

SCIENCE DIASPORA NETWORKS

A REPORT ON THEIR GOALS,
FUNCTIONS, AND FUTURE



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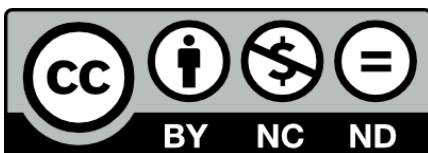
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Science Diaspora Networks

A Report on their Goals, Functions, and Future

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EXECUTIVE SUMMARY

Background

Scientists and researchers increasingly pursue educational and professional opportunities abroad, and since the turn of the 21st century, countries and fellow émigrés increasingly develop science diaspora networks to support them. These networks connect diaspora scientists to each other and to their country of origin, ostensibly easing mobility and strengthening research collaborations and science diplomacy between nations. For any given network, there is usually an underlying organization that administers the communication channels, activities, member recruitment, finances, and other logistical details required to operate a network.

Many kinds of stakeholders care about the operation and evaluation of networks and their underlying organizations. A few kinds include network funders, intergovernmental organizations, countries that host diaspora networks, countries that originate researchers in networks abroad, network members, network managers, and diaspora scientists, to name a few. These stakeholders use knowledge about networks and their organizations to inform their uses, investments, evaluations, and interactions with networks.

Within the growing academic and gray literatures about science diaspora networks, there is little robust and systematically developed knowledge about these networks or their underlying organizations. There are several reasons for this shortage. First, science diaspora networks are a relatively new and specialized phenomenon, and the very concept of science diaspora networks remains ambiguous and is often imprecisely operationalized. Relatedly, science diaspora networks vary widely in their characteristics and functions, leading to differences in how they define success, overcome challenges, and plan for the future. As a result, meaningful studies to canvass, characterize, and compare networks can be difficult to design and execute.

This Report

This report documents the results of an empirical study to characterize science diaspora networks and their underlying organizations and to document how network managers characterize operational successes, challenges, future plans, and relations to science diplomacy.

This is the first mid-scale interview study of managers for science diaspora networks for which the total pool of networks represents scientists from a sizable set of countries. It employs an explicit conceptual framework for

science diaspora networks and organizations, and it characterizes variability in structure and management across 21 networks.

In brief, the study shows that managers characterize **success** according to at least nine criteria, with nearly all managers tracking connections made and events held, and with managers using many different metrics within any given criterion, metrics that are often not present across all organizations. For **challenges** a majority of managers describe an increasing scarcity of resources—financial, personnel, or otherwise—that hindered the activities and potential of their organizations.

For **future plans**, nearly all network managers plan to make more connections with extant and prospective members and other stakeholders, and a majority plan to expand the network into new geographic areas, scientific disciplines, and other sectors. For **diplomacy**, managers discuss the capacity of networks to international collaborative research and promote foreign policy dialogue. Managers for

networks connected to governments especially see their networks as means to advance diplomatic goals.

Several results were common across those themes.

- We find potentially important misalignments between the prevalence with which managers discuss particular challenges, for instance scarcity of resources, and the prevalence or lack thereof with which they discuss plans to address those challenges or design success criteria informed by those plans.
- Managers are especially focused on how the COVID-19 pandemic and resulting public health measures are changing nearly every aspect of the operation, planning, and conceptualization of the networks.
- Managers discuss the importance in nearly every facet of the organization of helping researchers move internationally, manage emigration processes, and acclimate to local cultures.

Recommendations

Based on those results, this report makes the following recommendations.

For leaders or managers of network organizations

- Track a Broader Range of *Service* Accomplishments.
- Characterize and Track *Organizational* Accomplishments.
- Prepare Future Organization Leaders.
- Develop and Strengthen Cross-network Connections.
- Align Criteria of Success with Challenges and Future Goals.
- Continue to Think about Science Diplomacy.
- Publish Accomplishments.

For external organizations that support networks

- Governments, funding agencies, and philanthropies should support network organizations both materially and non-materially.
- Governments should explore creating or sponsoring diaspora networks if their countries do not have diaspora networks and if they are interested in remaining connected to their scientists abroad.
- Organizations interested in soft science diplomacy should seek out science diplomacy networks and their managers.

This report is descriptive and exploratory. We suggest an agenda of questions for further research into science diaspora network organizations.

- How do networks and network organizations affect their stakeholders?
- How do networks and network organizations influence science diplomacy and foreign policy?
- How are networks and network organizations evolving since the COVID-19 pandemic?

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1. INTRODUCTION

1.1 Science Diaspora Networks and Science Diplomacy

Scientific research fosters collaborations and the sharing of knowledge across international boundaries. In the 21st Century, highly educated and skilled professionals in STEM (science, technology, engineering, and math) increasingly emigrate from their countries of origin to pursue educational and career opportunities elsewhere (Anand et al., 2009; Barré et al., 2003; De Domenico et al., 2016; Docquier & Rapoport, 2012; Netz et al., 2020). Furthermore, many countries aim to recruit skilled foreign workers through programs often offering competitive salaries, funding for relocation, and lab start-up funds.

In their host countries or regions, emigrants often maintain connections with people from a shared country of origin. Demographers refer to these groups as *diaspora networks* (Box 1.1) (Mahroum et al., 2006; Panibratov & Rysakova, 2021). As these diaspora network communities evolve and grow, their members or outside stakeholders can form increasingly formal organizations to support and manage them (Gamlen, 2014; Gamlen et al., 2019; Panibratov & Rysakova, 2021). These network organizations enable and

manage member communications, events, and relations with relevant embassies and consuls.

Emigrant scientists create diaspora networks and associated managing organizations focused on supporting STEM communities (Barré et al., 2003; Brown, 2002; Meyer, 2001; Meyer, 2019). Example networks include the: Association of Scientists of Indian Origin in America; Korean Scientists and Engineers Association in the UK; German Academic International Network; Caribbean Diaspora for Science, Technology and Innovation; and the Netherlands Science Network with China. Previous studies have termed these *diaspora knowledge networks* or *science diaspora networks* and have shown how these networks foster community, provide professional and social opportunities to members, and cultivate transnational research collaborations and interdisciplinary partnerships (Burns, 2013; Ciumasu, 2010; Meyer, 2001).

Science diaspora networks are of interest to many countries and governments because of their potential as knowledge assets (Mahroum et al., 2006; Tejada et al., 2013). For countries that aim to support their emigrant researchers abroad, diaspora networks based in foreign countries provide information and broaden access to research resources such as funding, facilities, and education (Meyer, 2001;

Parmar, 2002; Poetscher, 2021; Welch & Zhen, 2008). For countries looking to counter so-called brain drain, or that are otherwise looking to recruit talent, relevant diaspora networks provide pools of recruitable scientists and channels to communicate with them (Brown, 2002; Ciumasu, 2010; Radwan & Sakr, 2018; Séguin et al., 2006; Zong & Lu, 2017). Finally, for countries that host diaspora networks, there is an opportunity to learn much more about how those networks advance local interests and support growing scientific diversity within those countries.

Science diaspora networks are also of increasing interest to those who work to understand or conduct science diplomacy (Ruffini, 2017). Science diplomacy is often conceptualized in three parts: how knowledge generated by scientists can inform international diplomacy (e.g. how documented fish migration patterns can inform fisheries treaties), how diplomacy can influence the conduct of science (e.g. by enabling international research centers or projects); and how the international scientific collaborations can influence diplomatic relations between countries (Copeland, 2016; Mauduit & Gual Soler, 2020; Ruffini, 2017; Rungius, 2018). Especially in the third sense, many treat science diplomacy as a form of informal cultural diplomacy, often called *soft diplomacy* or *track II diplomacy*, which is work done outside official channels of national governments (Kaltofen & Acuto, 2018; Nye, 2021; Ruffini, 2020). For research that is minimally politicized, track II diplomacy treats science as a tool for international norm building that has led to initiatives to develop climate resiliency, reduce nuclear proliferation, and normalize relations between antagonistic countries (Robinson, n.d.; Rungius et al., 2020; Witze, 2009; Zewail, 2010). Given that science diaspora networks span national boundaries, many see them as loci for science diplomacy that can benefit both researchers and their countries of origin

(Docquier & Rapoport, 2012). Managers and members of diaspora networks build connections between countries to foster research and innovation, and they often advocate for a range of policy priorities in and between the two nations (Poetscher, 2021).

A fourth and often implicit dimension of science diplomacy focuses on competition and national interests (Ruffini 2020). This dimension is often obscured by mainstream discussions of diplomacy, which tend to focus on peace and international cooperation. Nevertheless, competition is salient at least for issues of researcher recruitment, resources allocation, and scientific results informing the allocation of international resources.

Lastly, science diaspora networks are of interest to their participants and managers. These individuals conduct nearly all the activities within the network and for the network organizations. As discussed in our results, they care about the maintenance and persistence of the networks. Like host and origin countries, members and network managers are interested to learn which methods foster the success, persistence, and growth of networks. There is also an opportunity to learn much more from participants and managers of peer organizations.

We note several trends from previous research into science diaspora networks. First, much of the research on science diasporas focuses on individual countries or network organizations for purposes of evaluation or publicity (for recent examples, see (Avendano-Urbe et al., 2022; Bonilla, Aquino Valle, et al., 2022; Bonilla, Arrechea, et al., 2022; Bonilla, Romero-Oliva, et al., 2022; Gómez-Flores et al., 2022; Ortega-Paino & Oliver, 2022; Pandey et al., 2022)). These studies are often detailed and rich, and they can be complemented with results from studies that compare many organizations across multiple regions.

Second, previous research indicates that the managers of these organizations consider making connections as a primary criterion for success (Brown, 2002), and further criteria have been comparatively less studied. Recent literature has indicated that the impact of diaspora researchers on local policy issues may be a criterion soon considered more widely (Asturia et al., 2022; Barrios-Guzmán & de la Cruz, 2022). Regardless, there remains an opportunity to characterize criteria of success for network organizations. Third, research has shown that network organizations provides at least two functions: they keep diaspora members in communication with their countries of origin, and they provide origin countries access to their emigrant researchers as a way to combat so-called brain drain from origin countries (Brown, 2002; Meyer, 2001; Newman, 2003; Séguin et al., 2006; Zong & Lu, 2017). While many aspects of these diaspora networks have been studied, there remains much to learn about them as organizations and players in international diplomacy.

1.2 Need for This Research and Driving Questions

Despite previous studies of science diaspora networks, there are many unaddressed questions about the operation and management of network organizations (Barré et al., 2003; Brown, 2002; Meyer, 2001). Prominent among these are questions relating to program and organizational evaluation. Many stakeholders want to establish evaluation criteria for particular initiatives and document the value the networks add to their parent organizations (e.g. embassies), host and origin countries, and efforts for science diplomacy. Similarly, some network-of-networks organizations (e.g. EURAXESS) are interested in comparative measures by which to evaluate the health of the particular networks in their portfolios. With such

Glossary

Diaspora: A set of people who identify as from one country or region, usually due to birth or significant time lived there, but who live elsewhere. The relevant identities can be social, cultural, national, geographical, or a mix of the four.

Diaspora network: A network of people who are members of a shared diaspora and who voluntarily interact with each other. Interactions may be via informal conversations and social gatherings, or by more formal communication channels (listserv, social media group, etc.), regular social interactions, etc. Commonly the people share a country or region of origin *and* a host country or region. In practice, these networks often include people from the host country or region who have interests and identities in the country or region of origin.

Host country: For the overwhelming majority of members of a diaspora network, the country in which they now live.

Host region: For the overwhelming majority of members of a diaspora network, the region in which they now live. Regions are larger than particular countries, often covering continents or multiple countries with strong cultural or political ties.

Network: A set of items with relations between them. Often represented as dots or nodes representing the items and lines between the nodes representing relations.

Network organization: A formal organization that manages a diaspora network. An organization has at least one person who manages the budget, activities, communications, and resources for the network. Commonly they have bylaws and can be subunits of parent organizations (e.g. of embassies), non-governmental organizations, clubs, etc. They have histories and can be studied empirically.

measures, they can choose how to invest time, energy, and resources into individual networks.

These efforts cannot presently begin for several reasons. First, there is no universal understanding of what constitutes success for network organizations. There is no construct of success that is *a priori* true of all organizations and is also operationalizable for measurement in particular instances. Without direct and substantial input from those who manage organizations about how they define success, an evaluation criterion will impose an *a priori* metric from outside the organization that is unlikely to reflect, and may even subvert, its aims and the operations of the organization. It is an empirical program to characterize the aims and success criteria for any given organization, and to compare aims and criteria across organizations to determine which are shared widely, moderately, or scarcely. This empirical program is just beginning (see Echeverría-King et al., 2022 for a recent example).

Second, there is little general understanding of how science diaspora networks view their role in engaging with and influencing science diplomacy, which is a complex construct. As with success, there is no construct of science diplomacy that is *a priori* true of all organizations and is also operationalizable for measurement in particular instances. Again, it is an empirical and developing program to characterize the proximity to diplomacy for any given organization, and to compare diplomatic involvement across organizations to determine which forms of diplomacy are shared widely, moderately, or scarcely.

Third, there is substantial heterogeneity among science diaspora network organizations. When compared to each other, networks vary in size, structure, age, relevant nationalities and cultures, available resources and funding, and

Glossary, continued

Origin Country: For the overwhelming majority of members of a diaspora network, the country they moved away from and for which they identify or maintain interests and connections.

Origin Region: For the overwhelming majority of members of a diaspora network, the region they moved away from and for which they identify or maintain interests and connections. Regions are larger than particular countries, often covering continents or countries with strong cultural or political ties.

Science diaspora: A diaspora in which the people are trained, practicing, or professional scientists or STEM researchers.

many other features. Variation in these characteristics may influence variation in how organizations conceptualize success and their approach to science diplomacy. For instance, a small, volunteer-based network of Latin American researchers in Western Asia may have very different aims than a large, embassy-supported network of European researchers in North America. The missions and aims of these vastly different organizations can vary widely. Thus, strategies and activities that are effective for one organization may be ineffective for the other. There is a need to develop categories to characterize organizational heterogeneity among diaspora network organizations, and to observe how this heterogeneity relates to how organizations define success and understand their relationship to science diplomacy.

We therefore designed an exploratory and descriptive (Gerring, 2012) study to address the following questions for a set of science diaspora networks.

1. How do science diaspora networks vary in structure and funding?
2. How do network organizations conceptualize success?
3. What challenges do these organizations confront?
4. What are their future goals or plans?
5. How do networks organizations conceptualize their relationships to science diplomacy?

The findings of this study will be useful to many stakeholders of science diaspora networks including but not limited to: network members, network managers, countries of origin, host countries, funders, administrators of academic and research centers, STEM-related industries, and diplomatic organizations and officials.

1.3 Methods Overview and Report Structure

To address those questions, we conducted an exploratory and descriptive interview study from March 2021 to February 2022 (Charmaz, 2014; Kvale, 2007; Miles, et al., 2018). Section 6 of this report provides a more detailed account of the methods overviewed here.

First, we developed and iterated a list of 43 science diaspora networks. Second, we recruited managers from all 43 network organizations to participate in an interview study, and we ultimately interviewed managers from 21 organizations using a semi-structured interview script informed by the research questions above (Appendix 1). Third, we inductively coded the transcripts of the interviews to identify themes and subthemes that were commonly discussed across the interviews. In Section 2 we quote extensively from the interview transcripts. We modified quotes to maintain speaker anonymity by inserting

bracketed category variables in place of proper names. We also deleted a few filler words (e.g. 'um'), but overall we strived to alter the quotes as little as possible to maintain fidelity to the interviewees' thoughts and expressions.

