

BUILDING RESILIENCE:

Network Solutions
for a New Era of
Global Instability

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Diverse communities with urgent interests are developing innovative, networked solutions that build resilience to many of the critical disruptions unfolding in the 21st century.

While the somewhat overused concept of resilience has become a bit of the latest buzzword, a growing number of ambitious initiatives and networks are giving real meaning to the term, and suggest actions to enhance the ability of communities, regions and systems to adapt to, recover from and thrive in the face of the chronic shocks and stresses imposed by climate change, population growth and other global challenges.



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Idea in Brief

The array of resilience initiatives being established to cope with disasters and disruptions seems to be growing at an incredible pace. We believe there is much that can be learned, especially regarding how these resilience activities organize themselves, pursue collaboration, engage diverse stakeholders, and facilitate information and communication. Explicitly or implicitly, many of these resilience initiatives are establishing and maintaining networks of various types and supporting them in various ways.

Drawing upon the GSN taxonomy in our research we note that many of these resilience-oriented networks are multi-stakeholder in nature, which is one of the defining characteristics of the GSN taxonomy. Many are leveraging cutting-edge technology and analytics to organize or inform on-the-ground, community-based activities and networks. By examining the approaches of several global solution networks that are working in the space of creating or restoring resilience for impacted communities, regions, or the entire globe, it is possible to see the approaches that are having the most success and start to consider ways in which those best practices can be brought to bear on the challenges and risks of the future.

Unpacking the Concept of Resilience

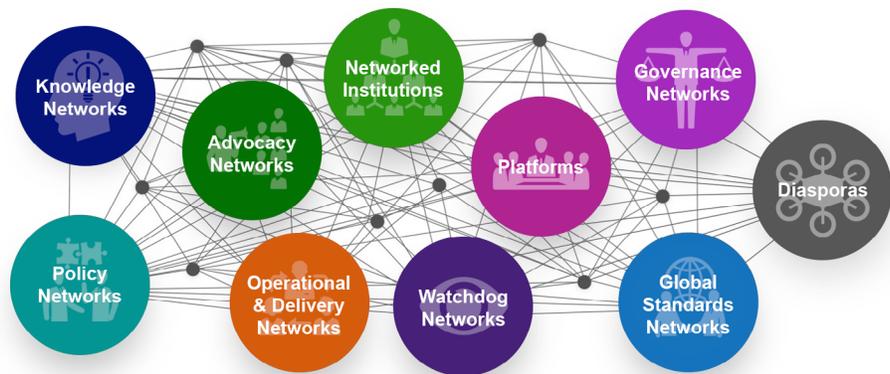
Resilience is a concept used in many disciplines and across multiple applications. While the meaning and implications of the term may vary by field, the use of the term suggests several common elements: the ability to rebound, sustained adaptability, the capacity to cope with unexpected events and robustness in the face of known risks.¹

The United Nations International Strategy for Disaster Reduction (UNISDR) defines resilience as:

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.²

UNISDR's definition refers to systems, communities and societies that involve many different types of stakeholders and a web of networks. Enhancing resilience on any scale within those systems and communities requires some level of collaborative or coordinated action.





The GSN program has identified ten different functional roles of networks:

1. Watchdog networks scrutinize institutions to ensure they behave appropriately.
2. Knowledge networks develop new thinking, research, ideas, and policies
3. Operational and delivery networks deliver the change they seek, supplementing or bypassing traditional institutions.
4. Policy networks create government policy even though they are not networks of government policy makers.
5. Advocacy networks seek to change the agenda or policies of governments, corporations or other institutions.
6. Governance networks have the right and responsibility of non-institutional global governance
7. Platform networks create the capability for other networks to organize.
8. Global standards networks develop technical specifications and standards on key issues
9. Networked institutions provide a wide range of capabilities similar to state-based institutions but with a very different *modus operandi*.
10. Diasporas solve problems through kinship and ethnicity connections





Learning from Community— Level Resilience Efforts

Pursuing resilience on a manageable scale is a challenge that many practitioners and networks face. Approaches to community resilience help to define scope and scale in a way that enables individual engagement, speaks to that specific community's culture and context, and supports coordinated, holistic action.

Case Study: The Institute for Social and Environmental Transition—International

While the notion of bottom-up, multi-stakeholder engagement is new to the study of resilience, there are entities such as the Institute for Social and Environmental Transition International (ISET-International) that, for decades, have based their work on more horizontal approaches to dialogue and collaborative solutions to emerging problems. This approach to development and resilience is sometimes contrasted with, or seen as complementary to, more traditional, hierarchical, state-driven approaches to development or problem-solving.

ISET-International, as an organization and through its networks, serves as a connector between global science and policy discussions, and as a translator of that information to make it accessible to people in vulnerable communities. It works with local networks to determine vulnerabilities and prioritize interests in order to appropriately scale global science and policy information to make it pertinent and context-specific. To do this, ISET-International uses a “narrowcasting” strategy to “target audiences that...are particularly critical in catalyzing action.”³ It engages these stakeholder audiences through “local language publications, regional print, and electronic and social media.” In this sense, ISET-International and its partners foster connections and applicability between global and local knowledge and policy networks.⁴

For example, the Intergovernmental Panel on Climate Change (IPCC) recently released its 5th Assessment Synthesis Report, which outlined in great detail the observed climatic shifts that have occurred as a result of anthropogenic climate change.⁵ What those scientific findings mean for a specific city or community though, is unclear. Take Islamabad, Pakistan, one of Rockefeller Foundation's chosen 100 Resilient Cities, where ISET-International worked with local city doctors to understand climate change in terms of the city's heat index and the threshold for human health. Local doctors explained that three consecutive nights of above 37°C temperatures would exceed the human body's ability to recover from the heat, leading to illness or death of vulnerable populations unless actions were taken to manage human exposure to heat.⁶

“...resilience of a community is often based on 1,000 1% solutions around locally grounded approaches that may have common elements but that are tailored to context and needs of the people carrying them out.”

ISET-International and its partners leverage global science and policy networks to inform local community and household networks in order to help translate science into information people can act on, such as how climate change will affect their local heat index and how that might impact old coping strategies. ISET and its partners helped to identify steps to enhance climate resilience by determining what actions people, households, or the broader community might need to take to withstand the heat and survive.

In ISET-International’s experience, a key aspect to facilitating community resilience on issues such as climate change, water or energy is determining vulnerability and providing actions that can be taken at the household level. The household level may seem to have the least effect on problems of such magnitude, but it is also the level over which individuals feel they have some control and can see the result of taking action. According to ISET’s founder, Marcus Moench, “Resilience of a community is often based on 1,000 1% solutions around locally grounded approaches that may have common elements but that are tailored to context and needs of the people carrying them out.”

