INTERNATIONAL EMERGENCY RESPONSE: FORMING EFFECTIVE POST-EXTREME EVENT STABILIZATION AND RECONSTRUCTION MISSIONS

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ABSTRACT

Debates about whether or not to engage in interventions to stabilize and rebuild states that have suffered extreme events, such as wars and large-scale natural disasters include questions about whether or not the intervening force can complete the mission. Intervening is a complex task that faces considerable political and military obstacles, even when the intervention is welcome. The situation is only more complex and difficult when the force is not welcome. This requires the reconstruction, and often construction, of governance capacity in the situation when all, or nearly all, capacity has been destroyed, but the situation is rapidly changing. To be effective, the missions and the governance structures that those missions are trying to build must have not only the capacity to govern, but also the resilience to respond and adapt to that changing environment.

This research examines the relationship between resilience, capacity, and a mission's effectiveness. Capacity is the total amount of resources available to the mission, including the funds, materiel, and personnel that each organization devotes to the effort of completing mission tasks. Resilience is the mission's ability to identify changes in the environment and adapt to them. Effectiveness is the mission's ability to meet its formally stated goals, as well implicitly understood goals. Analyzing these relationships requires first answering these questions:

- Who are the actors?
- What are the system rules?
- What are the patterns of interaction?
- How do actors select actions?
- How do actors select which actors with whom they will interact?

- What are the patterns of variation in the data covered in the preceding questions?

The data to answer all of these questions is gathered both from existing data sources, including situation and newspaper reports, and from interviews with the individuals involved in the decision making during two reconstruction efforts: the 1992-2002 UN intervention in Bosnia-Herzegovina and the on-going UN intervention in Haiti, which began in 2004. The research constructs models of these events using qualitative systems analysis, network analysis, statistical analysis, and simulation analysis to show that increasing resilience increases effectiveness, after controlling for capacity.

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AAR	After Action Report
ARBiH	Army of the Republic of Bosnia and Herzegovina (Bosniak Army)
BiH	Bosnia and Herzegovina (local language acronym)
CANA	Caribbean News Agency
CAP	Consolidated Appeals Process (United Nations)
CAS	Complex Adaptive System
CASOS	Computational Analysis of Social and Organizational Systems (Carnegie Mellon University)
CCCM	Camp Coordination/Camp Management Cluster
CDEMA	Caribbean Disaster Emergency Management Agency
CDM	Center for Disaster Management
CIMIC	Civil Military Cooperation
DINEPA	National Directorate of Water Supply and Sanitation
EOC	Emergency Operations Center
ESF	Emergency Support Function
EU	European Union
EUFOR	European Union Force in BiH
ERGM	Exponential Random Graph Modeling
FBiH	Federation of Bosnia and Herzegovina (BiH Entity)
GDP	Gross Domestic Product
GNI	Gross National Income
HNP/PNH	Haitian National Police (French: *Police Nationale d'Haïti*)
HVO	Croatian Defense Council (Bosnian Croat Army)
IAD	Institutional Analysis and Development Framework
ICG	International Crisis Group
IFOR	Implementation Force (NATO)
IGO	Inter-Governmental Organization
IMF	International Monetary Fund
INGO	International Non-Governmental Organization
IPO	International Private Organization (includes Multi-National Corporations)
IPTF	International Police Task Force
JNA	Yugoslav People's Army
MIF	Multinational Interim Force
MINUSTAH	United Nations Stabilization Mission in Haiti (French Language

	Acronym)
NATO	North Atlantic Treaty Organization
NGO	Non-Government Organization
OAS	Organization of American States
OCHA	Office for the Coordination of Humanitarian Affairs (United Nations)
OFDA	Office of Foreign Disaster Assistance (USAID)
OSCE	Organization for Security and Cooperation in Europe
PAHO	Pan-American Health Organization
PIC	Peace Implementation Council
RS	Republika Srpska (BiH Entity)
RSK	Republic of Serb Krajina
SFOR	Stabilization Force (NATO)
UN	United Nations
UNEP	United Nations Environmental Program
UNHCR	United Nations High Commission for Refugees
UNMIBH	United Nations Mission in Bosnia and Herzegovina
UNICEF	United Nations Children's Fund
UNPA	United Nations Protected Area
UNPROFOR	United Nations Protection Force
UNSC	United Nations Security Council
US/USA	United States of America
USAID	United States Agency for International Development
UK	United Kingdom
VRS	Vojska Republika Srpska (Bosnian Serb Army)
WASH	Water, Sanitation, and Hygiene Cluster
WFP	World Food Programme
WHO	World Health Organization

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I owe a special thank you to the individuals who served as my guides and translators while conducting interviews and visiting sites in both Haiti and Bosnia. They must remain nameless here, to protect their anonymity; all of them became sources in my efforts to understand these cases, and so merit the same protection as those interviewed, though their contributions extend far beyond that data to the logistical support and access to interviewees that were necessary to complete successful field work.

A dissertation is far too large and intense of a project to complete without meaningful escapes from the work. For this, I have my friends and family to thank. I will not list them all by name, because the list is too long and in case I might inadvertently offend someone by forgetting to the include them in a detailed list because they played key roles early on in the project but not during the latter stages. Completing this project has been a long and difficult process, often including challenges that required considerable personal strength to persevere. The acknowledgements listed above provided the logistical means for completing those tasks. My friends and family provided me with the support that gave me the wherewithal to actually perform those tasks and maintain that perseverance all the way through the project. The value of this support is impossible to overstate; it is at least as certain that I would not have completed this project without all of your help as it is that I could not have completed this project without any part of the logistical support.

1.0 CONTINUED FAILURES OF NATION-BUILDING MISSIONS

Debates about whether or not to engage in interventions, whether humanitarian, as in United Nations (UN) interventions that followed the ouster of then-Haitian President Jean Bertrand Aristide or the signing of the Dayton Accords that ended the conflict in Bosnia-Herzegovina, or primarily military, as in the US invasions of Iraq and Afghanistan, include prominent questions about whether or not the intervening force can complete the mission (Kaufmann, 1999). The questions are valid; these are not simple missions. Intervention is a complex, military task that faces considerable political and military obstacles, even when the intervention is welcome. The situation is only more complex and difficult when the intervention is not welcome (Kaufmann, 1999; Posen, 1999). Then the laborious and more complex task of nation-building follows the intervention. Nation building requires the reconstruction, and often construction, of governance capacity in the situation when all, or nearly all, of that capacity has been destroyed. To date, reconstruction missions have not performed well, either. These missions assemble and then wield enormous amounts of money and manpower. They rarely achieve any lasting success. Aside from the well-publicized, on-going conflicts in Afghanistan, Iraq, and Libya, more than ten years after the end of fighting in Bosnia and Herzegovina, Kosovo, and East Timor, each remains in the focus of the international security agenda (ICG, 2012). Current policy is already elucidated by current research, indicating that the research lacks the necessary insights for effective policy in this arena.

1.1 NATION-BUILDING AS A RESPONSE TO INSTABILITY AND CONFLICT

1.1.1 Nation-Building Basic Theory and Role

Nation-building is not a new term, though it has taken on multiple definitions over time. First emerging in the 1950's, nation-building was closely aligned with development theories on modernization (Hippler, 2005c). These theories sought ways to drive economic growth and development in parts of the world that remained poor and unindustrialized. They sought to distill and condense the experiences of those countries considered "developed,", meaning Western Europe, Canada, and the United States as a roadmap for growth and development elsewhere (Peet and Hartwick, 1999; Rostow, 1960). This view saw nation-building as the political equivalent to modernization theory's work on economic growth and development. By the mid-1970's, modernization had fallen out of favor with development theorists (Peet and Hartwick, 1999), and so too had this original formulation of nation-building theories and policies (Hippler, 2005b).

While modernization theory has never benefited from a rebirth, nation-building remerged in 1990's, but with a different usage. It now carried two meanings. One provided scholars with a language to describe the genesis of modern nations and nation-states. The ages-long process of building nations, such as the German nation, the French nation, or the American nation gained the label of nation-building (Hippler, 2005c). At the same time, nation-building became the term that analysts and policy makers applied to the effort of building a national identity in a population (Hippler, 2005c). The popular view of this kind of effort is of teleological theories and policies designed to draw together the disparate member groups of a society and build the capacity and legitimacy of a government in its own territory (Derichs, 2005; Pfaff-Czarnecka,

2005). It was not always used this way. In some areas, most notably in, but certainly not limited to, the Balkans, nationality definitions defined in-groups as much by who their out-groups were as by common culture, history, and language. This produced ethnic and national conflicts as these groups vied for control of states and governments whose borders crisscrossed national divisions (Hayden, 2011; Pfaff-Czarnecka, 2005; Burg and Shoup, 1999).

As part of the understanding of nation-building that developed during the 1990's, three elements developed that denoted nation-building. Under this definition, nation-building required 1) an integrative ideology that allowed for constituent ethnic groups to view themselves as a single, coherent nation; 2) an integration of society that brings together the constituent ethnic groups into a single, coherent society and economy; and 3) a functional state apparatus, the construction of which is often referred to as "state-building" (Hippler, 2005c). This sets out a clear, if expansive understanding of what nation-building requires for success.

In this definition, analysts recognized a possibility for using nation-building as a strategy for preventing regional conflicts from occurring or recurring (Mason *et al*, 2011; van Edig, 2005). A growing propensity for internal conflicts after the end of the Cold War required a different approach to conflict response than had always been used in responding to intrastate conflicts (Helman and Ratner, 1992). Helman and Ratner refer to this as "state-saving," calling for the United Nations to step into failed and failing states and conduct "nation-building" to stabilize that state's government. Heinrich and Kulessa rightly point out that "Heldman [*sic*] and Ratner speak of 'nation-saving', whereas what they really mean is 'state-saving' (2005, 57). This clarified any agenda of nation-building to support stability as being truly about the third element of nation-building, state-building. With the capacity to police its own a territory, a government could prevent instability from developing and spilling either into internal conflict or

across its borders into another state. If this had already occurred, then nation-building could still be applied to prevent instability or conflict from recurring.

1.1.2 Nation-Building Policy Research Patterns and Shortcomings

With the potential of nation-building, or, more accurately, state-building as a means for establishing stability within and between states identified, scholars and policy makers began to seek policies that produce nation-building on a timeline that could prevent conflict. Like any work of construction, two questions must be answered: "What do we need to build?" and, "How do we build it?" For nation-building, in a post-Cold War world, this meant establishing stable democracies, which, in turn, meant understanding what institutions made up a democracy and how to directly construct or induce the construction of those institutions (Pateman, 1996). Only with answers for these questions could policy makers take advantage of the perceived benefits of nation-building for political and social stability.

1.1.2.1 Theoretical Research Patterns

The first of these questions co-opts the already voluminous research on democracy and democratization. Questions and conclusions that are as old as the writings of Locke (1690), Rousseau (1762), and de Tocqueville (1840) become relevant as they presented fundamental building blocks of democracy. Democracy theorists build from these texts to understand the place and role of civil society in functioning democracies (Putnam, 2000; Chambers and Kopstein, 2001; Barber, 1998; Cohen and Arato, 1992). Others examine economic freedom (Bowles and Gintis, 1986), participatory democracy (Pateman, 1970), and deliberative democracy (Benhabib, 1996; Gutmann and Thompson, 1996), as the key institutions of a

functioning democracy. This body of literature examines advanced democracies and what structures and institutions operated internally, and so provided guidance on what must be built.

At the same time that many political scientists delved into the constituent elements of functioning democracy, others tried to understand and chart how democracies developed. Like modernization theory in economic development before it, and some based heavily in modernization theory (Lipset, 1953), democratization researchers often seek stages of development that compared historical paths with the development of the institutions that the democracy theorists had identified as key institutions (Markoff, 1996; Rueschemeyer, Stephens, and Stephens, 1992; Rustow, 1970). This body of literature became voluminous as well as each successive researcher critiqued the stages that previous researchers presented. This culminated in the work of Rueschemeyer, Stephens, and Stephens (1992) that presents a separate and individual path of democratization for each country. The stages that each researcher presents wash up against the complexity of the definition of democracy and the historical and political processes that brought about democracy. This complexity prevents conclusions from emerging from case studies research methods as the cases are too idiosyncratic to support broad conclusions about how democracy can or cannot be built.

On top of the co-opted theoretical research on democracy and democratization, policy researchers sought the best way to state-build in the shortened timeline necessary to ameliorate conflicts than the sometimes centuries-long timelines of democratization theory. One of these lines of research asks the basic question of how nation-building can be done by an external power to the country that serves as venue to the nation-building (Hopp and Kloke-Lesch, 2005; Dobbins *et al*, 2003). Another line of research examined the transitional justice to see how legal systems could be organized, and developed, and what legal tools could be applied to support the

development of rule of law and stabilize war-torn societies (Matheson, 2001; Stahn, 2001; Strohmeyer, 2001; Christie, 2000). Another questioned the usefulness of military and political interventions, including the efficacy of the military forces, in effecting the changes and building the institutions that a democracy needs to survive (Grigoryan, 2010; Hippler, 2005a, 2005b; Schäfer, 2005). Yet still other lines examine the role of international organizations (Lemay-Hebert, 2011; Shannon *et al*, 2010; Reljic, 2005; Dobbins *et al*, 2004) non-governmental organizations in nation-building (Schade, 2005), oil wealth (Obi, 2005), foreign aid effectiveness (Winters, 2010), and how to address self-determination and multiethnic societies during nation-building (Reljic, 2005). To be explored in more detail in Chapter 2, these lines of research suffered from the same defect as the theories on democratization. First, the research has struggled to maintain a common definition of nation-building. Sometimes it seeks to understand nation-building, but more often it uses the language of nation-building to investigate state-building. Second, each focuses on the role and structure of one institution or another, testing how to build their focal institution, and in what order the institutions could or should be built. The only consistent conclusions they could reach was that each case was too unique to support conclusions across cases. This leaves policy makers without any clear answers on how to conduct an effective nation- or state-building mission.

1.1.2.2 Research Methods Patterns

In trying to reach conclusions, some of the studies listed above use statistical approaches (Grigoryan, 2010), the rest use case study analysis, whether they select a broad base of cases, a small selection of cases, or a single case. For case study analysis to provide external validity, it requires cases to be substantially similar on all but a small number of variables (George and Bennett, 2004; King, Keohane, and Verba, 1994). In single cases, this requires policy makers to

compare current cases back to past cases to see if the salient details of the single case apply to the current case, while the researcher must select cases based on patterns of variance in the variables in multi-case studies. As a result, even the most ambitious of projects can reach only general conclusions. Dobbins *et al* (2004) reach the largest set of conclusions when comparing a vast array of both United Nations- and United States-led nation-building missions. Focusing on conflict interventions, where United Nations Security Council resolutions give the intervention latitude and international legitimacy in operating to support future stability, their list is as follows:

> Deficiencies included:
> - the slow arrival of military units
> - the even slower deployment of police and civil administrators
> - the uneven quality of military components
> - the even greater unevenness of police and civil administrators
> - the United Nations' dependence on voluntary funding to pay for such mission-essential functions as reintegration of combatants and capacity building in local administrations
> - the frequent mismatch between ambitious mandates and modest means
> - the premature withdrawal of missions, often following immediately after the successful conclusion of a first democratic election. (Dobbins, 2004, xvii-xviii)

These same conclusions would become a refrain for a great deal of post-conflict nation-building assessments. Each time, with the lessons of the previous missions already known, a new mission would try again and make the same fundamental mistakes, just in a different way (Dobbins *et al*, 2004; Dobbins *et al*, 2003; Dempsey and Fontaine, 2001). Even the most meticulously planned of interventions and nation-building missions, East Timor, which the World Bank foresaw and began to plan for well in advance of the start of the mission (Rohland and Cliffe, 2002), faced the

same critiques. Dobbins *et al* (2004) went on to rate the UN's mission in East Timor as successful, but by ten years after the initial intervention, East Timor was fraying again (ICG, 2012). These conclusions had been enough to determine the key tasks of post-conflict nation-building, but not how to complete these tasks on the ground.

1.1.2.3 Policy Prescription Patterns

Finding the policies for effective stabilization and reconstruction continues to be the central question of the research agenda of post-conflict research. Some of these studies apply statistics (Shannon *et al*, 2010) or even game theory (Grigoryan, 2010), while most conduct case studies. Regardless, the formulation of this research has been to take a policy approach that has been tried in a post-conflict setting and test its method or extent of application against either the overall success of the mission or against the success of the mission in the field that that policy affects, such as rule of law, social cohesion, or governance.