Fourth, we tracked variations in organizational characteristics by developing an informal database. To categorize participating organizations, we consulted the interview transcripts, websites, and public organizational documents of each diaspora network in our study. In Section 2.1 we graphically summarize subsets of the 21 interviewed organizations. We compared the subsets to the interview themes to identify correlations. Recently, we published an updated and expanded database of scientific diaspora networks (Butler et al., 2022).

The interviews were conducted on condition of anonymity so that managers could feel comfortable speaking freely. To protect their anonymity in this report, we use no identifying characteristics, and we have replaced all network, country and institution names with anonymized identifiers (Table 2.1.a).

The rest of this report is structured as follows. Section 2 details the results of the study. Section 2.1 characterizes the 21 organizations studied and their variations in structure, funding, age, etc. Sections 2.2 through 2.5 each cover one theme and a related set of subthemes. The themes discussed in order are Success, Challenges, Future, and Science Diplomacy. The discussion in Section 3 provides interpretations of the results, and it notes the limitations of the study and its potential for generalization and for informing further studies. Section 4 provides final conclusions and recommendations, and Section 5 lists acknowledgments. Section 6 details the methods, and Appendix 1 provides supplementary materials.

2. RESULTS

We discuss in order the overall population of networks studied (2.1), and then the themes of Success (2.2), Challenges (2.3), Future Plans (2.4), and Science Diplomacy (2.5).

2.1 Description of the Population of the Networks

We studied a pool of 21 science diaspora network organizations. We grouped them into categories as detailed in section 6.4. These groupings are: perceived federal influence from country of origin, structure, funding, age, and polity scores for the organizations' origin and host countries (Table 2.1.a).

The first grouping is by federal status, with categories of perceived federal and perceived non federal indicating that the organizations did or didn't have strong ties to a federal entity for funding. The networks perceived to be federally backed often had one prominent funder, a department or agency within the government, and had to align their goals with mandates specified by their funders. The second grouping is degree of structure, with three discrete categories of loosely, moderately, and highly structured. The third

Table 2.1.a Participant Organizations and Their Characteristics

Organization (n = 21)	Affiliation Type	Structured	Funding	Age
HS-1	Federal	Highly	Stable	20+
HS-2	Federal	Highly	Stable	20+
HS-3	Federal	Highly	Stable	20+
HS-4	Federal	Highly	Stable	20+
HS-5	Federal	Highly	Stable	10-19
MN-1	NonFederal	Moderately	None to Little	10-19
MT-1	Federal	Moderately	Transient	0-9
MT-2	Federal	Moderately	Transient	0-9
MT-3	NonFederal	Moderately	Transient	10-19
MT-4	NonFederal	Moderately	Transient	10-19
MS-1	Federal	Moderately	Stable	0-9
MS-2	NonFederal	Moderately	Stable	0-9
MS-3	Federal	Moderately	Stable	0-9
MS-4	Federal	Moderately	Stable	0-9
LN-1	NonFederal	Loosely	None to Little	0-9
LN-2	NonFederal	Loosely	None to Little	0-9
LN-3	NonFederal	Loosely	None to Little	0-9
LN-4	NonFederal	Loosely	None to Little	10-19
LN-5	NonFederal	Loosely	None to Little	10-19
LT-1	NonFederal	Loosely	Transient	0-9
LT-2	NonFederal	Loosely	Transient	10-19

Notes: Ages are in years.

Categorization of the Diaspora Networks

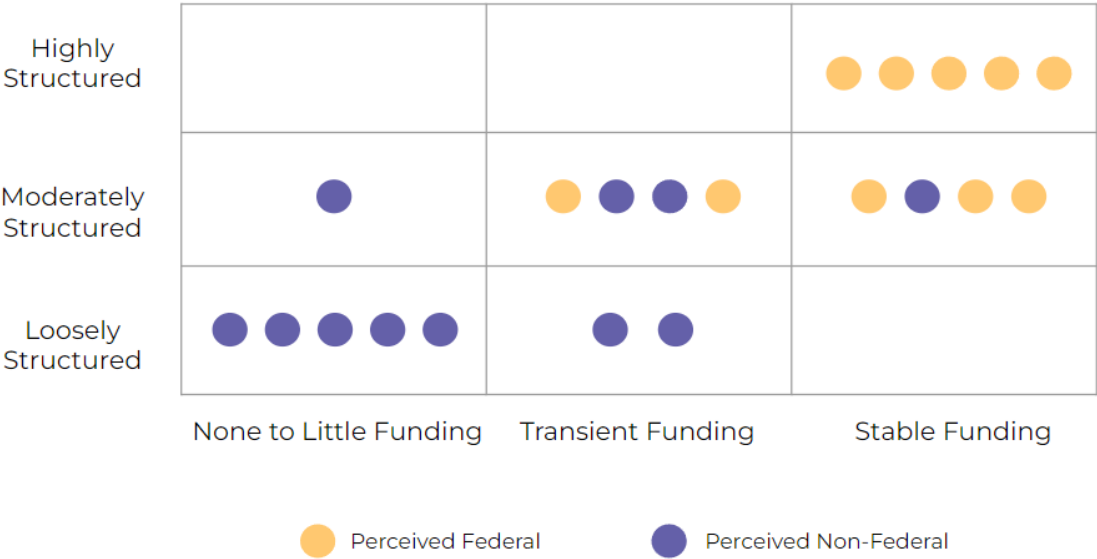


Figure 2.1.a: Relation between Organizational Structure and Funding. Each dot represents an organization, with orange dots representing organizations with perceived federal government funding, and purple dots representing organizations with no perceived federal funding. Figure shows that federal organizations are more likely to have more structure and stable funding compared to non-federal organizations.

grouping is by funding, with three discrete categories of none to little, transient, and stable funding, and lastly the networks' relative age, based on interview content or their websites, is listed.

Table 2.1.a indicates that the highly structured organizations tend to be older, have federal affiliation to their home countries, and have more reliable funding streams. Loosely structured organizations

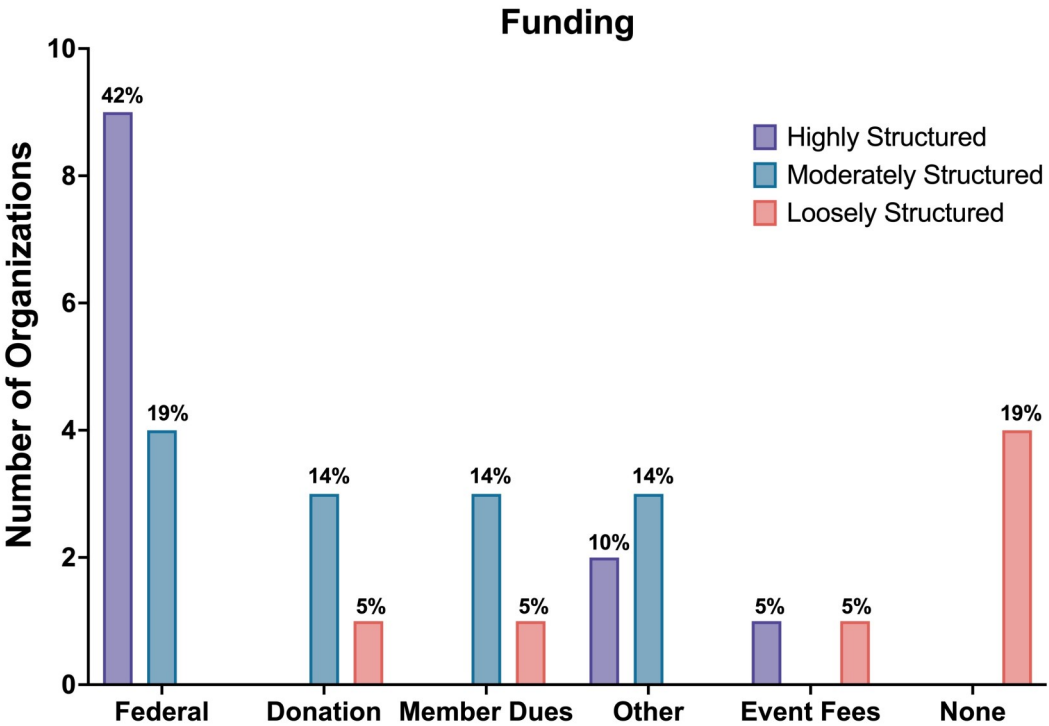


Figure 2.1.b: Relation between Organizational Structure and Sources of Funding. The graph demonstrated the instances of various funding mechanisms mentioned by highly (purple), moderately (blue) and loosely (orange) structured organizations. The percentage above each bar represents how many of the total number of organizations mentioned using a particular funding mechanism.

2. RESULTS

tend to have no federal ties, but age and funding overlap with moderately structured organizations. The variability of funding is visualized in Figure 2.1.a. It shows that networks with stable funders are primarily federally managed organizations. For these network organizations, their funders have controlling interests in their activities. Organizations with little connection to a federal entity are more likely to have none to little or transient funding, and they were more likely to be loosely or moderately structured.

For each organization, we tallied distinct kinds of funding sources. Figure 2.1.b shows the breadth of funding, which include federal allocations, donations, member dues, event fees, other sources, and cases in which networks had no funding at all.

Highly structured organizations overwhelmingly relied on federal allocations. Moderately and loosely structured organizations both had equal variety of funding sources, but moderately structured organizations had more

Table 2.1.b Age and Polity Score of Participating Networks

Category	Number of Networks		
Age (years)	0–9	10	
	10–19	7	
	20+	4	
Polity Score	Country of Origin	Host Country	
	-10 to 0 (autocracy)	2	4
	0 to 10 (democracy)	20	17

Notes. Ages relative to 1 February 2022. Polity scores assigned based on the Polity 5 Database from (Marshall & Elzinga-Marshall 2017). If there are multiple countries of origin, the network is only included if they all have a similar policy score. Global origin or host is not included.

prevalence of funding.

Organizations were also grouped into age categories and polity score based on country of origin, as shown in Table 2.1.b. Age categories are in years of 0 to 9, 10 to 19, and 20+, relative to 1 February 2022.

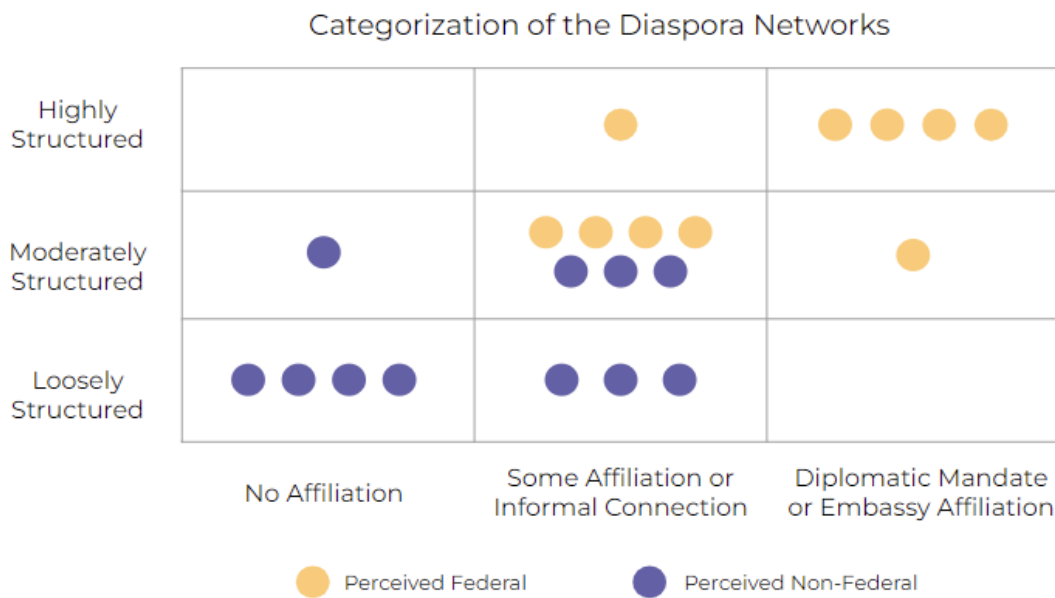


Figure 2.1.c: Relation between Organization Structure and Diplomatic Engagement. Each dot represents an organization, with orange dots representing organizations with perceived federal government funding, and purple dots representing organizations with no perceived federal funding. Figure shows that organizations with embassy affiliations and diplomatic mandates are mostly highly structured and federally funded. Organizations with no embassy affiliations are mostly loosely structured and without federal funds. Organizations with some connections to embassies or diplomacy projects are mostly moderately structured, with a mix of organizations federally funded and those that are not.

2.1.1 Characteristics of a Highly Structured Network

Among the 21 organizations studied, 5 are highly structured, and all of those were created and funded by the relevant country of origin's federal government. The intentions motivating the creation of these networks varied and were often multifaceted. Founding governments aimed to maintain connections with their émigré researchers, to represent science in their diplomatic corps, or to create a body that could create connections and maintain national interests and competitiveness. This latter point was repeated across nearly all of the networks in conjunction with concerns about so-called brain drain.

Four of the network organizations are housed within government units. Managers interviewed from these organizations typically said that their government units periodically evaluated them and granted them substantial autonomy in daily activities.

Interviewees also described flexibility in structure, with 3 network managers mentioning that their organization is decentralized to allow for flexibility in programming, and 2 managers mentioned that their organizations contract side projects for additional networking and funding.

All of the highly structured network organizations manage multiple locations, often called offices, local hubs, or chapters. These locations are primarily selected based on operating zones of interest, though what interest means varies for the networks. Many referenced their locations as having influential pockets of scientific personnel that they wished to tap into.

2.1.2 Characteristics of a Loosely Structured Network

Of the 21 organizations studied, 7 are loosely structured networks characterized by grassroots or nonprofit-led creation and a lack of stable funding. Managers of these organizations are often founding members. They typically talked of creating the network out of a need for community, information sharing, or wishing to replicate existing networks for their particular diasporas. Five of the organizations are registered as non-profit organizations, 4 of which had achieved that status after previously existing as volunteer organizations. Additionally, one organization was created by consolidating several prior networks during financial difficulties.

Loosely structured organizations have little to transient funding or resources. Interviewees from 3 of the 7 organizations mentioned having no current funding and relying entirely on volunteer labor. Others said that they use irregular event fees, membership dues, and donations to cover costs. Managers mentioned that lack of funds were a perennial issue, and that their operating budgets were equally minimal. Most of these networks use funds primarily for events.

For management structure, 3 organizations use a minimal hierarchy and three reported no explicit governing structure. Minimal hierarchies involve two tiers—an explicit organization leader and all other members—due to the small size of the networks. Only one loosely structured organization have more than one chapter or location. Several of the organizations without a clear governing structure self-described their networks as 'not very well managed', citing either high turnover, unclear organizational structure, or ambiguous future plans.

2.1.3 Characteristics of a Moderately Structured Network

The 9 moderately structured organizations fit in neither of the previous two categories, and they are diverse in their characteristics. For example, 3 of the organizations began as non-profit organizations, 2 as volunteer organizations, and 4 started with federal support. Those that started as grassroots efforts or with federal support had grown in size and mission and had diversified their funding efforts to reach a level of stability not shared by loosely structured networks. For management, one network has federal oversight, and the rest have a mixture of hierarchy and decentralized governance. Unlike the loosely structured networks, interviewees noted no dissatisfaction over network administration.

These organizations relied on a range of funding sources, including donations, membership dues, private funding (contracts, partnerships, and sponsorships), and federal grants. They averaged 1.8 different funding sources, nearly double the averages for highly structured and loosely structured organizations. This diversity in sources and in methods of acquiring funds is the defining characteristic that distinguishes organizations in this category.