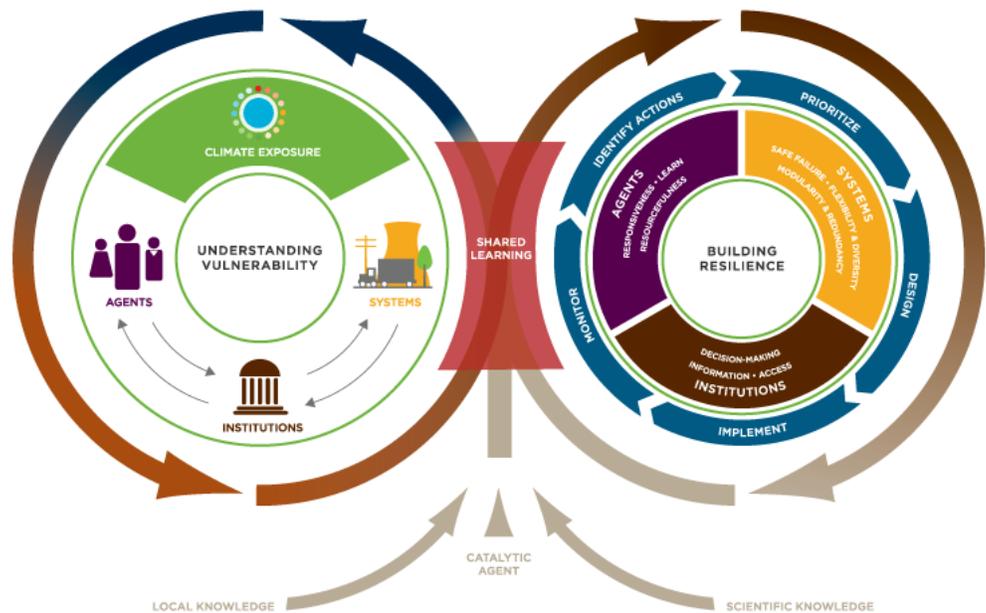
Communicating and understanding these threats and providing information on preventative action to address them can afford resources for households and the community to adapt to unforeseen threats, contributing to their overall resilience.

In addition to ISET-International’s work of “reshaping global knowledge into local understanding and action,”⁷ it also provides a suite of online training materials, such as its Climate Resilience Framework (CRF).⁸ The goal of the CRF is to provide a “structured framework...to build networked resilience that is capable of addressing emerging, indirect, and slow-onset climate impacts and hazards.”⁹ To do this, the CRF works with a three-step framework for:

1. Establishing resilience principles.
2. Understanding vulnerability and risk.
3. Building resilience.

This step-wise approach has been utilized in a number of cities in South and Southeast Asia as part of Rockefeller Foundation’s Asian Cities Climate Change Resilience Network (ACCCRN).¹⁰





ISET-International's Climate Resilience Framework¹¹

For example, one of ACCCRN's resilient cities, Can Tho, Vietnam, worked closely with ISET-Vietnam to "raise the level of knowledge and awareness of climate change within city government...increase capacity of technical staff...and...facilitate learning and exchange between city stakeholders."¹² During the initial stages of using the CRF, Can Tho identified institutional vulnerability as a key priority citing "a lack of effective mechanisms for coordination and harmonization of efforts across government departments, scales of government, and non-governmental actors [which] presented a major barrier to building resilience."¹³

By using the ISET's Climate Resilience Framework (CRF) and three-step process, the city of Can Tho was able to take action to enhance resilience in a number of ways, including creation of a climate change information database for government agencies that includes population, climate, and socioeconomic data; and setting up participatory planning activities that gave rise to community-based management for restoring the riverside to better manage floods.¹⁴ Some of the household-level solutions for enhancing resilience against floods included efforts to reduce "riverbank erosion, such as bamboo fences, growing water hyacinths, and planting mangrove apples."¹⁵

To date, the ISET's CRF has been used by ten cities in Asia as an approach to engaging multiple stakeholders in cross-sectoral issues. The CRF process helps identify locally-specific climate change vulnerabilities and threats and develop action plans for addressing those challenges.¹⁶ ISET-International's work to leverage its networks and help reshape global information into locally-relevant information at the individual and city-levels has provided





real-world opportunities to build and enhance resilience to identified risks and vulnerabilities.

Case Study: CARRI's Community Resilience System—A Platform for Strengthening Community Resilience

Another platform for community based resilience that has been utilized in the United States was developed by the Community and Regional Resilience Institute (CARRI) several years ago, motivated by the experience of Hurricane Katrina. CARRI is a non-profit organization that works to strengthen a community's or region's ability to prepare for, respond to, and rapidly recover from significant human-caused or natural disasters with minimal downtime for the community. It recently became a program at Meridian Institute.

Three years of action research on whole-community resilience brought experts and diverse elements of communities together to identify and pursue locally-relevant and driven resilience efforts. It became clear to CARRI that there was a need to build a system that could provide practical and immediately useable resources and processes for communities that would enable users to systematically understand, assess, and improve their resilience to human and natural disasters.

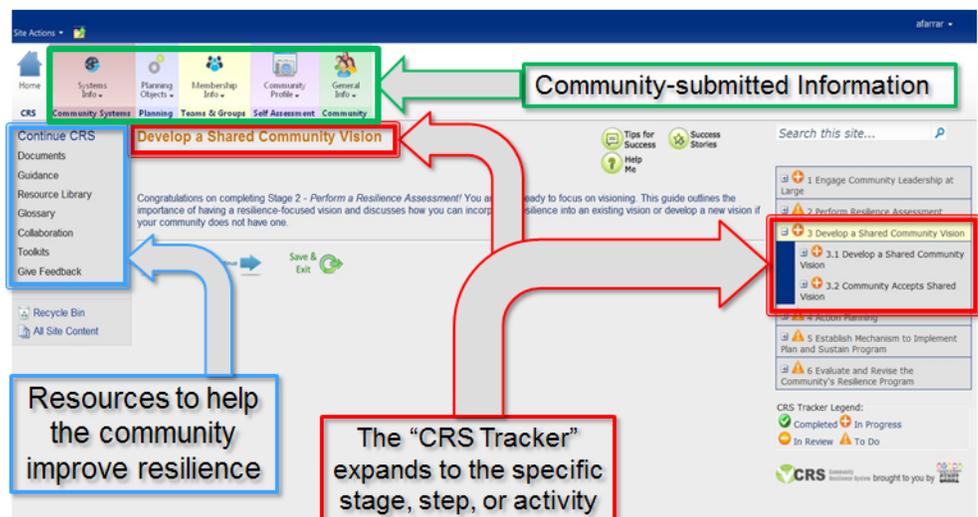
In order to address these needs, CARRI worked in conjunction with Meridian Institute, a non-profit organization that designs and facilitates multi-stakeholder collaborative processes, to launch an 18 month long collaborative development effort called the Community Resilience System Initiative (CRSI). Over 200 representatives from across the nation (e.g., business and industry leaders, non-government organizations, resilience researchers, and officials from communities, states, regional bodies and federal agencies) provided knowledge and feedback on what CARRI could provide to help communities improve resilience strategies. The system was also informed by pilot programs in three communities: Gulfport, Mississippi; Charleston, South Carolina; and Memphis, Tennessee. As a result of this comprehensive collaboration, the Community Resilience System (CRS) was born.