Prominent in this literature is the focus on transitional justice. Uniformly recognized as an essential task, transitional justice seeks two aims. First, it looks to try to bring healing to the immediate conflict aftermath. The tool for this task is the truth and reconciliation commission, some of which utilize prosecutorial arms while others do not (Stahn, 2001; Strohmeyer, 2001; Christie, 2000). The authors in these cases examine how different missions handled reconstructing local courts or, for Christie (2000), how the South Africans established their own truth commission. They propose reasons why commissions worked in their separate contexts, but are only able to provide suggestions for what aspects of the society a future mission must consider when attempting to establish a commission. In an unpublished work, presented at a conference of the International Studies Association, Scheinert (2009a) provides statistical evidence of how truth commissions have helped in preventing wars from recurring when the

original conflict saw extensive civilian casualties. While this study has better external validity than others on the use of truth commissions with its use of statistics rather than a 1-N case study, it looks only at the cases of actual commissions and does not address the decision processes that led to the use of the commissions. It also produced complicated results that do not speak to any goal of stabilization or reconstruction beyond ensuring that the initial conflict does not recur. These studies provide evidence that truth and reconciliation commissions can be an effective tool in transitional justice, but still only address one aspect of one issue in the long and complex list issues involved in post-conflict reconstruction.

Transitional justice research is not the only nation-building research to face these limits. Other researchers are attempting to understand post-conflict political and security development or economic development. Grigoryan (2010) applies a game theoretic model that shows why violence towards minority groups might increase under the threat of external intervention. Shannon *et al* (2010) show that external intervention is statistically likely to shorten conflicts. Mason *et al* (2011) apply a hazard model to show that the outcome of the previous conflict does not influence its recurrence, but rather the degree to which the settlement perpetuated a condition of multiple sovereignty. Lemay-Hebert (2011) review the failures of the UN approach to state-building in Kosovo and East Timor, examining how well UN policies applied the principles of cultural sensitivity and local participation, and finding that the international administrations did not support them well. Winters (2010) argues strenuously for accountability in the flow of foreign aid. Each of these studies focuses on one policy issue, even as some compare multiple missions with either case studies or statistical analysis. This creates research with limited policy application, as it is only able to assess whether a specific policy worked in a specific case or why a certain principle was or was not faithfully followed. More importantly, none of these studies

looks at one of the hallmarks of a complex system, how policy choices and progress impacts other policy areas, that is to say, the impacts across issues in non-linear systems.

Seybolt has shown some evidence of leading research on interventions towards a complexity approach, but has yet to reach the lessons already learned in other fields about analyzing complexity. Seybolt (2007) embeds his search for a measure of success with questions such as how much force should the interveners use, based on a typology of four types of intervention. This is an attempt at addressing the complexity of intervention, but still limits the amount of complexity it can address by forcing case studies into a limited number of categories. In another study, Seybolt (2009) even uses the language of complex systems, applying what he calls "system network theory" to design a system dynamics model of aid flows, identifying the same weaknesses in the current literature that are discussed here. He recognizes the existence of a network of non-governmental organizations all attempting to provide aid, citing a network's propensity for adaptation, but fails to examine the formation of the network or how and why the adaptation has its impact, merely taking its presence as an *a priori* characteristic of a network with certain impacts. In effect, Seybolt examines the aid system without examining the aid actors. This leaves out a key piece of a full complex systems analysis, as will be presented in Section 2.2.2. The result is that, while he uses the language of complex systems, Seybolt does not perform an analysis that applies the precepts and methods of complex systems. Drawing instead from business management, Seybolt misses the lessons that disaster preparedness and response have already learned in applying complex systems to a situation that is far more comparable to post-conflict reconstruction.

1.1.3 Towards a New Understanding and New Approach

The continued failure of existing research to generate the conclusions necessary to find the policies that will turn around the track record of nation-building missions suggests that a new approach is required to find effective policies and practices. In practice, nation-building missions more closely resemble political intervention that seeks to provide aid to war-torn populations and support post-conflict reconstruction of physical infrastructure, governments, and societal institutions. The missions are not the only international interventions to attempt this task, though they are the only ones to do so in a post-conflict context. International extreme events, though, are not limited to just conflicts. Included in that same category are large-scale natural disasters. This includes examples such as the January 12th, 2010 Haitian Earthquake, recent tsunamis that struck Indonesia in 2009 and 2004, and the 2011 Japan Black Swan Event that brought an earthquake, tsunami, and nuclear accident. The need to prepare for, and respond to, these events has generated its own voluminous literature that contains lessons for the organizations responding to conflicts and conflict aftermaths.

At the same time that the international community was preparing to intervene in East Timor, a new method for responding to natural disasters was emerging in the respective literature (Homer-Dixon, 2006; Comfort, 1999; Perrow, 1999; Hutchins, 1995; Wildavsky, 1988). These researchers focused not on what kinds of response teams would be necessary or what kinds of equipment would be necessary, requirements that are analogous to those which Dobbins *et al* (2004) focus on for nation-building. Instead, they focus on the response process, on how preparedness and response identify and disseminate information that responders need in the field (Comfort, 1999; Hutchins, 1995). This conclusion is based on two key insights into the nature of disasters and disaster response. The first insight is that it is not safety procedures that produce

safety, but risk taking and the lessons for resilience in the face of danger that produced greater safety. By risking dangers, experiencing them, and learning how to adapt in response to them, society could improve overall safety (Wildavsky, 1988). The second insight was that disaster response efforts are made of networks of organizations and individuals all acting separately, but coordinating with each other to ameliorate the impacts of the disaster and prepare for future disasters (Comfort, 1999). This represented a fundamental change in the conception of disaster response. No longer were these responses top-down, centrally-organized efforts of responders. Instead, a response could, and, under the network conception would, inherently, take advantage of such network benefits as self-organization and adaptation (Barabasi, 2002; Johnson, 2001; Axelrod and Cohen, 2000; Holland, 1995, 1992). The key to response was finding how to build a resilient network that could manage that adaptation (Comfort *et al*, 2010a). The second insight also means that many organizations would be spread over the geographic expanse of the response, each knowing and learning different types of information about the progress of both the disaster and the response (Hutchins, 1995). Managing adaptation in that network would mean integrating all of that information so that any one organization could respond effectively (Comfort *et al*, 2010a).

The insights of disaster response are only relevant if post-conflict reconstruction missions are sufficiently similar to disaster response to justify comparison. Following her tenure as United Nations High Commissioner for Refugees, a tenure which saw the First Gulf War, massacres in Rwanda, the break-up of Yugoslavia and its attendant wars, the ouster of Aristide and the Haitian boat people, the break-up of the Soviet Union, and Taliban's takeover of Afghanistan, Sadako Ogata published a memoir (2005) that describes her experience in confronting these crises. In it, she describes rapidly changing and emergent situations with new

challenges emerging constantly. Each situation she describes contains unique problems that are products of the history, politics, and current events of the locations. This matches the kind of situations that disaster preparedness and response scholarship faces. Further, Ogata (2005) describes situations where social structures and institutions as well as physical construction have been heavily damaged, if not outright destroyed. Disasters, even without the explicit impacts of the conscious involvement of governments, armies, or any kind of irregular military force, do this same damage. In so doing, governments and militaries generate opportunities for change, reorganization, and redevelopment to stabilize the future situation and generate greater future growth and development (Homer-Dixon, 2006). Post-conflict reconstruction, then, represents the same opportunity that nation-building scholars have noted (Mason *et al*, 2011; van Edig, 2005). These similarities provide sufficient evidence to justify reimagining the approach to post-conflict state-building and reconstruction that utilizes the methods which disaster response and preparedness research is using to seek new policy options and solutions.

This study tests the application of inferences from the disaster and preparedness and response literature about the role of communication and coordination in post-conflict situations. It first defines the concepts of resilience, capacity, and effectiveness, used in the disaster preparedness and response literature, in ways tailored to post-conflict stabilization and reconstruction missions. Using these definitions, the study measures communication and coordination networks in two empirical cases to build a conceptual model of stabilization and reconstruction that illustrates the roles that communication and coordination play in the systems that form within stabilization and reconstruction missions. The conceptual model and measurements of resilience, capacity, and effectiveness then support computational models that measure the relationships between resilience, capacity, and effectiveness in a generalized, but

empirically-based, model of post-conflict stabilization and reconstruction that provides final lessons and the role and impact of resilience, capacity, and effectiveness in post-conflict stabilization and reconstruction missions. This model shows how communication and coordination can improve the effectiveness of these missions, regardless of the individual context of each mission, thereby providing policy guidance that escapes the traps of path dependency and idiosyncrasy that have so far stymied the post-conflict state-building literature.

1.2 DEFINING RESILIENCE, CAPACITY, AND EFFEECTIVENESS

Current research into disaster response and preparedness includes a strong focus on the importance of capacity, both of the response operations mobilized by the government of the region struck by the disaster, and resilience for effectively managing any response (Comfort, Boin, and Demchak, 2010; Comfort, 2005). Since post-conflict stabilization and reconstruction missions can be compared to post-disaster relief efforts, the implication is that sufficient resilience and capacity is required in the network of organizations that develops among the organizations overseeing and participating in the post-conflict mission for the mission to be effective. To test this hypothesis requires a definition of each of the key conceptual variables for this study: resilience, capacity, and effectiveness. None of these terms represents a simple concept, requiring careful definition, and, in Chapter 3, operationalization.

1.2.1 Resilience

When post-extreme event relief and reconstructions missions begin, whether after natural disasters or armed conflicts, a varying number of public, private, and non-profit organizations rush into the area to begin delivery of various services which the local population needs. A network forms among these organizations when they attempt to coordinate their efforts. The network passes knowledge, information, materiel, and personnel between the organizations to support the response effort. A response emerges from the aggregate of the individual interactions between the organizations as they attempt to further their relief efforts (Comfort, Oh *et al*, 2010; Ostrom, 2005; Axelrod and Cohen, 2000; Holland, 1995; Prigogine and Stengers, 1984). For this network to be effective, it must continue to provide these needs to those operating in the network and those relying on its services (Provan and Milward, 2001, 422). In a static situation, this kind of analysis can be used iteratively to bring a network into a closer match to the situation, with the network administrative organization that Provan and Milward claim a network requires (2001, 418) directing the change through adjusting funding and organization. In a rapidly changing situation, this framework fails since it would attempt to hit a moving target, as the needs of network members and clients and the best way to meet those needs continuously change. Networks are also known for this ability to self-organize (Watts, 2003; Arquilla and Ronfeldt, 2001; Johnson, 2001; Axelrod and Cohen, 2000; Kauffman, 1993; Prigogine and Stengers, 1984).[1] Requiring a network administrative organization jettisons this strength. Instead of asking whether a network meets the needs of those operating it and those relying on its services, questions about network effectiveness should focus on how networks can utilize self-

[1] See Chapter 2 Section 2.2, "Complexity" for a fuller discussion of this characteristic of networks.

organization among their component actors to identify changing needs and then adapt to meet those needs.

How the actors in a network identify, acquire, and utilize information about changing needs determines the network's resilience. A resilient system or organization is one that can maintain operation after being stressed in some way (de Bruijne *et al*, 2010). For military planning, resilience means redundancy in materiel and personnel. When a unit or its materiel is destroyed in battle, the army can continue operations by deploying troops and materiel to replace those destroyed. Even in the context of the computer networks that maintain Wall Street's operations, resilience comes from having extra materiel which the network can rely upon when the primary materiel is destroyed (Homer-Dixon, 2006). For a network of organizations, this means that the organizations involved find a way to continue operating through stresses. In the context of armed struggle between networks, Arquilla and Ronfeldt (2001) argue that this requires correctly operating on five key levels, "the technological, social, narrative, organizational, and doctrinal levels" (Arquilla and Ronfeldt, 2001, x). Their explanations of this definition suggest they approach getting these levels correct as part of preplanning. If it is not planned correctly, then the network will not achieve its goals. In contrast, a resilient network will treat errors in planning as a stressor to be overcome and will identify errors and adapt when it is operating incorrectly on any of those levels. Arquilla and Ronfeldt's theory does not account for adaptation to environmental changes in practice in the planned operation for each level during the mission, making it a static system.

Understanding resilience in a changing situation requires moving beyond Arquilla and Ronfeldt's static approach. New research is finding ways to approach resilience in this way. For Comfort *et al* (2010), resilience is found in how organizations detect, recognize, and

communicate information about the risk of natural disasters. For Demchak (2010), resilience is found in maximizing information to minimize operational surprise, which comes from a lack of knowledge. Instead of focusing on preplanning or on prepositioning materiel, these approaches focus on how organizations acquire and utilize information. To be resilient, an organization must have access to the information generated in a system and use that information to adapt to changes in the system. This requires the organization to interact with as many other organizations as possible, thereby learning what the other organizations know. It also requires that organizations process that information and then adapt appropriately.

1.2.2 Capacity

Even resilient organizations and networks can be overwhelmed if they can identify key changes but lack the capacity to respond. While presenting the impacts of the heterogeneity of a disaster response system, Comfort (2005) drew parallels between the size of an organization and its capacity. For Comfort, capacity comes from the amount of resources, local knowledge, and personnel that an organization can devote to its disaster response tasks. For post-extreme event reconstruction, this same principle would apply; capacity is the amount of resources, local knowledge, and personnel that an organization can apply to its reconstruction tasks.

1.2.3 Effectiveness

At its most simple, an effective response to any extreme event is one that meets the goals set out in its original mandate. The clearest measure of mission effectiveness is the degree to which the mission achieves the aims set out in its mandate (Cohen, 2006). In Haiti, this document is UNSC

Res. 1542 (2004). A response to the internal armed conflict that drove then-Haitian President Jean Bertrand Aristide into exile, the resolution established the United Nations Stabilization Mission in Haiti (MINUSTAH), with a mandate to stabilize Haiti, support the duly constituted political process, and support efforts at improving the human rights conditions in Haiti, particularly for women and children (UNSC Res. 1542, 2004, 2 – 3). For Bosnia, there are two resolutions that defined the initial goals. The first, UNSC Res. 743 (1992) established the United Nations Protection Force (UNPROFOR) with a mission of protecting civilian "pink zones" (UNSC Res. 743, 1992; "Former Yugolavia – UNPROFOR, 1996). Subsequently, UNSC Res. 1035 (1995) established changed UNPROFOR into the United Nations Mission in Bosnia-Herzegovina (UNMIBH)[2], with a mission to monitor, advise, inspect, and train law enforcement officials in Bosnia, advise local governance on policing and aid NATO's Implementation Force (IFOR).[3] UNMIBH also had responsibilities beyond policing, to coordinate other UN activities regarding demining, elections, humanitarian relief, human rights, and economic and infrastructure rehabilitation (UNSC Res. 1035, 1995, 1; "Bosnia and Herzegovina," 2003). For defining and measuring effectiveness, this study works from the basic premise that missions are effective to the degree to which that they achieved their stated goals. For Haiti, this means measuring how well the mission has met its goals of stabilizing the Haitian political situation and improving human rights conditions. For Bosnia, this means measuring effectiveness by how well the mission has met its goals of training law enforcement, rebuilding infrastructure, providing for elections, human rights, and humanitarian relief.

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[2] Initially, the force was formally referred to as the International Police Task Force (IPFT). A Special Representative of the Secretary – General would direct UNMIBH and have authority over the IPTF Police Commissioner ("Bosnia and Herzegovina," 2003).

[3] IFOR would later be replaced with the multinational Stabilization Force (SFOR), also directed by NATO. UNMIBH tasks in assisting IFOR would transfer to SFOR with the changeover ("Bosnia and Herzegovina," 2003).

There is more to the success of these missions than whether they achieve whatever goals the mission states at the outset. Researchers have long noted the tendency for mission creep in all sorts of international missions, whether military interventions or IMF and World Bank bailout efforts, among others (Einhorn, 2001). Reconstruction and nation-building are also prone to mission creep (Hippler, 2005; Dobbins *et al*, 2004; Dobbins *et al*, 2003). Nation-building is unique in its mission creep in that it drifts toward building more governance and, often, a more robust democracy. That is, nation-building efforts, once started, tend to drift towards more extensive and expansive versions of the same primary goal, to establish stable governance with sufficient strength and capacity to govern the whole of the area in question, whether a whole state, an autonomous region, or a set of autonomous regions within the recognized borders of a single state. Since assessments of how well the mission has achieved this goal will require subjective assessments, measurements will rely on expert opinions of how well the mission has performed and how effectively the system has developed the kind of governing institutions it has attempted to build. These judgments will not likely provide any kind of numeric measure of success, but rather will provide a qualitative assessment of effectiveness that varies between undermining mission effectiveness and completing mission goals, at the two extremes.