2.1.4 Member Selection

The criteria that organizations use to include and recruit members relates to how the networks are organized. As the networks studied focused on diasporas, the majority of organizations regardless of their level of structure used country affiliation as a screening mechanism. 12 of the 21 organizations studied stated that a relationship to the home country, either through citizenship or an interest in the country or its culture, is a feature looked for in members. Several interviewees noted that while their organizations were founded to cater to a specific country's diaspora, they would need to look beyond nationality to further grow the network.

Some organizations screened network members for skill sets, most commonly technical backgrounds or education in the STEM fields (5 of 21), and one network was designed for the alumni of a prestigious fellowship. The use of awards was intended to collect a more prestigious group of members so that the organization could have more targeted impacts, perhaps influenced by a limited budget. Highly structured networks tended to recruit their members based on skill sets, as many were created to maintain connections to skilled workers abroad.

Five networks had minimal to no screening requirements, open to anyone interested to join. These networks varied in their reasons for openness, attributing it to helping anyone interested, looking to broaden their membership, or not having considered more specific membership criteria.

2.2 How Network Organizations Characterize Success

Interviewees discussed nine subthemes of success (Figure 2.2). Subthemes of Connections Made and Events Held are shared across strong majorities of all 21 network organizations. Six subthemes each represent different collections of roughly half of the organizations. These six are Visibility Enhanced, Positive Feedback Received, Mobility Facilitated, Professional Development Supported, Organizational Growth, and Followed Direction from Chapters or Members. A final subtheme of Information Gathered was discussed only by a substantial portion of organizations with stable funding, and all of which were strongly tied to federal funders.

We discuss each subtheme in order of most widely shared to least. For each subtheme, interviewees discussed that they considered advancing, meeting, or surpassing it as a marker of success for the organization.

2.2.1. Connections Made

Interviewees for 95% (20/21) of network organizations discussed the subtheme of Connections Made. Interviewees said that they evaluated their organization by how well it built new and strengthened extant connections between and across individuals, organizations, governments, and home cultures.

For instance, interviewees typically said "What makes [our] network successful is when people know one another through the network...so the network is really interconnecting the people" (MT-1), and "Our main goal is really just to connect people" (LN-2). Others noted the importance of connecting people and organizations, like government embassies.

"Then, when [members] say they want to get in touch with their embassies...they're proactive about it and they're interested in getting in touch with [the embassies]. And we just do that, that's very easy, for I know the embassy people...so I can very easily put them in touch." (MS-4)

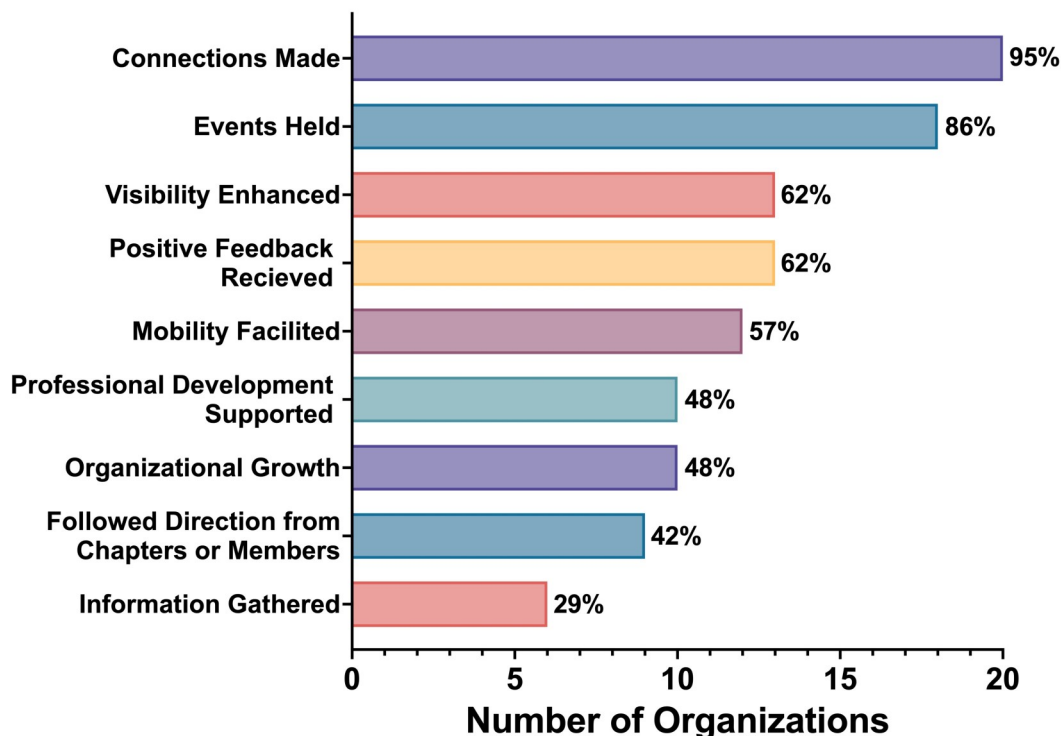


Figure 2.2: Subthemes within the theme of Success. The figure shows nine subthemes discussed by interviewees ordered by prevalence.

Others focused on different sectors such as academia and business.

“For me it was very important to bring in people in academia and industry, and have connections between those two areas because there's so much good research happening in both, and it feels sometimes that they're quite isolated from one another.” (LN-2)

Some discussed cultural connections.

“I'm so happy so those are to me like the real moments where when a scientist says, 'Look, I still feel like I'm part of the [origin country] community, even though I've been here [in host country] for 15, 20 years', then we've done our job right because we want to build like this connection and identity where people feel seen and heard.” (HS-4)

2.2.2 Events Held

Interviewees for 86% (18/21) of network organizations discussed the number and variety of Events Held as a marker of success. Interviewees described a range of different kinds of events (Box 2.2.2). While the kinds of events differed across organizations, almost all of them considered event execution as a primary marker of success, especially for annual cycles of planning and organizational review. All organizations with none to little or transient funding discussed the importance of holding events as a marker of success, while three organizations with stable funding did not discuss this topic.

Interviewees typically said things like “We're an events driven organization, right now at least, so that's what [we're] focused on” (LT-1), and “Success is, I think we measure that by the events we hosted. How many people applied? Yeah. Do we have enough speakers? Were people afterwards, were they happy?” (MS-3).

Some tied the signature event to fundraising.

Box 2.2.2 Types of Events Held

- annual conferences for network members
- focused workshops or webinars on research or logistical topics of interest, e.g.
 - vaccination drives
 - professional development
 - navigating bureaucracy
- social and cultural excursions, e.g.
 - camping
 - picnics
 - heritage festivals
 - holiday celebrations
- featured speakers, e.g.
 - scientists
 - business people
 - government or embassy officials
- mentoring sessions
- loosely structured small socializing events

“And [the organization founders] had that mission to come together to have a scientific meeting. It's always scheduled around the talk and they just got together, they had drinks, they had foods, and had a conversation before and after the lecture, and it was like, every three months. Because they had like this big fundraising event when all the attendees could donate money and be fed.” (LN-4)

2.2.3 Visibility Enhanced

Interviewees for 62% (13/21) of organizations discussed the subtheme of Visibility Enhanced. Interviewees discussed that their organization publicizes information about the network itself, the work of its members, or of members' countries. Audiences could be wide and public or targeted to specific institutions, such as universities, funding agencies, professional societies, government bureaus, embassies, etc. For some organizations, enhancing visibility also involved presenting awards

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and grants to members for outstanding research contributions.

Interviewees typically said things like "Whatever [members] do, we are just kind of a conduit or a platform to showcase it or to help catalyze it by connecting them to other members" (MN-1), or "Our main goal is to become the voice of the researcher" (MS-2), or "It's about kind of showcasing the breath, and the excellence of [origin country and host country 1] research for example or [origin country and host country 2] research, which happens organically and brilliantly already and has done so for generations" (HS-5).

Some noted that the network aimed to influence public perception of a nation or its researchers in a different nation.

"And then there's the sort of the wider goal, slightly distinct from policy, basically what you might call public diplomacy. That's basically, burnishing the [origin country's] credentials as a kind of science and innovation nation, and with aspirations and ambitions to know to be better and bolder. So, within that, there is a what you would call a "values" or "force for good" agenda which is lots of these things that we are joining and connecting our scientists on and our research is about solving the existential global challenges that we face. Climate change being a key one; but actually the COVID response and global health being another one. So, there is a very strong values piece coming through to this which is linked to but slightly distinct from our kind of pure foreign policy goal." (HS-5)

While others noted that the network aimed to influence public perception of a nation or its researchers in a nation of origin.

"But also for us, one of the other goals that we want is to create visibility about the excellence and the breadth of what [origin country] scientists are doing in

[host region]. Towards not only the [origin country] science community in [host region] and our stakeholders like the embassy or official institutions, but also to the broader public back home in [origin country]. So we are very actively collaborating with media and journalists etc. So basically whenever we have a very impactful publication by somebody who has [origin country] background or roots then we immediately, we have our network of journalists and we feed that to them. We are basically a resource for them." (MT-4)

2.2.4 Positive Feedback Received

Interviewees from 62% (13/21) of organizations discussed Receiving Positive Feedback. Such feedback usually comes from network members or from representatives of institutional stakeholders such as funders, embassies, partner professional societies, and other diaspora networks. Feedback is often collected in highly structured formats, for instance in surveys to members or via questionnaires completed by individuals who attended events hosted by the network organizations. Many interviewees mentioned that they also receive loosely structured and usually unsolicited feedback via hallway chats, emails after events, social media posts, and comments and suggestions from embassy representatives.

Interviewees typically said things like "For us, the subjective feeling is much more important than the hard numbers" (MS-1), or "I feel that we're successful when our researchers give us the feedback that they feel seen, they feel heard, they feel that [origin country] is paying attention to them, and that they still feel like they're part of the [origin country] scientific community" (HS-4).

Such feedback was especially important to the network managers to motivate their work.

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“So that’s definitely like the most, at least for me, empowering thing. When you hear from a member who tells you that ‘oh you shared this and it was really useful for me and my work.’ So I think that’s what makes me feel like we’re doing something worthwhile...We have done a couple of surveys for specific things that we’ve done to see if people have enjoyed [programming] but it’s mostly just, as I mentioned briefly earlier, that people are sending unprompted emails saying [they] like something. Or we have a [project management website] where we have all our members and we put up resources and things like that. And through that people can also comment on what we post, and sometimes they share, like, “Oh, this is great” and “this was really useful to me.” (LN-2)

2.2.5 Mobility Facilitated

A fifth subtheme for success is Mobility Facilitated, discussed by interviewees from 57% (12/21) of organizations. Interviewees who discussed this subtheme noted that diaspora researchers must navigate significant logistical and cultural tasks when moving abroad, and that the organizations aimed to help alleviate burdens or obstacles to achieving these tasks. Logistical tasks include securing visas or other government documents from origin and destination nations, navigating customs processes, completing paperwork for employers, following policies for receiving and spending funds from agencies or foundations, and securing housing, transportation, and healthcare. Cultural tasks include, on the one hand, acclimating to the norms, mores, cuisine, and social options of a new country, including making interpersonal relationships. On the other hand, cultural tasks also include finding a community of cultural compatriots in a new nation. Interviewees typically said things like “We can be facilitators in enhancing international science mobility and cross

national collaboration of scientists” (HS-3). Some discussed the importance of welcoming diaspora researchers to new locales.

“The idea is to, like, welcome...the new people coming to the [host country] and help them to integrate [into] the city to know other people...that are in the same situations, because they just came. These [researchers], they just came with their family alone. So... we create a network in the city to support them and to help them to face the first situation, the first experiences that you can have in a city that you don’t know.” (LN-3)

Some noted the importance of social ties.

“Some people come here to [host country]. They feel a little lonely, or they don’t have so many friends. Our network helps with this, no? Like they find some friends. We also organize some activities to climb a mountain, or to have dinner. A lot of people find our network, our association, very useful especially to find friends to meet people, to have a group.” (MT-2)

While some network organizations aimed primarily to enable a particular diaspora in a particular national or regional context, several explicitly aimed to recruit diaspora members back to their countries or regions of origin.

“Our mission is [to] help [origin country] scientists move back to [origin country]...We want people to come back. We think that those brilliant minds and brilliant people should find their place back in [origin country].” (MT-3)

2.2.6 Professional Development Supported

Interviewees from 48% (10/21) of organizations discussed a sixth subtheme Professional Development Supported (Box 2.2.6). These accomplishments go beyond publicizing the research of members or disseminating job ads. Interviewees typically said things like "I think that the career development is very important, especially for us coming from overseas. We don't have networks, we don't have connections" (LN-5), and "We're trying to make it attractive to [diaspora researchers] to be able to join these networks because it's going to be, you know, just useful and good for them" (MS-4).

Different organizations ran different kinds of programs. For instance, "We had a mentoring program focusing on researchers' mental health, and it has huge interest. And it's fully volunteer-run and there is no money involved so I call this a success" (MS-2).

Or:

"We also have programs of internships, where we work with institutions in [origin country] to facilitate the access of students, or new graduates in [origin country's] universities, or early career people, access to institutions—research institutions—in [host region] for research experience or educational experience in the context of a degree that they might be working on." (LT-2)

Furthermore, some organizations talked about different kinds of awards. For instance, "[It's] awarded to young investigators, and that [is] a signature program that we have had for over 10 years now" (LT-2).

Or:

"[Organization founders] established an award [of] which they are really proud, and that's...a very major goal, for me to keep that alive. We provide roughly a

Box 2.2.6 Professional Development Activities

- promoting mentorship, travel, and internship programs for students and junior researchers
- offering or publicizing awards programs for early career researchers
- funding seed grant competitions
- publishing digital newsletters, blogs, and journals
- providing guidebooks and FAQs about professional success in a host nation
- offering workshops focused on specific topics like
 - administering grant budgets
 - writing manuscripts
 - writing proposals and annual reviews
 - forming a business
 - work-life balance
 - nurturing collaborations

[currency amount] award for a [origin country] young scientist who [is] living in [origin country]...so I think that's one of the major goals—to get together and have this award and just give back." (LN-4)

There was a correlation between the categories of funding type and the share of organizations that explicitly mentioned this subtheme. It was discussed by 67% (4/6) of organizations with none to little funding, by 50% (3/6) of organizations with transient funding, and by 33% (3/9) with stable funding.

2.2.7 Organizational Growth

Also discussed by interviewees from 48% (10/21) of organizations is a subtheme of Organizational Growth, in terms of raw numbers and of rates of change. Growth applied to a range of different kinds of organizations features that can be counted and tracked over time (Box 2.2.7).

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Box 2.2.7 Features of Organizational Growth

allied institutions (universities, funders)

- allied people or leaders from those institutions
- chapters (by region or discipline)
- diversity in members and allies
 - age
 - career stage
 - current regional locations
 - gender
 - race
 - sexual preference
 - research disciplines
- events
 - kinds (workshops, conferences, social gatherings, etc.)
 - number
 - size (attendance, program, partners, etc.)
- funding (number of sources and amount of money)
 - contracts
 - donations
 - dues
 - grants
- network numbers
 - members
 - leaders
 - connections between members
- messages sent to members and allies from
 - listservs
 - social media
- other digital analytics
 - listserv engagement
 - social media reach
 - website size and traffic
- services
 - frequency
 - kinds (program for internships, mentoring, etc.)

Interviewees typically said things like "So we measure our success and the numbers... the members quality in their projects, and the number of partnerships we have..." (MN -1), or to "Increase the array of sponsors, funders, partners, and increase... reliance on our network on the part of our partners and entities who wanted to associate with us" (LT-2).

Some organizations also considered their leadership and succession planning as essential to growth.

