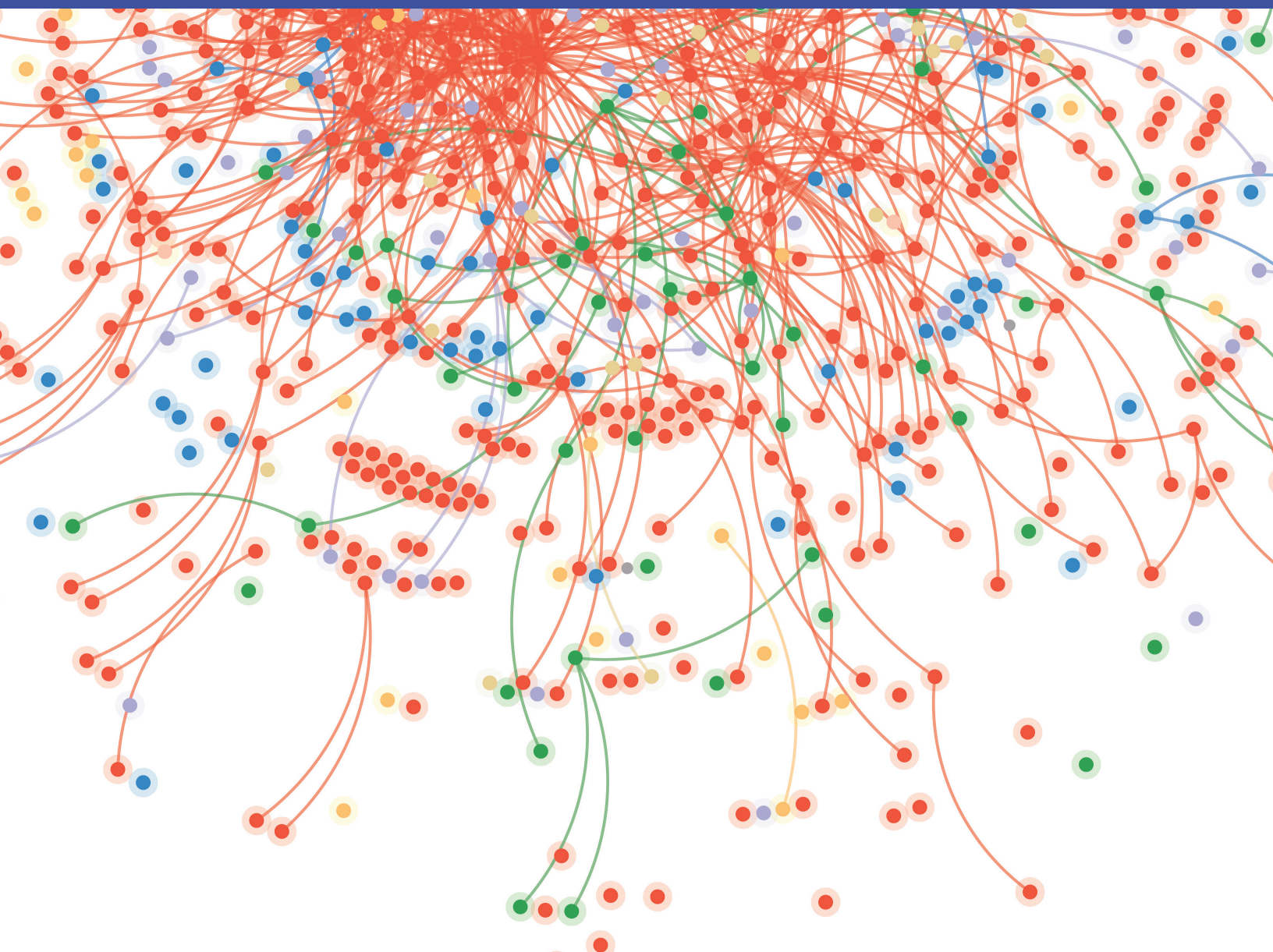


Response Innovations for Somalia Emergencies (RISE) -

The Innovation Ecosystem Mapping Report



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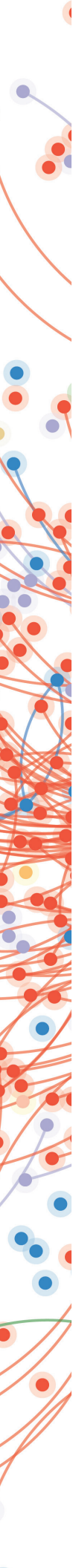
Executive Summary

The Response Innovations for Somalia Emergencies (RISE) program, funded by the United States Agency for International Development's Office of Foreign Disaster Assistance (USAID/OFDA) seeks to improve how humanitarian stakeholders prepare for and respond to disasters in Somalia. This report presents the findings from the RISE innovation ecosystem mapping study which seeks to provide a more comprehensive understanding of the key actors, factors, and relationships within Somalia's humanitarian innovation sector. Specifically, the study identifies needs, opportunities, and gaps in the existing ecosystem as well as potential barriers to and drivers of a successful, thriving innovation ecosystem.

RISE is led by the George Washington University's Elliott School of International Affairs (GW/ESIA), in collaboration with the Somali Disaster Resilience Institute (SDRI) and the Somalia Resilience Program (SomReP). Together, these partners are testing and implementing the global Response Innovation Lab's (RIL) approach to improve stakeholders' understanding of humanitarian innovation in Somalia. RISE is grounded in the tenets of the United Nation's Grand Bargain (2016) which emphasizes localization by shifting support, resources, and financing more directly to local and national actors. RISE also seeks to amplify the voices of local innovation stakeholders as well as the voices of the communities served.

The study employed both quantitative and qualitative methods undertaken concurrently. A systematic review of publicly available organizational data was derived from various Internet sources and produced the underlying ecosystem map and accompanying database. Fifty key informant interviews (KIIs) were conducted among individuals in the Somali innovation sector using semi-structured interviews to complement the social network analyses (SNA). SNA was conducted on the innovation ecosystem map data using key metrics through the Kumu Inc platform. These metrics included closeness centrality, eigenvector centrality, and reach which helped in the identification of key actors and connections within the ecosystem.

Given the newly emerging innovation ecosystem in Somalia, the mapping of this system involved constant learning and readjustment, similar to that of innovation programming where no known causal pathway exists (Obrecht, Warner, & Dillon, 2017). This learning was a process of structuring the unknown through theoretical sampling to develop, define, and refine theoretical categories. Relationships and entities were identified via snowball sampling and negotiated meaning-making across individual, institutional, and social understandings of innovation.



These efforts resulted in a more nuanced understanding of the Somali innovation ecosystem. Keystone actors, those who make connections and promote innovation (Hwang & Horowitz, 2012), were identified within the Somali ecosystem, serving as important knowledge brokers and network builders. A single Somali actor was responsible for leading the efforts to organize two critical innovation events and establish one organization around STEM (science, technology, engineering, and mathematics) topics. These events and others highlighted the occurrence of recombinant innovation within the Somali ecosystem where existing innovations have been translated into new ones, suitable for the Somali context. The Somali diaspora was also identified as a “keystone” actor, recognized for its contributions to convening events and directing financial and networking support to entrepreneurs and start-ups. SomRIL, the Somalia Response Innovation Lab (SomRIL) and a close partner within the RISE project, was identified as a leading convener and knowledge broker in the Somali innovation ecosystem.

Identified barriers to innovation were related to capacity gaps in terms of technology skillsets and the lack of capacity among a diverse group of stakeholders within the humanitarian sector responsible for the delivery and support of innovation in the Somali context. Yet promising practices supporting and sustaining innovation in fragile and conflict-affected states can be found among experiences with the Africa Enterprise Challenge Fund (AECF) and in Iraq, which provide important learning and replication opportunities for Somalia’s ecosystem. The Somali diaspora’s on-going experience and involvement in the ecosystem also provides site-specific and relevant learning opportunities as well as potential entry points for broader investment and support. The findings also suggested areas for further inquiry and research, notably around issues related to gender and power dynamics with an aim towards greater inclusion and broadening participation within the innovation ecosystem.

The Somali innovation ecosystem is a dynamic and emerging system; one which possesses great opportunity to realize and scale important innovation in response to humanitarian needs and challenges. The Somali experience also provides a unique opportunity for learning about innovation within a context of a fragile and conflict-affected state. Researchers are encouraged to contact SDRI with requests to access the innovation ecosystem map and accompanying database for further inquiry and investigation. SDRI requests may be sent via <http://sdri.so/contact-us/>.



Acknowledgements

This research report seeks to share learnings from mapping the emerging Somali innovation ecosystem over the course of the Response Innovations for Somalia Emergencies (RISE) project. This study is the result of a collaborative effort that would not have been possible without the significant commitment and contributions from multiple partners including the Somali Disaster Resilience Institute (SDRI), World Vision International (WVI), Somalia Resilience Programme (SomReP), the Response Innovation Lab and the George Washington University's Elliott School of International Affairs. Appreciation is expressed also for the Somali innovators themselves and the stakeholders participating in the SomRIL convenings, as well as the key informants for the study.

Additionally, we would like to acknowledge the generous support of the United States Agency for International Development's Office of Foreign Disaster Assistance (USAID/OFDA) and the East Africa Regional team that enabled RISE to carry out this body of research. And special thanks goes to the Federal Government of Somalia and the many ministry staff who have engaged in the process.

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List of Acronyms

2D	Two dimensional
3W	Who Does What Where?
AECF	Africa Enterprise Challenge Fund
FGDs	Focus Group Discussions
FGS	Federal Government of Somalia
GW/ESIA	The George Washington University, Elliott School of International Affairs
IDP	Internally Displaced Persons
IKB	Innovation Knowledge Base
INGOs	International Non-governmental Organizations
IOM	International Organization for Migration
IP	Intellectual property
ITEA	Iraq Technology and Entrepreneurship Alliance
KIIs	Key Informant Interviews
NGOs	Non-governmental Organizations
OECD	Organisation for Economic Co-operation and Development
OFDA	Office of Foreign Disaster Assistance
PCW	Post-Conflict Window
RIL	Response Innovation Lab
RISE	Response Innovations for Somalia Emergencies
SDRI	Somali Disaster Resilience Institute
SNA	Social Network Analysis
SomREP	Somalia Resilience Program
SomRIL	Somalia Response Innovation Lab
STEM	Science, technology, engineering, and mathematics
UN	United Nations
UNDP	United Nations Development Programme
USAID	United States Agency for International Development



Response Innovations for Somalia Emergencies (RISE) - The Innovation Ecosystem Mapping Report

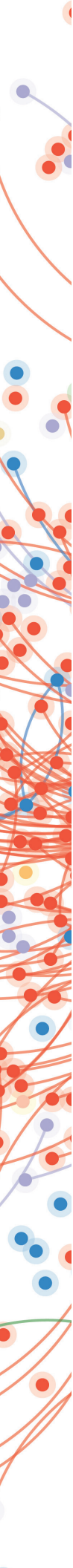
Introduction

Disasters and shocks are occurring more frequently and often with greater intensity than ever before. Chronic stressors and prolonged crises have become the norm, displacing communities and disproportionately affecting the most vulnerable (Global Resilience Partnership, 2019). The global humanitarian response to disasters, conflict, and on-going crises is struggling to meet demand. On average, 350 million people are affected by disasters annually (Global Humanitarian Overview, 2019). Need greatly outstrips funding as evidenced by a 40 percent gap in coverage for United Nations (UN) led humanitarian response plans (Global Humanitarian Overview, 2019) and a 28 percent gap in Somalia (Financial Tracking Service, 2019). Conflict and climate change will continue to drive and shape humanitarian need across the globe. Somalia mirrors many of these trends where the triple nexus of conflict, disaster, and development collide.