The CRS is a web-based system that is simple, educational, and action-oriented. Importantly, it is designed for any community to use without outside experts. The CRS has characteristics of a platform network in that it provides a virtual forum and process for diverse people to come together around a common cause and it provides a tool for that group to create social change—enhancing the resilience of their community. It is a system for communities to utilize and use as a foundation for their own resilience network by using the system and process to engage diverse community stakeholders and leaders.

In the case of community-based resilience, CARRI's powerful online CRS software strongly suggests the need for cross-community collaboration and then guides the user through a process by which community members are able to organize multi-sector leadership, engage broad community participation, complete a resilience assessment, and access a variety of resources in order to take the actions needed to strengthen the community's resilience. Through web-enabled CRS technology, developed with CARRI's resilience expertise, communities have access to and assistance from successful resilience practices that have been gathered from researchers, practitioners and other at-risk communities around the world. The final output of the CRS is a customized action plan for strengthening community resilience with fully committed "owners" who are responsible for each identified action.¹⁷

How Does the CRS Work?

The CRS includes six stepwise modules of resilience. As a community progresses through the CRS it gains a clearer, holistic understanding of its strengths and vulnerabilities, as well as recommended actions that are automatically captured in the final community resilience action plan. As described by Warren Edwards, CARRI's Executive Director, "The CRS brings together a network of people, process and technology to support communities in building their resilience and managing the risks they face."



The CRS homepage where users can access resources, information, and the CRS Tracker, which helps navigate through the system and its modules¹⁸



In brief, the six steps of the CRS include:

1. **Engagement:** leading the community through organizing and recruiting a resilience leadership team to help identify key actors and influencers in the community and region who can be called upon in a crisis.
2. **Assessment:** a process of questions and self-discovery to help the community understand its resilience gaps and strengths with the help of subject experts who help to assess up to 18 service areas (economy, energy, local government, housing, food supply and distribution, public health, water, transportation, etc.)
3. **Developing a Shared Community Vision:** provides guidance on communicating and revising a vision that fosters adaptation and growth based on community member feedback.
4. **Action Planning:** generates suggested actions based upon the assessment. Actions are modified to fit community needs, assigned a level of priority, supported with resources and adopted by an “owner” to lead implementation of the action.
5. **Implementing:** recognizing that resilience planning and action is a long journey that may transcend current community leaders and must be institutionalized to be successful, this step provides guidance, processes, and tools that create and codify a community’s action plan and implementation strategy.
6. **Monitoring and Maintenance:** the community uses simple tools to document metrics and track progress of individual projects and the entire resilience program. This step provides resources to help the community test its projects and plans through resilience exercises that consider both short- and long-term recovery.¹⁹





A map of the Module 2 Assessment Process²⁰

How is the CRS Being Used?

In 2011, Anaheim, one of the most populous cities in California, was selected as one of eight cities in the US to pilot the CRS.²¹ In Anaheim's case, there was a desire to align disaster resilience planning with neighborhood programs and build on their robust emergency management programs. The CRS helped them to assess risks and apply that assessment by identifying three near-term goals:

1. Improve resilience in vulnerable neighborhoods
2. Stimulate and expand private sector resilience
3. Enhance "whole community" emphasis of existing emergency management activities

As a result of applying the CRS, Anaheim's resilience leadership network pursued a range of actions including new partnerships between private sector mentors or sponsors in specific vulnerable neighborhoods to identify and implement neighborhood-relevant resilience activities; developing a Business Resilience Workshop in which experienced businesses already pursuing their own resilience action plans could share what they were learning with other businesses; and private sector representatives becoming more aware, informed and engaged with other sectors in whole community preparedness.²²

The CRS has been utilized in a total of eight communities in the US, and there is some initial exploration regarding whether and how this system might be utilized to meet the needs of communities in other countries and contexts.



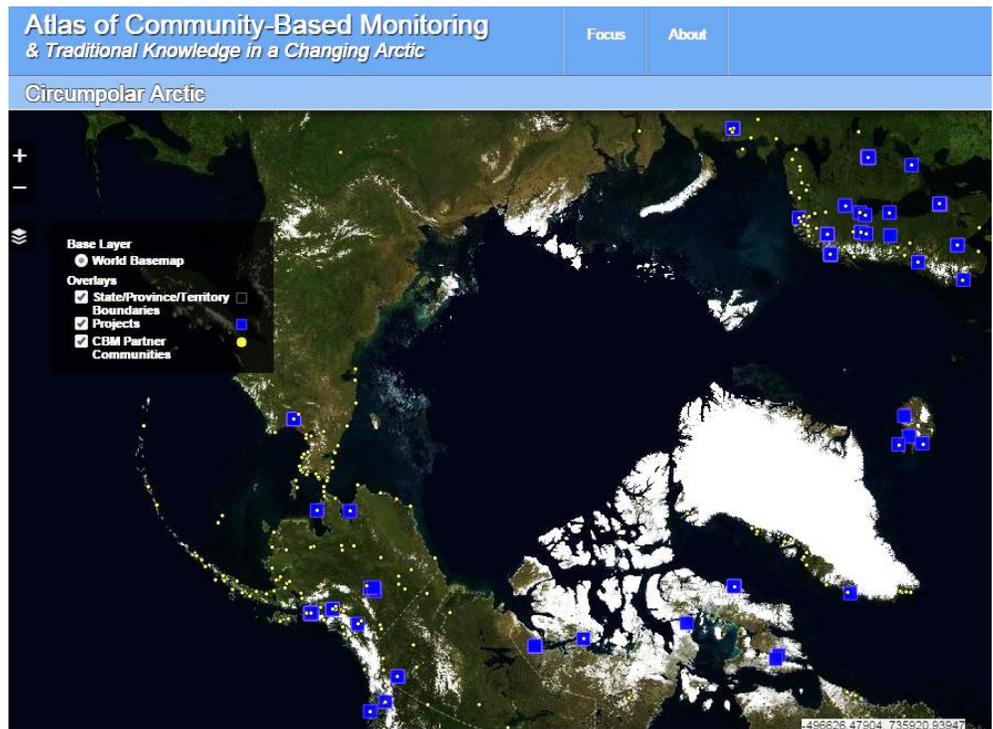


Case Study: Atlas of Community-Based Monitoring and Traditional Knowledge in a Changing Arctic— A Platform for Sharing Knowledge

Another platform for community collaboration is a web-based atlas designed for sharing information from community-based monitoring efforts in the Arctic, where local populations such as the indigenous Inuit are facing challenges to their livelihood, culture, health, and prosperity. In particular, food sovereignty—a core concept within the Inuit communities that includes political, legal and other rights to make decisions about food and to define their own systems of food production, distribution, and consumption—is becoming a significant challenge for the Inuit.²³