"Growing the leadership means that we want to be able to grow our successors. If you wish, it's not different from succession planning. We have a board of directors, we wanted to grow the candidates [for] the next board of directors. We have chapters, so those provide the leadership at the regional level because we are a national network. We want to grow a cadre of people who have the necessary interest in the ability to be the next leaders in the chapter. So true leadership in the chapter becomes [qualification for] a candidate to take up leadership in the organization." (LT-2)

A few also considered diversity.

"One of the metrics is now also numbers of applications and also a big topic lately has been diversity of our network as measured through diversity of applications for our [organization] awards...basically if you have published a paper in the last year, you're already eligible for the [organization's] awards...and the diversity aspect of that is really important to us because you know there's a natural bias towards biomedical or physics. Less so, you know, social sciences, etc. Big bias towards, you know, white men. If you look at publications, two thirds are always men. So basically, how are we reflecting the network?" (MT-4)

Organizations paid special attention to growth during the COVID-19 pandemic, as some organizations' features grew and others didn't, with mixed results.

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“[N]ow it is easier to reach more researchers so that the our numbers are increasing a bit faster because of COVID, you know, not because of the results of COVID, you know, so it has some good and bad effects for us, because although [we] have really good increasing numbers, but the connections are not really strong.” (MS-1)

2.2.8 Followed Direction from Chapters or Members

Interviewees from 42% (9/21) of organizations discussed a subtheme of Followed Direction from Chapters or Members. Many organizations didn't have regional or disciplinary chapters, or they rely on leaders and sponsors to set metrics of success, so this subtheme didn't apply to them. But a significant portion of organizations discussed giving autonomy to chapters, if they had them, or having regular venues for members to suggest and implement markers of success.

Interviewees typically said things like:

“We give a lot of independence and a lot of flexibility to the different locations. We also strongly believe that what works as type of collaboration, as type of project, as type of people, what works in [host country city] is not the same as what works in [external country 1], or in [external country 2].” (HS-1)

Similarly:

“I really care about trying to support these individuals. I really want to. I feel like what distinguishes us as a network here is that we're not working with institutions, we're working with people. And we approach this whole structure from the bottom up through the individuals and then we can like, through them, we can learn how these other structures work and so on.” (MS-4)

2.2.9 Information Gathered

A final subtheme is Information Gathered, discussed by interviewees from 29% (6/21) of organizations, all from the group of organizations with stable funding from federal governments. This subtheme focuses on the host region or country. It includes systematic surveys of researchers' living conditions, information about the structures and functions of social systems of research, and information about current trends in local research. Organizations with large diasporas also used their networks to connect journalists and other media professionals from one country with those in another. Interviewees described themselves by saying, “We're information brokers” (MS-1).

Some organizations focused on information exchange between network members and embassies and foreign ministers.

“Oftentimes the people that come [to events] are policymakers...[t]hey like to speak with our scientists about their experiences here, not just about research but also about the framework within which they actually do their research.” (HS-4)

Some focused on issues of scouting.

“What is important is really this role of scouting. For example, seeing what trends are coming. And we see that the trends that are coming in [host country], they will at some point... come to [origin country] and they serve as an inspiration.” (HS-1)

And:

“And then along the way it turned out to be actually a very good tool for other things as well. For also collecting information, you know, to hear what is happening, what the issues are that they're facing. Later I got in touch with the [intergovernmental] delegation... which we actually have a good relationship with now. So that was not initially planned at all. And now we're more involved with these policy issues, I think.” (MS-3)

2.2.10 Summary

Table 2.2.10 summarizes the theme of Success and its subthemes.

Table 2.2.10: Summary Table of Subthemes for Theme of Success.		
Theme	Subtheme	Share of Organizations
Success	Connections Made	95% (20/21)
	Events Held	86% (18/21)
	Visibility Enhanced	62% (13/21)
	Positive Feedback Received	62% (13/21)
	Mobility Facilitated	57% (12/21)
	Professional Development Supported	48% (10/21)
	Organizational Growth	48% (10/21)
	Followed Direction from Chapters or Members	42% (9/21)
	Information Gathered	29% (6/21)

2.3 How the Network Organizers Characterize Challenges

Interviewees discussed four subthemes of Challenges (Figure 2.3). Changing or Lack of Resources emerged as the main issue shared across majorities of all 21 network organizations. Three subthemes each represent different collections of just less than half of the organizations, these are: Inability to Hold In-Person Events, Difficulty Gathering and Evaluating Data, and Mobility Constraints and Deteriorating Relationships. The subthemes are sometimes meaningfully disaggregated below by categories of organization age, funding, and polity score, as characterized in Section 2.1.

2.3.1 Changing or Lack of Resources

Interviewees from 62% (13/21) of organizations discussed the subtheme of Changing or Lack of Resources. While most issues relate to a lack of funding,

other challenges include staffing, structure, and institutional knowledge. Interviewees said that they operate with suboptimal resource levels. While some attempt to be “hard-nosed on [key performance indicators]” (HS-2) to demonstrate their effectiveness, others are floundering without “the resources or ability to emulate” (MS-1) successful network models and outcomes. Some struggle to perform basic functions, and still others are fighting to be “recognized and supported to some extent” (LT-2), by their countries of origin.

Funding

Managers were concerned about funding, even prior to the economic impact of the COVID-19 pandemic. They talked about how resources affected their ability to hire staff, manage resource tools for members, and deliver services to their network. One manager discussed trying to update the network’s member management system:

“It’s a very old [tool] but they tried to build into [it], and it’s again just no money and yeah. The other thing was there was no money. Of course, I was not able to do that on my time, and I do think a president should do that or so, but we couldn’t hire

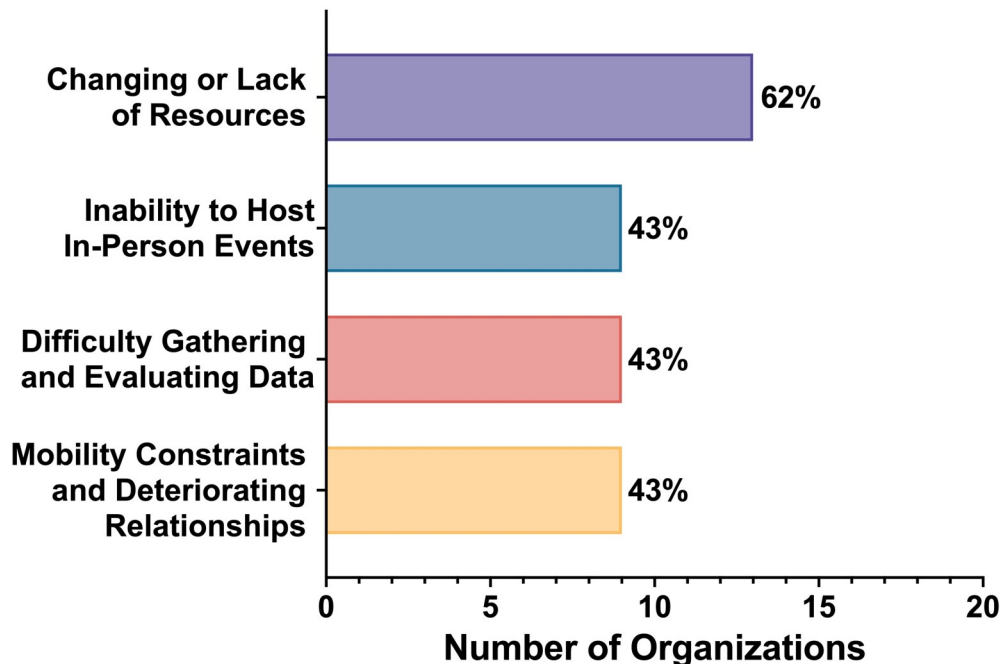


Figure 2.3: Subthemes within the Theme of Challenges. The figure shows four subthemes discussed by interviewees ordered by prevalence.

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anybody to do that work. They [the funders] didn't want to spend the money on it, so those are the challenges." (LN-4)

And:

"[I] came on in a volunteer capacity. So I'm actually a volunteer. And there are no staff, so the people I recruit are volunteers, undergrads, who volunteer their time to keep this moving. So because of that, and you know COVID hit, as well. So all of those coming together kind of minimized the capacity and bandwidth on which we can work." (MN-1)

In some cases funding and fundraising was "severely impacted by COVID" (LT-2), while others were already dealing with low levels of funding or resources as a result of "being part of the developing world" (MN-1). Some noted that their sources of funding were changing, that they had hoped for "entities, other than the government to support [them]... [but] those are more difficult to come by" (LT-2). Several remarked that "they get really big support from the [host country]" (LN-4), but suffer from "limited investment" (LT-2) with no opportunities to apply for funding from their countries of origin.

Interviewees said that future hybrid events will be "complicated and very expensive to do" (LT-1), citing the cost of hosting an in person event combined with the technical requirements and costs for ensuring online participation.

Lack of staff

Interviewees noted a lack of funding for staff, and the absence of dedicated staff and of highly trained network managers. Several were explicit that they were "not talking about money, because many of these things... just energy and time, which is very priceless" (LN-4). Most had specific projects, such as overseeing online communications with new members, that they acknowledged would benefit from dedicated staff. Managers noted that these issues "minimized the capacity and the bandwidth on which we can work" (MN-1) when working with

volunteers. High turnover also affects working knowledge of individual members that comes easily to more experienced personnel.

Managers discussed these issues in context of the COVID-19 pandemic. They noted that high staff turnover means many are "adapted to the pandemic" (MS-1) and don't have any experience with in-person meetings and events. Others noted that, especially early in the pandemic, the staff

"Suddenly became entirely overrun by questions from our network, and from our colleagues at the various [country] consulates and embassies in [host country 1] and [host country 2]. Because everyone was turning to them and saying 'what do we do now?'" (HS-3)

2.3.2 Inability to Host In-Person Events

Interviewees from 43% (9/21) of organizations discussed the subtheme of Inability to Host In-Person Events. These can include everything from large conferences and networking events, to issue-specific group meetings, chapter hub meetings, and one-on-one meetings. Because many networks characterize success by the number of events held (Section 2.2.2), managers cited the inability to meet in person as a result of the COVID-19 pandemic as a major challenge. Even with online technology, managers typically felt that "the connections made are not really strong, and they can just unsubscribe" (MS-1).

While many remarked that "people want to get back to in-person events" (LT-1), they conceded that they "found some good value in digital programming" (LT-1), and they were likely going to move to a hybrid event model in the future. Interviewees stressed that before the COVID-19 pandemic, "90% of all events were located by location. Because of [COVID-19], 90% of the events are online by webinars" (MT-3). Some interviewees noted that the move to

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virtual space was “strengthening the national network” (LN-3), although often at the expense of local-level engagement. Indeed, some networks were even able to develop new chapters that were previously separated by geographical barriers.

But managers said that virtual spaces require greater effort to build strong relationships, and reduce opportunities for spontaneous connection. One noted:

“This is very difficult right now. When you can’t bring two people together, when you can’t have face to face discussion, when you can’t have a room and then you meet somebody just by chance, and you’re interested in the same topic, but actually you’re not in the same room. Or you[re] in the same virtual room but you don’t know who that person is and you, you won’t be like, just like bumping into the person and having - you’re starting to create a discussion of this, and this is something where [network] is also important. And that is really challenged right now.” (HS-1)

Another added:

“With the online nature of it, it makes it a bit hard, we can be, they can feel a bit unnatural and there’s a lot of subjective aspects of being face to face with someone, sipping at coffee, even if it’s at some annual meeting in a city that neither of you have ever been to. You’re still face to face and it’s a bit intimate, even as strangers.” (MS-1)

2.3.3 Difficulty Gathering and Evaluating Data

Interviewees from 43% (9/21) of organizations discussed the subtheme of Difficulty Gathering and Evaluating Data. Managers said they struggled with gathering, evaluating, and drawing conclusions from membership surveys, and in some cases with balancing the

needs of membership with explicit goals set by funding organizations.

Some organizations struggled to muster resources simply to gather any information. Noting that “we don’t have any way of developing that” (LT-1) feedback system, other managers explained that when they did:

“We had about 10 people out of... it would have been [significantly larger set of people], that actually responded. So that sort of stops in its tracks my idea that we would have frequent mini-surveys in our bi-monthly emails, because I think people just aren’t amenable.” (MS-1)

Other interviewees noted lack of evaluation processes or quantitative metrics of success. Managers said that “we don’t have a sort of checklist where we’re asking ourselves certain questions, seeing how our efforts are, and then making modifications based on that... so we don’t really have an evaluation process” (MS-1). Others asked questions like “Where are we bringing value? Where should we not be active? And where we are active, what are we then bringing back in and how are we measuring it?” (HS-2).

Some organizations had considered how to quantify their outputs. “[I]s it, you know, number of connections made? Like we have no way of kind of tracking. Is it like number of business deals or scientific collaboration stuff to come off the back of this?” (LT-1). Other managers noted that to receive funding and resources, they sometimes prioritize funders’ interests over the needs of the network members. Some try to be “really hard nosed on KPIs [key performance indicators]” (HS-2), that are required by funders, but acknowledge that “lots of this is quite long term and quite difficult to measure by its nature [like] the kind of increased R&D investment into the [country] that our overseas networks help facilitate” (HS-2).

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Still others had difficulty even tracking researchers themselves.

“We don’t really keep track on who’s working where... we have X number of professors, they work in several locations in the world, we have no idea. Even the faculties do not even know where people are working, they just don’t keep track of it.” (MS-3)

In addition, where organizations did have resources and enough participation, they often had concerns about the reliability of the data they could gather. Managers were worried that data could be “convincing, but sort of has a natural half-life to it, or gets less reliable as time goes on” (MS-1). They also worried about response bias, saying:

“If we give a 45 minute presentation, and 50 people attend, maybe I’d be lucky if seven or eight share feedback, so at that point it’s so low that it’s also a self-selecting group of people that give feedback. [They] are not necessarily representative of the whole sample. So, I try to realize that only people that are really happy or upset might share feedback.” (MS-1)

2.3.4 Mobility Constraints and Deteriorating Relationships

Interviewees from 43% (9/21) of organizations discussed the subtheme of Mobility Constraints and Deteriorating Relationships. Movement of researchers, particularly securing visas, was difficult before the COVID-19 pandemic resulted in border closures, quarantine rules, and broader trends of hostility toward international researchers. Managers who arrived before the COVID-19 lockdowns talked about how “coming to [host country] was by far the most difficult thing I [had] to do” (LN-3). After the COVID-19 pandemic and subsequent lockdowns and border closures, managers were explicit that “basically everybody’s

residence promise [sic] got canceled because they had been outside of [host country] at that point of time of the lockdown. It was such a big disruption for [region of origin] researchers in [host country]” (MS-4).

However, even in difficult visa situations, managers noted that a lack of opportunities and limited funding for research still drove researchers to seek international opportunities. But as a result of increasingly hostile policies, alongside cultural differences, countries are “not doing a good job of making themselves look like a good destination for researchers” (MS-4).

Restriction of movement: visa denials, immigration, and border closures

Organizations struggled with movement restrictions between countries that affected their ability to retain membership and operate as a functional network. Of those organizations that represented at least one country with a polity score less than 2, all managers said that network members struggled with mobility. Interviewees from organizations older than 20 years (0%), with stable funding (11%), and operating between two countries with polity scores above 8 (31%) were least likely to discuss these issues. For many, this represented a shift in their operations, and resulted in much more uncertainty about their future.