The Response Innovations for Somalia Emergencies (RISE) program, funded by the United States Agency for International Development's Office of Foreign Disaster Assistance (USAID/OFDA) seeks to improve how humanitarian stakeholders prepare for and respond to disasters in Somalia by increasing knowledge of the ecosystem of actors, factors, and relationships shaping innovation within the humanitarian sector. RISE is led by the George Washington University's Elliott School of International Affairs (GW/ESIA) and in collaboration with the Somali Disaster Resilience Institute (SDRI) and the Somalia Resilience Program (SomReP). Together, these partners are testing and implementing the global Response Innovation Lab's (RIL) approach to improve stakeholders' understanding of humanitarian innovation in Somalia.

Specifically, RISE and its partners undertook an innovation ecosystem mapping exercise and conducted specific research as part of a broader effort to improve stakeholders' understanding of humanitarian innovation across the following knowledge blocks:

- Common understanding and definition of humanitarian innovations in the Somali context.
 - Increased knowledge of factors and conditions that enable affected Somali community voices to drive the humanitarian innovation design process.
 - Increased knowledge of factors and conditions that lead to successful and failed humanitarian innovations in the Somali context.
 - Increased knowledge of factors and conditions to scale innovations using the MatchMaker in Somalia.
-



RISE is committed to conducting research that explores enabling factors of humanitarian innovation while ensuring inclusiveness and localization. Although disagreement exists among stakeholders as to the working definition of innovation within the humanitarian sector, this research utilizes a broad definition of innovation, originally put forth in the Oslo Manual:

An innovation is the implementation of a new or significantly improved product (good or service), a new process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations. (OECD/Eurostat, 2018)

Humanitarian innovation is an iterative process that identifies, adjusts, and diffuses ideas for improving humanitarian action (Obrecht, Warner, & Dillon, 2017). Unlike standard programming with its anticipated pathways to success, innovation programming is seldom based on a known causal pathway, but relies on constant learning and readjustment because so little is known about whether, how, and why an idea for improvement might work (Obrecht, et al., 2017). As the field of humanitarian innovation continues to emerge, programs and processes must be established that embrace innovation and amplify local community voices. RISE intends to provide greater insight into how to best empower local actors to expand and sustain the innovation ecosystem in Somalia.


The Response Innovation Lab (RIL) Model

The RIL is a global collaboration that partners with a wide range of entities working in humanitarian innovation. The RIL is a collaboration between Save the Children, World Vision, Oxfam, Civic, and the George Washington University. The RIL partners include local and international innovators, international and local NGOs at the field level, local government, and academic institutions, as well as affected populations. The RIL model seeks to improve knowledge, application, effectiveness, and scale of humanitarian innovation. The RIL approach emphasizes on-the-ground innovation and real-time, problem solving in the various humanitarian contexts such as large scale emergencies and protracted crises. The primary functions of the RIL are to convene, match-make, and support innovations. The RIL currently has a presence in five locations: Puerto Rico, Jordan, Iraq, Somalia, and Uganda with initial planning also underway to open a lab in Bangladesh.

The purpose of innovation ecosystem mapping within each RIL is to provide information on what humanitarian and innovation actors are doing and where to connect actors together for support and better programming. The Somali Innovation Ecosystem Map (<https://responseinnovationlab.com/somalia>) is designed for actors working on innovative solutions to humanitarian challenges to identify and connect with relevant actors. The online map was created by the Somali Response Innovation Lab (SomRIL), an inter-agency mechanism supporting humanitarian innovation in Somalia which is hosted by SomReP, with support from USAID and partners.

SomRIL created an initial, flat 2D ecosystem map building upon information gathered at a convening event with the aim to identify innovation actors within the humanitarian sector. This map has evolved to an interactive map that identifies critical functions and key actors within Somalia. Functions comprise finance, knowledge, and support; actors comprise government, implementers, and the private sector. Each element in the map is linked to a brief description and website address, as available.

For the purpose of this study, this interactive map was further expanded to include a broader scope of actors in Somalia and a deeper understanding of individual elements; identify relationships between elements; and facilitate Social Network Analysis (SNA). The combination



of ecosystem map database and visualization provides a more comprehensive understanding of the existing ecosystem and the role each element plays. This granularity of understanding facilitates the identification of potential leverage points as well as potential barriers, identifying needs, opportunities, and gaps in the innovation ecosystem. SomRIL and SDRI function as intermediaries within the ecosystem, providing access and updates to the online mapping tool (SomRIL) and the research map (SDRI) as the ecosystem evolves. The research presented here is based upon this higher-level innovation ecosystem map, developed with the Kumu application. Kumu.io is a visualization platform for mapping systems and relationships.

In summary, three mapping exercises were undertaken during RISE project implementation: 1) a 2D (flat) ecosystem map; 2) an interactive map with additional actors; and 3) a higher-level, innovation ecosystem map which serves as the basis of this study report.

Methods

Purpose

The purpose of the ecosystem mapping study is to gain an in-depth understanding of the Somali innovation ecosystem and its infrastructure within the humanitarian sector. Specifically, the ecosystem mapping study seeks to answer the following foundational questions:

- Who are the key actors in the humanitarian innovation ecosystem in Somalia?
- What principal roles do these actors play in the humanitarian innovation ecosystem in Somalia?
- How are the different actors related to one another in terms of functionality?
- What are the barriers to innovation ecosystem functioning?
- What are the drivers of innovation within Somali's humanitarian sector?

Design

Data collection employed a mixed methods approach with quantitative and qualitative methods undertaken concurrently. A systematic review of publicly available organizational data derived from various Internet sources produced the interactive, ecosystem map and accompanying database. Fifty key informant interviews (KIIs) were conducted among individuals in the Somali innovation sector using semi-structured interviews to complement the social network analyses (SNA) performed on the ecosystem map database.

A review of publicly available organizational data was conducted among key actors in the Somali innovation ecosystem. Sourcing the data from "user-generated content" or public data often locates more data sources (Wang, 2018) and has the potential to provide a broader capture of the ecosystem. Data was pulled from various Internet sources (Facebook pages, program reports, Twitter feeds, websites) as well as the Somalia Operational Presence (3W) Map and Somalia Humanitarian Response Plan (Humanitarian Response, 2019). Key actors were identified across a variety of different data sources to complete the ecosystem mapping database:

-
- Organizations included in the SomRIL 2D ecosystem map.
 - Organizations suggested by participants at the two convenings entitled "RISE: Ecosystem mapping & challenge identification" (Nairobi, February 2018 and Mogasihu, March 2018) comprising 107 individuals from 43 different organizations.
 - Organizations suggested by key informants.
 - Organizations suggested by USAID/OFDA Kenya Regional Office staff.
 - Actors from the Somalia Operational Presence (3W) Map.
 - Actors from the MatchMaker program.

A modified snowballing technique was used to identify organizations to be included in the Somali innovation ecosystem database whether that was a mention by an individual or a reference within an Internet source or a review of the grey literature. Each element included in the database is connected to another, so the researchers followed the various threads to grow the database. Any element that was confirmed as being involved in Somalia’s humanitarian sector and/or innovation ecosystem was included.

The ecosystem database variables comprise label (existing acronym or one created upon data entry), name of organization, type of organization, tags, location, email address, Facebook handle, Twitter handle, and website address, as available. Type of organization included 45 discrete categories upon data capture. These 45 “types” of organizations were re-categorized into eight discrete categories (Table 1).

Table 1. Categories of element types

Individual	Diaspora; Entrepreneur; Individual
Organization	Academia; Bilateral; Civil society; Foundation; Fund; Government; NGO; Media; Multilateral; NGO; Private; Start-up; UN agency
Network	Cluster; Consortium; Forum; Network; Platform; Working group
Systems level	Community; District; Subnational region; Country
Event	Event
Innovation focused	Innovation focused
Product	Application; Approach; Program; Report

Elements included in the “innovation focused” category are those that focus primarily on supporting innovation and enterprise development. However, “innovation focused” excludes elements categorized as “event.”

A convenience sampling frame to identify key informants was derived from a list of innovation actors from the SomRIL 2D ecosystem map and refined with input from the RISE team and USAID/OFDA staff. The sampling frame contained 210 potential respondents who were prioritized by organizations deemed as “innovation focused.” These 210 potential respondents were contacted via email, LinkedIn, Twitter, web conferencing, or telephone. Not all potential informant respondents replied to the contact requests and others simply were inaccessible via email or telephone. The semi-structured interview was tested and modified, and intended to serve as a guide. Key informant interviews (KIIs) in Somalia were conducted by faculty and graduate students from the SDRI. Interviewers received training prior to the actual KII; interviews were conducted in pairs to improve note-taking of responses. KIIs were also conducted in Nairobi, Kenya by a RISE team member and accompanying doctoral student. Twenty-five KIIs were conducted in Somalia, 18 KIIs were conducted in Kenya, five KIIs were conducted virtually, one KII was conducted in Kampala and one KII was conducted in Rwanda. Respondents were provided an opportunity to opt-out of the interview at any time, informed of the confidentiality of the interview and information collection, and asked to provide consent.

The KIIs targeted ten distinct types of organizations operating in Somalia, supporting Somali innovation, or linked to organizations supporting Somali innovation:

- Somali accelerators/hubs
- Somali civil society
- Somali foundations
- Somali start-ups
- Public sector
- Academia
- Private sector
- Venture funds
- International NGOs
- UN agencies

KIIs sought to capture information related to an enhanced understanding of innovation within the Somali context as well as an understanding of innovation ecosystem drivers and barriers in the region. In general, the semi-structured interview guides were similar in content with minor variation in questions based on organizational type and expected involvement or exposure to Somali's innovation ecosystem. KIIs were conducted over a six-month period, from January to June 2019.

Among the 50 KIIs conducted, 70 % represented Somali organizations and 28 % represented Kenyan organizations. The remainder comprised five internationally oriented organizations. Almost 30 % of organizations were categorized as "innovation focused" followed by 25 % from the private sector. Roughly 10 % of KIIs were conducted among organizations representing Somali civil society, 10% representing academia, and 10 % representing INGOs. The remaining KIIs were conducted among Federal Government of Somalia (FGS) agencies, foundations, funds, platforms, and UN agencies.

Analyses

Social network analysis (SNA) was conducted on the innovation ecosystem map data through the Kumu platform. Kumu.io provides a means to visualize complex networks, capture the basic structure of a network, and reveal a network's key actors. Additionally, the platform provides a number of metrics to identify critical actors and connections. Kumu metrics used for this study include: closeness centrality, eigenvector centrality, and reach. Each metric is described below:

Closeness centrality: Measures the distance between elements in the network. A higher number or high "closeness" indicates an element in the network that spreads information faster and possesses higher awareness as to what is happening across the network.

Eigenvector centrality: Measures how well an element is connected to other well connected elements. Generally, elements with high eigenvector centrality are considered the leaders of the network, although these elements may not possess the strongest local influence.

Reach: Measures the portion of the network within two steps of an element. Elements with high reach can spread information through the network through close "friend-of-a-friend" contacts.