The effects of climate change on sea ice, weather extremes and hazards, and changes in animal migration all impede Inuit hunting and harvesting of traditional food. Rapid climatic change in the Arctic is also generating increased international attention and calls for species protection and conservation, which often conflicts with traditional hunting livelihoods. This, in turn, pressures Inuit communities to shift their food production and consumption to more industrialized methods, which dramatically changes their socioeconomic system and cultural foundations. Even where Inuit communities are turning to more commercial foods, they face extreme prices and unhealthy processed food choices due to transportation costs and the perishable nature of fresh foods. They must also grapple with the complex implications of a cash-based economy (e.g., issues with money management skills in paying for food, fuel, power, and rent), and low incomes.²⁴

In response to some of these environmental and socioeconomic challenges, the Inuit Circumpolar Council (ICC) has developed a web-based platform for communities to collect and share information across the Arctic region. This platform, called the Atlas of Community-Based Monitoring and Traditional Knowledge in a Changing Arctic, was initiated by a partnership between the ICC and others interested in environmental change. As communities have started to generate content on the atlas, it is reflecting the more holistic perspective these communities. As a result, they are documenting environmental events and the relative impacts.²⁵



Atlas of Community-Based Monitoring in a Changing Arctic²⁶

In a region where many communities are physically isolated from one another, this atlas provides a platform for them to share real-time observations of environmental and social change, as well as a mechanism to engage those communities in a broader knowledge network.

Many of the changes monitored by the Atlas are related to resilience. Some efforts monitor climatic changes, others measure community food security, and there is also an effort to monitor Inuit health and wellness.²⁷ One of the biggest vulnerabilities of Inuit communities is food security in the face of a changing climate. However, existing global frameworks for defining and monitoring food security “do not necessarily match the Arctic ecosystem or cultures within.”²⁸

As a response to this disconnect, ICC-Alaska is one of hundreds of community projects contributing to the web-based Atlas platform. ICC-Alaska has designed a project based on the notion that “Inuit hold a unique understanding of food security within the Arctic; viewing food security to encompass both cultural and environmental systems; systems which interlink and support each other.”²⁹ The project is aimed at “building a conceptual framework on how to assess food security” from the perspective of Alaska’s Inuit.³⁰

To date, ICC-Alaska has engaged 15 Inuit communities in a series of community meetings and interviews of individuals who are responsible for,



or contributing to, the acquisition of food within the community. Each meeting is convened to share information about the project, to obtain input from the community about the approach and method, and to engage that community in discussion on food security objectives.³¹ Food security aims for the project include:

- Providing an understanding of Arctic food in/security, from an Alaska Inuit perspective.
- Identifying drivers of food security.
- Identifying what will need to be monitored in order to create action plans.
- Creating an assessment tool.³²

In this way, the project provides a unique bottom-up, community-led definition and understanding of food security that then informs community actions and provides a method of monitoring vulnerability and progress. Engaging communities in discussion and creation of action plans for food security can also contribute to building a network of permanent actors committed to working on enhancing their community's resilience.

This project is one of many that are contributing to the Atlas platform for community-based monitoring. Sharing of this knowledge via the atlas platform network allows other communities across the Arctic to learn about food security issues and about the project's approach and methodology, thereby contributing to a greater Arctic-wide knowledge network.

Analysis and Observations of Community Resilience Networks

These cases are demonstrations of building an approach to resilience that is systematic and meaningful to the community at risk. They draw upon information from sub parts of the community but also bring in relevant and useful outside information and technology that fits the community's circumstances and needs. While oriented to slightly different scales as the starting point (household, single community, or region), they all take into account the context within which they are seeking to intervene—all drawing upon technology in some way.

Many of those interviewed emphasized the importance of using a systematic process for pursuing community resilience that was locally relevant and locally driven. Such an approach would help individuals in a community determine what is important to them, what the risks to their community are, what they consider high priority, and how to go about working on those aspects of resilience.





Many community resilience practitioners will state that there is no “one size fits all” approach for every community. However, expecting communities to start from scratch is naïve and discounts local experience, knowledge, and systems that may be useful to adapt or utilize. Along those lines, some expressed frustration with conceptual frameworks as the sole basis for pursuing community resilience because the frameworks do not provide specific direction or actions for the community to take in order to become more resilient. Every community has different needs and different ways of working to solve problems. Therefore, any approach to community resilience needs to be flexible and adaptable to a bottom-up, networked, community approach.

Leveraging Technology and Information for Resilience

Technology in resilience networks is utilized in various ways, from helping to form or maintain a network, to collecting, analyzing and distributing new information. There are a number of ways in which technology and real-time information are being used to promote or enhance resilience.

The spectrum of resilience, from assessing threats to effectively responding when they occur, often requires both information and a network for sharing that information across a diverse group of actors ranging from community leaders to outside response entities.

Case Study: InSTEDD’s GeoChat and Resource Map—Platforms for Resilience, Response and Recovery

The community resilience case studies emphasize a need to tailor information and solutions to local context and needs. An organization helping to do just that is Innovative Support to Emergencies, Diseases and Disasters (InSTEDD), a Seattle-based non-profit organization. InSTEDD designs and utilizes open source technology tools to help partners improve collaboration, information flow and knowledge sharing to better deliver critical services to vulnerable populations.³³

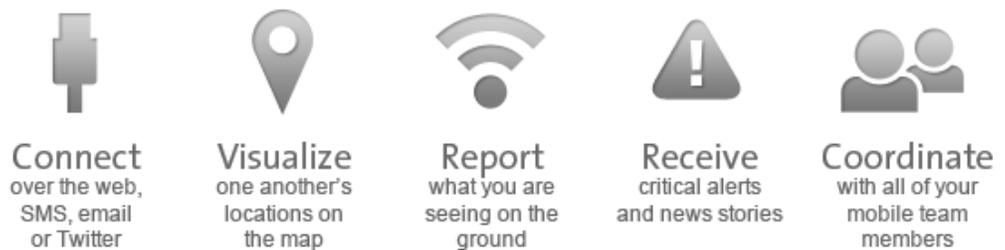
The problem InSTEDD is working to solve lies in the all-too-familiar scenario that follows a disaster: the community has immense and quickly changing needs, and responding entities have their own missions and pathways to provide relief. In spite of best efforts, sometimes aid does not match the need. In these scenarios, many different stakeholders (e.g., local population,



policymakers, emergency responders, religious leaders, businesses, healthcare workers and humanitarian and development workers) all need to better understand the situation with real-time information, and have ways to communicate and coordinate across that complex and often chaotic post-crisis response period.³⁴

To help do this, InSTEDD has a suite of technology tools, ranging from voice-enabled mobile messaging services, to real-time mapping of available supply resources on a mobile-accessible map. Rather than developing technologies in Seattle and applying them in the field, InSTEDD's iLabs in Southeast Asia and Latin America help build technical capacity among local people in vulnerable communities to enable them to use the open-source software code and tailor it to local needs and available technologies. This allows the software platforms to be developed in a way that represents and works for local needs rather than applying an existing architecture and assuming it will work. This, in turn, better equips crisis responders with the tools, information and connections they need to carry out their role effectively.³⁵