1.3 RESEARCH FRAMEWORKS: THE STRUCTURE OF ORGANIZATIONAL NETWORKS IN UNITED NATIONS INTERVENTIONS

As discussed above, the current policy prescriptions and research on nation-building continues to fail to produce effective post-conflict stabilization and reconstruction missions. This holds whether the policy recommendations are drawn from the research on nation-building and

democratic transitions independent of internal conflict or from empirical study of actual cases of reconstruction missions using current standard methodologies (See Section 1.1.2). Despite the vast resources assembled, the needs outstrip the resources applied to the effort. Current research has failed to produce an explanation for this outcome (Dobbins *et al*, 2004; Kaufmann, 1999). That research may not apply the most appropriate framework. If the conclusions drawn from the disaster preparedness and response literature are applicable to post-conflict efforts, then research using methods from the disaster preparedness and response literature will show that a lack of coordination and adaptation in the behavior of the organizations involved in the state-building and reconstruction missions explains the continued lack of effectiveness.

1.3.1 Frameworks for Analyzing Complex Adaptive Systems

The situation that these missions face is chaotic and rapidly changing. The governance structures that those missions are trying to build and the missions that operate in them must be ready to adapt to chaotic and rapidly changing situations (Ogata, 2005). To address their own rapidly changing situations, disaster preparedness and response research applies a research framework and methodology specifically designed to deal with rapidly changing situations, complex adaptive systems. The aim of complex adaptive systems theory is to address the unique issues raised by situations characterized by rapid change, multiple lines of causality, and non-linear relationships (Axelrod and Cohen, 2000; Holland, 1995). This is the approach that disaster preparedness and response research currently applies (Comfort, Oh *et al*, 2010; Comfort, 1999). This is the approach that this study will apply to post-conflict state-building and reconstruction missions.

The situations that complex adaptive systems theory and methods are designed to address present a challenge to standard approaches to scientific research. Whether positivist, post-positivist, or from another epistemological tradition, social science attempts to identify cause and effect in a specific context. Yet complexity shows that the very causes and effects that alter the context also alter the relationships between causes and effects. This interaction reduces the validity of methods that assume independence among the actors to the analysis of complex problems. Estimating a model of the effects of one specific policy choice, such as the expansion of funding for schools, either in Bosnia or in post-earthquake Haiti, faces a stiff challenge in producing meaningful results unless the analysis can also account for how the system will respond to that policy choice.

Scholars have begun to consider ways to adjust scientific approaches to analyze the unique issues of complexity theory. In the social sciences, specific attention has focused on the work of Axelrod and Cohen (2000) and Elinor Ostrom (2005) and her colleagues in the Workshop on Political Theory. Each set of researchers proposes a framework for addressing complexity that describes and analyzes the system that operates in the action situation under study, focusing on how the actors interact with each other. These frameworks focus on modeling the operation of a system as a means of understanding how the system works. Ostrom's model focuses on action arenas where the researcher analyzes the system by identifying the actors in the arena and the rules which govern how the actors make decisions and carry out their actions. Axelrod and Cohen extend their model to include efforts at predicting how that system will respond to policy changes and initiatives. Both sets of researchers establish a framework for studying individual cases of complex adaptive systems to understand the dynamics of complexity. Both frameworks will be described and explored in detail in Chapter 2. The

frameworks provide guidance on what questions a research must answer to describe a system and then model how that system changes in response to exogenous and endogenous events.

1.3.2 Initial Conditions

Before any research can assess the impact of any system on a situation, it must first determine the initial conditions of that situation. This establishes a baseline and allows for measurement of the change (Comfort, 1999). Traditional comparative approaches require that these conditions be the same in theory and substantially similar in practice. As discussed above, this is where most comparative efforts in post-extreme event reconstruction declare failure and default to attempting to draw policy conclusions from single-case studies. In *Shared Risk*, Comfort compares the responses to eleven different earthquakes in widely divergent parts of the world, across ten years, from 1985 to 1995 (Comfort, 1999). What makes comparison possible is that the method does not compare the particular situations, but the systems that respond to them, and draws lessons from how the systems vary with the amount of improvement, or worsening from the baseline. The methods which researchers have developed for studying complex adaptive systems are designed to allow for systemic comparisons of situations that would not initially appear to be comparable. By acknowledging the path dependency and non-linearity of such systems, complexity theory explicitly states the vast differences between each case. By adopting an analytical framework of complex adaptive systems that builds on the IAD and *Harnessing Complexity* frameworks, this analysis explicitly addresses situations that are widely divergent in context but similar in terms of the policy problems they present. Complexity frameworks focus on the system and adaptation rather than specific descriptors of a system. Analysis of complex

systems builds comparability by determining how, why, and to what degree, a system and its actors change and adapt from a baseline of each system's initial conditions.

The first step of this project will be to characterize the initial conditions in each case under study, the UN missions in Bosnia and Haiti. In the context of a conflict, these initial conditions include the cultural, technological, and organizational context, as well as the political, and historical situations in which the initiating conflict occurred. In *Shared Risk*, the initial conditions included geologic risk of earthquakes and the policies regarding emergency response and the structures of the emergency response systems. In post-extreme event reconstruction, the initial conditions will focus on governance forms and structures, societal fractures and fault lines, and the risk of conflict. In defining that baseline, I will compare the degree of adaptation and rate of change in the missions by assessing the varying levels of resilience and capacity documented for each mission over time.

1.3.3 Primary and Intermediary Research Questions

This study examines the proposition that reconstruction missions following extreme events, either after conflicts or natural disasters, when governance has been severely diminished or eliminated, need both capacity and resilience to be effective. Separately, both capacity and resilience are necessary, but insufficient. To test this proposition, this study first answers a series of more specific, intermediary research questions, guided by the IAD and *Harnessing Complexity* frameworks. These research questions guide data collection and analysis for this study. Collecting data in reference to the set of intermediary research questions will ensure the data necessary for exploring the primary question and measuring resilience, capacity, and success. Only with the intermediary research questions answered can this study build the

network models, conceptual variables, and simulation model (See Chapter 3) that it will use to draw conclusions regarding the primary research question regarding the relationships between resilience, capacity, and effectiveness.

Applying IAD, the study will ask the following intermediary research questions of two post-extreme event reconstruction missions, Bosnia and Haiti:

- Who are the actors?
    - What are each actor's characteristics?
    - What roles are they expected to play in the peace-keeping mission?
    - What roles do they play in practice?
- What are the system rules?
    - What rules apply to all actors?
    - What rules, if any, apply to different actors within the system?
        - How do the actors view the rules?
        - How do the actors respond to the rules?
        - How and when do the rules change?
    - What rules apply to the environment? How do they operate?

Applying *Harnessing Complexity*, the study will also ask this further set intermediary research questions of the same post-extreme event reconstruction missions:

- What are the patterns of interaction?
    - Which actors interact with which other actors
    - What incentives or disincentives to interaction do the actors face?
    - How does interaction change actor capacity?
    - How do patterns of interaction change system resilience?
    - How does interaction change assessments of success?
- How do actors select actions?
    - Are actions based on official roles?
    - Are actions based on assumed roles?
    - How do assumed roles change with the actions of other actors?
- How do actors select which actors with whom they will interact?
    - Are interactions selected through system roles?
    - Are interactions selected through a relationship between the characteristics of the actors choosing either to interact or not interact?
- What are the patterns of variation?
    - How do actors respond to other actors?
    - How do actors gather information about variation?

- How do actors utilize information about variation?
- How do system changes impact actor capacity?
- How do system changes impact system resilience? What changes promote resilience and what changes undermine resilience?
- What is the relationship between system variation and assessments of success?

1.4 CONTRIBUTIONS OF THE STUDY

This study draws together two disparate strains of research that focus on substantially comparable, but not identical, policy situations, bringing benefits to both bodies of literature and policy practice, primarily for the performance of post-conflict reconstruction missions. For the reconstruction literature, this study introduces a new mode of understanding and method of analysis. As introduced above, in Section 1.1, and will be discussed in greater detail in Chapter 2, the nation-building and reconstruction literatures do not currently conceptualize stabilization and reconstruction missions as complex adaptive systems. Applying complex adaptive systems theories and methods will refocus questions on what makes stabilization and reconstruction missions effective from which tasks must be done and which policies applied, and in what order in all missions. Indeed, this study does not seek to define what goals a mission should have or policies it should pursue. Rather, it changes the questions to how the organizations involved build a system in all missions that allows them to learn about changing needs and priorities in individual missions and adapt to meet those changes, to identify and adapt to situations where they have the wrong goals and policies. This will change the focus of both the policy prescriptions and research on stabilization and reconstruction missions from a focus on a recipe of policies and institutions to a focus on system, communication, and coordination.

While this study is designed to apply insights from the research on disaster preparedness and response to post-conflict situations, it still brings benefits to the research on disasters. In a response to a natural disaster, all of the organizations enter the response system agreeing, in principle, on the primary goal: humanitarian aid and disaster relief. This context undoubtedly influences the conclusions that expanded communication and coordination improve results (Comfort, 1999), that maximal resilience is found in maximized communication and coordination (Comfort, Oh *et al*, 2010). This is not an assumption that necessarily applies to post-conflict situations. Indeed, it is not an assumption that applies to the reconstruction of Bosnia. Unrepentant Bosnian Serb forces continued after the war to oppose centralization of Bosnian authority and undermine central government (Bose, 2002; Chandler, 2000). Both Bosnian Serb and Bosnian Croat leaders continue to this day (OHR Media Round-ups, 2002, 2001, 2000). Changing this assumption about the nature of the organizations that make up the response system may or may not change the final conclusions, but it will expand their applicability.

1.5 ORGANIZATION OF THE STUDY

This study applies mixed methods that will be explained over the next two chapters and applied in the remaining six chapters. Chapter 2 presents the theoretical concepts that support this study. This review includes expanding the presentation of literatures on nation-building and complex adaptive systems, and resilience presented in this chapter, as well as distributed cognition. Chapter 3 presents the data and methodology used for this study. It presents the details of how the IAD and *Harnessing Complexity* frameworks are applied in this study and how the concept

variables, resilience, capacity, and effectiveness are operationalized with several component variables for each. Chapter 4 begins the analysis by developing the initial conditions that will serve as a baseline for analysis for both case studies, Bosnia and Haiti. Chapters 5 and 6 present the case study analysis done under the IAD and *Harnessing Complexity* frameworks and network modeling. Bosnia is presented in Chapter 5 and Haiti is presented in Chapter 6. Chapter 7 integrates the results from the analysis of the case studies by presenting a conceptual model of post-conflict stabilization and reconstruction and a factor analysis to measure the correlations between the component variables defined in Chapter 3. Chapter 8 draws together the analysis from Chapters 4, 5, 6, and 7 to define and run a computer simulation that models the functional operation of a post-conflict stabilization and reconstruction mission. Chapter 9 then presents the study's final conclusions, the ramifications for current academic and policy debates, and directions for future research.

2.0 COMBINING NATION-BUILDING WITH DISASTER PREPAREDNESS AND RESPONSE FOR A DEEPER UNDERSTANDING

This study draws on research from several fields, combining them to pursue interdisciplinary research. In seeking to understand the effectiveness of international interventions and nation-building missions, it is primarily situated in the literature of nation-building, and specifically within the state-building portion of that literature. This literature, focuses on studying the processes of nation- and state-building, on what institutions develop and which institutions are the most essential, and on what policies can and should be used to promote building various institutions. Where this study departs from that literature is assuming that even in the best planned missions in the most researched countries and parts of the world, nation-builders will still commit errors in understanding of history and culture, which lead to errors in policy and practice.

Accounting for this pattern of error, while still producing effective stabilization and reconstruction missions, requires constant reassessment of the value of aid activities and adjustments to changing needs and priorities. To do this, organizations must attain and communicate information on the effectiveness of their programs and adapt those programs as needs change. Systems analysis refers to this as a feedback loop (Johnson, 2001; Holland, 1995, 1992; Prigogine and Stengers, 1984). The research on Complexity and Complex Adaptive Systems is on assumptions of the feedback loops underlying multiple directions of causality

inherent in the presence of such loops. Since case study methods (George and Bennett, 2004) and statistical methods (Kennedy, 2003; Pindyck and Rubenfeld, 1998) are built primarily upon, and work best in, situations of unidirectional, if not necessarily linear, causality, they fail to properly analyze complex adaptive systems. To address this problem, Ostrom (2005) and Axelrod and Cohen (2000) have developed frameworks for a systems analysis of complex adaptive systems. These frameworks will guide this analysis. In addition, Hutchins (1995) has identified key aspects of information flow through complex adaptive systems that are built on human actors, while Comfort (1999) has applied the method to disaster preparedness and response. These works provide additional guidance to this study, and when combined with the frameworks for analyzing complex adaptive systems define the method for modeling that this study utilizes.

2.1 INTERNATIONAL INTERVENTIONS AND NATION-BUILDING

2.1.1 The Position of Nation-Building in International Relations Theory

Chapter 1 established what nation-building is and its potential role as a way of responding to current conflicts and preventing future conflicts, and how the current literature fails in conceptualizing stabilization and reconstruction. These efforts sit in a complicated position of international law and international security policy, one where competing absolute international legal principles collide against each other right alongside politics between states, where a state's position is often dictated by the extent of its interest in the conflict being discussed. The collision point is where international interventionism collides with state sovereignty (Finnemore,

2003). This collision has generated an enormous scholarly literature that expands into the core international relations theories of liberalism and realism, to role and power of codified international law and norms of international behavior of states, both on the independence of states, acceptable behavior of governments and individuals, and civil war and the right of self-determination. A full review of these literatures is unnecessary for this study, but a basic introduction sets an important context.

2.1.1.1 The Legality of Intervention and Nation-Building

It might be impossible to find a concept more foundational to modern international relations than state sovereignty. The entire system of states is built on the declaration in the 1648 Peace of Westphalia that created the concept when it gave German princes the ability to determine the official religion of the people under their rule without interference from any outside power. This was the defining feature of the Peace and the defining feature of the "Westphalian" system that is the one still in operation today (Nye, 2000; Rourke and Boyer, 2000; Malanczuk, 1997). In principle, sovereignty allows intervention only when the local government invites the intervening force, or, under Chapter 6 of the United Nations Charter, when both parties to a conflict invite a peacekeeping force. Without this invitation, no attempt at external state-building can be made legally since external state-building is an intervention, and external intervention is, inherently, a violation of sovereignty.

In the 1940's, history intervened when memories of the Holocaust began the process for developing a new international norm that allows conflict intervention to stop particularly egregious war crimes, particularly genocide, mass killing of civilians, and ethnic cleansing (Finnemore, 2003; Nye, 2000; Rourke and Boyer, 2000; Kaufmann, 1999; Malanczuk, 1997). This provided a check on state sovereignty and the basis for what has become known as Chapter

7 and a half peacekeeping (Nye, 2000; Rourke and Boyer, 2000; Malanczuk, 1997), where the United Nations can impose peacekeeping missions in on-going conflicts without any local consent, though it does require a UNSC resolution. The effort to find the balance between these two norms, sovereignty and intervention, in practice has generated a debate among scholars as to which takes precedence, in general and in specific cases, as well as the true extent of both norms and just how absolute they really are, and with real-world impacts on international law and the legality of interventions (Krasner, 1999; Hoffman, 1995) and the stabilization missions that so often come with them. If sovereignty prevails, then state-building becomes largely illegal, but if intervention prevails, then state-building is a legal tactic, but still only as useful as it is effective.