These analyses focused on a subset of the larger ecosystem, drilling down to those categorized as Somali-led, Somali-focused, Somali-support, and Somali-linked. Somali-led refers to those elements that are primarily led by Somalis. Somali-focused elements are defined as those elements operating in the country, but led or instituted by organizations or individuals that are non-Somali but whose activities are designed for the Somali context. Somali-support elements operate externally to the country but provided support to the Somali innovation ecosystem. Somali-linked elements do not specifically focus on Somalia, and do not provide any innovation support for Somali programs at this time.

More granular analyses were conducted on this subset of elements focusing on “event” and “innovation focused” elements. Refer to Table 1 for types of elements. The Kumu metrics were also applied to these elements to identify potential drivers of innovation within the Somali humanitarian innovation ecosystem.

Event and innovation focused elements serve as proxy indicators of the growth of the innovation ecosystem within Somalia, a recognized fragile state (Fragile State Index, 2019). Each event and innovation focused element was coded to characterize its role within the ecosystem in terms of innovation intermediary, building upon the typology of Kilelu, Klerkx, Leeuwis, & Hall, (2011):

<p>Enterprise development support: Intermediaries guided by market demand, focusing primarily on business or enterprise development. Often involved substantively in the innovation process, including the provision of extension support (production), research, and training of business skills.</p>
<p>Knowledge brokering: Connecting the disciplines of research and practice by brokers possessing credibility in both contexts (Kislov, Wilson, & Boaden, 2016). Involves bringing people together, and includes exchange between those who are considered decision makers (Jackson-Bowers, Kalucy, & McIntyre, 2006 in Ward, House & Hamer, 2009)</p>
<p>Network building: Intermediaries build networks by brokering relationships between heterogenous actors. Linkages can be forward (output) or backward (input) including emerging technology inputs (Kilelu et al., 2011).</p>
<p>Technology brokering: Intermediaries facilitate access to existing technologies and support adaptation for the local context or stimulate demand for and application of new technology (Kilelu et al., 2011).</p>

Table 2 presents a modification of Kilelu et al.’s (2011) intermediary framework with two levels applied to the Somali innovation ecosystem.

Table 2. Levels of innovation intermediary

Enterprise development support	Resource investment; Structured innovation process; Incremental support
Knowledge brokering	Academic engagement; Call for papers; Research presented; Dialogue facilitation

Network building	Ecosystemic - policy; Innovation dialogue facilitation; Focus (Pro poor, Youth, Gender, Peace); Diaspora Engagement
Technology brokering	Data brokering; Technology hands-on; Structured innovation process; Incremental support

Event elements were also analyzed according to growth over time, from 1999 to 2019, to determine whether or not the event data suggests an emerging innovation ecosystem or an indication of “idea flow” and the level of infrastructure available for ongoing knowledge sharing (Hogan & Gallaher, 2018).

Upon completion of the KIIs, two RISE researchers independently reviewed and summarized emerging themes from the qualitative data, verifying major themes and identifying areas in need of additional clarification or expansion. Key themes that emerged in the qualitative analysis of the KIIs attempted to answer the following questions:

- How do key informants perceive innovation in Somalia and how do they believe it can influence the humanitarian sector?
- What are the drivers of Somali innovation?
- What are the barriers to innovation in Somalia? What are the current challenges faced by innovators in the system?

Limitations

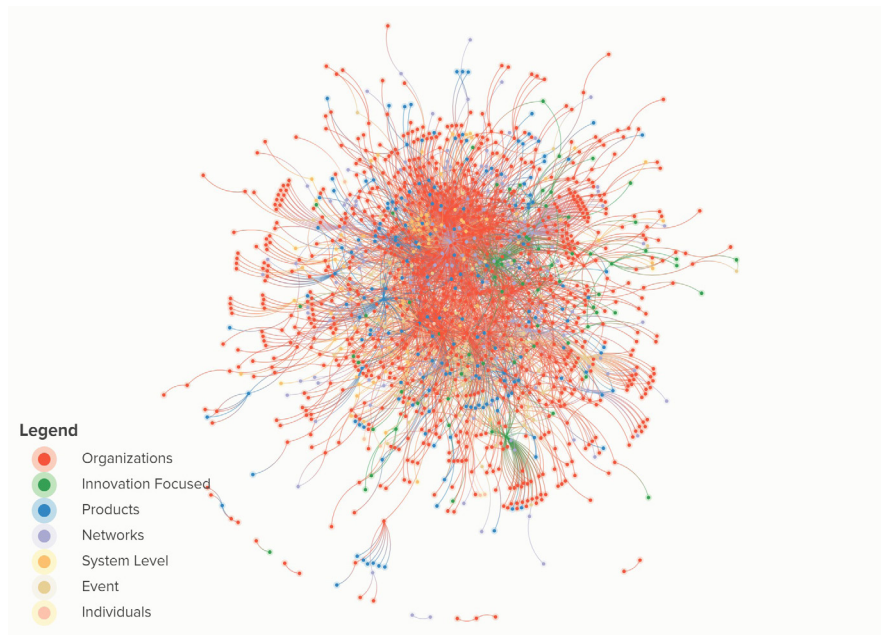
In reality, each RIL has had difficulty in collecting detailed information and effectively updating the data to populate the ecosystem mapping database, and the Somali experience has been no different. This challenge has been particularly apparent with regards to private sector entities and local NGOs as publicly available information is often less descriptive than larger I/NGOs. Additionally, smaller entities often do not maintain websites or have few published materials available; and perhaps prefer to maintain a less visible public profile given current security risks. Challenges remain in defining ecosystem actors, identifying who to include, and determining what comprises a complete dataset. In Somalia, given security concerns, limited access to the physical sites, and the availability of online information; the accompanying ecosystem database and the interactive map contain less than the full range of data. Given that the study also involves social network analysis (SNA), careful consideration was given to security, privacy, and ethical issues when deciding on the presentation of the results as SNA data is difficult to anonymize even when aggregated to a higher level (Baker, 2019). This concern further limits the amount of data shared. The research is exploratory in nature and recognizes that not all ecosystem elements are represented equally.

Results

Somali Innovation Ecosystem

The Somali innovation ecosystem map is comprised of 1519 independent elements and 4068 connections. Figure 1 presents a snapshot of the visualization of the Somali innovation ecosystem.

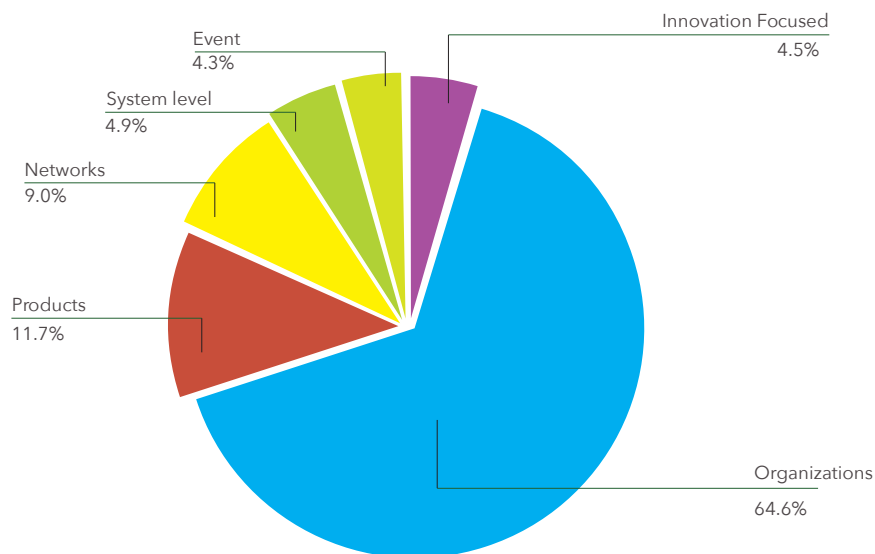
Figure 1: Somali Innovation Ecosystem Map - September 2019 (Full Ecosystem visualization in Appendix 1)



Organizations represented the most common type of element in the ecosystem (64.6 %) followed by products (11.7 %) and networks (9.0 %).

Figure 2 presents types of elements in the Somali ecosystem.

Figure 2: Elements by type, n=1519

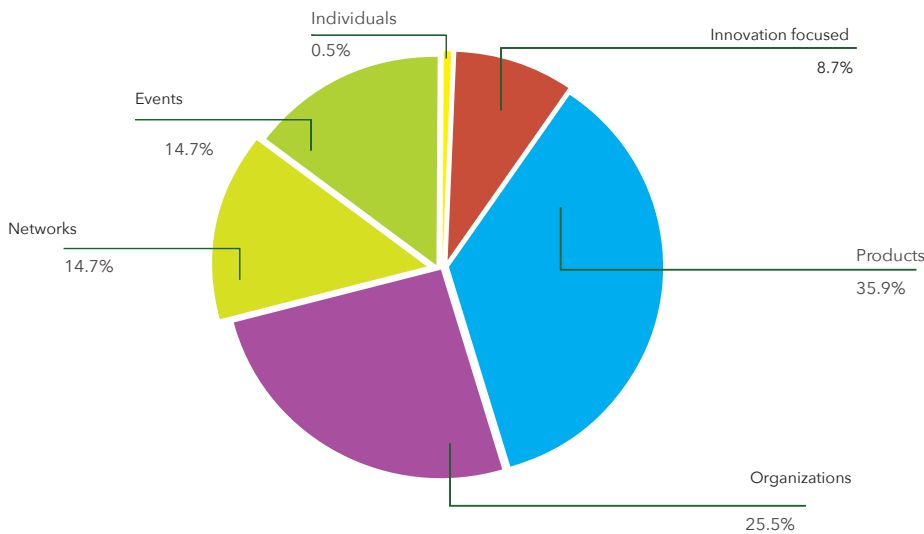


Although elements categorized as “innovation focused” and “events” only comprised 4.5 % and 4.3 % of the ecosystem respectively, these two types of elements accounted for almost a quarter of all connections within the ecosystem (23.5 %).

Somali-led and Somali-focused Innovation Elements

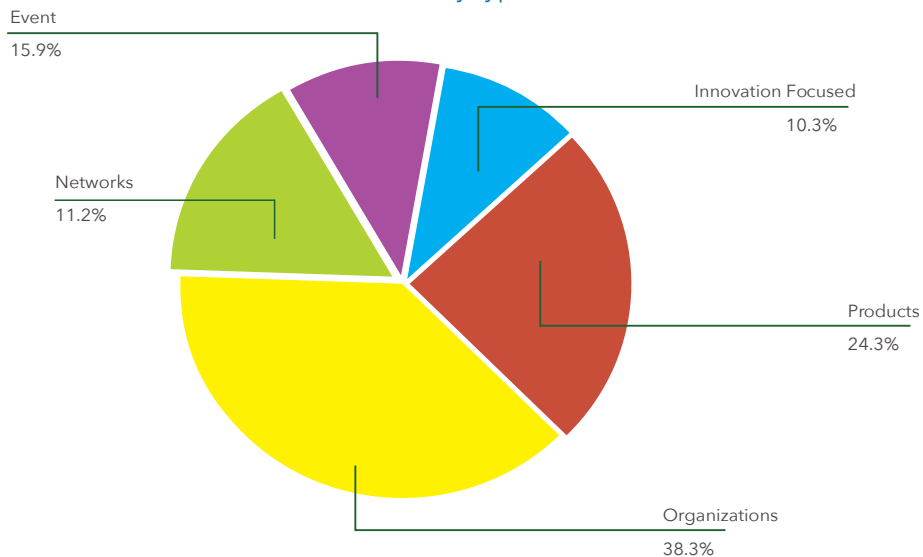
Among the 1519 independent elements, 252 were labeled as innovations, 107 of which were Somali-led and 77 of which were innovations operating in Somalia (labeled as Somali-focused). These 252 elements represented 1261 connections (28.4 %) within the ecosystem. Figure 3 represents a breakdown of Somali-led and Somali-focused innovation elements by type.