Interviewees noted that

“A lot of people found it difficult to get a visa, even just to come to [the country] to attend a conference. I have colleagues or I know someone who for them to apply for a visa, it will be like six months or even longer. So they go to the [embassy], which is the equivalent of an embassy in [country of origin], they apply for it and then their case will be sent back to the [host country’s government] in the [host country], and then they review it and then they decide whether this person is allowed to come to attend a meeting or not. So this is kind of a hassle and would deter people from doing collaborations. Even just to think about

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whether they're coming to do a visiting fellows or coming to attend conferences. If they have other choice, like to go to [another country], they will probably just go." (LN-5)

Especially as countries limited international travel, locked down, and closed borders to non-citizens in response to the COVID-19 pandemic, interviewees discussed immigration as "one of the most difficult things" (LN-3) researchers faced. Managers in different host countries noted that:

"Only people that still had a valid residence permit were allowed to travel back in. So in the end, I think we lost about 70-80% of the people that used to study here, because they were not allowed to come back and their visa expired." (MS-3)

Or in more severe cases:

"Mapping out the impact here in [host country] and we found out like a more than 70% of people got displaced and so on, because a lot of people had been on vacation when the [host country] situation came up, and were not able to return. And then we found out that after, then we did again lastly the lock down on the border and after basically everybody's residence permits got canceled because they had been outside of [the host country] at the point of time of the lockdown. It was such a big disruption for [country of origin] researchers in [host country] we just had to collect that data—good data—about what was going on. So I paired up with a [country of origin] PhD student and we did like a big survey on that as well and we found out about 60% of [country of origin] researchers in [host country], six months after the lockdown, had not been able to get a visa to get back." (MS-4)

Even when residence permits or visas were obtained, travel itself was not easy. Managers explained that "people have a problem in coming back to our country, because there is a lack of flights... there

are restrictions for traveling" (MT-1).

A few interviewees said that immigration policies can cause tensions. These managers said that some countries made it clear that they did "not want to have foreigners, in general" (MS-3), using the COVID-19 pandemic and control of borders to trap or expel international researchers. Some interviewees noticed that treatment of reciprocal diasporas is not equal between countries, and worry that this reflects a growing trend of isolationism that they fear will harm scientific and economic cooperation overall.

Borders or government response to COVID-19 pandemic

Interviewees noted that the COVID-19 pandemic impacted the freedom of movement and isolation of network members. One manager remarked how

"Our network suddenly became entirely overrun by questions from our network, and from our colleagues at the various [country of origin] consulates and embassy in [capital of host country 1] and [capital of host country 2]. Because everybody was turning to them and saying like 'what do we do now? We can't be in our labs, we can't travel back to [country of origin] because our visas are expiring' So then the diplomatic decisions on higher level, they had very immediate results on our day to day work." (HS-3)

In addition to visa issues, quarantine rules affect networks' ability to function. Managers noted that researchers are increasingly unlikely to "wait for six, maybe 12 months for [a country] to see what they're going to do and if they allow [them] back in" (MS-3). That same manager explained:

"You have two weeks central quarantine, one week home quarantine, three weeks in total, but if you travel to university, there are extra, there's extra rules sometimes you have an additional two, three weeks quarantine, two to three weeks quarantine at the university so in total you'll be in

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quarantine for six weeks. Which doesn't make any sense. So these are measures to make sure that people are not coming because no one's going to do that." (MS-3)

As a result, networks situated in countries with extreme quarantine or visa restrictions have seen some steep reductions in the number of researchers in their networks.

Tense, hostile, or worsening diplomatic or public relationships between countries and/or research communities

Finally, some interviewees said that relationships between their host country and country of origin affected their ability to connect with researchers and build programs. In some cases there are unwritten rules.

"When [country of origin's] embassy invites scientists from [research center], I learned that people are not supposed to go. It's part of the [host country's] policy, because they don't want to upset [country of origin]. So that does affect the interactions and our network. How much we can do is limited; we could do more but given this dynamic, our hands are tied." (LN-5)

Cultural difficulties can present problems on individual and national scales.

"[I]f you share a cultural background... you could create a consortium of six institutions [across countries] and they might work fine even though they're not

like based on a personal level. But I can tell you that does not work really well when you include [another country's] institution... Repeatedly people are burning themselves, and then end up with a very very sour sort of stories because they didn't understand each other... [people from one country] feel like they get cheated, or abused, and I can tell you on the [other country's] side there's similar... they also feel like [people] are not taking into account their like their interests, their approach [to] them is a colonial attitude or patronizing attitude." (MS-4)

On national scales, managers described how "[one country] makes funding available on the condition if [another country] puts in the same amount of money. And there was a problem that a lot of projects started, but [the second country] did not pay in the end" (MS-3), which leads to countries "inevitably also decoupling" (MS-4). This disengagement, managers note, is "going to be really really hard to stop... we just started like two years into a process that's going to take us at least two decades to wind down" (MS-4). Overall this has the effect of reducing engagement and collaboration, both between nations and their people, which hampers networks' efforts and negatively impacts their membership numbers.

2.3.7 Summary

Table 2.3.7 summarizes the theme of Challenges and its four subthemes.

Theme	Subtheme	Share of Organizations
Challenges	Changing or Lack of Resources	62% (13/21)
	Inability to Host In-Person Events	43% (9/21)
	Difficulty Gathering and Evaluating Data	43% (9/21)
	Mobility Constraints and Deteriorating Relationships	43% (9/21)

2.4 How the Network Organizers Characterize their Future Goals

Interviewees discussed four subthemes of Future Goals (Figure 2.4). Two of these, Making Connections and Growing the Organization, are shared across the majority of the organizations. The other two, Offering New Events or Programming and Managing Members and Knowledge, are shared by different collections of roughly half of all organizations.

Many of the future plans and ambitions of the organizations align with the previously discussed subthemes related to success and challenges and the networks' views on science diplomacy.

2.4.1 Making Connections: Networks, Individuals, or Countries

Interviewees from 90% (19/21) of organizations discussed some aspect of Making Connections. Plans for connecting involved connecting individuals, networks, countries, or a mixture of the three, with 68% (13/19) of relevant organizations discussing individuals and 44% (8/19) discussing other networks, and 21% (4/19)

discussing their origin countries.

Interviewees focused on connecting individuals to help network members better connect to each other through collaboration, social events, and sharing experiences. Interviewees typically said things like “the most important thing is to start having more and more academic and scientific collaborations among the members” (MT-1), and “I would like to see here in [host country] a very strong formalized, structured platform for [visiting] researchers to connect with each other” (MS-4). Some interviewees discussed this goal as a means to help members overcome challenges of international mobility by providing “support of the new immigrants from the people that are already here” (LN-3).

Interviewees focused on connecting networks when discussing international collaborations and strengthening the impact of scientist networks. Such discussions aligned with the managers' understandings of science diplomacy and their desires to use the power of these networks to address international challenges.

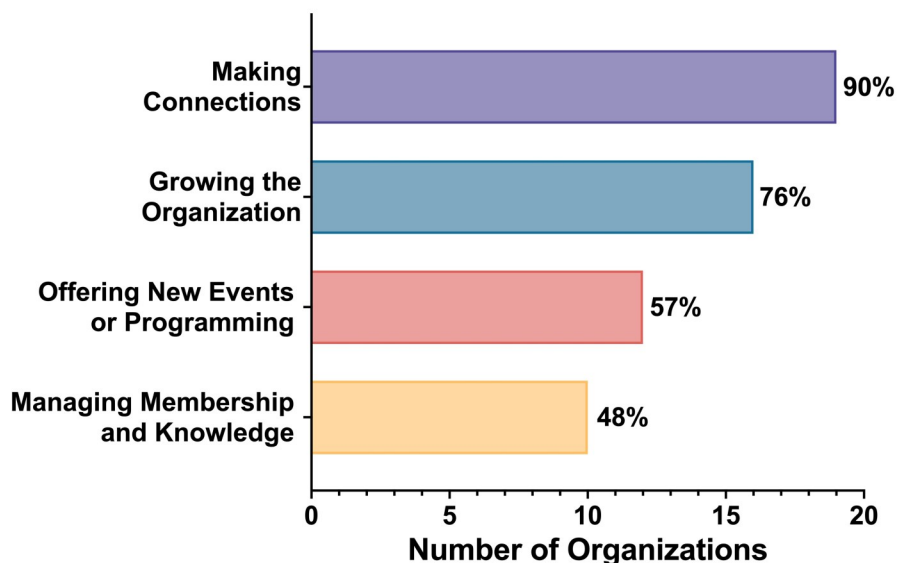


Figure 2.4: Subthemes within the Theme of Future Goals. The figure shows four subthemes discussed by interviewees ordered by prevalence.

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“And then the future of different networks around the world ... we cannot face the challenges of the 21st century unless we work together. And teamwork, and interdisciplinary, and having the courage to team up and work together. And so what I see in this vision is networks working together, each one bringing in their own expertise, their own focus, their own niche, where we complement each other, and our sum is much more than the addition of our numbers or, you know, potential, and eventually to create a better world for future generations. Yeah, I think that that's how I see it. Of course, it's gonna take time, a lot of effort, we will, you know, have challenges and run into bumps around, but I think what matters is to have a clear objective, clear focus of where we're going and learn as we go, evolve as we go, mimicking nature. And, and what survives will be the networks that are really serving and making a difference, because we're all working together.” (MN-1)

Furthermore, interviewees discussed that by working together, networks can increase their impact and visibility and influence science diplomacy. Interviewees expressed this sentiment by saying things like “we're not all doing things individually as nations but trying to solve problems together” (HS-5).

The interviewees discussed the importance of both themselves and the other networks:

“I think in general, scientist networks are going to be our future. Because... researchers are going to be more mobile. Now with this COVID and the new working remotely options...people are going to be in different countries and you need to find one way to kind of pull people together. You need to find a glue that can kind of hold those researchers together.” (HS-4)

As interviewees reflected on the future and the hopes of international collaboration, they acknowledged “The

missed opportunity so far has been to bring these networks together” (HS-2), and:

“I mean one thing what I see is missing is internetwork collaboration. And, thanks to COVID, I see that this is happening quite a lot because a lot of the events are in virtual format. So you can globally take part, you can globally contribute. So, more collaboration among the scientists networks.” (MS-2)

Interviewees also discussed connecting back to a network's origin country/government. One interviewee said:

“[T]hrough the embassy, we are in dialogue with other branches of the government...so that we can speak with one voice in the sense of informing the different programs and supporting the programs, and we would love to have a role that is sustained.” (LT-2)

Another interviewee focused on creating a partnership with their origin country's government and companies to create incentives for scientists to return to their origin country.

“We're trying to do a year internship. They will get paid. Wherever they are, they will come to [origin country] for one year and work at [these] companies. They will get paid very good and bring their families with them. And then, once they will move to do their internship, there is low chance that they will move back. They will stay probably in [origin country], they will get experience.” (MT-3)

2.4.2 Growing the Organization

A second subtheme is Growing the Organization, discussed by 76% (16/21) of interviewees. Interviewees from 38% (8/21) of organizations discussed growth in members, 38% (8/21) in geographic area, 29% (6/21) in prominence, 29% (6/21) in topics or knowledge areas, and 24% (5/21) in funding. Interviewees typically discussed growth in terms of membership by saying

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things like “I think my biggest goal is to have as many people as possible” (LN-4), and “I think our network is going to grow, because the research in [the host country] is growing” (MT-2).

Interviewees discussed geographic growth as expanding to more areas within a nation or becoming involved with more nations across a region or continent. Interviewees typically discussed plans for such growth by saying that they might go “to countries where there is really this untapped potential and there would be a real need to have a door opener and somebody who knows the cultural context and can make connections” (HS-1), and that “they could replicate in different regions around the world” (MS-4). Others expressed interest in engaging specific countries. “But one thing we have not done very well is engage with [a nearby country]. And so one of the... mission objectives is to improve that” (LT-1). Others noted their network’s current stability and geographic reach and hoped to continue in that same trajectory.

“So far we’ve been pretty stable, I think, over the last [time period] in where our main efforts are, or where our main hubs have been based. That is surely going to change if you look at the next 20 years or something. I’m sure we will be in other regions and in other locations that haven’t featured in the past.” (HS-2)

Some interviewees discussed plans for growing the influence of the networks. Doing so was both a goal to advance science and sometimes part of larger goals of growing the influence and recognition of the origin country or region and of their reputation as an international problem solver.

“Strong members who each one of them has a project or they work together in projects to create a difference, not just in the [origin region], by serving the [origin region] and advancing science and technology in the [origin region], but

becoming a beacon for the globe, to help support science advancement everywhere and anywhere.” (MN-1)

And:

“It’s a real statement of ambition about how the [origin country] wants to become a science intelligent superpower... And in order to achieve that we will need to invest in our networks overseas as well as back in the [origin country] in a new and different way. And so, what I hope we’ll see is that we’ll have a bigger footprint and more senior footprint and will really be able to convene these discussions and act as a real kind of international problem solver, which is how the [origin country] wants to position itself, sort of overseas.” (HS-5)

Other network organizations aimed to increase their recognition within their host country to better serve their current and future members and be easier for potential members to find.

“I would really like to be...something that people coming to [the host country], they found eas[ily] and they know that we are there and so they can contact us in the network and get in touch with people.” (LN-3)

Several interviewees discussed plans for growth in topics or knowledge represented in their networks. Many discussed desires to ensure that their networks evolve to have experts that can address emerging technologies and global problems.

“There are a lot of other big crises actually around the corner, be it global climate change or, you name it, oceans issues or any other. But as a human species, we have not decided how to tackle those challenges. ... [S]cientist networks should think proactively about how to tackle these challenges, and who to bring into the discussion from a scientific point of view.” (MS-2)

And:

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“I think if [we] look at the world that...we are faced with now...I think we are going to need more people who are both deeply versed and experts in these areas but also, crucially, able to translate them into policy terms, into layman terms, because this is a steep learning curve for lots of officials in government.” (HS-5)

Some of the topics and knowledge areas mentioned included global climate change, ocean issues, global health, artificial intelligence, digitization and digital governance, and other emerging technologies.

A final focus for Growing the Organization is funding, discussed by 24% (5/21) of organizations. As not all networks have a stable source of funding, some interviewees mentioned funding as part of their future plans. Those that discussed funding in their future objectives typically said things like “In my opinion, more funding should be put in scientists networks” (HS-4) and “We want to have access to more sponsors” (LN-3). Interviewees for organizations with none to little funding (33%, 2/6) and those with stable funding (33%, 3/9) mentioned future funding more than those with transient funding (0%, 0/6).

2.4.3 Offering New Events or Programming

Interviewees from 57% (12/21) of organizations discussed a third subtheme of Offering New Events or Programming. Interviewees discussed desires or plans to launch new kinds of events or programs not previously part of the organization’s programming, such as seminar series, social events, and programs for internships, alumni, mentorship.

Events are central to themes of success and to challenges organizations face, the latter especially so during the COVID-19 pandemic. Interviewees discussed balancing needs for virtual and in-person

events. As organizations work with mostly virtual events, some plan on “starting from the next year, probably not this year, but we will start these in-person meetings and then our membership and the contact with our members will also be...stronger” (MS-1). Some interviewees anticipate a mix of in-person and virtual meetings and “are planning...at some point, going into in-person, but we can keep up some virtual meetings as well which could be interesting to keep it hybrid, which is the new thing” (LN-4). Others wanted to continue events that they had previously characterized as successful and said things like “Well, it will be great to of course repeat these social events [at the host organization] and...[is] probably one of the goals” (LN-1).

2.4.4 Managing Membership and Knowledge

A final subtheme is Managing Membership and Knowledge, discussed by interviewees from 48% (10/21) of organizations. These organizations plan to better understand and manage their membership to improve the member experiences and to find ways that the members can benefit the networks. Interviewees mentioned wanting to have more interactions with their members, to create a better system to track their members, and to create surveys to understand the types of events and offerings their members prefer.

Interviewees typically said things like “What we want to do is we want to know in detail, who are our members” (LN-3) and:

“But in the end, it's the local leaders [and] the topic leaders that make this network. And if they have some career change, or something happens, and then they are no longer available to fulfill that role, we might have a big void for a while until that void is filled again.” (HS-3)

2.4.5 Summary

Table 2.4.5 summarizes the theme of Success and its four subthemes.