2.1.1.2 Failed States and Frozen Conflicts

Finding legal room for intervention initiated a movement among policy makers to find security situations that required interventions to address. Policy makers now took aim at ethnic conflicts and failed states (Solana, 2004; Gaddis, 2002; Kaufmann, 1999), using the potential for instability and the space for organized crime and armed conflict that weak governments generate (Zartman, 1995) as a basis for intervention. These were situations in which policy makers and researchers recognized a use for nation-building. A military intervention could only go so far; it could only defeat military adversaries or it could establish physical security. For a lasting solution to failed and failing states, governance would have to be strengthened to ensure that the government could enforce itself across the whole of the state. This is exactly the goal of state-building, and, as discussed in Chapter 1, nation-building in practice is actually state-building.

While publicly claiming to support peace, democracy, stability, or any other internationally-respected norm, many interventions actually sought to promote the interests of the intervening state or states. If not entering in a balanced way, such as promoting one side over

another, or if the intervention was poorly designed or executed, the result would often be a "frozen conflict" (Socor, 2004; Solana, 2004; King, 2001). Rather than finding a self-sustaining peace that can expand over time and generate stability, frozen conflicts exist in a permanent state of high tension, with the potential for an active resumption of the conflict part of every crime and political debate. This creates a need for a permanent intervention, and does so in two ways. In the cases where the intervener has picked a side, the intervener becomes a permanent part of the local political landscape, whose presence remains essential to preventing its opposition from restarting a conflict that that opposition might win (King, 2001). Even if the intervention is truly trying to improve local governance to turn a weak state into a strong state, and assuming that the state the intervention is supporting is not a party to a conflict, a frozen conflict can still create a permanent intervention, since that state of permanent near-conflict is what the mission is trying, and failing, to eliminate. That is, a frozen conflict represents unmet goals in the intervention, meaning the intervention must either continue or accept defeat and leave.

2.1.2 Understanding Effectiveness in Stabilization and Reconstruction

For a stabilization and reconstruction mission to avoid producing a frozen conflict, it must be effective, but what defines effectiveness is not necessarily clear, nor is how it is achieved. Comparing the effectiveness of missions requires finding a measure of effectiveness that can be compared across missions. As discussed in Chapter 1, research on post-conflict reconstruction has so far looked for which policies produce effective missions. In searching for this elusive goal, researchers have tried a variety of different measures of effectiveness as a means of testing which policies are most effective. In doing this, they have struggled just to define effectiveness. The search into what is effective has yet to consider the lessons of complexity and disaster

management. Rather, the field is seeking policy lessons by comparing various aspects of a mission with that mission's effectiveness or success (Cohen, 2006). As a research method, the principle is sound, but has yet to yield results. Most research gets bogged down in finding a definition of effectiveness or success that can be compared across missions. Each mission is unique, with specific goals and parameters that rarely line up neatly with those of another mission. Some missions set out to establish peace and generate economic growth, as in East Timor. Others set out with more modest goals, such as establishing sufficient peace for political processes to resume, as in Haiti.

2.1.2.1 Mission Goals

Two methods have emerged in the literature as a measure of success. Seybolt (2007) has proposed the use of lives saved by a military intervention, along with ways of calculating that figure. As will be discussed in greater detail, this method is limited. Its effect is to limit the measurement of effectiveness to the initial intervention, when military forces actively intervene to save lives. By this measure, Seybolt (2007) finds many successful cases of intervention that remain on the international security agenda as situations that face a threat or renewed conflict (ICG). Instead, researchers are settling into what Cohen has suggested as the method for measuring progress: the degree to which mission objectives are being achieved, as measured by a rigorous set of metrics (Cohen, 2006). While admittedly subjective, this approach enables at least rough comparisons between cases on an order of, "Was the mission successful or not?" This may be a blunt instrument, but it is more useful than endlessly redefining success, and might even allow for percentage measures of success for those missions that have multiple, clearly-stated goals.

Many analyses of post-conflict reconstruction have focused on why specific missions have failed. Researchers focus on why one actor or another was unprepared or incapable of the mission. They often take the form of decrying the efforts of one state or another, such as the United States, to get involved as nearly inherently untenable (Dempsey and Fontaine, 2001). Or they show why a major actor, such as the United Nations, lacked the necessary political power to make a successful contribution (Dobbins *et al*, 2001). It marks the kind of substantive analysis that disaster management now avoids and replaces with structural analysis. Analysis of reconstruction missions now tacitly acknowledges path dependency by regularly noting that the planning phases paid insufficient attention to the history of the locale and the conflict, and so made key political, legal, social, and economic mistakes.

2.1.2.2 Mission Creep

The greatest challenge to any conception of mission success or effectiveness comes from the tendency towards mission creep. Mission creep is the empirical observed tendency of international interventions to gradually take on more and more ambitious tasks and goals. To some degree, this is a function of the mission seeking to continue operating even as initial goals reach completion. At other times, it is the product of political leaders who wish to achieve greater goals than those initially set (Einhorn, 2002). Well established in the research of long-standing international financial organizations such as the World Bank (Einhorn, 2002), mission creep happens in international peacekeeping and reconstruction missions. While never noted directly, Hippler's edited volume (2005) and all of Dobbin's *et al* edited volumes (2008, 2004, 2003) show this pattern when discussing and defining mission goals and effectiveness. The post-war mission in Bosnia and the peacekeeping mission in Haiti both began primarily as missions designed to support policing ("Bosnia and Herzegovina"; "MINUSTAH") before being asked to

support greater efforts at guaranteeing security, rule of law, and political development. In Bosnia, this goes even further when including the pre-war mission, UNPROFOR, which began as a mission to maintain safe havens, first in Croatia, then in Bosnia, before first being expanded to support active humanitarian efforts under the United Nations High Commission for Refugees (UNHCR), and being expanded again to deploy military force in self-defense and coordinate in eventual NATO airstrikes ("Former Yugoslavia"). This pattern of expansion makes using a measure of effectiveness built purely from achieving mission goals impossible. Any measure must include the more expansive goals that mission creep generates.

2.2 COMPLEXITY AND COMPLEX ADAPTIVE SYSTEMS

2.2.1 Entropy and Emergence

In physics, the forces of entropy are identified as a powerful dynamic that moves toward disorder (Prigogine and Stengers, 1984). Despite this tendency, biological structures exist on activity and order, fighting against entropy within their own structures (Prigogine and Stengers, 1984, 131). Increasingly complex organisms develop to deal more effectively with their environment and competition from other organisms. Humans design and build more complex tools and machines (Prigogine and Stengers, 1984, 10 – 18). Governments have become more complex in governing style, from very simple methods of policy formation under monarchies to complex processes of writing and approving bills in today's United States Congress. After developing bureaucracies to implement policies, governments and populations find that those bureaucracies grow in size and complexity, even as opposing interests would threaten to rip them apart (Weber, 1968, 1964).

Order emerges when it appears it otherwise should not. Further, this process is not limited to structures like an organization or an organism that exists within larger systems. Large systems develop through the same adaptive processes as the organizations operating in them. Indeed, the structures of both the systems and the organizations adapt to that of the other in an interacting, evolving process. Even societies that are torn apart by civil war and other internal conflict find some form of order through reciprocal exchange of action and effect. As the actors change, so will their structure of interaction. What evolves is a complex adaptive system.

Like Schrödinger's Cat, the entry of an actor into the system changes the system. Any actor that wishes to operate in such a system will have to understand the rules by which such a system operates, both in general arrangements and in specific details. It requires that those actors understand what changes are occurring in the system and how they are occurring. Not only will that actor need to understand how their very presence affects the system, but they will have to be able to both anticipate and then assess, and often reassess, how their actions affect the other actors and the system (Comfort, Oh *et al*, 2010, 35 – 41). It is the purpose of all interventions to change the situations they enter and to predict how the situation will change and to understand how the situation is changing.

This challenge faces those states and international organizations that seek to aid war- and conflict-torn states and societies. Policy makers and security analysts have begun to identify these weak states as international security issues and threats. Scholars define them as states in which central control and order largely collapse (Helman and Ratner, 1992); they are defined by chaos. In what looks like the complete disintegration of order and society, the maximum state of social entropy, a system of actors, including individuals and organizations, nonetheless, will have emerged. This system will have some shape and some order which evolved from the interplay

among the set of actors, each pursuing its own interest. Any organization that fails to seek information about this emerging system and then integrate it into its mission will fail to improve the faltering society it was intended to support. Examining the networks that interventions have supported will show what type of network structures facilitate or diminish this information flow. It will also show whether structure is sufficient to support success, or whether resilience is essential to the performance of the network. Network operations remain critical; without information flows, even the best structured networks will still fail.

Developing network structure is not simple. Whether the United Nations, NATO, or an individual state launches the mission, it designs a mission structure that matches its standard methods of operations. That is, UN missions like MINUSTAH in Haiti focus on peacekeeping and supporting the government which invited them (UNSC Res. 1542, 2004), while NATO missions like the Implementation Force (IFOR) and Stabilization Force (SFOR) in Bosnia take a military approach, using chains of command. Mission structures change organically, as they enter the situation. How they operate in practice will not necessarily match how they are intended to operate. So, the question changes from whether or not self-organization occurs, to how, why, and at what point in the mission it occurs in practice (Holland, 1995; Prigogine and Stengers, 1984). To explore these questions, I turned to the theory of evolution that explains the development of different forms of organization and organism.

In Darwin's Theory of Evolution, researchers found a starting place (Holland, 1995). The theory provided a mechanism in adaptation that could be observed and applied to any system, organization, or organism. As an actor tried something new, either the adaptation would succeed and carry on, or it would fail and be eliminated. This recurring practice helped to explain why the organs of a plant or animal or the policies and procedures of an organization

were not always the most effective or the most efficient. As the organism attempted various adaptations, it did not undo the previous forms. Rather, each successive adaptation was built on the previous one (Holland, 1995).

This pattern of adaptation, in turn, suggests a theoretical explanation for another observation. Similar situations did not always produce similar adaptations. Similar policies built to address similar policy problems did not always produce similar results, nor did similar countries apply similar strategies of action or similar institutions while still achieving similar goals. Instead, they noticed the phenomenon of path-dependency (Holland, 1995). Traditional policy analysis focuses heavily on econometric and statistical analysis. This method generally ignores context and history, unless that context and history are part of the statistical model. Path dependency illustrates the failings of that approach; the situation is not exogenous, and prior actions and events have a meaningful impact on what effects the policy has. Path dependency eliminates the ability for policy researchers to generalize across a wide variety of what would have previously been considered similar policy problems. It is no longer possible to create a generalized policy approach to low grade conflicts or to the reconstruction efforts that usually follow. Under path dependency, the history of the conflict influences what policies will have an effect and what those effects will be. It is important to know how the conflict developed and how groups reorganized themselves within the society, and what actions they took. All of these events influence which states or international organizations can intervene in the conflict and can support the rebuilding, and which ones cannot, either due to local politics or to that institution's strengths and weaknesses.

2.2.2 Analyzing Complex Adaptive Systems

Complexity theory describes situations that traditional research methods, such as statistics and case studies do not handle very well. Case studies require substantially similar situations to develop natural experiments of a limited number of variables (George and Bennett, 2004). Complex systems are unique, preventing a researcher from finding sufficiently similar cases to produce valid research conclusions. Statistics require a large number of independent trials (Kennedy, 2003). Complex adaptive systems defy both of those requirements; the separate systems are not large in number nor are they independent, either between cases or within cases. Learning occurs in organizations during each case as they adapt to meet their goals, and learning from previous cases happens between cases for the very same reason (Ostrom, 2005; Axelrod and Cohen, 2000). This requires new methods to analyze complex adaptive systems. In the social sciences, two works have proposed frameworks for analysis and will be presented here. These frameworks guide the analysis of this study.

2.2.2.1 *Harnessing Complexity* Framework

Axelrod and Cohen (2000) defined the earlier framework and the one that names the situations it is designed to address. Axelrod and Cohen define three spheres of examination that a scholar could use to study an operational system. These are variation, interaction, and selection. The authors note that these functions are the key descriptive factors of a complex adaptive system (CAS): that is, CAS's have constant variation, interaction between the actors and other conditions such as geography and resources, and actors in the CAS self-select their actions and interactions based on observation of current practice. They, therefore, design their framework to identify the patterns of variation, interaction, and selection that exist in the

network. The goal of the researcher is at first descriptive, in that he or she finds the patterns of variation, interaction, and selection that exist in the targeted research area.

To guide a researcher in describing those patterns, Axelrod and Cohen set out a detailed list of terms that they define as central elements of the framework. These central elements define the detailed questions that a researcher must answer to apply Axelrod and Cohen's Complex Adaptive Systems framework. There are twelve total central elements, presented in the author's order with the author's definition of them (p. 153):

- Strategy, a conditional action pattern that indicates what to do in which circumstances.
- Artifact, a material resource that has definite location and can respond to the actions of agents.
- Agent, a collection of properties (especially location), strategies, and capabilities for interacting with artifacts and other agents.
- Population, a collection of agents, or, in some situations, collections of strategies.
- System, a larger collection, including one or more populations of agents and possibly also artifacts.
- Type, all the agents (or strategies) in a population that have some characteristic in common.
- Variety, the diversity of types within a population or system
- Interaction pattern, the recurring regularities of contact among types within a system.
- Space (physical), the location in geographical space and time of agents and artifacts.
- Space (conceptual), the "location" in a set of categories structured so that "nearby" agents will tend to interact.
- Selection, processes that lead to an increase or decrease in the frequency of various types of agents or strategies.
- Success criterion or performance measure, a "score" used by an agent or designer in attributing credit in the selection of relatively successful (or unsuccessful) strategies or agents.

To define the patterns of variation, interaction, and selection, the researcher describes the full observed data for each of these twelve categories. With that done, the researcher defines the full scope and complexity of the system under study.

This is an open framework that can be applied to a variety of vastly divergent situations, making it more of a method of understanding systems, and justifying it as a framework for defining research. Comparability between cases comes in explaining and comparing the content that each separate case has in each of the twelve categories. Additionally, the authors claim that by completely defining the system in this way, the researcher can draw plausible inferences for how the system will respond to any changes or shocks to which the researcher chooses to subject the system, making this framework useful as the initial step in defining a validated simulation of the system.

2.2.2.2 Institutional Analysis and Development Framework

Ostrom (2005) takes a different direction in defining her framework. While she utilizes the system and actors as central parts of her framework, she focuses on the rules of the system. These rules define how actors interact in the specific system and so define much of the system's performance. Instead of describing a system only through its observed characteristics, Ostrom defines action arenas that encompass the constituent parts of the system, as well as the system's performance. For Ostrom, the action arena is a function of the actors, systems, rules, and other attributes present. This conceptualization allows her to limit the variables required in studying a complex adaptive system without limiting the ability to consider that complexity. In Ostrom's model, exogenous variables such as biophysical or material conditions, community attributes, and rules feed into an action arena. In this action arena, participants interact in action situations, and reciprocally influence each other. The interactions of these participants then feed information back into the action arena and produce outcomes. These outcomes, in turn, feed back into the exogenous variables and the larger action domain. Ostrom calls this formulation the Institutional Analysis and Development framework, which can be applied to actual policy

situations similar to the application of Axelrod and Cohen's framework. That is, a researcher would develop a conceptual model of a complex system by identifying the actors involved, their individual or organizational characteristics, their interactions with one another, and the rules they use to govern their system of interactions.

2.2.2.3 Role of Network Analysis in Systems Analysis Frameworks

Neither framework requires the use of network analysis as part of applying the framework. Nevertheless, a researcher applying network analysis will be able to answer many of the questions that the frameworks direct. A network analysis is primarily a descriptive agent-based model of an empirically observed system. Whether they are organizations pursuing humanitarian goals or individuals forming friendships or seeking advice, the actors and their patterns of interaction define that system. A network model captures this two-tiered system where an agent-based model provides the basis for a systems model. The frameworks for analyzing complex adaptive systems use the same conception of a system built from many constituent parts that all apply their own rules and strategies. The concept of networks then provides the rigorous format that aids the researcher in defining the characteristics of that system.

With the actors and interactions defined, network analysis then gives the researcher a set of tools and measures to rigorously describe the network (Newman, Barabasi, and Watts, 2006; Hanneman and Riddle, 2005; Wasserman and Faust, 1994). These measures allow the researcher to identify key nodes in a network in different ways that have different interpretations for different parts of a system, such as identifying hub nodes in the network with degree centrality as well as bridging nodes with betweenness centrality. Networks researchers have also identified network types, such as small world networks, scale free networks, and core-periphery networks,

providing both conceptual and mathematical definitions of each (Newman, Barabasi, and Watts, 2006; Hanneman and Riddle, 2005; Wasserman and Faust, 1994). There is now a long list of network measures and a proliferation of network analysis computer programs that will calculate those measures (Borgatti, Everett, and Freeman, 2002; Carley, 2001). Whether identifying the rules of an action arena or the patterns of variation, interaction, and selection in a complex system, network analysis will answer many of the questions of the frameworks, and it will do this in a way that is verifiable and replicable across the same data from the same data sources.