Figure 3: Somali-led and Somali-focused innovation elements by type, n=252



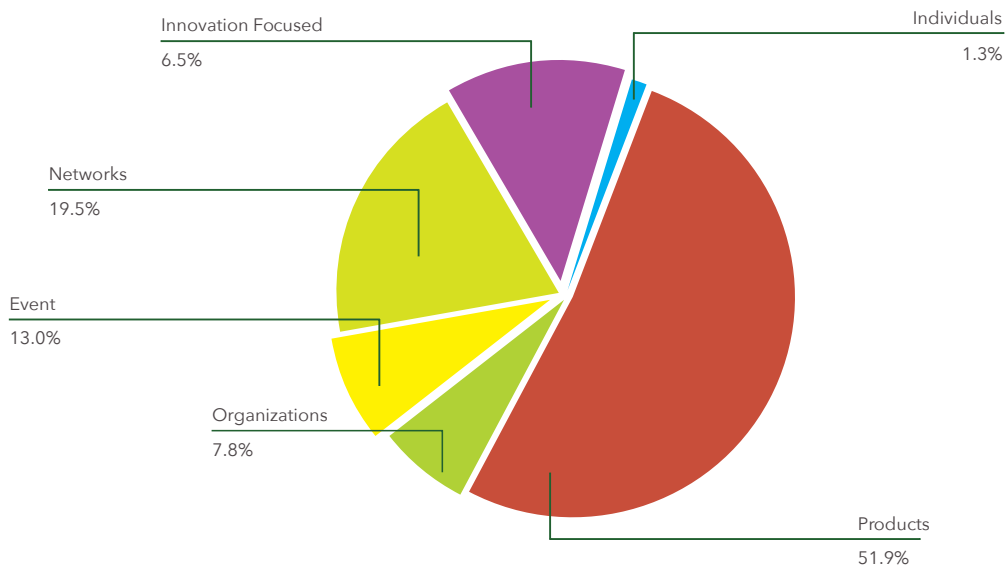
The majority of innovation elements were products (35.9 %) comprised of 48 programs, 22 applications, and 10 approaches and one report; followed by organizations (25.5 %) and events and networks (each at 14.7 %) which accounted for over 80 % of the innovation elements. Somali-led elements accounted for 726 connections and Somali-focused elements accounted for 889 connections. Somali-led elements are dominated by organizations (38.3 %) and products (24.3 %) which comprised 12 programs, 12 applications, and two approaches.

Figure 4: Somali-led innovation elements by type, n=107



Somali-focused elements were dominated by products (51.9 %) and networks (19.5%) as presented in Figure 5.

Figure 5: Somali-focused innovation elements by type, n=77



Deeper analyses were conducted on the 107 Somali-led and 77 Somali-focused innovation elements using specific SNA metrics comprising closeness centrality, eigenvector centrality, and reach. Table 3 presents a comparison among this ecosystem subset for closeness centrality, eigenvector centrality, and reach.

Table 3: Closeness centrality, eigenvector centrality, and reach values for Somali-led and Somali-focused elements.

Metric	Somali-led n=107	Somali-focused n=77
Closeness centrality:		
Range	0.3894	0.2511
Lower limit	0.0026	0.1819
Upper limit	0.3920	0.4330
Mean	0.2683	0.2794
Median	0.2420	0.2830
Eigenvector centrality:		
Range	0.0093	0.0100
Lower limit	0.0000	0.0000
Upper limit	0.0093	0.0100
Mean	0.0004	0.0006
Median	0.0001511	0.0002667
Reach:		
Range	0.31102	0.47802
Lower limit	0.00198	0.00198
Upper limit	0.31300	0.48000
Mean	0.05864	0.06622
Median	0.03562	0.04216

Somali-focused elements had slightly higher mean values of closeness centrality than Somali-led elements at 0.2794 and 0.2683, respectively, indicating that Somali-focused elements were slightly faster at spreading information through the ecosystem and possessed a somewhat higher awareness of what was taking place in the ecosystem. Somali-focused elements had higher mean Eigenvector centrality values than Somali-led at 0.0006 and 0.0004, respectively, indicating that Somali-focused elements were slightly more well-connected to other, well-connected elements. Elements with higher Eigenvector values are identified as “network leaders” although these elements may not possess the strongest local influence.

Eigenvector metrics were also calculated on all the ecosystem’s innovation elements (n=252). Figure 6 provides a visualization of Somali-led innovation elements within the Somali ecosystem according to Eigenvector values. See Appendix 2 for a full visualization.

Figure 6: Eigenvector values for Somali-led elements, n=107



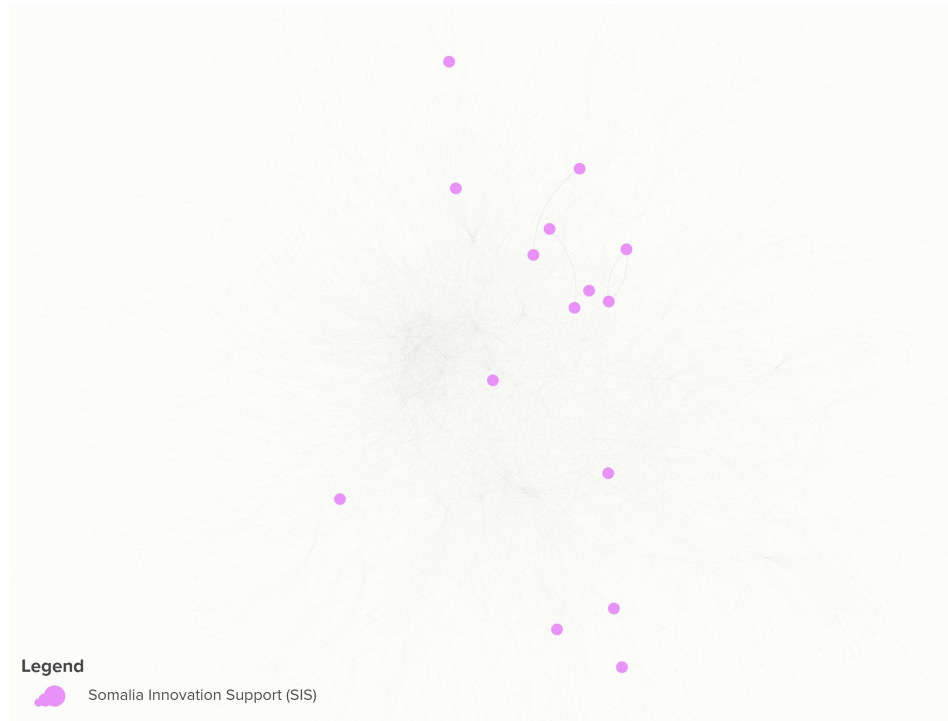
Figure 7 provides a visualization of Somali-focused innovation elements within the Somali ecosystem according to Eigenvector values. See Appendix 3 for a full visualization.

Figure 7: Eigenvector values for Somali-focused elements, n=77



Figure 8 provides a visualization of Somali-support innovation elements within the Somali ecosystem according to Eigenvector values. See Appendix 4 for a full visualization.

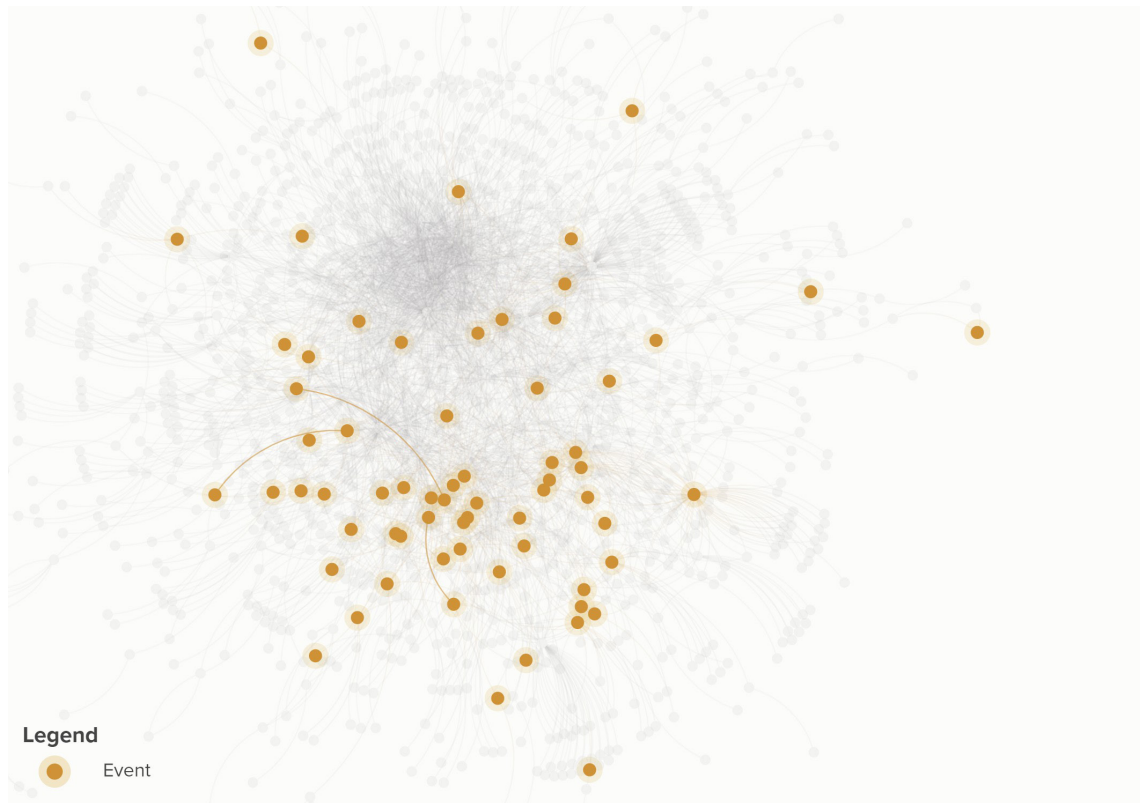
Figure 8: Eigenvector values for Somali-support elements, n=15



Somali-led and Somali-focused Innovation Event Elements

Of the 48 event elements (Figure 9), 50 % are categorized as innovations and accounted for 257 connections. Sixty-five percent of event elements were Somali-led and accounted for 340 connections. Thirty-five percent of event elements were Somali-focused and accounted for 158 connections. The majority of event elements occurred in Mogadishu (14), followed by Hargeisa (6), and Garowe (3).