Table 2.4.5: Summary Table of Subthemes for Theme of Future Goals.		
Theme	Subtheme	Share of Organizations
Future Goals	Making Connections	90% (19/21)
	Growing the Organization	76% (16/21)
	Offering New Events or Programming	57% (12/21)
	Managing Membership and Knowledge	48% (10/21)

2.5 How Science Diaspora Networks View their Organizations' Roles in Science Diplomacy

The interviewees discussed science diplomacy across the themes of Success, Challenges, and Future Plans. So as not to dilute information about diplomacy across those themes, we coded a distinct theme of Science Diplomacy. Interviewees discussed three subthemes: International Research Capacity and Competitiveness, Promoting Foreign Policy Dialogue, and Geopolitical Involvement (Figure 2.5). We characterize those subthemes in the subsections below. We also report some practical ambiguity about science diplomacy and its meanings among the interviewees. Researchers and practitioners usually conceptualize science diplomacy in three parts: science for diplomacy, diplomacy for science, and science in diplomacy.

2.5.1 International Research Capacity and Competitiveness

Interviewees from 86% (18/21) of organizations discussed a subtheme of International Research Capacity and

Competitiveness. This subtheme is about the ability of organizations to facilitate research on a global scale. Interviewees discussed enhancing the visibility of a country or region for topics related to science, including capacity to host or participate in international research projects. Interviewees also discussed topics of researcher mobility, brain drain, brain circulation, and recruiting researchers.

Interviewees typically said things like, without international collaboration on cutting edge research, “You’ll end up with a lot of separated, isolated islands of science around the world and [there is] going to be a lot of wasted effort” (MS-4). Many federal networks had a to recruit highly skilled scientists and attract international private sector investments. Interviewees for many non-federal networks see the value in establishing themselves as a known knowledge entity and make themselves accessible to governments and individuals. For this purpose, one interviewee stated that their

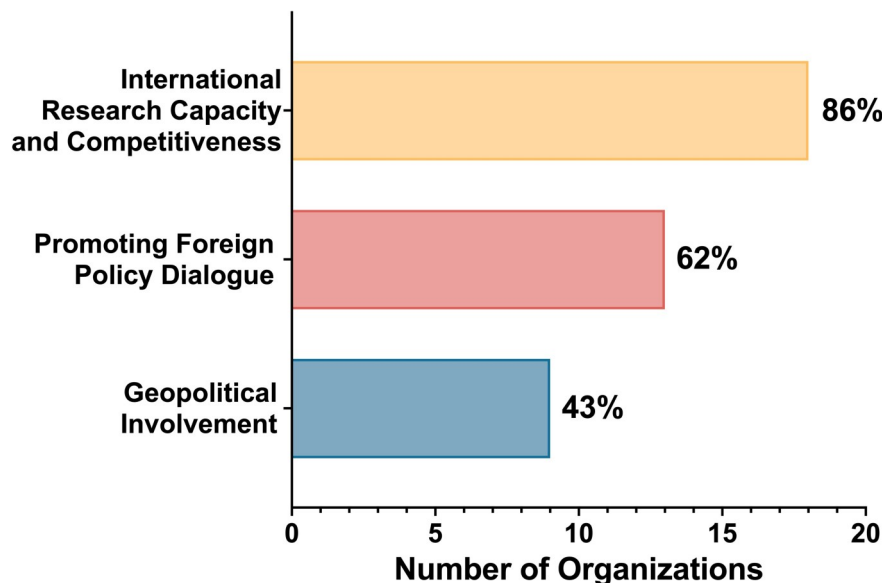


Figure 2.5: Subthemes within the Theme of Science Diplomacy. The figure shows three subthemes discussed by interviewees ordered by prevalence.

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“Objective is that [our network] should be kind of the go-to for scientific expertise by anyone at the level of policy in [this geographic region]” (MN-1).

“From [our] perspective, I would say ... diplomacy for science [is most valuable]. It's the connection, the local knowledge, sometimes the translation – and I don't mean language - but I mean the translation...in terms of business culture or research culture [between countries]. So this sort of connecting, advising, trend-scouting, and using the local knowledge.” (HS-2)

Interviewees transitioned from topics about international research capacity to topics of researcher migrations. For instance, managers for federal network organizations linked diplomacy, international science capacity, and recruitment.

“This is really the objective of [origin country] when it comes to international relations in education, research, and innovations: [to be] a global hub for excellence in education and research, and to stay internationally open to attract the best talent.” (HS-1)

Interviewees from non-federal network organizations focused more on the assets that traveling researchers bring to themselves, countries, and diplomacy; especially by promoting diverse thinking or unique perspectives. These managers typically said things like, “I do believe science right now has no borders” (LN-4), and that there are “highly mobile people” all contributing to a global “knowledge economy” stemming from high transnational collaboration (LT-1). Interviewees said that it is valuable to grow the number of opportunities for PhD level scientists and other highly educated experts by expanding the potential geographic region in which they can work. As one interviewee explained:

“I think the amount of resources for science [are very] few compared with the human capital [in some countries]. I think that we have many more well qualified people than resources to sustain these people. And I think inevitably many people will leave [these countries]. I think this is true for [origin country] and is true for other [neighboring countries]. And [host country] is a place where that will be enough investment in the next few years where someone can come and develop a career.” (MT-2)

While several networks said that they were unaware or unable to use the concept of science diplomacy, A few networks were working to increase their members' understanding of science diplomacy and expand the role science diplomacy plays in their network:

“We're giving a series of workshops for the scientists in our network for whoever's interested on science communication [and] science diplomacy. [We also] encourage young scientists to seek a career outside of pure academia ... in diplomacy [or] in journalism, because to have a background of science and go into policy is much better than having a background in policy and trying to understand the science.” (MN-1)

This may help make scientists more aware of the potential they have to contribute formally and informally in the global policy and diplomacy sphere. For example,

“A lot of researchers would like to move directly into science diplomacy, but ... there is almost no position called science diplomat, right? So, we are rather focusing on training our members with the tools and equipment [of diplomacy] so that they can apply it in negotiation [or] international cooperation [they experience] already in their job.” (MS-2)

2.5.2 Promoting Foreign Policy Dialogue

Interviewees from 62% (13/21) of organizations discussed a subtheme of Promoting Foreign Policy Dialogue. This subtheme is about advocating on behalf of network members and shaping science policy at the national or international level in accordance with their members' needs. Interviewees typically said that "you cannot separate politics from science if a scientist's life is being threatened" (MN-1), and "[i]f we think that any policy movement is counterproductive to our vision of [origin-country] scientists or global science and it could impact our goals then we speak up [and] voice our specific concerns" (MT-4).

Some federally connected networks provided opportunities for members to meet with policymakers and share what was going well and what could be improved in the research landscape both at home and for internationally mobile researchers.

"So, you have a handful of members of parliament who come to this annual conference. And we always sell it as: this is your opportunity to really tell policy makers what is going well and what is not going well. So I think that is also a very important role that this network provides is really in a way of forcing those people in power to listen, and to be exposed to this group and see what their concerns are, what topics they're interested in. Not so much in terms of the concrete research they're involved in, but in terms of the labor market, the restrictions, the gender inequities...their perception of these research institutions, [if] there may be toxic work environments...all of these other concerns." (HS-3)

These connections enable scientists to share information with diplomats about the academic and industry culture and raise awareness for issues affecting researchers. Interviewees discussed some examples of specific issues facing researchers that networks helped to bring

to the attention of policymakers.

"One big topic for [country of origin] researchers who are here in [host nation] is the citizenship question...in order to get [host] government funded grants, in order to go into meetings [with host government agencies] where you need a security clearance, [you need to have dual citizenship]. At some point you've reached kind of the ceiling of what jobs you can do [in the host country without citizenship]... we had our [Official] at an event and... everybody kept hammering him with the dual citizenship question." (HS-4)

Or:

"We work with the issues which are very core to researchers life but kind of not taken into attention. For example, we work with researchers with disabilities. We work with refugee researchers or scholars at risk, we have a specific task force for that...we are one of the few organizations, for example, working on researchers' mental health. We had a mentoring program focusing on researchers' mental health, and it has huge interest." (MS-2)

Some federal network organizations advise policymakers on the federal budget for science and research funding. They do so to promote spending on science and innovation and to use government leverage to incentivize research in much needed areas. Doing so helps the government "show that we have a clear interest in this [scientific topic] and ... take some of the fear or the uncertainty or the risk that scientists" face when initially breaking into novel areas of research (HS-5).

"We don't see enough research happening that is going towards the kind of things that we need to do [to address 21st century challenges]. Can we put a prize fund out there? Can we leverage some private sector investment? How do we incentivize that [type of research] to happen? [what] is really going to bring in the big R&D.. and really get our best people working on this?" (HS-5)

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Interviewees for some non-federal networks said they had a responsibility to advocate for all human rights and give a voice to oppressed scientists. They said that it is vital to support researchers who cannot do their work because of oppressive authoritarian regimes, unstable political conditions, or significant health and safety risks associated with the origin or host country.

“As scientists, our objective is to create a better life for humans, and it starts with giving basic human rights and holding those up...living in diaspora you'll have an advantage, and you have a voice, and you have a responsibility to do something. It's like the saying: if you see something, say something. You have to call out what you see is not right...you have to call out any ... global oppressors.” (MN-1)

Several interviewees discussed how diaspora scientists can shape policy both in their origin and host regions as well as internationally. This is especially important when addressing emerging technologies that lawmakers are less familiar with.

“Look at digital governance, for example. How do we set global rules for trustworthy A.I.? This is where we have clear added value because we have scientists everywhere and we can really say, ‘oh this model of management from [country] is great [and it] could be used around the world.’” (HS-1)

And:

“[W]e are going to need more people who are both deeply versed experts in these areas but also, crucially, able to translate them into policy terms, and into layman terms, because this is a steep learning curve for lots of officials in government and ministers.” (HS-5)

2.5.3 Geopolitical Involvement

Interviewees from 43% (9/21) of organizations discussed a subtheme of Geopolitical Involvement. This subtheme is about the exchange of information, often between network organizations or network members and government officials on topics other than policy. Interviewees also discussed fostering diplomatic relations across host and origin countries.

Information Exchange

Interviewees noted claims like “it is very good for the member states’ embassies to meet with the researchers. A lot of the time [the embassy] might not even know how many foreign researchers are here in [the host country] or what is going on” (MS-4) with the scientific landscape in the host country. Similarly:

“When we have these meetings [with policymakers back home], I talk about our association [and] I talk about our life. I can feel that people, these leaders [are] very surprised. [They ask] like, ‘Is this really happening in [the host nation]?’ They don't have much information.” (MT-2)

One interviewee described the relationship between the network and local consulate as a “symbiotic relationship” (LN-4) in which funding and support are exchanged for metrics and information. Some interviewees said that embassies encourage researchers to engage with diplomats, especially because embassy employees move more often for short term posts than do mid-career and senior scientists. Scientist networks can provide continuity to the information flow.

“The people that come in to do these [embassy] jobs come to do like a four year post...They might not have a background in how [the host country] works...there is no knowledge that accumulates over time... As soon as somebody [gets] really good at this job here and understands how things work in [the host country], they are normally sent away and there's a new person that comes over...So that is a problem for the

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diplomatic level. [But] when it comes to science and technology, if [embassy staff] can get in touch with scientists from their own country [living in the host country], they will be informed really quickly. [Scientists] will understand...how the [country's citizens] operate, what drives the [country's citizens], and what the priorities of the [host country] are.” (MS-4)

Some interviewees said that scientists in their networks provide a source of information to publics in their countries of origin.

“I can give a recent example from COVID. In May [2020], we had a bit of a public information challenge in [origin country]... So, [origin country press agency] reached out to us and asked us if we knew any experts that were working on the COVID issue so that they could use those experts to help inform the public...We sent out one email to everybody in our network... and we had over two dozen people from different academic disciplines reach out! So obviously the virologists, the people in medicine and life sciences, but we also have people from economics, and we had analysts, we had sociologists, psychologists talking to us about the psychological problems of children with schools [closing]...So, we had like this huge pool of people who were so willing to share that information with [origin country] stakeholders.” (HS-4)

Fostering Diplomatic Relations

Interviewees discussed several ways in which their networks and network members foster diplomatic relations between origin and host countries. Several said that scientists are effective intermediaries between countries with strained relations or without formal diplomatic relations because science is perceived as less value-laden than other issues dividing nations.

For instance, some interviewees noted that the country of origin embassy “sees

our network as a possibility to realize science diplomacy and the kind of strategies and partnerships they’re developing with the [host country’s] government” (LN-2). Scientist networks and international projects provide common ground between the countries.

Interviewees discussed how shared scientific projects can inspire diplomats to view host countries anew. One manager noted that “networks can play a role in showing how much exchange there already exists between different nations and that can inspire additional partnerships that work in international diplomacy” (LN-2). Another manager said

“[W]e are just launching a ... new Research and Innovation framework for [origin country], which is like a huge thing! [The investment] will include [host country] collaboration. And at that point I told [the diplomatic delegation], ‘there’s going to be millions and millions of [currency] going into collaborating with [origin and host countries] institutions and so on. Wouldn’t you be interested in finding contact points here inside of institutions for [origin country] researchers here?’” (MS-4)

Interviewees across federal and non-federal organizations shared examples in which science diaspora networks provided opportunities for diplomacy in a region with a history of hostility.

“This is a region where there was conflict in the past and this conflict still exists. [The region] consists of many different countries. Because we do not have enough members from [any country individually] to have a single chapter, we have a chapter for [the whole geographic area]. Now, this chapter is a true example of science diplomacy because the chair was elected from one country, and she brought the scientists from the different countries in under one umbrella and then appointed the country representatives, and then started to discuss topics which are pretty sensitive. So, even

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when the foreign ministers are kind of fighting with each other [and] probably even the education ministries are fighting with each other. But researchers are coming up with completely different examples of collaboration.” (MS-2)

Some managers noted that tense relationships can arise when there are perceived to be unequal or unfair divisions of funding on joint research projects. Some spoke of the “colonial attitude or patronizing attitude” (MS-4) they

experienced in situations for which the more powerful national partner was not “taking into account the interests” (MS-4) of the formally colonized country.

2.5.4 Summary

Table 2.5.4 summarizes the theme of Science Diplomacy and its three subthemes.

Theme	Subtheme	Share of Organizations
Science Diplomacy	International Research Capacity and Competitiveness	86% (18/21)
	Promoting Foreign Policy Dialogue	62% (13/21)
	Geopolitical Involvement	43% (9/21)

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3.1 Takeaways

The themes present in the interviews reveal new information of diaspora networks including how managers view the aims and operations of their networks. The themes also reveal operational and functional variety among the organizations. Any attempt to evaluate some particular network organization should be tailored to the organization's particular aims, histories, and structures; and *not* to some idealized or assumed set of functions or goals taken as essential to the general category of science diaspora networks.

3.1.1 Success

There are several notable takeaways about the theme of Success.

Unsurprisingly, the most commonly discussed subtheme was Connections Made. A social network is, by definition, a group of people connected by social interactions or relations. More revealing was the variety of ways in which networks valued connections. For instance, many networks valued facilitating relations between members. However, within that broader practice, some managers discussed increased numbers of connections, while others discussed strengthening existing connections or

even supporting connections that may be brief but nonetheless influence a member's career. Similarly, some managers valued connecting with policymakers, diplomats, and embassies, while others focused more on helping members expand their professional networks within host countries or regions.