2.3 INFORMATION FLOW IN COMPLEX SYSTEMS

2.3.1 Distributed Cognition

Underlying the concept of complex adaptive systems articulated by Ostrom and Axelrod and Cohen is an often unstated assumption about how the actors recognize variation and respond to it. Implicit in this approach is the assumption that, as the situation changes, only a portion of the actors involved will notice the change when it happens. Depending on the network and its conditions of operation, a change may go unnoticed initially, with the participating actors recognizing the change in performance only when they rely on a previous assumption or reenter a geographic location that they have not entered for a certain period of time. In order to operate effectively, individuals and organizations must be cognizant of this information. If they are not, then they cannot adjust to it, and their decisions will be based on faulty information (Simon, 1983). Nevertheless, an implicit characteristic of complex adaptive systems is that no one part of the system contains all of the relevant information about the system and its operations. In his

work, Hutchins (1995) illustrates this phenomenon. His work (1995) documents the practice of navigation as a situation that necessitates constant and clear, if encoded, communication for all the actors to perform their jobs properly. This premise is even more important in action arenas, such as post-extreme event reconstruction, that are more geographically distributed than the navigation deck of a Navy ship.

Aside from the greater understanding of information flow within teams that the Hutchins' (1995) research generated directly, distributed cognition has several important impacts for researching geographically-distributed systems. Since no one person knows all of the information in such a system, no one set of data sources, compiled by one person, can have all the relevant information for research and analysis. Additionally, field reports from organizations' active response to disasters and conflicts tend to focus on specific issues. Often the best individual source, situation reports focus on what the publishing organization has done and achieved, and often with which other organizations they worked. News reports are more detached from individual actors, but often miss activities in hard-to-reach locations, which abound in conflict zones and the immediate aftermath of large scale disasters. Humanitarian appeals provide large scale details about the organizations that combined to write the appeal, including extensive data on the amounts of personnel and resources dedicated to the response and the complete list of projects that each organization is attempting. Amidst that detail, though, aid appeals tend to lack details on active collaborations and ignore challenges so as not to inadvertently convince donors that a response might be futile, indicating that sending additional funding would be wasting those resources. There are still other types of reports, including Hotwashes and After Action Reports (AAR), government and academic studies, that all have their own foci and blind spots. The result of these focus and geographic limitations to

information is that no one type of report from no one organization can provide the necessary details to support a systems or network analysis. Rather, the researcher must pull together data from a variety of sources, published from a variety of organizations, to acquire sufficiently complete information for a valid systems analysis or network analysis.

2.3.2 Information and Coordination in Natural Disaster Response

Along with its impact for researchers, distributed cognition has many important impacts on practitioners in geographically-distributed systems. As discussed in Chapter 1, Comfort (1999) has focused on fully developing the understanding of those impacts and seeking policies and procedures to address them. Comfort begins with the same principle embedded at the base of distributed cognition. That is not the principles from Hutchins, but rather that mentioned above from Simon (1983), that a decision maker must have accurate and as complete as possible information to make a properly informed decision. Comfort (with Wukich *et al*, 2011; with Oh *et* al, 2010; with Haase, 2006; 1999) then adds another layer to Hutchins' (1995) observation about geographically-distributed information. This observation recognizes that information is also distributed over time in the form of past practices and experience and in the expertise of past and current disaster managers. Since managers have incomplete information about both past practices and current developments, to meet Simon's requirement, the managers need a way of gaining real-time information on current developments and access to a store of past practices and experience. The solution that Comfort and Wukich *et al* (2011) propose is the application of sociotechnical systems that integrate disaster and operations reporting from organizations active in the response with a decision support system that contains lessons from past practice.

International disaster response efforts have begun attempting to use such systems. Scheinert and Konstantinova (2011) examine the use of two specific systems in the aftermath of the January 12th, 2010 Haitian Earthquake, ReliefWeb[4] and OneResponse.[5] Operated by the United Nation's Office for the Coordination of Humanitarian Affairs (OCHA), and within the context of the United Nations Cluster System, both sites present reports from the organizations involved in UN-coordinated disaster response efforts. Unfortunately, these sites fared poorly during the response to the Haitian earthquake, as communication both failed to deliver information in a timely manner or contain the information necessary to coordinate a response (Scheinert and Konstantinova, 2011) and ultimately broke down entirely (Comfort, Siciliano, and Okada, 2011). This breakdown in organized communications in the response system left a stratified response built around three pools of actors, the international responders, the Haitian government, and the Haitian general populace (Comfort, McAdoo *et al*, 2011). This failure in the field does not represent a disproof of the effectiveness of sociotechnical systems, but indicates of failure to apply them properly. The importance of the use of such systems to actual response in the field still stands as the implication for practitioners of distributed cognition.

2.3.3 Complexity in International Relations Theory and Practice

It would be false to claim that the development of complexity theory and networks has gone unnoticed by scholars and practitioners of international security. They have primarily taken a different focus, however, and different application than that which researchers for natural disaster preparedness and response have found. These security scholars have recognized the

[4] Can be found online at: www.reliefweb.int.
[5] Can be found online at: http://oneresponse.info.

growth of non-state actors that are made from networks of individuals. Sometimes these are peaceful political movements, other times they are dark networks, that is, networks like terrorist groups and criminal organizations that hide their membership and structure. Either represented a network that could affect the situation that a fighting force would have to take into account, whether as an enemy combatant or in defining the political context of a military operation (Arquilla and Ronfeldt, 2001). Even more distant from the network of organizations responding to a disaster, security scholars have also identified the growth of information technology networks, that is, computer networks as both a vulnerability to attack and a tool for offense and defense. Using the same language of resilience and effectiveness, these scholars have developed requirements for defensible computer networks that will not be interrupted by attack (Homer-Dixon, 2006; Alberts, Garstka, and Stein, 1999). It is only in a limited way that security researchers have begun to apply organizational interactions and networks as a way of understanding the operations of a military force and complexity theory in understanding complex political and military situations (Alberts and Czerwinski, 1997; Rosenau, 1997). In these ways, the concept and language of complexity and networks has entered the military lexicon, but still has not entered the discourse for the phase the follows after any intervening military force has generated a "mature theater," one in which open fighting has ceased, but in which the military still plays a role (Bosnia Respondent 1).

The most developed work on the list is that which addresses dark networks and computer networks. The authors in Alberts and Czerwinski's edited volume (1997) write about the concept of complexity and understanding complex adaptive systems, but only in terms of seeking long-term plans for operations in the system. They write about the need for understanding the mechanisms of complex systems, listing the key features of those systems (Maxfield, 1997).

This is only the barest-bones analysis of the situation. The work on disrupting dark networks and securing computer networks goes deeper, seeking and finding some policy options for developing networks that can survive attacks while also seeking ways to attack networks made of adversarial actors. This research even uses the language of resilience that is present in the organizational network literature on disaster response and preparedness (Homer-Dixon, 2006; Arquilla and Ronfeldt, 2001; Alberts, Garstka, and Stein, 1999).

This allows for some comparison between the two literatures on how they conceive of resilience. The fundamental definition of resilience is the same, the ability of a network to persist in effective operation following a shock to the system. How this is achieved is not the same. As discussed in chapter 1, in disaster preparedness and response, resilience comes from the adaptive behavior of organizations in the network. It is an emergent pattern of the system that develops out of organizations engaging in, and utilizing, self-organization and adaptation in the network to exchange information and coordinate operations that identify and adapt to emergent patterns that are specific to each system (Comfort, Boin, and Demchak, 2010). For the researchers and policy analysts of dark networks and computer networks, and like the military establishments supporting their work, resilience comes from redundancy. Like military materiel in the field, resilience in a computer network is assured when additional materiel can be redeployed to fill the roles of any materiel that has been destroyed. This conception of resilience requires greater capacity for operation, as resilience is a function of the redundancy of materiel, and governance capacity is a factor in determining the level of materiel available. Post-conflict reconstructions missions, however, face a situation where much, if not all, of both governance capacity and materiel have been destroyed; a large portion of the task of reconstruction is rebuilding that redundant set of materiel, especially in a situation where a peace has insufficient

broad-based support to prevent adversarial groups from attacking it. This means that resilience must come from something other than pure materiel redundancy. This is where the conception of resilience as an emergent pattern from the behavior of actors adds to literature on interventions and reconstruction. By redefining resilience, this study provides a basis for redefining the mode of operations for post-conflict reconstruction missions. While capacity to support action will still be necessary, a mission that applies this new definition stands a greater chance of effectiveness, as it will be able to adapt to changing situations, redress its own errors, and support the development of local governance that can find and maintain the requirements of a sustained peace in that region, regardless of what those requirements are, and especially when they vary greatly from the requirements of past efforts.

3.0 DATA AND METHODOLOGY

This study will seek to measure the relationships between resilience, capacity, and effectiveness in post-conflict reconstruction missions. To do this, the study builds a mixed-method analysis using empirical data gathered from two historical cases to test the application of inferences from the disaster preparedness and response literature about the role of communication and coordination to post-conflict situations. The first is the UN intervention in Bosnia-Herzegovina that started with the 1992 ceasefire agreement[6] and expanded in 1995, following the Dayton Accords to acquire a larger mandate and the involvement of the North Atlantic Treaty Organization (NATO). The second is the international response to the 2004 armed conflict in Haiti that led to the ouster of then-Haitian President, Jean Bertrand Aristide. These events will be analyzed as case studies of international intervention that are intended to build local governance capacity for sustainable development of the damaged regions. Each mission began with a UN Security Council (UNSC) resolution that responded to conflict and defined the structure and goals of the mission. For Haiti, this is UNSC Resolution 1542 (2004). For Bosnia, there are two: UNSC Resolution 743 (1992) and UNSC Resolution 1035 (1995). These resolutions will provide a baseline for each mission for measuring the degree of change over time from that baseline. This method draws from the nation-building literature in international relations by focusing on empirical cases of UN interventions that sought or continue to seek long-term

[6] This date represents the date of the signing of the Agreement in Sarajevo, on 2 January 1992.

political stabilization while analyzing the interventions using the different lens of the network approach currently used in the disaster preparedness and response literature. The study first applies the IAD and Harnessing Complexity frameworks discussed in the previous chapter to understand the missions and their context. The study then builds network models that allow for defining and measuring the key concept variables: resilience, capacity, and effectiveness. Each variable contains a set of component variables that are measured using ordinal scales that reflect the content of the network data. A factor analysis then measures the correlations between these components, both within and between concept variables. Finally, the component measures, factor relationships, network models, and frameworks all provide basis for a computer simulation of a reconstruction mission that shows how resilience components affect the mission's ability to complete aid tasks and build the local government's resource stock. This simulates the more complex relationship between resilience components and mission effectiveness that a factor analysis cannot capture, due to limitations in both network coding structure and statistical analysis methods. This chapter lays out the details for each step and their justifications.

3.1 EMPIRICAL DATA ANALYSIS AND CASE STUDY COMPARISON

3.1.1 Case Study Selection

Researching policy problems like the continued failure of post-conflict reconstruction missions requires using empirical data. These missions occur as generally distinct events that last for a varying amount of time. They occur in a limited geographic range, limited by the borders of whatever state on which they are focusing. They have stated goals, while also having many

unstated goals caused by mission creep. They operate in a specific cultural, political, and historical context, as well as current legal and physical security contexts. To test the relationship between resilience and effectiveness, traditional case study methods would require finding two or more cases that are sufficiently similar to each other across all of these contexts, but having different levels of resilience and effectiveness, with similar capacities, since effectiveness is a function of both capacity and resilience (George and Bennett, 2004; King, Keohane, and Verba, 1994). Post-conflict reconstruction is a relatively new phenomenon. The first true cases of it occurred in the Post-World War II reconstructions of Germany and Japan (Dobbins *et al*, 2004; Dobbins *et al*, 2003), only about 60 years ago. Since that time, reconstructions have been attempted only a limited number of times. Table 3-1 lists the events that have happened to date along with the lead political unit that directed the mission and its timeframe. This is the population from which a researcher can select cases.

Table 3-1. Major Post-Conflict Reconstruction Missions

Mission	Political Lead	Time Frame
Germany	USA, UK, France	1945 – 1952
Japan	USA	1945 – 1952
Congo	UN	1960 – 1964
Namibia	UN	1989 – 1990
El Salvador	UN	1991 – 1996
Cambodia	UN	1991 – 1993
Somalia	UN/USA	1992 – 1994
Mozambique	UN	1992 – 1994
Haiti (I)	USA	1994 – 1996
Bosnia-Herzegovina	NATO/EU	1995 – 2002
Eastern Slavonia	UN	1995 – 1998
Sierra Leone	UN/UK	1998 – on-going
East Timor	Australia/UN	1999 – on-going
Kosovo	USA/NATO	1999 – on-going
Afghanistan	USA	2001 – on-going
Iraq	USA	2003 – on-going
Haiti (II)	UN	2004 – on-going

Sources: Dobbins *et al*, 2008; Dobbins *et al*, 2004; Dobbins *et al*, 2003

What Table 3-1 shows is the diversity of context for all the cases of post-conflict reconstruction missions. They have taken place on four different continents, including North America and Europe, and across several decades of history, representing immediate post-war, Cold War, post-Cold War, and post-9/11 time periods. They have had a variety of lead actors. Finding two cases to support a traditional case study comparison would be impossible. The complexity frameworks presented in Chapter 2, however, provide a basis for comparing vastly divergent cases. This study utilizes that capability to compare two cases. These cases, as listed in Table 3-1 are Bosnia and Herzegovina and Haiti (II). The Bosnia case will begin with the initiation of UNPROFOR's deployment to Bosnia in 1992, and will include the transformation of UNPROFOR into UNMIBH in 1995. It will end with UNMIBH's conclusion, on 31 December 2002. The Haiti case begins with the ouster of then-President Jean Bertrand Aristide and the initiation of the MINUSTAH mission, in 2004. Though this mission remains on-going, this study closes its study period on 31 December 2010. The reason for this is a practical one; this was the time at which work on this study began, while still allowing for a view of the rapidly changing events surround the 12 January earthquake and subsequent cholera outbreak.

These cases are selected for their accuracy to current intervention practices and accessibility to study. These two cases represent prominent UN interventions in response to extreme events. Both events have taken place during the age of the internet, a great deal of data is readily available for public access, particularly in the Haiti case, which allows for more complete analyses than could be done in many other cases. Second, just as the mission environments continually evolve, so does mission planning and operation. Fully covering this change in Bosnia requires studying both the UNPROFOR and UNMIBH missions. Both cases are recent missions. Missions prior to these may be more settled, particularly for Haiti, but data

are less accessible and practices continue to evolve over time. It would be fruitless for this study to critique practices from the earliest missions, unless those practices that had remained consistent throughout. The very failure that this study examines has led to efforts by actors to improve performance and has eliminated that possibility. Continual study has generated an on-going literature in 'lessons learned' (Seybolt, 2009) that this study critiques in Chapters 1 and 2. Each new mission has sought to apply those lessons learned (Dobbins *et al*, 2008; Dobbins *et al*, 2004; Dobbins *et al*, 2003). That they have done so and continue to fail generates the fundamental policy problem of this study. Newer cases have utilized the least tested and least critiqued methods, providing fertile ground for new study. Newer cases also took place in a different technological context. One of the newer practices of these missions is to post data in widely and publicly accessible forums, including internet websites. Data for Haiti and Bosnia have been posted in such a manner. The location of the cases also allows for ready field access for study, which has been conducted. Details of the data are discussed below, in Section 3.2.1. In the language of the IAD Framework, these cases are the action arenas for this study; in the language of the *Harnessing Complexity* framework, these cases are the complex adaptive systems for this study.