Two of InSTEDD's technologies, GeoChat and Resource Map, serve as global solution network platforms for local populations and stakeholders to use and design to meet their needs. GeoChat is a collaboration tool that uses SMS, email and Twitter to "enable self-organizing group communications by allowing users to link the field, headquarters, and the local community in a real-time, interactive conversation visualized on the surface of a map."³⁶



Capabilities of InSTEDD's Geochat

For example, responders in "Haiti's earthquake relief efforts [used GeoChat] to coordinate field teams setting up wireless services and to provide remote support from the USA."³⁷ It is also being used as an everyday public health resilience tool in Mukdahan province in Thailand to "connect over 600 community health workers with each other and their managers to accelerate outbreak response and spread useful information to villages."³⁸

Another InSTEDD technology platform, ResourceMap, responds to the challenge that many organizations or entities face in tracking available resources (e.g., facilities, supply levels, human resources) by allowing a team to "collaboratively record, track, and analyze resources at a glance using a live map."³⁹





Capabilities of InSTEDD's Resource Map

Resource Map can be used by any computer or mobile device capable of text messaging (i.e., a smartphone is not required since basic SMS can allow a user to view or update resource allocations, which is a valuable characteristic in many parts of the world). Resource Map has been used for a number of resilience-related efforts including tracking emergency and medical supplies and personnel, monitoring food prices and supply levels, and testing environmental health.⁴⁰

These platform tools demonstrate the utility and power of technology to serve as a vehicle for allowing networks to organize and for those networks to carry out their goals, and, in the end, allow the network to equate to something much bigger than the sum of its parts. Understanding how these technologies are being utilized to organize and enable greater collaboration among stakeholders and within networks may prove valuable for other existing or emerging global solution networks.

Case Study: UN Global Pulse

On the other end of the technology spectrum at the regional and global levels are efforts to aggregate incredible amounts of existing data and to analyze that information in ways that can be useful at smaller scales.

One such example at the global level is the United Nations Global Pulse, an initiative of the UN Secretary-General that functions as an innovation lab and a knowledge network by leveraging technology to share data, research and enable learning, and to facilitate exchange of data and information across a diverse range of actors and stakeholders that can be freely accessed and utilized around the world. Global Pulse consists of a series of innovation labs that conduct research on how digital data can provide real-time information about changes in human well-being and the effectiveness of response policies across the world—important factors of resilience. The Global Pulse Labs, are located in Jakarta, Indonesia; Kampala, Uganda; and New York. Global Pulse is currently conducting applied research projects on a variety of topics that contribute to resilience including food security, humanitarian logistics, economic well-being, gender discrimination, and health.⁴¹



Pulse Lab teams typically include experts in data science, data engineering, data visualization, research coordination, legal and privacy issues, and partnerships and communications. These teams support UN agencies and development partners in conducting pilots and evaluations of new tools and approaches to be used at the country level within existing programs and policy initiatives.

One of the main objectives of Global Pulse is to advance Big Data for Development (BD4D).⁴² BD4D is a concept that refers to the identification of sources of big data—large amounts of digital data that can provide information about human behavior and inform policymaking for global development.⁴³ Examples of data sources used by the Pulse Labs include, but are not limited to, news stories, blogs, social media, e-commerce sites, financial services (e.g., purchases and money transfers), communication services (e.g., patterns of anonymized mobile phone usage patterns), and information services (e.g., anonymized records of search queries).⁴⁴ Pulse Labs share their findings internally and publicly with stakeholders to help develop global best practices for using new sources of digital data and technologies to inform policymakers about what is happening to vulnerable populations in real time.⁴⁵

When collected and analyzed properly, big data can inform global development, including disaster risk management, by:

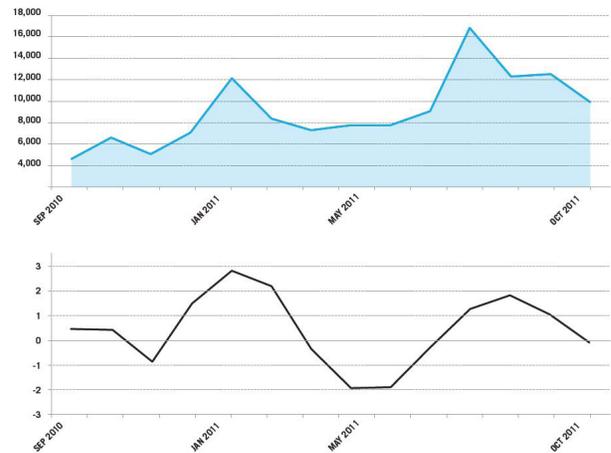
- Detecting anomalies early on to enable faster responses to crises.
- Informing the design and targeting of programs and policies.
- Indicating through real-time monitoring of the impact of policies and programs and whether adjustments are needed.⁴⁶

For example, in conjunction with Crimson Hexagon, a social monitoring and analytics group, Global Pulse explored whether Twitter data can be used to provide insight about how people perceive issues related to food, fuel, housing, and the economy in Indonesia. These services of a society are typically seen as critical to community resilience.⁴⁷ Global Pulse and Crimson Hexagon categorized Twitter messages posted in Indonesia based on keywords related to those issues, as well as keywords reflective of concern (e.g., “afford”), to then categorize and quantify the sentiment of relevant messages. The volume of keywords from Twitter was then correlated and compared against official statistics (e.g., unemployment or inflation statistics), and significant events. It was found that the number of tweets discussing the price of rice in Indonesia closely matched the official inflation statistics, demonstrating how the volume and topics of Twitter conversations can reflect a population’s concerns about potential stressors and threats.⁴⁸ The main difference is that, while official food inflation statistics take months to process and publish, Twitter provides information about public sentiments in real-time, which in turn means that public officials can intervene earlier if needed.




**Tweets about the price of
rice
(per month)**


Food Price Inflation



The number of tweets discussing the price of rice in Indonesia over the last year follows a similar function as the official inflation statistics for the food basket.⁴⁹

In another project, Global Pulse and SAS International, using Ireland as a case study, worked to determine whether social media can add depth to unemployment statistics, another key component of community resilience and stability.⁵⁰ Global Pulse and SAS collected digital data (e.g., social media, blogs, forums, and news articles) related to unemployment, categorized the mood of these online conversations, and correlated the volume of mood-related conversations to official unemployment statistics. The results showed that an increase in social media conversations about work-related anxiety and confusion provided early indicators of unrest in the population three months ahead of an unemployment strike in Ireland.⁵¹ As in the Indonesian rice-price/inflation example, leveraging big data to track and anticipate risks and possible threats to a community can provide opportunities for leaders and policymakers to take preventative measures for impending crises before they occur.

In addition to conducting research on how big data can be applied to global development and resilience, another goal of Global Pulse is to strengthen cooperation in the BD4D arena by forging partnerships with companies, organizations, researchers, and academic institutions that have the data, technology, and analytical expertise needed for BD4D projects and advocacy. As their process and capability mature—and as the pool of available data expands—networks such as Global Pulse will play a vital role in providing GSNs and other actors with an encompassing picture of the welfare of individuals, communities, and the planet.