We note the breadth of the nine notable subthemes. Each subtheme characterizes organizational phenomena and also provides a source of ideas for organizations to consider when operationalizing and expanding their extant criteria for success. For instance, while most organizations (86%) take Events Held as a criterion of success, different organizations manage and host different types of events. Box 2.2.2 lists the variety of events the interviewees discussed, and managers can use that information to consider new and different types of events to host for their particular networks. For example, managers who are focused on annual conferences for network members might also consider social events like picnics or camping trips. Managers can similarly use Box 2.2.6 about professional development activities and Box 2.2.7 about organizational growth.

Fewer than half (48%) of interviewees discussed the subtheme of Organizational Growth. For many younger organizations, we suspect this outcome results from a lack of time and resources to think about the

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organization in spans longer than a few years (Butler et al., 2022). Many younger organizations are working merely to continue existing; plans regarding growth and development may be a luxury not afforded within their limited resources.

Regardless of an organization's age, growth can be a difficult topic for managers to navigate. Managers want vibrant and evolving organizations; however, they often want to avoid focusing too much on standard bureaucratic metrics. Collecting data is time-consuming and can overshadow the networks' missions of helping researchers as individuals and not just as potential resources for host or origin countries.

A few organizations have found an interesting strategy to balance these interests. They focus especially on growing the capacity of members to lead the organization, for instance, by training them to start new chapters or discussion groups or preparing them to be organizational presidents or board members. This strategy enables these organizations to track metrics relevant to the organization and its members, such as hours and money spent on leadership training, the pool of leaders recruited, mutually beneficial mentoring relationships, and successful transitions of power. At least one organization has incumbent leaders shadow their operational counterparts for a year before assuming full responsibilities. This organization was notably strong in nearly all criteria of success and financial health compared to other participating organizations.

Finally, we note two correlations. We found that organizations fell into one of two categories: those with less stable funding structures and no formal connection to federal governments, and those with more stable funding and formal federal ties. First, interviewees from organizations of the first type were more likely to discuss Mobility Facilitated as a

criterion of success. Second, interviewees from organizations of the second type were the only ones to discuss Information Gathered from networks as a criterion of success. These correlations indicate that non-federally supported organizations focus more on supporting the acculturation interests of émigrés than the flow of information to their countries of origin. They also indicate that federally supported organizations may not wish to measure and be evaluated by how well they facilitate the emigration of highly educated researchers, regardless of whether or not they aid those processes or agree with the discussions about the benefits of so-called brain circulation. The criteria of success for any organization, including a diaspora organization, depend partly on the stakeholders who institute it, and those stakeholders most salient to managers decide the criteria (Mitchell et al., 1997). However, more research is needed to determine if these findings are robust.

3.1.2 Challenges

Notably, there was no single overwhelming challenge for all networks. Generally, managers were concerned about the four main subthemes discussed in this report (Changing or Lack of Resources, Inability to Host In-Person Events, Difficulty Gathering and Evaluating Data, and Mobility Constraints and Deteriorating Relationships). Arguably, many of these issues stem from the most cited (62%) issue of Changing or Lack of Resources.

A large component of the challenges faced by networks was the impact of the COVID-19 pandemic. While the initial data collection was not intended to assess the influence of the COVID-19 pandemic on the networks, many interviewees were explicit that it significantly negatively affected their ability to connect membership, to host events, and to secure resources and funding.

Similarly, many of the challenges faced by individuals and networks were the result of diplomatic relationships and the changing international landscape during the COVID-19 pandemic. Bilateral and multilateral relationships often affect diaspora network members, independent of the COVID-19 pandemic. International scientists face many bureaucratic hurdles (e.g., visa requirements, immigration restrictions, and access to foreign banking). Countries' responses to the COVID-19 pandemic exacerbated these and shifted cultural attitudes and governmental policies toward foreign individuals more broadly (e.g., border closures, difficult to obtain or canceled visas, and residence permits). Many organizations struggled to adjust quickly to the changing landscape of immigration and quarantine policies affecting their members. They may have benefitted from pooling resources and sharing information, especially among organizations operating in a common host country.

Interestingly, despite having many criteria for success, organizations could not gather reliable data to interpret whether they were achieving their goals. Few organizations write annual reports or name and track Key Performance Indicators (KPIs). Even when KPIs or equivalents were used, they were often set by the parent organization or funder, with little or no input from the membership. In those cases, managers often commented on the struggle to balance the needs of members with the requirements of the funding organization. Overall, as with the majority of Challenges, a major barrier is a lack of dedicated personnel, resources, and institutional knowledge that would facilitate collecting, tracking, and acting on information to assess the success of networks in articulating and achieving their long-term goals.

3.1.3 Future Goals

Making Connections was the most common subtheme among networks for Future Goals. This is unsurprising considering that Making Connections was the most discussed subtheme of how networks characterize Success. However, the way in which organizations conceptualized a future of Making Connections differed based on the size, age, structure, stability, and prior successes of the network. Some networks that were smaller or younger or had less financial stability had goals more focused on boosting connections among individuals through social or scientific events. Some of the smaller groups also mentioned how fluid the member movement could be and wanted to help connect members as they come and go within the host countries. Other networks with more capacity or experience to plan beyond just connecting individuals also had goals to connect with other networks. These interviewees were often part of federally associated networks and recognized the utility of science diaspora networks and a unique position they hold in facilitating science diplomacy. These networks discussed wanting to connect with other networks with similar goals in order to strengthen diplomacy efforts and increase productivity. Interviewees acknowledged the impressive work other networks are doing and wanted to collaborate in the future to learn from one another. Additionally, federally funded networks and those that have an existing connection with their home country's government wanted to strengthen and diversify that government's involvement and support.

Interviewees also focused on Growth for the future of their networks. While some networks specifically focused on growing the number of individual members, other networks were focused on expanding to new scientific disciplines, economic sectors, and geographic locations for chapters. Some also highlighted the importance of growing awareness of their network

internationally and within their origin country.

As previously reviewed, many of the organizations considered Events Held as a success metric and about half of the organizations had goals around future events for their networks. These future events often focus on filling an unmet need. For instance, one interviewee mentioned gaps in the services provided by other government organizations or groups. Hence, their network aims to provide or assist members with these specific bureaucratic issues. Some networks had future ideas for events that would also serve their goal of connecting members. These interviewees mentioned social events, chapter-specific local events, and website resources to provide more opportunities for members to connect.

3.1.4 Science Diplomacy

Science diplomacy through diaspora networks can be a form of track II diplomacy; individuals from different countries who share information on science and technology also learn about one another's culture and partake in one another's customs. This exchange can help foster peace because it broadens understanding for one another's economic and political situations and goals.

While diplomatic divides can also be difficult to overcome, navigating countries' social and cultural differences is helpful to building strong scientific and diplomatic partnerships. Some networks spoke about the challenges of maintaining collaborations across nations with vastly different research norms, scientific priorities, and levels of investigator autonomy. Structural inequities and power imbalances can beleaguer scientific partnerships between countries in the global north and those in the global south (Edejer, 1999; Sempere et

al., 2022; Voller et al., 2022). Future research is needed to explore how science diaspora networks can facilitate efforts to decolonize north-south research partnerships.

Interestingly, we found that conceptions of science diplomacy were not uniform across networks, and some interviewees were unfamiliar with the term or standard definitions of 'science diplomacy'. For example, when asked how science diplomacy plays a role in their network, one network manager responded: "Can you tell me more about what science diplomacy is about? ... [because] I don't have a concrete idea" (LN-5). However, even though that manager did not understand the term, they described participating in many practices of informal science diplomacy.

Some managers said that science diplomacy was not a stated priority or goal of the network, especially because international diplomatic relations do not usually affect members' day-to-day lives in research lab settings. On the other hand, for some groups operating in countries with less-than-friendly relations with the origin country, diplomatic affairs are a highly salient issue. The managers of these networks follow explicit and implicit rules for interacting with and using resources from either the host country or origin country.

For most governments that fund science diaspora networks, these networks represent just one small facet of their nation's vast diplomatic corps. The funders of federally-funded networks often have many other avenues of track I and track II diplomacy through which they can engage with other nations. The data on the characteristics and distribution of diaspora scientists is of high value to embassies and consulates. Many high-income countries have long-term plans for investing and contributing to the growth of presently developing and underdeveloped countries. In the coming years, billions of U.S. dollars worth of investment in infrastructure, research and technological development,

and scientific collaborations will be made globally. Embassies and organizations could establish contacts and connections to capitalize on future economic growth in lower-income nations.

3.2 Similarities Across the Themes

We uncovered many threads that tie together the themes of Success, Challenges, Future Goals, and Science Diplomacy. Managers often discussed these topics throughout their interviews, and we draw particular attention to their impact on multiple aspects of administering science diaspora networks.

First, the COVID-19 pandemic strongly influenced how managers thought about their roles and organizations across all themes. We conducted interviews during worldwide lockdowns in 2021. While our interview questions did not inquire about the impacts of the COVID-19 pandemic and economic shutdowns on networks, nearly all managers discussed them in relation to successes, challenges, goals, and diplomacy efforts. Lockdowns due to the COVID-19 pandemic forced all managers to re-engineer the operations and aims of their organizations. While they modernized the tools they use to connect members, the pandemic also presented new challenges for international mobility, maintaining community, and members' mental health. We suggest that the COVID-19 pandemic will be an enduring inflection point for network organizations, and that the effects are yet to be fully determined.

Second, almost all interviewees emphasized that making connections was an organizational mission and for many, it is an important aspect of diplomacy. They expressed interest in many types of connections: connecting people across diverse geographical and cultural differences, creating relationships between people across scientific/

academic fields or sectors of employment (e.g., industry, news media, non-profit, government), and connecting with other networks. Some networks faced challenges in forming or maintaining connections but still emphasized the importance of working towards strengthening connections in their future plans. While making connections between networks and new geographic areas was discussed as a challenge due to differences in culture or histories between the host and origin countries, it is also an opportunity for networks to participate in science diplomacy and accomplish more by working together.

Third, subthemes about organizational growth and funding have interesting ties across the four primary themes. Fewer than half of the interviewees discussed Organizational Growth as a criterion of Success, yet more than three-quarters of interviewees discussed Growing the Organization as a Future Goal for their organizations. A similar relationship exists for funding: interviewees cited lack of funding and resources as the most common Challenge across organizations, yet only a few explicitly expressed seeking funding as a Future Goal. These results indicate that in many cases, a given organization's goals and actual challenges may not be informing its success criteria, and vice versa. In such cases, we would expect the organization to stagnate or go defunct, especially upon the departure of one or a few managers who conduct the majority of the work for the network. Furthermore, these results indicate that organizations might benefit from more attention paid to funding. We suggest elsewhere (Butler et al., 2022) that one untapped source of information about funding strategies is the pool of diaspora network organizations itself. Managers should carve out time to learn from each other about beneficial funding strategies.

Fourth and finally, the mobility of researchers to move across borders was a topic across the four major themes. Regardless of whether or not the

interviewees discussed Mobility Facilitated as a criterion of success, nearly all organizations worked to enable and improve the experiences and processes of moving by researchers. Lockdowns from the COVID-19 pandemic created challenges for organizations, often by creating extra bureaucratic hurdles for researchers to move, especially in or out of countries with a polity score of less than 2 (i.e., a semi-autocracy or autocracy). Interviewees cared a great deal about helping individuals in or connected to their networks in a manner that appeared more interpersonal than managerial. We hypothesize that this interpersonal effect contributes to the success and persistence of network organizations.

3.3 Scope and Limitations

The results reported here are exploratory and descriptive (Gerring, 2012). We recommend further studies to assess internal descriptive validity within the same or very similar sets of organizations and by generalizing and checking for external validity to larger and increasingly diverse sets of science diaspora network organizations (Maxwell, 1992).

Regarding internal descriptive validity, we note several limitations of this study. First, the managers interviewed had limited time, and most interviews lasted about 45 minutes. Lengthier or repeated interviews may have yielded further themes and subthemes or increased saturation of subthemes across interviewees and, by proxy, across organizations.

Second, as with all qualitative results from interviews, especially when interviewees represent organizations, the absence of evidence for a theme within a transcript is not incontrovertible evidence for the absence of the theme as an interest of the interviewee or their organization. Such absence is only evidence that the theme was not part of a single discussion. If the interviewees were interviewed again with

the same questions, they might have focused on different topics. For this reason, we urge caution about correlations identified across organization types within the themes. These correlations are exploratory regularities in need of further research for verification.

Third, further interviews of managers from organizations similar in structure could alter the themes. We identified an additional 22 organizations that did not participate in the study. While we believe we interviewed managers from enough organizations to identify and saturate relevant themes (Guest et al., 2006; Hagaman & Wutich, 2017), we acknowledge that interviews with additional managers may have led to further insights that this study did not capture (Weller et al., 2018). As mentioned previously, many network managers are overworked and therefore may not have had the time nor capacity to participate in an interview.

For external validity, we note several limitations. First, we focused on science diaspora networks with specific structural features. Organizations with different features may have managers whose interviews would yield different themes. In particular, we focused primarily, but not solely, on network organizations for which each network exists in a host country with connections to an origin country. Other diaspora network organizations have different structures. Notably, some exist within an origin country and network the country's diaspora of researchers living in several other countries or more dispersed globally. These kinds of networks may have different challenges, criteria for success, future goals, and approaches to science diplomacy.

Second, the study may have introduced language and geographic bias in its design. Potential interviewees were contacted in English-language emails and interviews were conducted entirely in English. This practice may have introduced a language bias into our study in terms of building a

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pool of interviewees and expressing content in the interviews. Additionally, most organizations surveyed and participating in this study represent at least one host or origin country in the global north, especially in the U.S. and western Europe. This geographical bias may be because our research team comes from the U.S., and our cultural assumptions likely influenced the canvassing methods. Alternatively, nations in the global north may represent a more significant portion of the actual population of diaspora network organizations, perhaps due to greater

national resources for science and diaspora management. To test those hypotheses, we encourage the development of more robust databases of diaspora networks spanning more parts of the world and studying the factors that influence the development of networks and those that forestall them. Regardless, the results reported here should ideally be tested with studies of network organizations and managers from more diverse parts of the world.

4. RECOMMENDATIONS

Based on the above findings, we make recommendation for leaders or managers of network organizations and for external organizations that support networks:

4.1 For Leaders or Managers of Network Organizations

Track a broader range of service accomplishments. Managers and network organizations complete a substantial amount of work, yet many track primarily the growth in size of their networks and the number or size of events. These accomplishments are core to nearly all network organizations, but alone they under-characterize the amount, breadth, and depth of impacts from the organizations. Boxes 2.2.2, 2.2.6, and 2.2.7 indicate a range of different service outcomes that organizations can track, depending on their particular situations and goals. The boxes are not exhaustive and might inspire further ideas on things to track. We encourage managers to systematically track a greater variety of their work and accomplishments. For instance, managers should not only track quantitative metrics. Many managers noted the importance of qualitative feedback from event attendees, network members, and diplomats. Such feedback should be stored and used to evaluate organizational activities and goals. Furthermore, quantitative metrics often

treat growth, efficiency, and return on investment (ROI) as foundational success metrics. A lack of numerical growth, efficiency, or quantifiable ROI may be a benefit when addressing topics such as the international mobility needs of stranded network members, equity within the network or at network events, or a smoothing of relations between émigré researchers and embassy workers. We stress that this recommendation is not to provide more services, and is instead to better characterize the many services networks already render.

Characterize and track organizational accomplishments. Many people treat science diaspora networks solely as a means to provide services to members, countries, communities, or other stakeholders. Lost in this focus are the interests of managers as managers and the needs of the network organizations as organizations. For networks to thrive and persist in providing services, their leaders and underlying organizations must be able to operate in healthy and mutually beneficial fashions. We encourage network leaders to characterize, apart from service delivery, how they would define a healthy organization and good treatment of managers and leaders. We also encourage them to track their activities that contribute or hinder the accomplishment of that characterization. The organizational goals complement the service delivery goals, and network leaders should build in planning, implementation activities, and

evaluation of both kinds of goals into their regular activities, budgets, and bylaws. We provide an example in the next recommendation.