3.1.2 Unit of Analysis

The unit of analysis for this study is the organization. Specifically, the study focuses on organizations involved in two UN missions and the interactions among them in the process of implementing the missions. The organizations under study will be the principal actors involved in each of the two cases, including governments and their agencies, non-governmental organizations, private businesses, and international organizations, including their agencies. The

primary measures of capacity, resilience, and effectiveness will focus on the organizational level. This includes measures of the capacity of an organization in terms of its personnel and resources and measures of the degree to which organizations exhibit behaviors that demonstrate resilience. Finally, this analysis includes measures of the degree to which the participating organizations are meeting the stated goals of the missions. Data will be gathered at the organization level, and the first level of analysis will present profiles of the performance of individual organizations and their interactions in mission operations.

For each organization, this study will collect several characteristics. In the parlance of network analysis, these will be organizational attributes. Recording these attributes will maintain greater complexity in the data and allow for a richer analysis by supporting analysis of the patterns of these attributes in the network. The attributes are Source of Funding, Jurisdiction, and Nationality. Source of Funding records the economic sector from which that organization draws its funding, public, private, or non-profit. Jurisdiction records the territorial space over which an organization's actions have ramifications. An organization with a State jurisdiction will be able to impact other actors over the entire territory of the target state of the mission, either Haiti or Bosnia, but not beyond the respective borders. While this includes official state organs, it is not limited to them, and applies only to the extent that those state organs are observed as operating in the data. Jurisdiction is defined relative to the target country for the mission. That is to say, any organization based outside of either Bosnia or Haiti, as part of the respective case is labeled as either Regional or International. For Bosnia, a Regional jurisdiction refers to the Balkans. For Haiti, it refers to the Caribbean. Nationality is the state or national affiliation for the organization. This includes categories for organizations just as international non-government organizations (INGO's), inter-governmental organizations (IGO's), and

international private organizations (IPO's) that do not have clear nationalities. For Haiti, an additional attribute will be recorded that notes whether or not the organization was part of the United Nations system of international organizations. The organizations will fill the role of actors under each of the frameworks for this study.

The analysis will extend beyond the separate organizations to include system-level analysis. This is necessary since the organizations under study do not operate independently of each other, but interact in a way that forms that system. This creates a nested set where the organizations operate both autonomously and in relation to each other. Under this framework, the structure of the system constrains how the organizations operate as well as defines their access to resources and ability to achieve success. Consequently, it is necessary to assess the relationships among the organizations in the system formed by their interaction. The analysis will also apply system level measurements of capacity, resilience, and effectiveness that are aggregates of the primary organization – level measures. The systems of UN intervention will be more narrowly defined than typical system-level analysis within the field of International Relations. Typically, system level analysis looks at patterns of action and interaction in the full system of states (Waltz, 1959). Rather, in this analysis, the two systems in question will be limited by geography and function to the specific reconstruction missions in Bosnia and Haiti. The exact bounds will be set for each case study, since the appropriate geographic, functional, and temporal bounds vary for each mission and over time within the mission, as listed and explained in Section 3.1.1.

3.2 DATA AND VARIABLES

3.2.1 Data Sources

Table 3-2. Data Sources

Source	Case	Data Contained in the Source
UNSC Res. 1035 (1995)	Bosnia	Initial Mission Goals, Initial Conditions, Knowledge, Formal Mission Structure
SFOR CIMIC Documents	Bosnia	Actual Organization Interactions and Actions, Resources, Knowledge
OHR Media Round-ups (Content of Newspapers)	Bosnia	Actual Organization Interactions and Actions, Resources, Knowledge
UNSC Res. 1542 (2004)	Haiti	Initial Mission Goals, Initial Conditions, Knowledge, Formal Mission Structure
MINUSTAH sitreps	Haiti	Actual Organization Interactions and Actions, Resources, Knowledge
ReliefWeb sitreps[7] (OCHA, USAID, WHO, and other organizations)	Haiti (Post-Earthquake)	Actual Organization Interactions and Actions, Resources, Knowledge
Consolidated Appeals (CAP) Documents	Bosnia, Haiti (Post-Earthquake)	Tasks, Resources, Knowledge, Organization Involvement, Personnel
Formal Reports	Bosnia, Haiti (Pre-Earthquake)	Knowledge, Effectiveness, Actual Organization Interactions and Actions
Semi-Structured Interviews	Bosnia, Haiti[8]	Validate other sources, Patterns of Interaction, Personnel, Resources
Individual Organization Websites	Bosnia, Haiti	Mission Statements, Knowledge, Resources

Data on the networks are available from a variety of sources. Each source contains different types of information that will aid in answering different questions and are mission specific.

[7] All of the documents which ReliefWeb has for the earthquake are available at <<http://www.reliefweb.int/rw/dbc.nsf/doc108?OpenForm&emid=EQ-2010-000009-HTI&rc=2>>.

[8] Semi-structured interviews in Haiti were completed as part of a project the Center for Disaster Management completed, which included two trips to Haiti, the first during the second week of March, 2010, and the second 2 – 9 May, 2010. Data are used with permission.

Table 3-2 summarizes what data each source will provide. After being gathered, the data will be coded into a single database, containing each organization's actions, interactions, resources, knowledge, and personnel, and coded for timeframes. This database will provide the basis for network modeling and analysis and for measuring the key variables, as described in Section 3.2.2. In addition to the data sources listed in Table 3-2, field research was conducted in both Bosnia and Haiti. In both cases, this consisted of expert interviewers conducted on site. A formal interview protocol was prepared for Bosnia; it is attached as Appendix A. Field research in Haiti occurred from 2 – 9 May 2010, as part of a University of Pittsburgh, Center for Disaster Management rapid response study to the 12 January 2010 Haitian Earthquake. Field research in Bosnia occurred from 13 – 19 September 2011.

3.2.2 Network Coding

Since network analysis is the appropriate modeling tool for researching complex adaptive systems, as discussed in Chapter 2, this study's analysis utilizes that tool. To do this, data coding focused on constructing a validated network database. The principal component of any network database is the set of dyadic links between the actors in the network, which, as discussed above, are organizations in this study. The researchers involved in coding the data for this study[9] reviewed the data sources for each case to identify which organizations were taking actions at which times. The name of that organization is then recorded with the content of the action taken and any interacting organization that are also involved. Each row of the database contains a

[9] Data coding for each for each case was handled separately. The author of this study coded the Bosnia networks. For the Haiti networks, the author owes a great debt to the work of Ralitsa Konstantinova, who coded a very large portion of the data for this case, along with the author of this study.

single network dyad. Events that include three or more organizations interacting are spread over multiple lines of the database. Often, the action includes only one organization. In those cases, the database codes an initiating organization, but no responding organization. Rather than being a dyad, these actions are network monads, while still containing important data on the presence and activities of an organization in the system, even though that organization is unconnected to any other at that time. To simplify the language, this study refers to the network monads and dyads, as well as network interactions. In addition to the dyad, the network interactions record the attributes of each organization observed in the interaction and a status code for the progress of organizations in completing the tasks that make up the content of the interaction, along with the date of the interaction and the specific source of that interaction. This is a standardized network coding method that has been in use in the University of Pittsburgh's Center for Disaster Management. This network database forms the basis upon which the study operationalizes its concept variables and records the interaction, selection, and variation of the *Harnessing Complexity* framework.

3.2.3 Definition and Operationalization of Variables

This study focuses on the relationship between three concept variables: resilience, capacity, and effectiveness. It contends that, after controlling for capacity, greater resilience will produce greater effectiveness in post-conflict reconstruction missions. Chapter 1 presented the conceptual definitions for the conceptual variables. These remain broad concepts that need specific, measureable definitions that can be applied to directly to the data. To operationalize these variables, this study defines several component variables for each concept variable. Each component variable is operationalized using an ordinal scale that is specific to that component.

The value is assigned by reviewing the content, status, and attributes of the organizations involved in each the network interactions and determining the appropriate category for all components. This value is then recorded in the network database on the line of the respective network interaction. The frequency counts for each component are first calculated to examine the data. Concept variable measures are then aggregates of the component variable measures, where higher values on the ordinal scales represent higher values of the respective concept variable for that component.

3.2.3.1 Resilience

Resilience is the practice of accessing information on changing situations, adapting to them, and coordinating activities within and between organizations (Comfort, Oh *et al*, 2010; Demchak, 2010). For this study, resilience has four components, as follows, with their scales:

- Presence on the Ground (the mix of organizations by jurisdiction engaged in field activities)
    - 1: No Presence; organizations not engaged in field activities
    - 2: Only domestic organizations operating in the field (sub-national level)
    - 3: Only domestic, state-level (national, federal, state) organizations
    - 4: Only International organizations
    - 5: Combination of Local- and State-level organizations
    - 6: Combination of Local- and International-level organizations
    - 7: Combination of State- and International-level organizations
    - 8: Combination of Local-, State-, and International-level organizations
- Internal Coordination
    - 1: Action does not involve internal coordination
    - 2: Report includes communication between different parts of the same organization
- External Coordination
    - 1: Action does not involve external coordination
    - 2: Organization publishes report or makes requests for coordination
        - requests action in a task outside its own field of operation w/ no mention of reciprocation from the organization that receives the request
        - situation report published to open system such as ReliefWeb
        - explaining/justifying actions to another organization
    - 3: A meeting between two or more organizations for coordination.
    - 4: Report includes cooperation between at least two organizations towards a goal

- Adaptation
    - 1: Action does not include indications of adaptation
    - 2: Content of interaction reports shows pattern of changes in actions or policies over time when compared against each other
    - 3: Report of interaction includes explicit change in an organization's actions or policies
    - 4: Interaction aimed at more closely tailoring organizations towards goal
    - 5: Error Correction: When organization recognizes shortcomings in its knowledge and reaches out to a more knowledgeable organization in regard to the interaction

3.2.3.2 Capacity

Capacity is the amount of resources available to an organization to apply to its efforts to meet its goals. These resources come in the form of funds, personnel, and knowledge. This study will use the following scale for measuring the funds, resources, and personnel of the organizations involved, including definitions of each level:

- 1: very small organizations (all jurisdictions)
    - Those with expected staffs of around 10 members or less
    - Includes "black" groups
    - Groups of insufficient size to maintain a website or web presence
- 2: small organizations (all jurisdictions)
    - Organizations that would staff up to about 50 people or budgets in thousands to 10s of thousands of dollars, annually
    - Includes Entity-level political parties
    - Includes local-level government offices
    - Foreign Medical and Search and Rescue teams supported by government resources, but only including small staffs
    - INGO's that only function or can only function in one location at a time
- 3: medium sized organizations (all jurisdictions)
    - Staffs between 50 and 100 or budgets at or exceeding $500,000/year
    - Includes state-level political parties
    - Entity-level agencies
    - INGO's working in a limited number of countries
- 4: large domestic organizations and large international organizations (not government backed)
    - Large staffs or budgets exceeding $5,000,000/year
    - Organizations backed by a single foreign government
    - BiH Entities
    - INGO's working in many countries
- 5: large international organizations (public only) that draw on resources of multiple governments, allowing for budgets of many millions of dollars per year

While funds and personnel are clearly operationalized measures, knowledge is a concept that requires operationalization. The literature on knowledge and networks focuses on measuring knowledge and information flows through the network. In this study, the movement of knowledge between organizations is treated as part of resilience; knowledge flows allow for resilience by providing organizations with the information they need to either confirm accurate knowledge stocks or repair inaccurate knowledge stocks (National Research Council, 2003). In the security literature, many authors argue that military organizations are ill-suited to nation-building and peace keeping due to misalignment of mission (Snow, 2000; Gow, 1999; Posen, 1999). Whether this claim, as it pertains to the military is accurate or not, it provides a basis for measuring knowledge in a clear and effective manner that this study utilizes. It can be assumed that organizations possess the knowledge necessary to complete operations consistent with their primary mission as stated in their mission statements. Therefore, an ordinal scale that measures the match between mission statements and actual activities can be suggested where high match indicates high knowledge while low match indicates low knowledge while knowledge flows can mitigate low knowledge. The following scale will be used:

- 1: task and mission are fundamentally misaligned
- 2: task and mission are somewhat misaligned
- 3: task and mission are somewhat aligned
- 4: task and mission are fundamentally aligned

Alignment is determined by coding a mission type from each organization's mission statement. These are accessed on organization websites. For those with no website, mission types are inferred from the network data. Each mission type has two parts, the substantive field such as health, education, or military, and by the space in which the organization focuses its work,

including administration, organization, or field work. Each network interaction then receives the same typing, where the content of the interaction determines what kind of activity is being done in what space. Matching across both type and space qualifies as a '4' while matching across neither qualifies as a '1'. Partial matches will match only in either type of mission or space of operation, fall into categories '2' and '3.'

3.2.3.3 Effectiveness

Effectiveness is defined by completing stated mission goals and establishing pre-requisites for long-term stability (Cohen, 2006; Einhorn, 2001). Unlike resilience and capacity, effectiveness includes the possibility for a measure that codes for movement away from effectiveness; it includes space for a negative measure of effectiveness, although it is not coded with a negative number. Effectiveness has three components, defined and measured as follows:

- An increase in the completion of aid tasks, which can include social actions towards addressing war crimes history
    - 1: Actions undermine efforts towards completing aid tasks, including slowing or inhibiting completion as well as undoing previously completed aid tasks
    - 2: No action towards aid tasks; Not Applicable
    - 3: Some action towards organizing/completing task
    - 4: Significant action towards completing a task
    - 5: Task completed
- Government legitimacy in the areas it controls. This can include separate governing structures in the initial geographic area that each have legitimacy in the areas they control.
    - 1: Actions undermine legitimacy
        - Actions directly question authority of central or local government(s)
        - Actions bring legality of the actions of a public entity into question
        - Actions interfered with operation of post-war international regime
        - Actions demonstrate a lack of support for post-conflict constitutional structures
        - Actions complicating or impeding diplomatic relations
    - 2: Actions have no or neutral impact on legitimacy (includes N/A)
    - 3: Actions support legitimacy of local government
        - Action taken by the local government with prompting or lead by an international organization
        - Actions acknowledged as supporting rule of law/ICTY
            - Actions support legitimate government

            - Actions against legitimate government are done transparently and within the current system
        - Actions involved pursuit or arrest of war criminals
        - Report shows actions promoted and furthered effort at equal treatment of ethnic groups in Bosnia or economic classes in Haiti (See Chapters 5 and 6)
        - Corruption investigation after the target of the investigation is out of office
    - 4: Actions directly supported/aided operation of local governance
        - Requires locally-initiated action(s), according the text of the transaction; the local organization need not be the coded as the Initiating Organization
        - International organization supports and aids the local actor in completing a locally-oriented and locally-initiated action
        - Corruption investigation where the target of the investigation is in office
    - 5: Actions establishing or smoothing diplomatic relations between governments
- The formation of links between a legitimate government with resources and knowledge
    - 1: Actions undermine government connection to resources/tax base or inhibit/slow actions to make connections
    - 2: Actions have no impact on government resources or the content is "Not Applicable" for government links to resources
    - 3: Actions provide government with 1-time donation/provision
        - ex.: extensive, 1-time spending by International Organizations on local business/contracting
        - The provision of additional staff to a response effort
    - 4: Actions provided loan of funds to the government
        - Provision of loan that must be repaid
        - Provision of an internationally-based resource stream applied to a response effort for goods or personnel
    - 5: Actions provide government with resource stream/tax base
        - Development of local industry/business
        - Debt service
        - Locally-based resource stream applied to a response effort

3.3 ANALYSIS PROCEDURES

3.3.1 Factor Analysis

As presented above, the measurement for each concept variable is an aggregate of the observed measures of that concept variable's component variables. Each concept and component is based on a mixture of theoretical and empirical research, cited in the respective sections above. The

result is that it cannot be assumed that the component categories do not overlap either within or between concept variables, despite this study's efforts to ensure that this did not occur. Additionally, the magnitude of a change in value between the ordinal categories of different components is inconsistent between the components, even as it is as consistent as possible within a component. For these two reasons, simple aggregations, such as sums and averages of the ordinal scales will not produce a reliable aggregate measure.

Since simple aggregation will not produce reliable results, another aggregation method is required. Faced with a similar situation, Cutter *et al* (2003) solved the problem of generating an aggregate measure for potentially correlated data by using a factor analysis to group variables into factors, whose loadings can then be utilized in simple summations to generate an aggregate score. This study uses the same method as Cutter *et al* (2003) to test correlation between the component variables with one important difference. Modern statistical programs[10] allow for several different types of factor analysis. The most common two methods are principal factors and principal component factors, which is also known as principal components analysis. Principal factors analysis is best used for exploring untested correlation between variables, while principal component factors is best used for limiting data and combining variables (Shlens, 2005). Cutter *et al* (2003) utilize principal components factors to combine data from the outset. This study's approach is more exploratory than that done by Cutter *et al*, so it first uses principal factors to explore correlations and then combines data using principal components analysis to generate a measure performance across all the components for each network interaction. As will be discussed in more detail in Section 3.3.2, several networks based on study case and time frame, named timeslices in network analysis terminology, are constructed for network analysis.