Analysis & Observations of Leveraging Technology and Information for Resilience

Technology can support networks and resilience by:

- Capturing individual and local information and incorporating it at regional and global levels.
- Aggregating and analyzing data and information at a global level and translating that to regional and local levels.
- Expanding and enhancing collaboration.
- Fostering broader awareness of and accessibility to available information in a timely manner.

Many of those interviewed underscored that communities do not need to start from scratch when pursuing resilience; there are a number of existing approaches, systems, and tools they can make use of. Technology can provide access to valuable information and tools that inform how communities, sectors, and decision-makers organize or approach resilience efforts. Technology can also facilitate collaboration or help create customizable approaches that are readily available, perhaps via mobile technologies, to those working to enhance resilience in virtually any context or at any scale.

Both Global Pulse and InSTEDD demonstrate how technology tools are constantly evolving and being applied in new and different ways to help enhance or promote resilience across broader networks and scales. There are new frontiers for the field of resilience and ways in which it might expand or grow in the decades to come.

A New Opportunity for Global Solution Networks in Resilience

Examining resilience through the lens of GSNs led some resilience thought leaders to identify potential applications.

The Arctic, involves an increasing number of stakeholders interested in issues ranging from collaborative scientific research to exploring new trade routes for transporting goods. There are challenges for resilience in the changing Arctic and some of those challenges might be addressed by different types of GSNs.



Another application is a “meta-network” or “network of networks” in which diverse sectors, issue areas, and geographies are involved with different aspects of resilience. This has led to a growing set of definitions, frameworks, systems, tools, and measurements. Many practitioners stressed that there is an opportunity now to learn from what already exists by facilitating knowledge sharing and information exchange. What might be garnered from existing GSNs that may be useful to resilience practitioners as they seek to advance the field across diverse contexts and scales?

How Can Global Solution Networks Play a Role in Arctic Resilience?

The pace of change in the Arctic is quickening due to climatic shifts and increased access to the region. The Arctic Resilience Interim Report developed by the Stockholm Resilience Center and commissioned by the Arctic Council suggests using a resilience framework for understanding and managing challenges that may arise.⁵² Resilience in the Arctic is multi-faceted and involves an increasing number of stakeholder interests. For instance, the Arctic is seeing unprecedented climatic and landscape changes such as melting permafrost, decreased sea ice, and more extreme weather events. These environmental shifts are, in turn, creating new challenges and new opportunities: lost community infrastructure built on previously solid permafrost; increased natural resource exploration and extraction; new ocean shipping pathways; and threatened species extinction.

In terms of existing GSNs, much collaboration centers around scientific research and sharing of scientific data among universities and research institutions within Arctic countries as well as globally. Currently, efforts aimed at addressing Arctic challenges and opportunities are largely occurring through *ad hoc* interactions between interested external parties and Arctic community members. Indeed, Arctic decision-makers have felt overwhelmed by the dramatic increase in entities appealing for their attention on a particular issue area.⁵³ The prospect of having more coordinated or networked approaches to addressing some of these issues was quite appealing to some experts from an efficiency perspective, but also for achieving greater effectiveness.

Arctic governance presents a unique challenge in that the region includes multiple countries as well as indigenous groups. The main coordinating body among Arctic nations is the Arctic Council, which helps to collectively assess regional opportunities and challenges and develop policy for how to best address some of those issues. Policy recommendations developed by the Council then flow to individual countries and to local territories, communities, and individuals, where policies are put into practice. As a result, coordinating regional governance can be a challenge. Some Arctic experts and decision-makers are seeking to complement government coordination with bottom-up solutions.



Strawman Global Solution Network: What Would an Ideal GSN or Combination of GSNs Look Like for Arctic Resilience?

The Arctic presents a unique opportunity to gather resilience-practitioner insights on what an ideal multi-stakeholder global solution network might look like. In order to consider which GSNs might be most useful for enhancing Arctic resilience, it is important to first understand some of the challenges these networks might be trying to solve. Some of the challenges include:

- Governance is through individual states and some issues are coordinated through the Arctic Council, directly involving Canada, Russia, United States, Denmark, Norway, Sweden, Finland, Iceland, and Indigenous Peoples representatives.
- Arctic Council leadership changes every two years and recommendations from the Council have to be implemented by individual Arctic nations, which is often difficult.
- There does not seem to be a process to help non-governmental entities communicate, coordinate, or collaborate on Arctic issues.
- Subnational and national perspectives and how the Arctic Council wants to proceed do not always align, complicating policy development and especially implementation.
- Currently mechanisms are lacking for local communities, civil society, private sector, scientists, and governments working in the Arctic to make their ideas heard by those in leadership positions. As noted in the Arctic Resilience Interim Report, “Governing in the Arctic will require difficult choices that must grapple with different and sometimes conflicting priorities.... Participatory processes can more effectively ensure that diverse voices are represented and that all relevant forms of knowledge are included in decisions.”⁵⁴
- There are many efforts to collaborate on scientific research and data however there does not seem to be a way to aggregate scientific effort to see the big picture.
- Civil society, watchdog, and advocacy groups are focusing on Arctic issues, but thus far there are few ways for them to coordinate or collaborate.

While all ten types of GSNs may ultimately evolve and prove useful to enhancing Arctic resilience, several of those interviewed suggested prioritizing networks that could be most relevant and useful for enhancing resilience in light of the unique risks facing the Arctic.



High Priority GSNs for Arctic Resilience: Knowledge, Standards and Advocacy Networks

Knowledge Networks

According to Dr. James Baker of the Clinton Foundation, “A knowledge network for Arctic resilience is important because it can assess the totality of changes—physical, biological, chemical—in atmosphere, ocean, and land. We know much about each of these, but the interaction of all is little understood.” Science networks already gather and share ocean data from the Arctic. Beyond data, a knowledge network could share best practices, techniques, methods, or breakthroughs and translate data.

Global Standards Networks

This network type could develop standards for operating new shipping and transport lanes or for environmental and social impact assessments on new projects aimed at exploring or extracting natural resources in the mostly untouched Arctic ecosystem.

Advocacy, Diaspora, and Platform Networks

Advocacy networks could enable civil society and Arctic communities to get more involved in advancing understanding of key issues in the region and could provide a more unified voice to promote resilience ideas within policy and governance arenas such as the Arctic Council. There may also be synergy between an Arctic resilience advocacy network and a diaspora network of Inuit living outside the Arctic who are eager to advocate. A platform network could provide a forum to engage global stakeholders who are interested in different aspects of Arctic resilience (e.g., conservation, societal impacts of a changing environment, responsible management of new development opportunities).

Networked Institutions

Networked institutions could play a valuable role in linking institutions involved in Arctic resilience that do not otherwise have mechanisms to promote awareness of or coordinate their activities.