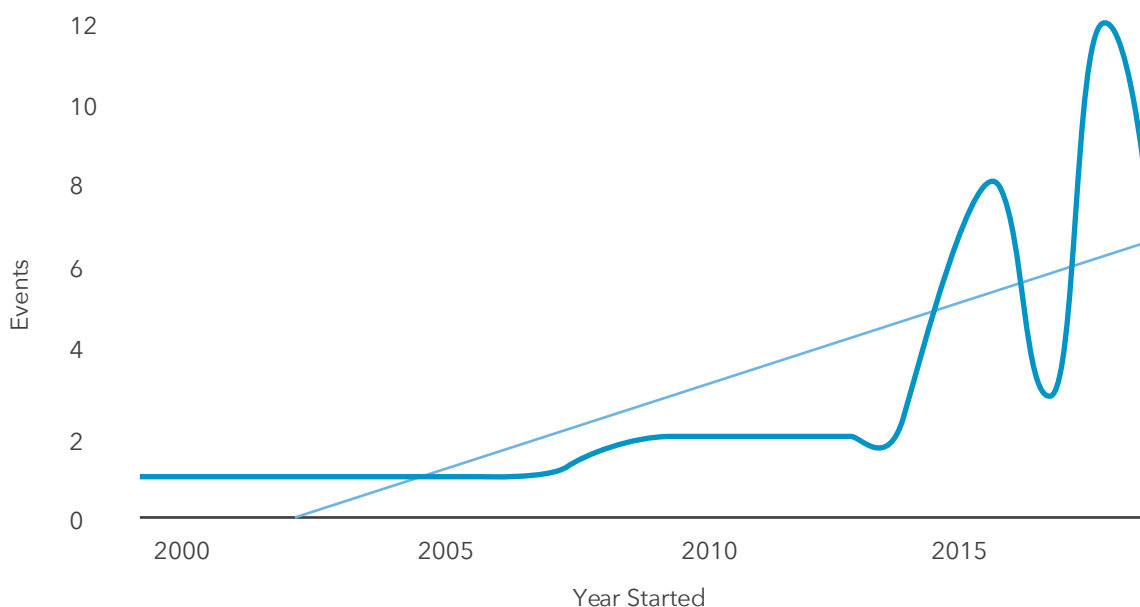
Figure 9: Event elements within the Somali innovation ecosystem, n=48.



See Appendix 5 for a full visualization

Thirty-three percent of the Somali-led event elements occurred in 2018; 50 % of the Somali-focused event elements occurred mostly in 2019. Figure 10 presents the number of event elements that occurred in Somalia from 1999 to mid-2019.

Figure 10: Number of innovation event elements organized in Somalia from 1999 to mid-2019, n=48



Among the 48 event elements, nine focused on gender and 23 focused on youth. Somali-led event elements organized more events focused on gender (5) and more focused on youth (18) than Somali-focused events with four events focused on gender and five focused on youth, respectively. Event elements engaged with 36 academic entities, 20 diaspora, and 15 in peace dialogue.

Table 4 presents a breakdown of engagement among innovation events organized by Somali-led and Somali-focused elements.

Table 4: Engagement among innovation events organized by Somali-led and Somali-focused elements, n=48

	Somali-led n=31	Somali-focused n=17
Academic	25	11
Diaspora	16	4
Peace dialogue	10	5

Somali-led events hosted a larger majority of events that engaged academia, the Somali diaspora, and peace dialogs than Somali-focused events.

Innovation events were categorized according to the type of innovation driver: enterprise development support (22), knowledge brokering (48), network building (48), and technology brokering (18). Table 5 presents a breakdown of innovation events by type of innovation driver.

Table 5: Innovation events by type of innovation driver, n=48

	Somali-led n=31	Somali-focused n=17
Enterprise development support	15	7
Knowledge brokering AND Network building	31	17
Technology brokering	12	6

The majority of Somali-led and Somali-focused innovation events were categorized as both knowledge brokering *and* network building types of innovation drivers. Less than half of all events were comprised of the innovation drivers enterprise development support and technology brokering.

Somali-led and Somali-focused Innovation Focused elements

Among the 1519 elements, 4 % were defined as “innovation focused” (n=66) and accounted for 410 connections. Among these innovation focused elements, 17 % were Somali-led and accounted for 115 connections. Fifteen percent were Somali-focused and accounted for 139 connections. Thirty-six percent of the innovation focused elements are considered “Somali-support” with 116 connections. Additionally, 32 % are categorized as innovation focused and linked to the Somali innovation ecosystem with 40 connections, but do not specifically focus on Somalia, and do not provide any innovation support for Somali programs at this time. These elements are categorized as “Somali-linked.”

Innovation focused elements were categorized according to type of innovation driver: enterprise development support, knowledge brokering, network building, and technology brokering. Table 6 presents a breakdown of innovation elements by type of innovation driver.

Table 6: Innovation focused elements by type of innovation driver, n=66

	Somali-led n=11	Somali-focused n=10	Somali-support n=24	Somali-linked n=21
Enterprise development support	8	9	24	4
Knowledge brokering	11	10	24	21
Network building	10	8	23	18
Technology brokering	7	3	12	12

Knowledge brokering and networking building were the leading drivers of innovation focused elements across all operating types: Somali-led, Somali-focused, Somali-support, and Somali-linked. Somali-support innovation focused elements accounted for the large majority of enterprise development support, three times that of Somali-led and Somali-focused innovation focused elements. Technology brokering lagged behind the other three types of innovation drivers across all operating types.

Perceptions of innovation in Somalia

Key informants (n=50) were asked a series of questions regarding their perceptions of humanitarian innovation in Somalia, barriers to successful innovation, and potential drivers of innovation. Many respondents presented their perceptions of humanitarian innovation in juxtaposition to humanitarian aid, comparing the two, and often citing humanitarian innovation as "...more effective and more sustainable than the [sic] humanitarian aid." (Innovation Hub Respondent) A common theme was the ability of humanitarian innovation to disrupt the cycle of aid dependency:

Yes, the humanitarian innovations makes [sic] different [sic]. It can change the traditional way of addressing the problems of the communities that can create dependences of aid. (INGO Respondent)

Aid is reactive, causes dependency; innovation is proactive.... (Civil Society Respondent)

Aid is no good as you are killing his/her brain, with innovation you build brains to have a creativity mindset. (Civil Society Respondent)

Comments often included references to the community and the feeling that communities could greatly benefit from humanitarian innovation:

I think a lot of innovations are most needed. Because our community are fed up with humanitarian aid, we need to innovate something important to our vulnerable community to our life and our dignity. If somebody gives you something it can't be something have long term effect, but if you teach them how to come up with something new, and at the same time have matched with our community needs, when we do that we can all benefit from that. (Government Respondent)

In humanitarian innovation, it may facilitate the affected communities take part and bring solution to their challenges with the support of I/NGOs and development agencies. It is more effective and more sustainable than the humanitarian aid. (Innovation Focused Respondent)

One respondent noted how humanitarian innovation serves to improve aid: "...those with tech can make a huge difference as [sic] can connect systems, people, communities and countries. Enhances transparency in aid delivery. Enhance speed [sic] of aid delivery, can cut costs, improve efficiency." (Civil Society Respondent)

Barriers to innovation in Somalia

Barriers to innovation in Somalia were numerous with the most common themes dominated by insecurity, a lack of policy and regulations around innovation, and a range of capacity gaps.

Of course, there are so many challenges such as; security is one of the major challenges and if you want to travel to Afgoye you may face a lot of problems, issues related to the skills and the capacity you need to do this work and there other issues related to the policy and regulations.
(Civil Society Respondent)

Many respondents cited insecurity as a barrier to innovation:

The overall security in Somali context is somehow barrier to any innovative solution to our current problems. (Startup Respondent)

Sometimes Somali ordinary people have business ideas or solution for some problems in their mind, but they may not be able to present it for security reasons, insecurity in the country is very challenging issue.... (Private Sector Respondent)

I would also say that the main challenges in the country is safety issue and it is difficult to demonstrate your opinion freely. Everyone who is working inside of the country knows what challenge is, if you are at the heart of the country the first thing we can point [to] is security.
(Innovation Focused Respondent)

A general lack of policy regulation within government was noted and many cited the lack of intellectual property (IP) laws, including copyright protection, as a barrier to innovation:

"We don't have legal frameworks that protect our intellectual property." (Academic Respondent)


Because there are no effective policies in the government, there is hardly [sic] less industrialization, and less productive sector. (INGO Respondent)

Although, I was not part of ----- when it's created, but I think there were many barriers, the biggest challenge was how to adjust our policies with the rules and regulations of the country, in the country that there are no rules and regulations. (Program Respondent)

Capacity gaps ranged from those associated with particular sectors, namely the academic and public sectors, as well as those associated with particular skillsets.

No, they have not [sic] active role and they have not enough capacity to support us. There is a big gap between universities and NGO. Also they don't have interest about working with communities and addressing their problems. They only focus on how to run their universities.
(INGO Respondent)

The type of talent or the level of talent that you get from universities here is not the same as elsewhere. They're not there yet. They are ready with ideas, but the [sic] many of the ideas are not ready to go to market. We found that the skillset that they're picking from universities is not at the level it needs to be. (Private Sector Respondent)



Time for mentorship and training is missing in the [innovation] ecosystem. (Private Sector Respondent)

More specifically, several respondents felt the Somali government lacked strategic vision for innovation and that this factor was an important barrier to innovation: "Our country does not have any strategic vision toward innovation ecosystem." (Startup Respondent)

There is no strategic vision formulated by the Somali government in the country that can support innovations, even these policies and strategies are set by foreign organizations, a foreign established policy with no regards of local context can be difficult to apply, there is no strategic vision for supporting Somali innovations that I know of. ...I think the government has priorities other than innovation, the government is facing challenges such as security challenge, droughts and natural disasters, so policies are framed through priorities, I don't think there is policy regarding innovation in today's system of governance but it can be fit into the vision when the vision is locally led and locally owned. (Private Sector Respondent)

Conversely, respondents conveyed the belief that the public sector did have a role to play in innovation: "Government should take the lead." (Private Sector Respondent)

I think federal government can play very important role in encouraging the innovators and can tell them how they are doing very important thing [sic] which have impact on the country. The government also can help such innovation to use their products if it's entrepreneurs. (Civil Society Respondent)

In addition to the public sector, there was often mention of a variety of different types of actors who respondents felt had a role to play in the Somali innovation ecosystem:

All INGOs can provide such kind of support. UNDP has the capacity to provide technical and financial support, private sector can play crucial role in assisting innovations. ...The government has to play policy role, private sector activities and fund is what they do best, educational should the role of research and trainings. (Government Respondent)

Capacity gaps were often cited as barriers to innovation: "

Don't really see people here in this region with the skillsets to bring worlds together." (Academic Respondent). Many respondents noted the lack of skillsets related to technology.

There is a high demand for tech expertise. So people are coming to do that. They don't have the innovation expertise, so humanitarians who are trying to do innovation in Somalia, they don't have the expertise to do innovation in Somalia and to prepare entrepreneurs with the business skills that they need. (Innovation Focused Respondent)

And as far as the diaspora, some are coming here to work. Some are joining in government, others on their own businesses and are seeing an opportunity. But we haven't yet seen in this innovation [sic] in the ecosystem giving back to the ecosystem people. Are looking for opportunities for themselves, but we haven't really seen the innovators who are coming really giving back to the ecosystem except for a few people. There is a high demand for tech expertise. So people are coming to do that. (Innovation Focused Respondent)



...If young people are going to really focus on agriculture and livestock, you should also focus on digital skills. We have a global economy that we must prepare young people for. (Innovation Focused Respondent)

There was general consensus regarding the need for an enabling environment "...for the innovation ecosystem in Somalia to flourish is a prerequisite for the development of the country." (Academic Respondent)

In Somalia, innovators are not huge in number, despite the increase of innovators particularly youth in recent years, they are mostly are [sic] depending on their selves. ...No networks that I know of that brings ideas together, innovators generate ideas on their own separately. (Startup Respondent)

Lack of access to financial instruments and or access to credit was cited by many respondents as a barrier to innovation.