[10] All statistical analyses, including factor analysis and frequency crosstabulations, in this study utilize Intercooled Stata 11, using a permanent license purchased through a Stata GradPlan.

These same timeslices serve as a basis for a sensitivity analysis of the factor results for the correlations between component variables. Should a consistent pattern of correlation be found in the data, then combined scores will be calculated using the principal component factors analysis method based on the pattern of positive and negative correlations found in the data. If no consistent pattern of correlation is found following the sensitivity analysis, then the combination of the component variables will be skipped and the results analyzed for what patterns are present and what those patterns imply about the data generating process. By identifying correlations between components, this analysis will provide insight into the rules and impacts of actions and events in the system and speak directly to the relationships between resilience, capacity, and effectiveness.

3.3.2 Network Analysis

Documenting patterns of interaction and selection in the data will require a more tailored approach than statistics offers. As discussed in Chapter 2, network analysis is the most efficient form of analysis for identifying patterns of interaction and selection in a system. It is a relatively simple method of modeling when it includes a single type of node and single type of network connection (Butts, 2009), but has the potential to be expanded to encompass very complex systems by using multiple types of nodes and multiple networks in a single model, as well as charting changes in the network over time. Standard network analysis includes the simplest models. Adding more node types and networks generates a meta-network analysis (Carley, 2003), while separating the network into time periods, known as timeslices, generates a dynamic network analysis (Carley, 2003). This makes network analysis a very flexible modeling

approach, allowing the researcher to carefully tailor the network models to the action arena under study.

3.3.2.1 Static Network Analysis

This study will begin its network analysis with the simpler model, analyzing organizational networks that treat the data as occurring during a single time slice. This type is called static network analysis to indicate the lack of time variation and to differentiate it from dynamic network analysis. To identify patterns of interaction and selection, the study analyzes these networks on both the node level and the network level. At the node level, the study identifies node counts for the network, indicating the number of organizations involved, and the study will break node counts down to indicate the number of isolates in the network, or nodes that are unconnected to any other nodes. The study will also identify the key actors in the network based on a range of centrality measures. At the network level, this study will examine the network density, or the ratio of the number of connections that are in the network to the number of connections that could be in the network. It will also examine grouping patterns, including any clique structures and clustering. Along with addressing questions of selection, the study uses these results to identify macro-structures of the network to determine if the networks are small world networks or scale free networks. This will identify connection patterns across the whole of the network, indicating system-level patterns of interaction and selection. These analyses are performed for both cases and their results are presented in Chapters 5 and 6.

3.3.2.2 Dynamic Network Analysis

Developing more complicated models like the metanetworks and dynamic network analysis requires very rich data to support a very detailed database. The data used in this study

are detailed enough to support to support dynamic network analysis. The data also contain details on the day of publication of the report. It is less consistent in terms of specifying on which days actions occur. For that reason, the dynamic model will utilize monthly time slices. Table 3-3 lists the timeslices for each case. The timeslices were chosen to match the availability of data to measure capacity and effectiveness, ensuring that data for all three concept variables are present in the same timeslice. Slicing the data monthly created an anomaly in the Haiti data time frames. Detailed data become available following the 12 January 2010 Earthquake. The immediate post-earthquake period is defined as the first three weeks following the disaster, running 12 January – 1 February, since this is the standard period for the scope of a large-scale response to a natural disaster, during which the system develops and lasting patterns take hold (Comfort, Siciliano, and Okada, 2011; Scheinert and Konstantinova, 2011; Comfort, 1999). The analyses performed for the static network analysis are repeated for each of the six time slices listed below. This method charts changes in key entities and network structures across time and allows for measurement of changes from the initial conditions for each case, which will be presented in Chapter 4.

Table 3-3. Network Timeslices

Timeslice	Bosnia and Herzegovina	Haiti
1	December, 2000	12 – 31 January, 2010
2	July, 2001	1 February 2010
3	January, 2002	June, 2010

3.3.3 Simulation Analysis

Each of the above analyses only covers part of the picture. Network analyses can provide rich results on the shape of networks and the flow of information through them, providing details on the flow of resources and the amount of resilience. The factor analysis can tie capacity and resilience to effectiveness, but only in a limited sense. The complexity frameworks that this study utilizes are necessary because complex adaptive systems violate several of the fundamental assumptions of statistical analysis. In networks, observations are not independent of each other, but closely tied through patterns of connections, network roles, and path dependency (Butts, 2009; Johnson, 2001; Axelrod and Cohen, 2000; Holland, 1995, 1992). The effects of non-linear results in complex systems suggests that effectiveness observed in a specific interaction may not be the product of that interaction, but rather the product of other interactions. Indeed, this pattern is regularly observed in the data; often the results of completed aid tasks and aid donations occur in an interaction separate from that which saw the resilient action that produced the desired outcome. The result is that often the resilient actions that appear to precipitate an effective result occur much earlier in the data than the observed effectiveness, sometimes even in a different timeslice. Additionally, multiple actions are often required to generate enough impact to register a measure of effectiveness. This is another characteristic of complex systems (Johnson, 2001; Provan and Milward, 2001; Holland, 1995, 1992; Prigogine, 1984). Factor analysis provides no means for addressing these short comings.

To address these shortcomings, this study utilizes computer simulation to build a dynamic model of a post-conflict reconstruction system and test hypotheses about variations in the system. With its near infinite flexibility, this method allows for operationalization of variables in ways more similar to the actual structure of the data generating process, providing

tools to social scientists that are not available elsewhere (National Research Council, 2006; Gilbert and Troitzsch, 2005). The method requires extensive preparation to build a valid model. The study applies the results from all the preceding analyses, IAD, factor analysis, and network analysis to develop and validate a simulation model. This model is built using the AnyLogic software package published by XJTek. This software allows for embedding a network in an agent based simulation model that in turn supports a system dynamics model. This is the basic method that this study uses; agents move through various states that impact the entry of resources into the system and the rate of aid task completion, the two clearly measureable components of effectiveness. The movement of organizations through states provides the Presence on the Ground component of resilience. The entry of resources provides the capacity measure while the rate of network connections and connection utilization determines the level of coordination and adaptation that are the other components of resilience. The numbers that the simulation applies are derived from the empirical results of the factor and network analyses. The construction of this simulation is a large and complex task, with many parts. Appendix B contains the full design notes of the simulation. The simulation will provide the final step of the analysis, drawing together the results from all the preceding analyses.

3.3.4 Summary of Methods

Taken together, this research draws from a variety of data sources to cover two primary cases of UN intervention in domestic affairs, Bosnia and Herzegovina and Haiti, one of which splits into two distinct periods. Each of these cases has distinct initial conditions that serves as a baseline for the case. Each case has separate data sources, determined by history and availability. Table 3-4 summarizes the structure of the study, as described above; it lays out how the cases compare

and the standpoints from which the study analyzes, and ultimately compares and contrasts, each case to build the final conclusions.

Table 3-4. Logic of the Argument Summary

Case	Haiti		Bosnia – Herzegovina
Study Period	2004 – Earthquake	Earthquake – December, 2010	1992 – 31 December 2002
Time of Initial Conditions	2004 Internal Ouster of Aristide		1992 Ceasefire Agreement 1995 Dayton Accords
Initiating Documents	UNSC Res. 1542 (2004)		UNSCR Res. 743 (1992) UNSC Res. 1035 (1995)
Data Sources	Formal Reports, MINUSTAH sitreps	OCHA sitreps, CAP documents	IFOR/SFOR CIMIC documents, formal reports, CAP documents, Content of Newspapers
Data Validation	Semi – Structured Interviews		Semi – Structured Interviews
Network Analysis	Static and Dynamic Network Analysis		Static and Dynamic Network Analysis
System Analysis	IAD to describe rules; Factor Analysis of Component Variable Scores		IAD; Factor Analysis of Component Scores
Integration of Findings	Comparison of Factor Results; Simulation Analysis		

This is still a complicated table, summarizing the mixed methods that are required to address a complex policy problem where no one data source does or can provide all the required data. There are multiple roles for the data to play, and certain portions of the data can fill multiple roles, while other portions cannot. Each role is an important piece of the analysis, and all roles must be filled to complete the analysis. This is true as well for the analytic methods. The research questions posed approach a system from multiple angles, requiring multiple approaches to address them all. Table 3-5 lays out the connections between research questions,

data, and analytic methods. It shows which data and methods this study uses to answer each research question.

Table 3-5. Summary of Research Questions, Data, and Analytic Methods

Research Question	Data	Analytic Method
Who are the actors?	Situation Reports, Content of Newspapers, CIMIC Documents	Network Analysis
What are the system rules?	Formal Reports, UNSC Resolutions, CAP Documents, Expert Interviews	Field Visits, Factor Analysis
What are the patterns of interaction?	Situation Reports, Content of Newspapers, CIMIC Documents	Network Analysis
How do actors select actions?	Situation Reports, Content of Newspapers, CIMIC Documents	Network Analysis, Simulation
How do actors select which actors with whom they will interact?	Situation Reports, Content of Newspapers, CIMIC Documents	Network Analysis
What are the patterns of variation in the data covered in the preceding questions?	Situation Reports, Content of Newspapers, CIMIC Documents	Network Analysis, Simulation

3.3.5 Research Validity

The validity of the research rests largely on the quality of definitions and measures used for the primary research concepts, resilience, capacity, and effectiveness. These are each complicated concepts, open to a variety of definitions and interpretations. This research explores these definitions and offers a fresh conceptualization of the requirements for an effective UN intervention to stabilize a conflict zone. Any conclusions that this research may support will include promoting the use of the definitions it proposes for understanding its key variables in future research.

Social network analysis and simulation face the shortcomings inherent in all modeling methods. Much of network analysis and simulation are built on the idea of modeling real world

events. The networks represent models of actions that people or organizations or another class of actors took and with which other actors they took those actions. Simulations represent action, outputs, and outcomes with even greater abstraction than network analysis uses. Network analysis and simulation still require simplifying assumptions that hide the full richness and complexity of a situation, even as they reach to grasp more of the complexity of a phenomenon than more established methods do. Butts (2009) lays these issues out clearly and succinctly. By exploring the way researchers define nodes and edges in a network, the mathematical terms for a network's representation of an interaction, and how they simplify and operationalize their definitions to build a model, Butts shows how improper definitions lead the researcher astray. Network analysis and complexity approaches still require the researcher to make assumptions, since it is still a modeling task. These methods do not give license for a non-rigorous approach to research utilizing them, but rather a framework in which to grasp greater complexity and account for changing situations.

3.3.6 Expected Findings

In previous unpublished work, Scheinert (2009) finds some evidence that response and reconstruction efforts do not build or utilize the feedback mechanisms that are part of resilient structures. He finds reports that noted that, in financing reconstruction grants and projects, the World Bank and other funding organizations considered methods of reviewing the success or continued appropriateness of grants already awarded in their aid program for East Timor. The only review done was to determine whether or not projects adhered to their grant applications (Schiavo-Campo, 2003), not whether they had the intended impacts or whether a new approach to that impact should be attempted, or if the impact itself remained appropriate. Prepared in

2003, it was not yet obvious what the full ramifications would be. Ten years after the conflict, the situation in East Timor began to break down again, as it suffered through continued economic stagnation. Without deeper study or the thorough testing of alternative hypotheses, this example gives some reason to expect the hypothesis of this research to be born out in the data.

This study's final step is exploring explanations for the continued failure of reconstruction and nation-building efforts despite the enormous resources that states and international organizations and international aid groups devote to the task. First, the primary hypothesis, that both resilience and capacity are needed, will be disproven if all the aspects of both are observed in a case but the case does not contain any markers of effectiveness, including resumed conflict or economic stagnation and break down that is disproportionate to global economic situations. This analysis requires evidence of communication about the changes in the situation, adaptation in the mission to adjust to the changes, followed by a lack of change in outcomes. Since the ability to sort valid from invalid information is part of a resilient system, then changes from failure to failure and effectiveness to failure brought about through network communication will provide evidence against the primary hypothesis.

Alternate explanations include that the UN missions are poorly planned beforehand, so that they cannot execute the mission or that missions do not properly account for the local situation. Related to this explanation is the view that the missions continually define effectiveness in unachievable and inappropriate ways. This view leads to missions that are doomed to failure from the beginning. If these hypotheses perform better, then they should be adopted. I will consider these possibilities in light of the findings.

A third alternative is that a mission may still fail if it does not carefully consider the situation's "initial conditions" in its mission design. If this is the case, either the factions that existed prior the mission will continue to operate or a coherent system between national and international actors that could generate a viable, working system will fail to develop. So long as a mission is able to circulate information about risk and about its own adaptations, then even a mission with a faulty initial design may reorganize itself into a new design that is likely to be less faulty. While this perspective lengthens a mission's timeline and increases the overall costs of crisis that spawned the response, it could still produce an effective mission. Poor initial research by policy makers on the history of the area and its current situation does not necessarily eliminate a mission's ability to be effective.

4.0 INITIAL CONDITIONS

As discussed in Chapter 1, using complex adaptive systems frameworks to compare the effectiveness of mission structures requires comparing how each case improved from that case's baseline. The method does not compare the cases directly, but rather compares cases from within each case's context. This chapter will lay out how the baseline is defined, including setting out what sets of conditions constitute the Initial Conditions of a case. After defining initial conditions, the chapter presents and analyzes the conditions in each case that characterize each case's initial conditions. Finally, the chapter compares the initial conditions across cases to verify the comparability of the cases, as well as provide a sense of the relative positions of the baselines for Bosnia-Herzegovina and Haiti. As the opening stage of this study, this approach will ground each case in its context and provide a basis for comparing and contrasting the two cases.

4.1 ROLE AND STATE OF INITIAL CONDITIONS

4.1.1 Baseline for Analysis

As mentioned above and discussed more fully in Chapter 1, initial conditions provide the baseline for measuring change in a system over time. Among its other contributions, Comfort's

work *Shared Risk* (1999) lays out the importance of initial conditions in assessing complex systems. The role that initial conditions play is fundamentally the same role as control groups in a laboratory experiment, a placebo group in a drug trial, control variables in cross-sectional and panel data statistical regressions (Kennedy, 2003), or controls for nonstationarity in time series statistical analysis (Pindyck and Rubenfeld, 1998). To chart the degree of change, the researcher must set a baseline from which to measure that change. Without that baseline, measurement is impossible, and without that measurement of change, analysis is, in turn, impossible. One of the innovations of disaster preparedness and response that *Shared Risk* makes is to set initial conditions as this kind of control mechanism for the analysis of complex systems, and then to define the key conditions that constitute a case's initial conditions.

4.1.2 Constituent Conditions

Defining the set of initial conditions for a complex adaptive system first requires defining what set of conditions make up the initial conditions. In *Shared Risk*, Comfort defines initial conditions as, "the existing state of the community at risk prior to a specific hazardous event. It includes the basic resources available for learning and action, as well as the current operating context of the community" (1999, 34). This is a broad definition that sets the basic formulation that initial conditions represent the pre-extreme event context in which the event and the subsequent response will later take place. Comfort further refines that definition, "as the existing state of technical, organizational, and cultural practices in the community prior to the occurrence of a given disaster event" (1999, 41). These three aspects represent the full context of a response to a natural disaster. The state of technical practices provides a basis for the set of tools and infrastructure that the response will have at its disposal. The organizational practices will detail

the laws and set of organizations, including government actors, within which a response must work. The cultural practices, finally, define the means and methods a responder must utilize to work with the other individuals involved in the response. Taken together, these are the full set of contextual practices for the operation of a response, and so define the set of states and practices that define initial conditions for a complex adaptive system.

At an even more fundamental level than the questions for analysis that they present, the complex adaptive systems analysis frameworks, presented throughout Chapters 1, 2, and 3, layout the key understanding that any complex system exists by its own context and rules and that analyzing one requires analyzing it according to its own context and rules. The indication for initial conditions is that these conditions will be a function of the rules and context of the specific system. What this means is that the technical, organizational, and cultural practices present in the initial conditions will depend on the locality of the response. The consequence for any analysis is that each case under study will require an independent assessment of the initial conditions of that case in reference to locality.