Second-tier Priority GSNs for Arctic Resilience: Governance, Operations, Policy Networks

The interviews and research pointed to work already being done in these areas:

Governance Networks

In light of the coordinating role the Arctic Council already serves among governments, a governance network was



considered a lower priority GSN. However, there could be value in an alternative, bottom-up approach to managing the Arctic as a region that may be complementary to existing governance structures and even help inform and influence those formal mechanisms.

Operational and Delivery Networks

In the case of an acute and significant disaster in the Arctic such as an oil spill, an operational and delivery network may become a top priority. However, in the current conditions of rapid Arctic change but few acute disasters, this was considered a lower priority network. In the future, an operational and delivery network could provide coordinated donations and transportation of food to communities in need of disaster response from environmental or natural disasters.

Policy Networks

Opportunities for facilitating bottom-up policy ideas, implementation strategies, or coherence in the region may be unwelcome in certain Arctic communities. Some of those interviewed predicted that regional groups or networks would likely respond to specific policy issues rather than creating networks for more broad regional questions.

Watchdog Networks

Watchdog efforts could be applicable to a range of Arctic issues including monitoring of sea ice, endangered species, and environmental safety. A watchdog network could complement knowledge and policy networks by making information transparent and publicly available in order to raise awareness on important issues for Arctic resilience.

Ultimately, whatever global solution network types may come into play in the Arctic region, resilience means different things to different people, entities and governments. For those living there, such as the Alaska Inuit, resilience may mean preserving a way of life, a culture, or a food-secure community. For some countries or private sector groups, it may mean shorter trade routes that reduce fossil fuel use, or greater access to natural resources that contribute to economic growth. It is precisely these types of differences that make multi-stakeholder networks more valuable to this fast-changing region.

The Evolving Field of Resilience

Growing interest in resilience from the local to global levels has sparked some thought leaders and practitioners to consider whether and how existing resilience efforts may be “plugged in” to a broader meta-network or network-of-networks in order to share information, ideas, resources, and tools for promoting resilience across different sectors, topics and scales.



“ *Where sustainability aims to put the world back into balance, resilience looks for ways to manage in an imbalanced world.* ”

In community resilience preparation and planning there is a need for collaborative communication and sharing of what is learned among existing networks. Opportunities must be developed to share experience across sector-based resilience efforts (e.g., what can agricultural resilience learn from cyber-resilience? How can public health resilience be informed by built infrastructure- or climate-resilience efforts?) Some of the key functions of a meta-network or network-of-networks might be to capture and elevate what is being learned across existing smaller networks, and to leverage technology to help disperse knowledge and application.

Several potential models have been mentioned, for example, a combination of solution networks such as knowledge, advocacy, or standards networks that will address different needs in the resilience field. Already, there are resilience-focused knowledge networks, the Resilience Academy,⁵⁵ and Resilience Alliance,⁵⁶ which aim to facilitate exchange and contribute to greater understanding or definition of the field. There may also be valuable lessons drawn from other related fields such as sustainability or by existing and successful GSNs.

With regard to sustainability, the term is often used synonymously with resilience, leading to confusion in using one term to mean the other. Andrew Zolli provides a simple way of capturing the difference, saying, “Where sustainability aims to put the world back into balance, resilience looks for ways to manage in an imbalanced world.”⁵⁷ Some resilience practitioners are quick to differentiate from sustainability, but there may be some value in learning from how the sustainability movement has evolved. Over the last 30 years, significant strides have been made in developing clear and measurable definitions and standards to inform widely accepted methods for tracking progress towards sustainability, some of which may be useful examples.

On the other hand, examining existing GSNs may be another way to advance the resilience field. The United States Green Building Council (USGBC)⁵⁸ has been able to achieve transformational green building design around the world through the use of a standards network as well as a knowledge network to help spread awareness and capacity building on green building design. The development of both knowledge and standards among an international network of stakeholders has made the USGBC the recognized leader in information sharing and best practices of the field, as well as the monitoring and evaluation system for measuring progress.⁵⁹

As resilience practitioners and leaders around the world consider the future of resilience and how to make the field more defined, more tangible, and more measurable, a meta-network or a multi-pronged system may provide a valuable model for connecting the dots across existing resilience efforts that are seeking to share experience, learn from one another, and ultimately advance resilience strategies in communities and sectors around the world.



Conclusions and Implications

Examining a diverse array of local, regional, national, and global resilience efforts through the lens of what constitutes a global solution network revealed several ways to think about how these two worlds intersect.

Scaling Resilience Networks

One way is to examine how existing communities and networks—based upon face-to-face interpersonal relationships—are utilizing more technology-enabled, digitalized relationships and networks to engage individuals/communities/sectors at a greater scale. Many are looking for ways to leverage technology and networked solutions to enhance the scale of impact and share lessons learned.

The GSN research has identified strategies for scaling networks that could be applied to the work that resilience practitioners are undertaking. As noted in the case study on the CARRI Community Resilience System, network leaders can amplify the scale of the impact and the ability to replicate projects with standardized ready-to-adapt toolkits and platforms that can be customized to local conditions. This allows individuals/communities/sectors to build on the work of others rather than starting anew, and to use the platform as a means to engage and take action. Similarly, knowledge networks allow interventions pursued and lessons learned in one community to be shared more broadly across the network and to be applied in new communities and contexts.

Harnessing Big Data

Another way of looking at how resilience and GSNs intersect is to understand how technologies, big data, and information can be funneled to existing relationship-based networks, and vice-versa. One of the challenges in resilience and disaster risk reduction is to get critical information into the hands of those who need it in a timely fashion. This is where having identified and accessible networks of people or institutions can allow real-time application of available technology and data.

Unlike UN Global Pulse, resilience practitioners and GSNs may not always have access to the advanced data science talent required to build leading-edge applications. But network leaders can source these skills on an as-needed basis and, fortunately, a growing number of capable networks have emerged to help facilitate the application of advanced skills to global problems.

Orchestrating a Multitude of Network Types

A third way of understanding resilience through the lens of GSNs is to explore how solution networks could be created and applied to new resilience challenges or issue areas. By most accounts, solutions to resilience issues will involve the orchestration of multiple networks working in tandem. For example, managing the preservation, maintenance, and consumption of water—an essential challenge for community-based resilience—not only requires a regional, and even international, approach; it requires participation



from the diverse stakeholders who impact the hydrological cycle and it requires a broad range of solutions ranging from new technologies for water purification to new political strategies for negotiating conflicts over water scarcity. A similar logic applies in the case of building resilience to climate change and indeed most complex global problems where a diversity of actors and solutions are needed.

In some ways it is not surprising that so many GSNs appear to have a resilience element to their focus. Resilience has a lot to do with managing interdependence, whether it is the interrelationship between types of critical infrastructure (e.g., banking and electricity) or the neighborhoods in a community. Understanding the interdependencies, seeking collaborators, accessing useful information, and establishing or maintaining technology platforms for the network of relevant actors seems inherently integral to those working on resilience applications—all critical elements of GSNs. Perhaps the next contribution is to further explore what makes the diverse range of GSNs successful and how those lessons might be applied to provide new insights for the communities, sectors, companies, countries, and regions seeking ways to enhance their resilience.