For example, access to markets, access to finance, and access to networks and skills can be huge hurdles when doing business in conflict-affected countries. These challenges are often exasperated for female entrepreneurs due to social, financial and geographical barriers. (INGO Respondent)

At first, I had difficulties for having enough funds for my operation as the business was new, banks and other financial institutions did not know my company so they could not trust me with their money fearing that I may default. (Startup Respondent)


Yes, there are certain challenges, investment support is a challenge, as I told you earlier, our people do have money but they do not know where to put their money. (Startup Respondent)

Although there was agreement across many respondents regarding the challenges of accessing funds and/or credit, one respondent provided the perspective from the viewpoint of a financial institution:

We work as a financial institution, there are many challenges that we face when provide credits to the businesses, most businesses they don't record their financial transactions, they don't provide to their financial statement that can be analyzed, so we cannot ensure these businesses are profitable or not, so it is very hard to audit these businesses. (Program Respondent)

The issue of gatekeepers also arose as a barrier to innovation, particularly in internally displaced persons (IDP) communities.

Although our idea worked, but still there were some barriers of the expectations of the community because the humanitarian aids [sic] have given much more unlike us. In addition to that there were gatekeepers who wanted bribery and for us, we did not wanted to pay it. The vulnerable communities we wanted to help were in the IDPs and every IDP was a gatekeeper; you can't enter the gate unless you pay to the gatekeeper. (Program Respondent)



Other barriers to successful innovation, seemingly specific to the Somali context, included the phenomenon of “parallel entrepreneurship” and existing cultural norms related to leadership and gender.

Parallel entrepreneurship, [where] in order to reduce the risk of one startup failing, the entrepreneurs intentionally startup more than one venture at a time. The cost of failure is high, so you have to mitigate your risk as an entrepreneur. (Innovation Focused Respondent)

The Somali approach is for seniors telling others what to do, but this limits the feedback loop even with young ones and but [sic] with young people in senior leadership telling others what to do can be difficult, but we do see some willingness to change. But sometimes there’s an attitude of when you have seen some success, why change. (Innovation Focused Respondent)

[Our] program was a great idea loved [by] the community for the first time, my team and I much worried about how looks [sic] like the perception of the communities according to the Somali social culture to the girls who working and learning technology, when people saw our primary objective, they realized that girls can do what mans [sic] can. (Private Sector Respondent)

Potential drivers of innovation in Somalia

Many respondents noted that successful innovation often came from “outside” or was somehow “reengineered.”

It happens, most Somalis who came up [with] innovative solutions or ideas came from abroad, they took these from where the countries they lived, the locals also use “me too” strategy to copy business ideas from others, so, sometimes it kills the business if it is not used properly. (Program Respondent-)

I think, all Somali innovations are outsourced from other countries around the world, the reengineering process need more effort and knowledge. (Startup Respondent)

Innovation is not only starting from zero, modification or reengineering process is another type of innovation to solve problems. [These innovations] can be captured by building platforms to these innovative youth. (Academic Respondent)

These “outside” forces were sometimes identified as Somali diaspora and the need to bring in more ideas was also cited:

...A replication company, taking what’s working elsewhere and bringing it to Somalia. We need to bring in additional ideas into Somalia, to see what’s working elsewhere on the continent African continent. (Private Sector Respondent)

- Who are the key actors in the humanitarian innovation ecosystem in Somalia?
- What principal roles do these actors play in the humanitarian innovation ecosystem in Somalia?
- How are the different actors related to one another in terms of functionality?
- What are the barriers to innovation ecosystem functioning?
- What are the drivers of innovation within Somali’s humanitarian sector?

Discussion

Findings from the RISE mapping study clearly identify key actors, promising trends, and important roles that currently sustain the Somali innovation ecosystem. This information provides opportunity to overcome barriers to the continued evolution of the ecosystem and its promise of innovation, and to identify existing and emerging drivers of innovation. This new knowledge serves to guide additional inquiry and research as well as to direct investment and support towards recognized drivers of innovation in this challenging context.

Keystone actors


Within successful innovation ecosystems, such as Silicon Valley, Hwang & Horowitz (2012) posit there are keystone individuals who make connections within the network and promote innovation through their efforts. A single Somali actor was responsible for leading the efforts to organize two critical innovation events and one organization: Africa Science Week, the Somali STEM (science, technology, engineering, and mathematics) Summit, and the Somali STEM Society, the latter which hosts a fully-equipped STEM lab for girls and women. Among the 48 event elements organized in Somalia, only nine (18.75 %) focused on gender; the KIIs highlighted the existence of barriers to including women and girls in Somali innovation. However, STEM education is recognized as an enabler for women's empowerment and vital for the 2030 Agenda for Sustainable Development (2015).

The Mogadishu Tech Summit was envisioned and carried out by iRISE, a local innovation hub in Mogadishu in October 2018. The high-profile event drew thousands of participants and garnered support from a wide range of stakeholders including the private sector,

comprised of investors, government, civil society, as well as humanitarian and development sector actors. The event afforded entrepreneurs opportunities to pitch ideas to venture capitalists. The last day of the summit showcased panels with the International Organization for Migration (IOM) leading a discussion on the diaspora's role in Somali's economic development.

The Somali diaspora appears to be a key force contributing to the evolving mindset necessary to change or reorganize the ecosystem structure, as evidenced by the number and trends of emerging innovation events. In addition to the necessary mindset, the diaspora seems to represent a fair number of keystone actors within the Somali innovation ecosystem. A 2011 study by the United Nations Development Programme (UNDP) noted that a large segment of the private sector reported receiving a range of support from the diaspora for startup activities: financial assistance, in-kind contributions, access to networks, and technical support and advice (Awad, Dagane, Hansen, Horst, Menkhaus, & Obare, 2011). The Somali diaspora is also known for the organization of the *hawala* system which serves as a substitute for traditional banking and money transfer systems (Newland & Tanaka, 2010) and supports the ecosystem's entrepreneurs. Although a sensitive issue, and one that includes protection concerns, the diaspora have and continue to perform as keystone actors, transforming the ecosystem and providing critical leverage points.

Two questions which emerge concern how to leverage substantive involvement of women and girls, and build upon the existing keystone actors within the existing Somali innovation ecosystem, particularly, the diaspora. In terms of gender, it would be helpful to understand how Somali-led, gender-focused innovation programming could be better supported. Variables to



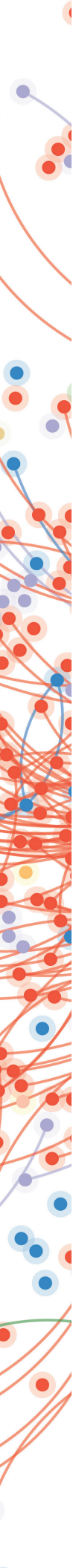
be considered may include literacy and education (critical for processing new information), access to information, access to credit, access to markets, and risk exposure and risk aversion (World Bank, 2007, p. 110). In terms of the diaspora, it would be helpful to understand which aspects of diaspora support and assistance could be scaled for greatest impact within the Somali innovation ecosystem. Further research and inquiry could guide external investments and direct on-the-ground programming.

Principal roles and relationships

Trends indicate increasing ability of Somali-led events to convene others in the innovation ecosystem. These convening events are most often organized and hosted by business, social, and technology oriented innovators and organizations, key actors in the Somali innovation ecosystem. Specifically, these key actors serve as knowledge brokers and network builders. These trends should continue to expand, deepen, and sustain the existing innovation ecosystem, promoting the sharing of knowledge and growth of networks. However, as these trends continue to build, it will be important for key stakeholders, including donors and international humanitarian actors, to ensure that all Somali voices are heard and have some level of opportunity to participate in the innovation life cycle. "...It is important to focus on the 'silence' of powerless groups who are invisible and whose voices are never heard" (Mehta, 2017, p. 3). Innovation has the potential to greatly alter existing power dynamics to the benefit of those who are often overlooked or ignored, those who are "invisible" (Mehta, 2017). Innovation also provides an opportunity to combat the "hidden" power of certain individuals and institutions who operate behind the scenes to set and control the political agenda (IPAT, 2015, p. 2). Both dynamics serve to exclude others, limit participation, and silence the

voices of less powerful groups (IPAT, 2015; Mehta, 2017). However, the challenge remains as to whether or not increasing Somali voices in the innovation processes will bring about desired change and transform existing patterns of exclusion or simply reinforce the status quo (Gaventa, 2005). Somali entrepreneur, Deeq Mohamed's call for "collaborative disruption" within the Somali business space of the innovation ecosystem, highlights the need for businesses to work together for the common good (Dahir, 2018). Such an approach may also provide an incremental mechanism that can be leveraged to transition from existing power dynamics and limited inclusivity.

This challenge is particularly true for SomRIL as it continues to be a leading convener and knowledge broker in the Somali innovation ecosystem. It is important to recognize that many of the Somali-led events are convened by those considered to be privileged, perhaps through their own knowledge or education. As Mehta (2017) notes, "...only very qualified (and perhaps privileged) individuals are likely to be involved in such startup enterprises, and hire from their own networks, [whereas] people from less privileged backgrounds may be excluded from the ripple-effects of a new enterprise" (p. 3). The existence of potentially inherent privilege within the Somali innovation ecosystem needs to be recognized at all levels of the ecosystem to avoid participatory processes and events that remain "power blind." This blindness is oftentimes normalized when it comes to gender, whether that be around gendered approaches or differential impacts (Mehta, 2017). Given that SomRIL is an accepted entity within the innovation ecosystem, and is well placed to understand the deeper context surrounding various power dynamics, it will have a vital role to play in balancing outside actors with the needs of those most marginalized (Mehta, 2017).



As the Somali innovation ecosystem continues to develop, a number of areas emerge from the ecosystem mapping study that suggest further inquiry and understanding. One such area is that of power dynamics. Given that transformative change requires change of the existing power dynamics, it is imperative that analyses of “power” accompanies our understanding of the existing innovation ecosystem. “...Strategies and tactics for change will be influenced by how the nature and distribution of power in a given environment is understood; and ‘power’ is a core aspect of the confidence and energy to make the change” (IPAT, 2015, p. 2). This understanding of power and its ability to generate momentum towards bringing about change are critical to the promotion and support of the emerging Somali innovation ecosystem.

Barriers to innovation

One of the key barriers to innovation identified by the ecosystem mapping study is the lack of capacity among a diverse group of key actors. This capacity is related to the ability of humanitarian actors and others to deliver, guide, and support innovation in the Somali context. Key informants identified a number of actors such as international humanitarian aid agencies, government, and academia as those in need of innovation capacity. Other key actors were identified as essential to strengthening the Somali innovation ecosystem and comprised the diaspora, the private sector, women and girls, and youth. A key message from several key informants was that the INGOs and NGOs themselves do not necessarily have the needed skillsets to support or drive the Somali innovation ecosystem. For example, one respondent remarked that even Kenyan innovation hubs do not have the appropriate skillsets to impart business knowledge to Somali startups. Others noted that funders often wanted Somali startups to talk to external consultants, yet these consultants often did not possess a deep understanding of the entrepreneurial context in Somalia.

Several key informants pointed out that the African Enterprise Challenge Fund (AECF), supported by USAID and other donors, has done a great job supporting startups.

