initiative/completed-evaluations. Additional design guidance will be provided as necessary.

	Electronic copies of the approved final infographic will be submitted by e-mail to the ECA Evaluation Division prior to the conclusion of the contract in multiple file types (i.e. PDF, Illustrator). The file delivered must consist of a high-quality infographic report in PDF format with high-resolution images that are 300 dpi (dot per inch). Additionally, the contractor will be expected to deliver two hundred (200) glossy, full color hard copies.

8. EXPECTATIONS AND PERFORMANCE

8.1 The contractor shall be held accountable for complying with the time schedule, and providing the required, Government-approved deliverables at the proposed firm fixed price without exceptions.

8.2 The contractor shall be responsive to Department of State needs, throughout the project, and demonstrate ability to provide and present information, according to the Department's needs and demands, as requested.

9. SUPPORTING INFORMATION

9.1 ECA Evaluation Division Support Staff

Task Order Contracting Officer Representative
(COR): Natalie Donahue (DonahueNR@state.gov)

An evaluation manager will also be named prior to the start of the evaluation.

9.2 Security

This project does not entail working with classified information. Note that all information and data in this project is sensitive, and should not be shared publicly without written consent of the ECA Evaluation Division.

9.3 Compliance with Applicable Requirements

All deliverables associated with this contract must conform to applicable standards, requirements, and restrictions governing official U.S. Government public websites, as well as data collection instruments including but not limited to:
- Section 508 of the Rehabilitation Act

- Paperwork Reduction Act (PRA) of 1995
- Privacy Act of 1974, as amended

Paperwork Reduction Act

Upon determination by the ECA Evaluation Division, as part of the Paperwork Reduction Act, the survey approval process for U.S. data collection will require additional review, edit and final consent by the Office of Management and Budget (OMB) via the Information Collection process. The process includes two separate public comment periods via the Federal Register (60 days and 30 days, respectively), and the final OMB review period (which may take an additional 90 days). **In all, obtaining clearance of the survey(s) from OMB may take <u>at least </u>180 days**.

More information on the PRA approval process can be found here:

https://www.usability.gov/how-to-and-tools/guidance/pra-overview.html

9.4 Language for Data Collection

The Contractor and its sub-contractor(s) will be responsible for conducting overseas research in relevant languages. The contractor should <u>not </u>assume that information collection from all key overseas informants can be conducted in English. Final languages for data collection instruments and fieldwork will be determined in consultation with the ECA Evaluation Division. There are several elements to the language requirements.

> <u>Fieldwork</u>: For field research, the Contractor will arrange and pay for interpreters and translation during field research as needed (i.e. field interviews, focus groups, fieldwork logistics, etc.).

All interpretation and translation must be performed by capable/professional individuals. The offeror should outline the steps they will take to ensure high quality professional work in terms of language translation and interpreting. Upon award the Contractor will be required to submit a quality control plan for the work on translation. The ECA Evaluation Division will review CVs of proposed translators if contractors retain individuals as opposed to translation firms.

<u>All data collection instruments will be submitted in English and the languages selected for the evaluation.</u> All field transcripts (interviews and

focus groups) will be submitted to the ECA Evaluation Division in English. Final reports and other reports outlined in the Statement of Work will be submitted to the ECA Evaluation Division in English.

9.5 Place of Performance

Domestic and overseas fieldwork will occur at the sites selected, all other work is anticipated to take place at the contractor's place of work.

10. LOGISTICAL SUPPORT

The ECA Evaluation Division will:

- Do what it can to prepare the other stakeholders in advance of their turn to review and/or provide feedback at various stages of the evaluation in order to help minimize delays in turn-around time.

- Provide upfront all available ECA related materials, documents available.

- Be responsible for managing the OMB PRA process and submission of the information collection, submitting all paperwork, and participate in discussions with OMB regarding any questions, comments

  they have towards the evaluation. The ECA Evaluation Division will inform the contractor as to the specific documentation, language they will need to provide to incorporate into the paperwork. If deemed necessary by the ECA Evaluation Division, the contractor may be requested to also participate in these meetings with OMB to go over the data collection instruments, methodology, etc.

- Will work with Embassies in selected fieldwork countries to facilitate field work initiation only. The contractor will take full responsibility for fieldwork implementation (i.e. preparation for fieldwork and data collection logistics) as deemed appropriate by the ECA Evaluation Division, and at the discretion and preferences of the Embassies.

- Will provide the contractor with access to user accounts on its survey platform Qualtrics for use during this evaluation. The contractor will be responsible for building the survey.

- Be the primary points of contact (through the COR and Project Manager) for this evaluation. Any contact with any ECA or other State Department Offices,

(domestically or overseas), grantees or local organizations, or other stakeholders shall take place only as authorized or requested (and subsequently arranged) by the ECA Evaluation Division.

Additionally, the ECA Evaluation Division will assist the contractor with the collection of contact information by initially requesting available contact information from appropriate ECA offices and U.S. embassies. However, the burden of effort, particularly with regard to obtaining other Alumni contact information from implementing partners and other external sources is the responsibility of the contractor.

11. BUDGET

The contract will be firm-fixed price.

11.1 Responsibility for All Costs

The contractor shall assume responsibility for all costs associated with the project as detailed in the Statement of Work. These costs include, but are not limited to: staff salaries; indirect costs; airfare, per diem and travel costs for all contractor and sub-contractor staff for domestic and international travel; securing and/or verifying Alumni contact information; data collection and data verification; overseas staff and/or sub-contractors; pre-testing qualitative/quantitative instruments; translation and back-translation into English of qualitative/quantitative instruments; interpreter/translation costs of conducting overseas key informant interviews and focus groups; representational costs; lodging and per diem, and/or meals for key informant interviews and focus group participants (if necessary); meeting room costs for focus groups; telephone calls; mail and postage costs; and document printing and reproduction.

The contactor should be aware that translation and interpretative services – in terms of interpreters, fieldwork coordinators, interviewers/focus group leaders and transcriptions of data collected is anticipated for data collection and analysis associated with non-U.S. participants.

11.2 Travel

Exact dates of overseas travel are often difficult to predict. Accordingly, the Department of State is not able to guarantee twenty-one days (21 days) advance notice and/or lowest air fares. **All travel shall be in accordance with federal travel regulations, including "Preference for U.S.-Flag Air**

Carriers" (January 1997), and the Department of State will pay for the equivalent of economy class tickets only.

11.3 Contractor and Exchange Rates

No contract adjustments will be made for changes in contractor rates and/or exchange rates during the course of the contract.

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