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Endnotes

- ¹ John Plodinec, “Resilience—What Is It, Anyway?” Community and Regional Resilience Institute. <http://www.resilientus.org/resilience-what-is-it-anyway/>
- ² “Terminology,” The United National Office for Disaster Risk Reduction. <http://www.unisdr.org/we/inform/terminology#letter-r>
- ³ “Target Audience.” ISET International. <http://i-s-e-t.org/about/audiences.html>
- ⁴ Ibid.
- ⁵ Intergovernmental Panel on Climate Change. Climate Change 2014 Synthesis Report. 1 Nov 2014. http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_LONGERREPORT.pdf
- ⁶ Ibid.
- ⁷ Marcus Moench, ISET International. Personal Interview. 2 Nov 2014.
- ⁸ “Climate Resilience Framework: Training Materials.” ISET International. <http://i-s-e-t.org/resources/training/climate-resilience-framework.html>
- ⁹ “Climate Resilience Framework.” ISET International. <http://i-s-e-t.org/projects/crf.html>
- ¹⁰ “Asian Cities Climate Change Resilience Network (ACCCRN).” The Rockefeller Foundation. <http://www.rockefellerfoundation.org/our-work/current-work/climate-change-resilience/asian-cities-climate-change-resilience>
- ¹¹ Climate Resilience Framework. ISET International. <http://i-s-e-t.org/projects/crf.html>
- ¹² “Institute for Social and Environmental Transition-International Climate Resilience Case Study.” Can Tho, Vietnam. Climate Change Coordination Office. 2011-2014. http://training.i-s-e-t.org/casestudies/iset_vietnam_casestudy_cantho_ccco_1304181.php
- ¹³ Ibid.
- ¹⁴ Ibid.
- ¹⁵ “Community Based Urban Flood and Erosion Management for Can Tho City.” Institute for Social and Environmental Transition-International. Climate Resilience Case Study. <https://static.weadapt.org/knowledge-base/files/1247/51e53b12599d7iset-vietnam-casestudy-cantho-urban-flood-130418.pdf>
- ¹⁶ Ibid.
- ¹⁷ Robin White, Email correspondence. Community and Regional Resilience Institute.
- ¹⁸ Community Resilience System. Community and Regional Resilience Institute.



- 19 “Building Resilience in America’s Communities: Observations and Implications of the CRS Pilots.” Community and Regional Resilience Institute. <http://www.resilientus.org/wpcontent/uploads/2013/05/CRS-Final-Report.pdf>
- 20 Community Resilience System. Community and Regional Resilience Institute.
- 21 “Anaheim Chosen to Participate in Nationwide Community Resilience Program.” Anaheim. 29 Sep 2011. <http://www.anaheim.net/administration/PIO/news.asp?id=1401>
- 22 Warren Edwards, Email correspondence. Community and Regional Resilience Institute.
- 23 “The right to food security in a changing Arctic: the Nunavut Food Security Coalition and the Feeding My Family campaign.” Hunger • Nutrition • Climate Justice 2013, A New Dialogue: People at the Heart of Global Development.
- 24 Ibid.
- 25 Atlas of Community-Based Monitoring & Traditional Knowledge in a Changing Arctic. <http://www.arcticcbm.org/index.html>
- 26 Ibid.
- 27 Ibid.
- 28 Ibid.
- 29 Ibid.
- 30 Ibid.
- 31 Ibid.
- 32 Ibid.
- 33 “About Us.” InSTEDD. <http://instedd.org/about-us/>.
- 34 Ibid.
- 35 “What is InSTEDD?” YouTube. InSTEDD, 8 Apr 2011. <https://www.youtube.com/watch?v=Um6tOy7cSHQ>
- 36 “GeoChat.” instead. <http://instedd.org/technologies/geochat/>
- 37 Ibid.
- 38 Ibid.
- 39 “Resource Map.” InSTEDD. <http://instedd.org/technologies/resource-map/>
- 40 Ibid.
- 41 “Overview.” United Nations Global Pulse. <http://www.unglobalpulse.org/node/14667>
- 42 “About.” United Nations Global Pulse. <http://www.unglobalpulse.org/about-new>.



- 43 “Ibid.
- 44 “Big Data for Development: A Primer.” United Nations Global Pulse. http://www.unglobalpulse.org/sites/default/files/Primer%202013_FINAL%20FOR%20PRINT.pdf
- 45 “Pulse Labs.” United Nations Global Pulse. <http://www.unglobalpulse.org/pulse-labs>
- 46 Ibid.
- 47 Ibid.
- 48 Ibid.
- 49 “Twitter and Perceptions of Crisis-Related Stress.” United Nations Global Pulse. <http://www.unglobalpulse.org/projects/twitter-and-perceptions-crisis-related-stress>
- 50 Ibid.
- 51 Ibid.
- 52 Arctic Council (2013). Arctic Resilience Interim Report 2013. Stockholm Environment Institute and Stockholm Resilience Centre, Stockholm, pp. ix–xii
- 53 Anonymous Personal Interview. 5 Sep 2014.
- 54 Ibid.
- 55 Resilience Academy. Munich Re Foundation. <http://www.munichre-foundation.org/home/DisasterPrevention/Resilience-Academy.html>
- 56 Resilience Alliance. <http://www.resalliance.org/>
- 57 Andrew Zolli, “Learning to Bounce Back.” The New York Times. 3 November 2012. http://www.nytimes.com/2012/11/03/opinion/forget-sustainability-its-about-resilience.html?pagewanted=all&_r=0
- 58 Rawn Shah, “Global Standards Networks.” Global Solution Networks. <http://gsnetworks.org/wp-content/uploads/Global-Standards-Networks.pdf>
- 59 Warren Edwards. Personal Interview. Community and Regional Resilience Institute. 28 May 2014.



About Global Solution Networks

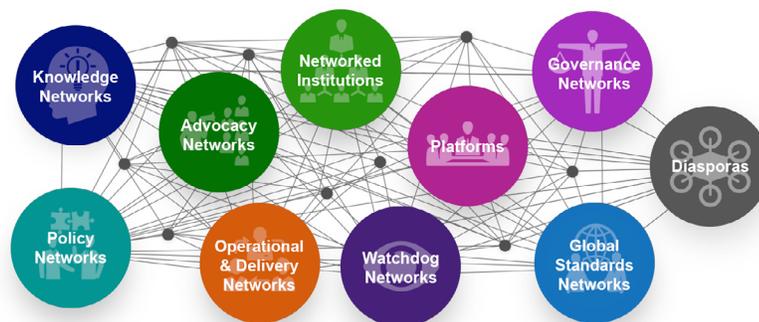
Global Solution Networks is a landmark study of the potential of global web-based and mobile networks for cooperation, problem solving and governance. This research project is a deliverable of the GSN program, offered through the Martin Prosperity Institute at the Rotman School of Management, University of Toronto.

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Ten Types of Global Solution Networks

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