In Africa, building upon its former incarnation under KPMG International, AECF has supported 268 companies in 26 sub-Saharan Africa countries across 40 value chains including the focal sectors of agribusiness and renewable energy. In Somalia, AECF, has supported two businesses through its Post-Conflict Window (PCW) competition, one demonstrating success through concentrated support efforts. AECF’s approach is to provide strong technical assistance to innovators, even embedding expertise within an actual startup. AECF also provides seed funding to early startups even if the innovation is not yet commercially viable, but might benefit the overall innovation ecosystem. This approach aligns with Adner who notes that innovations rarely succeed in isolation and are dependent upon other complementary innovations (2006), where an ecosystem provides the requisite space for startups to create value in the company of others (Durst & Poutanen, 2013).

Focused attention on emerging innovation ecosystems is needed for growth and sustainability. Wang (2009) notes that innovation communities can emerge and dissolve if collective attention disappears. It is important to understand how and why AECF is viewed as a positive force or potential driver of innovation in Somalia. One recommendation is to review this particular innovation system model of the AECF program to better understand its processes and engagement with key actors in the innovation ecosystem. Other potential innovation system models might include those operating in similarly challenging contexts such as Iraq, where the Iraq Technology and Entrepreneurship Alliance (ITEA) recently convened over 700 aspiring entrepreneurs and youth activists across five cities to solve some of the country’s most urgent problems (Lakshmanan, 2019).



Another recommendation to key stakeholders and allies in the Somali innovation ecosystem is to support AECF in the establishment of deeper partnerships in Somalia by increasing the number and types of innovation challenges available to entrepreneurs and startups in Somalia.

Drivers of innovation

Somali-led events offered more opportunities for enterprise development support and technology brokering than did Somali-focused events. Although Somali-led convening of innovation events appears to drive innovation, few events focus on hands-on, technology development; yet technology skills were identified as an important capacity gap in the ecosystem mapping analysis. Technology brokering continues to lag behind other drivers of innovation. In spite of these findings, key Somali-led events have emerged that focus on STEM: Africa Science Week, Mogadishu Tech Summit, Somali STEM Summit, and IndabaX, all driven by keystone actors.

These STEM events promote recombinant innovation and the reengineering of existing innovation, and serve as a means of introducing new networks and approaches to drive innovation in Somalia. This recombinant innovation builds off of existing ideas, processes, products, and/or technologies and adapts or reengineers them for a particular need or challenge, feasible within the Somali context. One important aspect of open innovation is its ability to increase the potential for knowledge to flow to new sites as well as sourcing knowledge from further afield. Numerous examples exist of recombinant innovation (Hargadon, 2002) in which knowledge is already well-established in one area or sector, and has the potential to have considerable impact in a different and often distant area or sector; such cross sectoral learning usually also requires brokering mechanisms (Burt, 2005), as one finds in the Somali-context.

A challenge to many innovation ecosystems in the humanitarian - development nexus,

is the ability of key actors to tap into other knowledge networks. Key actors often find themselves locked into existing routines of exchange and networks, unable to break free into new realms of knowledge and experience. The challenge is to find, form, and enable new networks while simultaneously loosening ties in existing ones. This transition from one network to another requires a discontinuity (Henderson & Clark, 1990; Kaplan, Murray, et al., 2003 in Bessant, Ramalingam, Rush, Marshall, Hoffman, & Gray, 2014), and the inherent challenge of overcoming discontinuity often prevents many innovation actors from engaging with new actors and new networks.

SomRIL and other key convening actors within the Somali innovation ecosystem should assume this challenge and strive to promote recombinant innovation through the convening and hosting of different actors in order to disrupt existing knowledge networks. SomRIL has been intentional in its effort to curate a diverse stakeholder group at convenings and to ensure humanitarian actors are engaging with the private sector, I/NGOs, government, and academia. This engagement has allowed for a more holistic understanding of the challenges and opportunities that exist within the wider ecosystem.



Conclusion

The Somali innovation ecosystem mapping study identifies important opportunities for enhanced learning and concrete action. Keystone actors are critical players within the innovation ecosystem, often playing the role of knowledge broker and/or network builder. Recent innovation events with impressive convening power have centered around STEM, yet it is important to recognize who is and who is not sitting at this innovation table. The findings suggested that more can be done to reduce gender barriers and facilitate the participation of women in the innovation ecosystem as well as those communities who have been most affected by climate, conflict, and disaster. The research also clearly showed the importance of the Somali diaspora and its role in supporting innovation in Somalia. Capacity gaps were noted both in technology skills and in expertise (both Somali-led and Somali-focused) in the innovation process itself, especially within the complex environment of a fragile and conflict-affected state such as Somalia. Successful models exist, both on the African continent and elsewhere, on how to support and advance an innovation ecosystem in a similarly challenging context; these models should be reviewed carefully for potential best practice lessons and appropriate application within the Somali context. The Somali innovation ecosystem possesses great potential to solve the problems of its communities if given the appropriate opportunities and supports; this task is before all of those who seek to improve the quality of life of the Somali people.

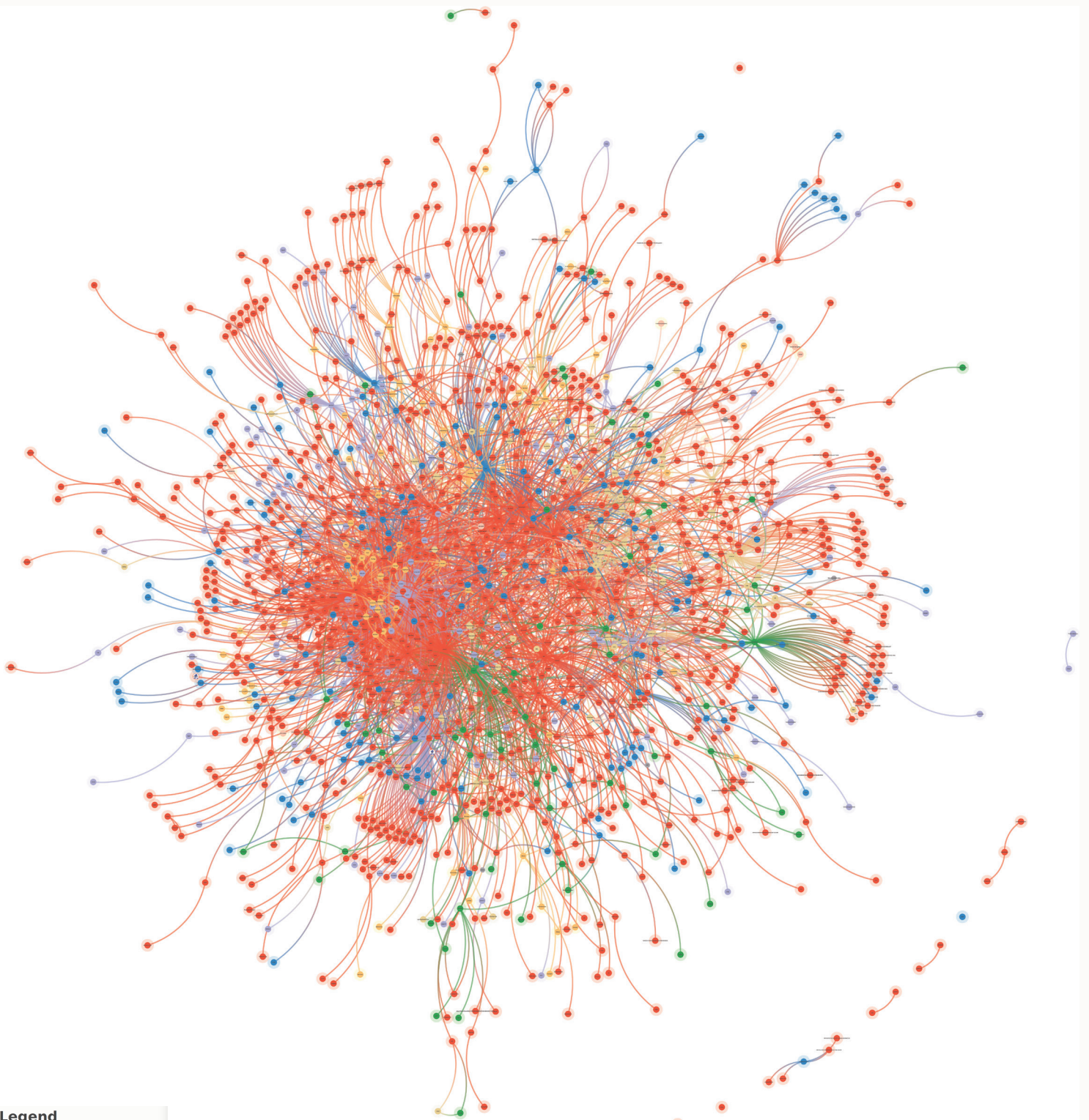
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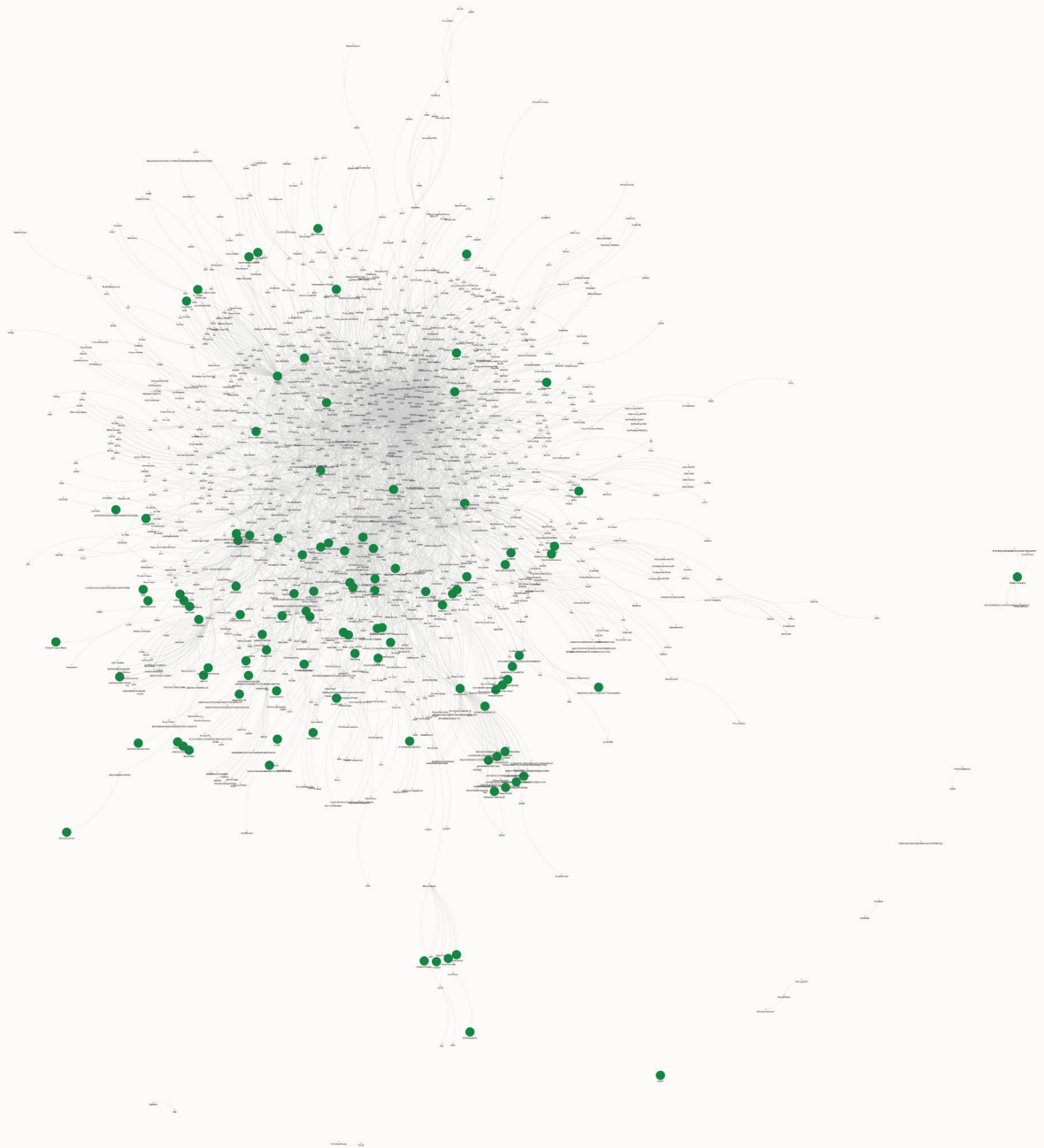
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Appendix 1 : Full Somali Innovation Ecosystem map visualization