Prepare future organization leaders.

Organizations should train and support members of their networks to become organizational leaders. While many networks identify and recruit leaders from within the networks, few prepare them or develop their leadership skills during their tenures. For many organizations, leadership opportunities arise when active leaders experience burnout or can otherwise no longer continue in their roles. A few organizations have developed a leadership model borrowed from professional societies, in which leaders are elected to terms for one or two years, but they also serve for training periods as, for instance, president-elect or past-president. With this model, leaders-elect shadow current leaders to learn the scope of the role and how to effectively execute it. Current leaders execute the role and their leadership visions. And previous leaders provide a regular source of advice and peer guidance. Regardless of structural and temporal details, more network organizations should design and implement leadership succession strategies. Such strategies can reduce stress among leaders, clarify expectations for time and work commitments, preserve institutional knowledge, smooth transitions of power, include more members in leadership, and enable fresh ideas to renew and guide the organizations. Furthermore, organizations should plan to support their leaders, perhaps through leadership training, regular interactions with leaders from other organizations, service awards, stipends, and teaching buy-outs (if applicable).

Develop and strengthen cross-network connections. As nearly all organizations focus on Connections Made as a criterion of success, it is surprising that so few managers regularly interact with each

other or build such networking activities into performance metrics. We argue elsewhere that there is an opportunity for network managers to interact with each other more robustly and frequently, especially to share ideas on strategies and tactics to secure resources (Butler et al., 2022). We further encourage interactions for a range of additional topics. Connections between managers enable them to exchange new methods, activities, or routines. Many interviewees said that they worry that their organizations are reinventing processes already developed elsewhere. We suggest this worry is in many cases well placed. Managers should actively seek connections with their peers so as to compare operational processes, success criteria, challenges, etc. Such exchange is practicable because, as most network organizations focus on particular émigré communities, few organizations are in competition with each other. Managers should find tactics to interact with their peers and build those interaction processes into organizational activities and accomplishments. In addition to phone calls, emails, requests for external input or evaluation, we suggest that managers attend at least one annual meeting per year put on by other diaspora networks.

Align criteria of success with challenges and future goals. Network organizations and leaders should ensure that their future plans address the challenges they confront, that success criteria include overcoming those challenges, and that they track accomplishments, no matter how modest, in meeting those criteria. For example, many interviewees raised a lack of resources as a major challenge, yet far fewer said that they planned to try for more resources in the future. We suspect that this and similar misalignments may be because many managers focus on service delivery compared to organizational stability and health, and because managers could share more operational knowledge across network organizations. Regardless, there is a risk for organizations of maintaining the same activities in light of

persisting challenges. As organizations and leaders evaluate and reflect on their accomplishments and challenges, they should ensure that their evaluations and reflections inform organizational design and future activities.

Continue to think about science

diplomacy. Some interviewees described detailed thoughts about science diplomacy, while several others had little or no familiarity with the concept or of how their network engaged in topics commonly related to science diplomacy. Yet their organizations participated in some level of diplomatic work. Science diplomacy is a complex and contested topic (Ruffini 2020). Diaspora networks and their managers are often at the operational leading edge of science diplomacy, taken broadly. Managers of diaspora networks should continue to engage diplomats and others in international policy, researcher mobility, and information exchange. Rather than striving to meet some set definition of science diplomacy, network organizations and their leaders should continue to explore the space in which research and international affairs intersect. Their activities and accomplishments should inform definitions or theoretical constructs of science diplomacy.

Publicize accomplishments.

Organizations should produce and publicize regular accomplishment documents, perhaps annually. While many organizations produce some form of regular evaluation document, for any given organization the document structure, content, and frequency are often variable across instances, and after a year or two even managers can struggle to find them. We suggest that organizations draft these documents to include both service and organizational accomplishments, and that they track accomplishments over years. Furthermore, organizations might publish these documents on their websites. There is an opportunity for a community

repository for diaspora network organizations, in which they could deposit gray literature such as annual accomplishment reviews, strategic plans, newsletters, etc. Such a repository would forestall the loss of institutional knowledge and could perhaps be supported by the United Nations or by so-called networks of networks, such as EURAXESS, RAICEX, etc. Regardless, by publishing their tracked accomplishments, organizations could help new or struggling networks identify paths to success, help convince outside funders about the viability of the organizations, and foster regular reflection about and iteration of the organizations and their goals.

4.2 For External Organizations that Support Networks

Governments, funding agencies, and philanthropies should support network organizations both materially and non-materially.

Such support could include money, personnel, political capital, advice, legal support, event space, publicity, in-kind donations, etc. When building any organization, those who support it should ensure that it can flourish and achieve its goals. A common theme that arose from the interviews was that many of the managers had plans and ambitions for their networks that were curtailed by constraints on funding or resources. Funding issues for which most common in the loosely and moderately structured networks, where the organizations had multiple but often divergent funding sources that directed activities. Any given network is a resource for outside entities in both the host and origin countries. Investments in improving the acclimatization of scientific talent to their new homes, as well as maintaining contact with their home cultures contributes to a more powerful and stable scientific enterprise, both nationally and internationally. Furthermore, non-monetary resources can greatly aid networks. Organizations with meeting rooms can

provide physical spaces where diaspora networks can host conferences or meetings of various sizes, and shared events across embassies or consulates might bolster soft diplomatic ties across members from different networks.

Governments should explore creating or sponsoring diaspora networks if their countries do not have diaspora networks and if they are interested in remaining connected to their scientists abroad.

In the limitations section above, we note that the lack of organizations from the global south may be an artifact of our canvassing methods, and not reflect an actual population of science diaspora networks. However, the lack of North American diaspora networks abroad is notable. North America is a popular destination for STEM professionals globally (*Nondefense Discretionary Science 2013 Survey: Unlimited Potential, Vanishing Potential*, 2013). American and Canadian researchers abroad may benefit from sustained contact with their countries of origin, and vice versa. We explore this topic in greater depth elsewhere (Warner et al., 2022).

Organizations interested in soft science diplomacy should seek out science diplomacy networks and their managers.

Diaspora networks, regardless of structure or funding level, can be vehicles of track II diplomacy. Organizations with an interest in increasing global peace, strengthening state relations, or diplomacy more broadly can fruitfully connect with network managers and members. By doing so, they gain access to cadres of scientists who maintain connections between particular host and origin countries, understand relevant cultures, and can foster scientific collaborations. Network managers operate less as gatekeepers and more as efficient guides to find experts. Managers therefore have substantial institutional knowledge that often goes unnoticed, underappreciated, and unused. Such knowledge is a

potential boon for soft science diplomacy.

4.3 Topics for Further Research

This study was designed to be exploratory and descriptive about science diaspora network organizations, focusing especially on the experiences of managers. It indicates questions and topics for further research. We highlight several in particular.

How do networks and network organizations affect their stakeholders?

This question is about causal relations and actual impact. Our report describes how managers characterize their goals and experiences. Further studies are needed to assess the extent to which networks and network organizations in fact achieve intended goals, or have other undescribed or unintended impacts. Such impacts often will be relative to different kinds of network stakeholders, including members, researchers, funders, universities, governments, etc.; in both host and origin countries. To characterize these causes and effects, further studies could segment those stakeholders for purposes of focused interview studies, the results of which could be compared across each other and this study. Furthermore, studies of these network organizations would benefit from organizational researchers embedding themselves in a few organizations for purposes of ethnography and independent characterizations of organizational structures, functions, histories, and activities. Altogether, such studies could reveal the web of causal relations that hold between any given network and its impacts, and general models of causation common across multiple organizations and types of organizations.

How do networks and network organizations influence science diplomacy and foreign policy?

This question is a particularly salient instantiation of the previous one. Science diaspora networks interest many due to their potential for influencing diplomacy. To

what extent do they in fact do so, by which social mechanisms, and which of those mechanisms are most effective for particular diplomacy issues or modes of influence? Furthermore, we note in earlier sections some interesting variability in how managers understand science diplomacy. And the Success theme did not show that managers widely direct or evaluate their organizations to influence policy formation in host or origin countries. Further studies could trace how network stakeholders other than managers understand science diplomacy and opportunities for networks to participate in it. Further studies could also characterize the actual impacts of networks on diplomacy, even if the networks don't track such impacts to evaluate success. Finally, insofar as some network organizations adopt more explicit aims and success criteria involving diplomacy or policy formation, then researchers could characterize the

influence of those networks on those aims to assess their role in the nexus of causal influences on diplomacy and policy.

How are networks and network organizations evolving since the COVID-19 pandemic? While not specifically prompted by our interview questions (Appendix 1), interviewees widely discussed the COVID-19 pandemic. Many managers noted the changes (either good or bad) their organizations underwent during the pandemic. An area for continued research could be to systematically study the long-term impacts the COVID-19 pandemic had on networks and network organizations. For example: what did these networks learn from the period of increased change and uncertainty? How has the increased access to online tools (e.g., Zoom) impacted the strength of the relations among members? And how have the organizations evolved in terms of their aims, structures, funding, and regular activities?

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6. METHODS

6.1 Stage 1- Iterative Canvassing of Networks.

We collected a list of active network organizations from which to invite managers for interviews. We grew the list iteratively from March 2021 to February 2022, and we trimmed it down as we learned that certain listed organizations were defunct or didn't meet the definition of science diaspora network.

We compiled the list from several sources, including lists previously published in the academic (e.g. Brown, 2002; Meyer & Wattiaux, 2006) and gray (e.g. Meyer & Brown-luthango, 1999) literatures and on science diaspora websites. Many of the listed organizations are now defunct, so we conducted web searches to verify those that are active, which we supplemented with regular open-ended searches for organizations previously unlisted. As we conducted interviews, we asked interviewees for the names of other diaspora network organizations. We similarly verified these organizations and added active organizations to our database.

The final list included 43 diaspora network organizations. For each organization we listed the host country or region, the country or region of origin for most members, and the website of the organization.

6.2 Stage 2- Semi structured interviews with network managers

We interviewed managers for 21 of 43 networks listed (Fontana & Frey, 2000; Kvale, 2007). Nineteen of the interviews were with one manager, and 2 interviews involved 2 managers each. The interviews were semi-structured with a set of open-ended questions (Appendix 1).

Interviewees were recruited by email. We emailed all organizations on our list until the interview period ended in September 2021. We interviewed managers from all organizations that responded to recruitment emails. Managers for all 43 networks were contacted to perform the interviews, and 3 follow-up emails were sent before the organization was removed from the contact list. Interviews were conducted by videoconference using Zoom Meetings. With interviewees verbal consent, the audio and transcripts were recorded via Zoom's inbuilt audi-capture and closed captioning functions. A typical interview included the interviewee and two members of the project team: one focused on recording and logistics and another on conducting the interview. Interviews typically lasted 45 minutes to an hour. Following the interview, the project team stored the raw audio and transcript files in a secure Dropbox. All text transcripts were verified against the audio recordings to

ensure fidelity of the text to the words spoken.

For their participation in the study, all interviewees were granted anonymity in this report and related project outputs. All team members completed human subjects-training for responsible conduct of research prior to the start of the data collection phase of the project. All data and analysis files were stored in a password-protected secure Dropbox provided by the NSPN and to which only the report authors had access permissions.

6.3 Coding

The transcripts were coded in several stages (Charmaz, 2014; Miles et al., 2018). First, coders inductively identified codes within the transcripts. For this stage, every coder analyzed at least half of the transcripts. For a given transcript, one coder read the transcript and labeled text segments with inductive codes. Then a different coder read and reviewed the codes, adding inductive codes as desired and marking points of disagreement. When necessary, the two coders met to resolve disagreements and agree on a single coded transcript.

Second, coders refined codes and developed themes (Boeije, 2002; Ryan & Bernard, 2003). For this stage, every coder analyzed a part of all transcripts. The coded snippets (quotes) and their associated codes were moved to a single spreadsheet and were grouped into nine rough categories, four about the structures and funding of the organizations, and five about the project's exploratory research questions. One coder focused on the first four categories, while five unique coders focused on one each on the remaining five categories. For their domain of codes, each coder iteratively merged similar codes, split heterogeneous codes, and then reassessed the quotes until there was a workable set of codes

that characterized distinct meanings. Codes and categories about the structures and funding of organizations were used to inform the categorization of the organizations into types as described in the section 6.4. The remaining five categories became the themes reported in the Results, with two categories about science diplomacy merged into one. The remaining codes were relabeled as subthemes for their respective themes. Coders tallied the number and percentages of organizations represented in each theme and subtheme. They also tallied those numbers for organizations when grouped into the typologies listed below, looking for potential trends or correlations. For each theme, coders selected quotes that were typical and short, typical and longer with more content, and atypical and demonstrating variation in the subtheme.

Third, the coders reviewed each other's work. All coders checked and agreed on the categories and quotes related to structures and funding. For each of the themes, a new coder checked the final tables of quotes grouped into subthemes, and they met with the theme's primary coder to resolve disagreement. Any of the previous procedures were redone as necessary. Finally, the whole team as a group reviewed each quote used in the report, checking for anonymity, subtheme illustrativeness and typicality, duplication, inclusion of all organizations, representativeness across organization types, and charitable transcription.

6.4 Database Creation

After the interviews were complete, we expanded the list of 43 network organizations into a more informative database. For each organization we listed its number of members, number of chapters or branches, and year founded. We identified this information from canvassing the organizations' websites, published documentation, and when possible from interview transcripts. After

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we completed our interview set, we continued to iterate the database, a substantially different version of which is in (Butler et al., 2022).

From websites and transcripts we also grouped organizations by three sets of typologies: federal-status, formality type, and funding type.

As the networks were contacted, they were binned into one of two major categories— federal or non-federal. This determination was based primarily on publicly available information prior to the interview and to our estimation of how closely tied the network was to their origin country's federal government for funding.

After the interviews had been completed we recategorized the networks by their relative amount of government control and their relative amount of stable funding. Each of these two categories had three subcategories, the use of which is seen in Section 2.1. The structure subcategories are loosely, moderately,

and highly structured. To place organizations in these subcategories, we relied on interviewees' responses to questions about the networks' management structures, inceptions and funding.

To further characterize commonalities and differences between the networks, they were binned into three different categories based on funding and management operation. Highly structured organizations exhibit structures for leadership, organizational parts or units, financial accounting, repeated or regular operations, planning, and communication within the organization and with network members. Loosely structured organizations exhibit less than a few of those features. Moderately structured organizations fit in neither of the first two categories. They might exhibit a majority but not all of the organizational features, or they might exhibit all of them but to a less developed extent than highly structured organizations.

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APPENDIX 1

INTERVIEW QUESTIONS

Short-answer questions

What is the network you manage and how long have you managed it?

When was it originally founded/established and why? Who funds your network?

How do you identify & recruit members? (if not on website—what qualifications are needed for membership?)

Longer-answer questions

What makes your network successful to you as manager?

[Put Differently]: How do *you evaluate the success of your network?*

Your organization?

[If needed. Put Differently]: What is the main goal for the network?

Your funders (insofar as they are different)? What do the funders see as their 'added value'?

What role does science diplomacy play in your network? (can you elaborate?)

Was science diplomacy a goal or has it become a byproduct?

[Time permitting]

What value do you believe scientist networks can bring to international diplomacy?

[If needed] Where is the potential? What is lacking?

What do you see as the future for your network? For science networks at large?

Does your network invite folks from multiple nations, or just one?

What are the diplomatic relations between the countries of your members and their host country?

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