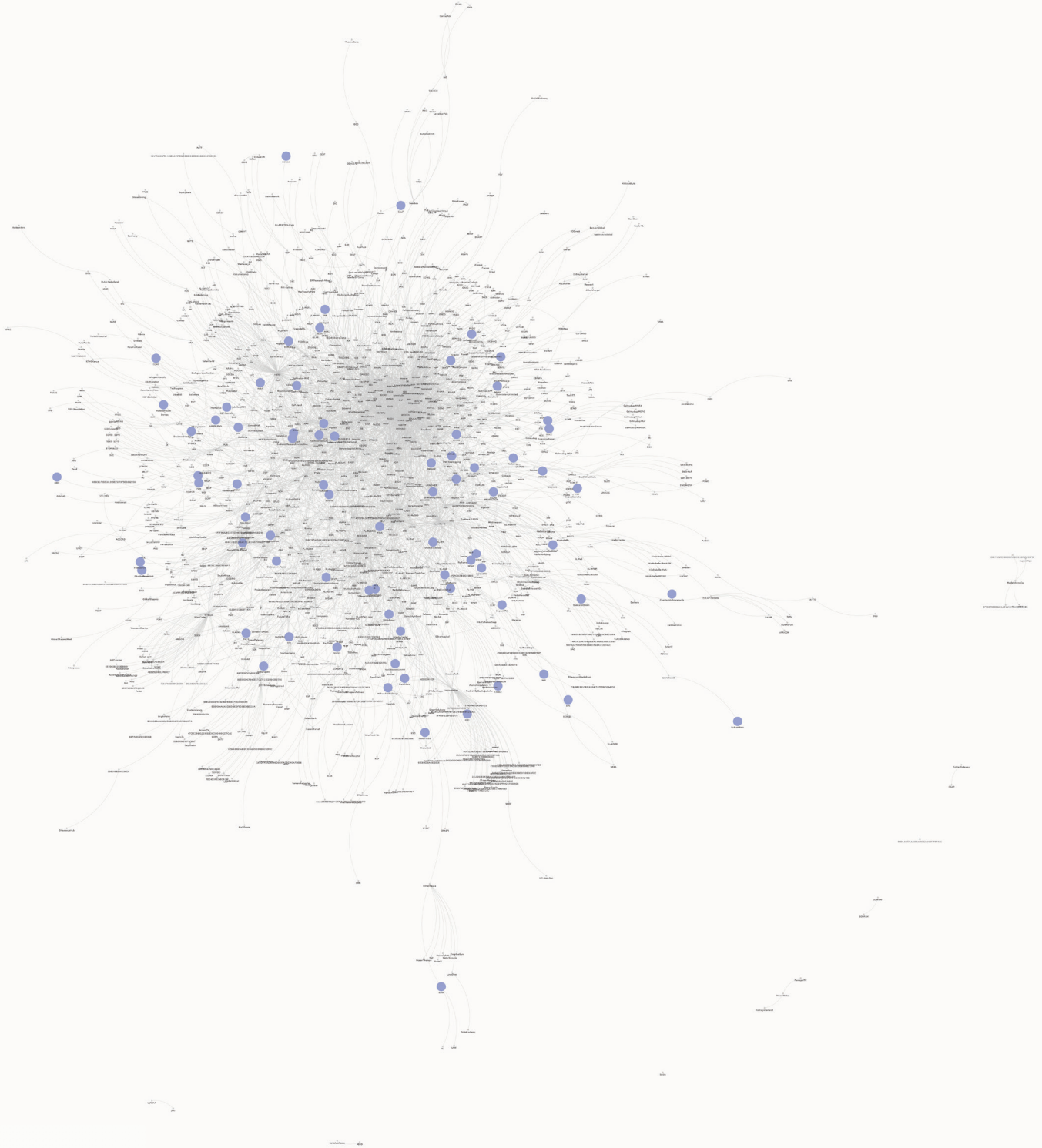
- Legend**
- Organizations
 - Innovation Focused
 - Products
 - Networks
 - System Level
 - Event
 - Individuals

Appendix 2 : Somali Led elements sized by Eigenvector n=107 full visualization



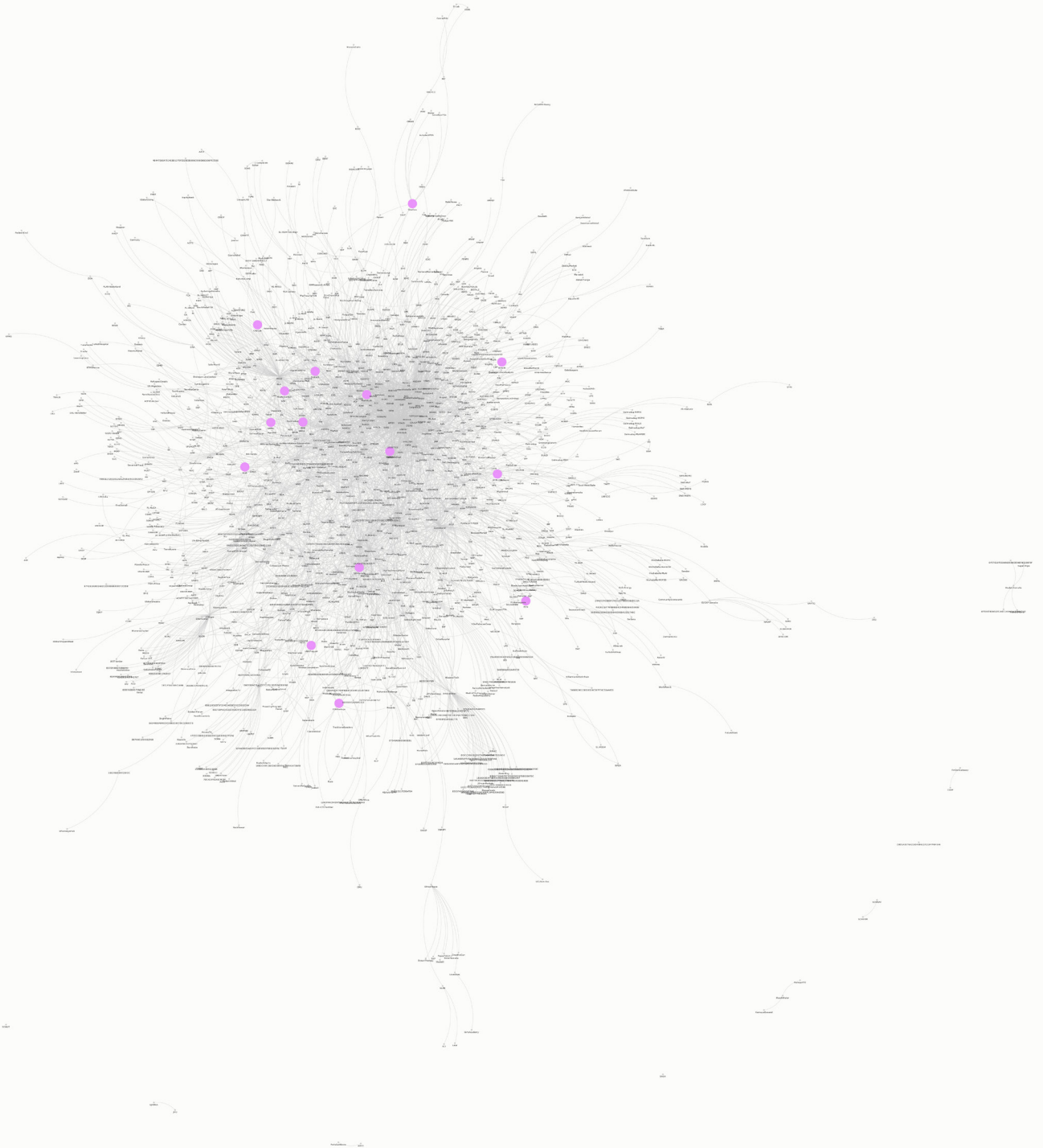
Legend
Somali Led (SL)

Appendix 3 : Somali focused elements sized by eigenvector n=77 for visualization




Legend
Somalia Focused (SF)

Appendix 4 : Somali support elements sized by Eigenvector n=15 full visualization



Legend

 Somalia Innovation Support (SIS)

Appendix 5 : Event elements within Somali innovation ecosystem full visualization



Legend
● Event

Glossary

Closeness centrality: Measures the distance between elements in the network. A higher number or high “closeness” indicates an element in the network that spreads information faster and possesses higher awareness as to what is happening across the network.

Ecosystem: A complex network or interactive system comprised of interacting entities.

Eigenvector centrality: Measures how well an element is connected to other well connected elements. Generally, elements with high eigenvector centrality are considered the leaders of the network, although these elements may not possess the strongest local influence.

Enterprise development support: Intermediaries guided by market demand, focusing primarily on business or enterprise development. Often involved substantively in the innovation process, including the provision of extension support (production), research, and training of business skills.

Hidden power: Decision makers operate behind the scenes to determine agenda items and participants; to the exclusion of others.

Humanitarian innovation: Adaption and improvement in the effort to find and scale solutions applicable to any process, product, or system within the humanitarian sector.

Innovation: Application of new solutions or differently introduced solutions in response to existing or emerging problems or needs.

Invisible power: Invisible power can lead to the acceptance of the status quo and provide for exclusion and structural inequalities as it operates on the level of norms. (Mehta, 2017, p. 1).

Knowledge brokering: Connecting the disciplines of research and practice by brokers possessing credibility in both contexts (Kislov, Wilson & Boaden, 2016). Involves bringing people together, and includes exchange between those who are considered decision makers (Jackson-Bowers, Kalucy and McIntyre, 2006 in Ward, House and Hamer, 2009).

MatchMaker: The MatchMaker is a component of the Response Innovation Lab which helps people with humanitarian challenges match to innovations which can solve these problems. (Response Innovation Lab, 2019).

Network building: Intermediaries build networks by brokering relationships between heterogeneous actors. Linkages can be forward (output) or backward (input) including emerging technology inputs (Kilelu et. al., 2011).

Reach: Measures the portion of the network within two steps of an element. Elements with high reach can spread information through the network through close “friend-of-a-friend” contacts.

Recombinant innovation: Adapting old ideas into new ones, reengineering innovations from one context to another.

Technology brokering: Intermediaries facilitate access to existing technologies and support adaptation for the local context or stimulate demand for and application of new technology (Kilelu et. al., 2011).



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