The type of extreme event will impact the relevant set of initial conditions. In the case of conflict, these conditions will further embed in the political and economic conditions that precipitated the conflict; in these cases risk represents the risk of conflict occurrence or recurrence, where the initial conditions include the post-conflict state of the arguments that caused the initial conflict. In the cases that Comfort (1999) analyzes, this is not part of the context since, while the response is certainly political, and the argument about causes may be political too,[11] the advent and fact of the disaster is not political. In an armed conflict, the causes are inherently political, and often have an economic aspect. The result is that, in a conflict

[11] The patterns that flooding in New Orleans took after Hurricane Katrina represent a situation where the flooding in the individual neighborhoods, particularly the Lower 9th Ward, took on a political dimension.

situation, the initial conditions include the state of political, economic, and organizational conditions. In this list, aspects of Comfort's original list change some places. With a larger importance on political conditions, some aspects of the organizational and cultural practices shift to the political conditions, while others shift to the economic conditions. These are the organizational conditions along with the state of communications technology and physical infrastructure that govern the operations of organizations at all levels. This provides a slightly different list of initial conditions for a post-conflict situation than for a post-natural disaster situation. The change in causes of the extreme event lead to a change in focus of the initial conditions, making political conditions more important following a conflict than following a natural disaster.

These conditions, political, economic, and organizational, form the initial conditions to the conflict event. The initial conditions of the response also include the events of the conflict, especially including the events that ended the active fighting, since the pre-war conditions, the conflict, and its termination, are all closely connected, and jointly, through the path dependency of complex systems, define context of any post-conflict reconstruction. This is the approach utilized by this study. In the context of post-conflict stabilization and reconstruction, I define initial conditions as the political, economic, and organizational conditions that existed prior to, and developed during, the conflict. To analyze these conditions, I present first the pre-conflict conditions, then the key aspects and events of the conflict, and how the conflict ended to properly seat the post-conflict environment in its historical context.

4.2 INITIAL CONDITIONS IN BOSNIA-HERZEGOVINA

In its broadest strokes, the initial conditions of the UN stabilization and reconstruction mission in Bosnia-Herzegovina lie in the end of European communism and the wars that occurred throughout the former Yugoslavia as that state broke up. The fracture lines of Yugoslavia's constituent ethnicities drove this break up and the break up, in turn, followed along these lines, with new political borders forming along Yugoslavia's standing ethnic borders (Hayden, 2000). The political, economic, and organizational conditions that existed in Bosnia at the start of stabilization and reconstruction efforts will, therefore, be the conditions that existed by end of the Bosnian War, and the resultant levels of infrastructure destruction, ethnic relations, and the remnants of economic activities following the impacts of a war that also disrupted the transition from a command economy to a market economy.

4.2.1 Political Conditions

The dominant aspect of political organization in Bosnia is the distribution of the nations present within Bosnia, the Bosniaks, Croats, and Serbs. A single, simple logic has defined political and social structures within the borders of Bosnia, since before the former Socialist Federal Republic of Yugoslavia. This logic is that, "the Bosniaks, Croats and Serbs form separate groups and the politics fall into line accordingly" (Hayden, 2011). These three groups constitute nearly all of the Bosnian population. In popular American parlance, they would be called Bosnia's main ethnic groups. A key aspect for understanding the relations between these ethnicities, particularly as communist states broke apart in Europe and Asia, is the parlance in the Balkans uses a different term, "nation." This usage follows the definition that the term nation has as part

of the academic jargon of the international relations field; it follows the definition of nation discussed throughout chapters 1 and 2 that makes the concept of nation-building so problematic. In this parlance, nation-building is the building of a national consciousness, and a nation-state is one whose state borders correspond to national borders (Hayden, 2011). When Yugoslavia would ultimately break up, the new borders would develop to follow those national divisions. Through the rest of Yugoslavia, this was relatively simple since the rest of state's federal units each contained a population that was largely ethnically homogenous. In Bosnia, in the geographic center of Yugoslavia, these lines would cross, and so set the stage for a contest over whether or not, and how, to change them (Burg and Shoup, 1999).

4.2.1.1 Bosnian Nations

To a more optimistic observer, it would seem the answer to this would be to initiate an externally-driven effort at actual nation-building, to build a Bosnian nation from the Bosniaks, Bosnian Croats, and Bosnian Serbs. This goal would be optimistic nearly to point of naiveté. A great deal of ink has been spilled by specialists on the relations of Balkan nations by scholars both from the Balkans and from outside. This discussion consistently focuses on the continued strife and distrust between so many of them, particularly those present in Bosnia. The history of the area is one of shifting imperial conquests and borders. After sitting astride Roman and Byzantine borders, the medieval Banate and Kingdom of Bosnia would first be overrun by, and then see the high water mark of, the Ottoman Turks, whose influence would lead some ethnic Serbs to convert from Serbian Orthodox to Muslim, and so make the Bosniak nation. Bosnia's northern border with Croatia would hold for a long time as the highly militarized border between the Ottoman and Austrian empires, with each side placing militarized Serbian populations on opposing sides of the border (Burg and Shoup, 1999). These regions, one in Croatia and one in

northern Bosnia, still have large Serb populations, and are referred to as a *krajina*, the Serbo-Croatian word for a military border. When the Ottomans withdrew, the Austro-Hungarians took over. After World War I, when the Austria-Hungary broke up, Bosnia would become part of the Kingdom of Yugoslavia, under the pre-war Serbian royal family. Finally, after World War II, it would be an important part of Marshall Josip Broz Tito's power base in the Socialist Federal Republic of Yugoslavia. Through all the ebb and flow of empires, the various nations would sometimes fall on different sides of the border and in different armies, sometimes on the same sides.

Throughout these periods, one or another nation would rule over the others. Under Ottoman rule, this was the Bosniaks. To this day, Serbs and Croats still refer to Bosniaks as "Turks" (Bosnia Respondent 2). During World War II, a fascist Croatian state would oppress the other nations, and Serbs dominated during the Kingdom of Yugoslavia. This history helped generate the resistance of Bosniak leaders to greater Serb centralization after Tito's death (Hayden, 2000; Burg and Shoup, 1999). Scholars have noted how national identities in Bosnia were at least as much about who was not a member as they were about finding members with shared language, history, and customs (Hayden, 2011, 2005; *Balkan Battlegrounds: Volume 1*, 2002; Burg and Shoup, 1999), but it took a fiction writer to truly express the subtleties and complexities of the situation. Ivo Andric, himself Bosnian, captured the tensions in his Nobel Prize winning novel *The Bridge of the Drina* (1945). Based in historical events, the novel captures life in a small town in Eastern Bosnia, Visegrad. No Croats are present in this town, but Serbs, Bosniaks, and Jews are present. National identity is rarely discussed openly in the minds and discussions of the characters, but it is an ever-present factor in decisions on who can and cannot be trusted, on what places in society were accessible. Town leaders always contained at

least one member from the present nationalities, though sometimes one member of that group would be closer to the ruling empire, so long as all three did not see that empire as an outsider. Cross-national relationships could form, but were rare. Scholars have found this pattern where, mostly in cities, and in Sarajevo above the rest, national identity could fade away at the personal level, but only slowly (Burg and Shoup, 1999). In 1981, 5.4% of the Yugoslav population self-identified as "Yugoslav" (Ramet, 1984, 21). By 1991, this had not expanded; throughout Bosnia, only six cities would see self-identification of "Yugoslavs" reach 10% of the population or more. Table 4-1 lists those cities, including the neighborhoods and surrounds of Sarajevo, which are included as a comparison, since they follow similar patterns to the cities outside of the six with the largest "Yugoslav" populations (Burg and Shoup, 1999, 30-32).

Table 4-1. Bosnian Cities with "Yugoslav" Populations of 10% or More in 1991

City	Percentage "Yugoslav"
Banja Luka	12.0
Bosanski Brod	10.6
Mostar	10.0
Tuzla	16.6
Zenica	10.8
Sarajevo	
Centar	16.4
Hadzici	3.4
Ilidza	7.6
Ilijas	4.6
Novi Grad	11.4
Novo Sarajevo	15.8
Pale	2.4
Stari Grad	6.4
Trnovo	1.0
Vogosca	7.0

The picture that remains is a complicated one. It has a simple, primary rule; the members of the three separate nations live separately in the same communities. Under the right conditions, the

members of the community can mix, and the lines between nations blur. The Bosniak population actively sought peaceful relations between the various Yugoslav nations (Burg and Shoup, 1999), but this blurring only happens slowly over time, at a rate that has been insufficient to generate any kind of Bosnian nation between a new set of events that re-solidify distrust among the members of the nation.

4.2.1.2 Yugoslav Federalism

Even while it is a simplification of the truth, the maxim that Yugoslav nations form separate communities and that politics falls into line with those is still accurate. That the break-up of Yugoslavia followed along internal national borders is a product of how Yugoslav domestic structures treated those borders and how domestic politics flowed from them (Hayden, 2000). Ethnic tensions persisted right through World War I, despite Austrian efforts to downplay it. The tensions continued through the Kingdom of Yugoslavia, where the tensions between Croats and Serbs created multiple governmental and constitutional crises (Burg and Shoup, 1999). The Socialist Federation Yugoslavia had some success in addressing "the national question" by first suppressing nationalist expression (Burg and Shoup, 1999) while also providing separate, parallel political tracks and spheres for members of the different nationalities (Hayden, 2011).

It still took Tito's leadership and strength to hold the state together (Ramet, 1984). When Tito died, no new leader was able to step up and fill the leadership role. To fill this role, the state devolved more power onto several federal republics, including two independent provinces within the Serbian republic. Each republic roughly matched the national homeland of one nation or another, including Serbs, Croats, Slovenes, Montenegrins, and Macedonians. The exception was Bosnia-Herzegovina, with no majority nation. Ramet's study (1984) aimed to find out why these

republics had separated. Ramet's study finds that the republics worked largely independent of each other, in a way that resembled an international balance of power system, with shifting alliances, and careful strategic calculations about when to negotiate and when to provoke a crisis to protect its own interests. Even this formulation would begin to break down, and ultimately fail in the late 1980's and early 1990's when the first free elections since World War II saw support for nationalist political parties grow, with more willingness to use crises to defend their interests, which were more and more narrowly defined, until Yugoslavia would finally break apart amidst a series of constitutional and governmental crises; even popular leadership following Tito had been unable to hold the country together (Hayden, 2000).

4.2.2 Economic Conditions

Scholarship on the start of the Bosnian War largely ignores the economic conditions in Yugoslavia as the country broke up and the war began. Researchers seem satisfied with explanations from nationalism and political crises. These explanations, touched upon above, are rich and complete and generally do not require additional economic data to paint a full picture. Where the economic conditions loom larger is in establishing the immediate post-war conditions. Hayden (2000) makes it clear that the break-up of Yugoslavia was not inevitable, even with Tito's death. Economic ties remained across republican borders and the 1970's and 1980's had seen dramatic increases in the amount of cross-national marriage and individuals self-identifying as "Yugoslavs" (Hayden, 2000). Still, the break-up occurred, severing those ties just as socialist economic models lost their legitimacy. The economic rules changed as markets became freer, and some radically so as black markets asserted themselves under the cover of the war and sieges in Bihac, Srebrenica, and Sarajevo (Andreas, 2008; *Balkan Battlegrounds, Vol. 1,* 2002). What

impacts these events had or would have had in Bosnia are difficult to assess, as the war quickly followed them, bringing its own dislocations, destruction, and new industry.

This pattern then repeated as Bosnia ripped itself apart in the war, creating mass population dislocation and directly destroying infrastructure and economic bases, all at the same time as the war dramatically shifted the location of wealth and expanded organized crime, particularly in the besieged cities (Andreas, 2008; *Balkan Battlegrounds, Vol. 1*, 2002; Burg and Shoup, 1999). The war did have some creative abilities, as nearly all wars do. War requires the production of arms and munitions. These industries, along with the majority of Yugoslavia's industrial base had been located elsewhere, primarily in Slovenia and Croatia (Bosnia Respondent 2, 2011; *Balkan Battlegrounds, Vol. 1*, 2002). Now largely cutoff from those supply bases, and, particularly for the Bosniaks, with a great need for those supplies, a small industrial base in munitions did develop, even as most efforts went into finding ways to import arms and munitions from abroad (*Balkan Battlegrounds, Vol. 1*, 2002). Nevertheless, by 1995, the war had eliminated roughly 80% of Bosnian economic output and led to enormous unemployment ("Bosnia and Herzegovina", 2012). The result is that, at the time of the start of reconstruction, there was very little economic activity to speak of, despite the lack of economic causes to the war.

4.2.3 Organizational Capacity

The story on Bosnian organizational capacity is very similar to that of the economic conditions. The communist era had seen enough peace to support the development of a reliable infrastructure within the technology available in the early 1990's. Impressive communist-era infrastructure projects, particularly road and rail bridges through the mountainous region are still readily visible

today.[12] The infrastructure technology used prior to the war was still that of most Eastern Bloc countries, electrical grid designs even through to today that have not been common in the cities of North America and Western Europe since before World War II, including streetcar designs and overhead electrical wires in the cities in portions of some cities. The designs may be dated, but the electrical grid was reliable throughout the war, except in besieged cities; Sarajevo did not have reliable electrical power during the war, due to being cut off by the besieging Serb forces. Cellular technology is ubiquitous in Bosnia today, but had not yet been developed in the early 1990's. Instead, military communications were conducted by radio (*Balkans Battlegrounds, Vol. 1*, 2002). While it was certainly damaged, infrastructure generally was not the main target of the military combatants, and so came through the war in better condition that might have been expected.

The challenging aspect of the state of the organizational capacity in Bosnia after the war came from the transition to a market economy and the duplication of infrastructure and utility providers that resulted from each nation operating its own utilities and transportation firms. First, under Yugoslavia, these firms had been government-owned enterprises, a status that would not have time to change prior to the start of the war. Instead, the international community, through the Office of the High Representative (OHR) would lead an effort to privatize government-owned businesses after the signing of the Dayton Accords (OHR Website). During the war, the separate nations needed these separate utilities, since any other utility lay across enemy lines, and each side of the three-way war received different levels of support. The Serb forces, the Vojska Republika Srpska (VRS) had received military material, both arms and logistical support from the Yugoslav National Army (JNA), as it retrenched after Croatian

[12] This study's author observed them first hand during field work in Bosnia and Herzegovina.

secession. The Croat forces, the Croatian Defense Council (HVO) received a more grudging, and less thorough, support from the new Croatian Army (HV) that had just expelled the JNA from Croatia, but so far failed to assert control over the whole of the territory that Croatia claimed. The Bosniak forces (ARBiH), organized under the official Bosnian government was left to fend for itself (*Balkan Battlegrounds, Vol. 1*, 2002). After the war, the utilities continued operating in the separate geographic regions, and serving the same populations. This led to separate telecom companies serving different segments of the population and different rail companies that operated the trains in different parts of the country, but not doing so in market competition, but as the utility provider to either the Bosniaks, Croats, or Serbs, but not to other two. The post-war period would include efforts to unify these utilities (OHR Media Round-ups), particularly within the Federation of Bosnia and Herzegovina (FBiH), where that entity contained both the Croat and Bosniak populations. Utilities needed to be repaired and restored, but more than the physical infrastructure, the challenge was in addressing the duplication of utilities across nationalities.

4.2.4 The 1992 – 1995 Bosnian War

It is not necessary here to review the entirety of the military operations of the three year long war. Several aspects are particularly important and have particularly important bearings the post-war period. In broad strokes, the Bosnian War was a three way war between the three nations, the recitation of whose names should now be familiar. It featured shifting alliances, particularly between the Bosniaks and Croats, who both opposed the Serbs in the first year, fought each other in the second, and then allied and coordinated together against the Serbs in the third year. In that first year, the Serbs seized control of much of the country. In the last year,

NATO began airstrikes against the Serbs to defend the UNPROFOR safe areas in eastern Bosnia. Most western observers credit those airstrikes with forcing an end to the fighting (*Balkan Battlegrounds, Vol. 1*, 2002), but this is only a truly convincing argument when the battlefield success of the Croat and Bosniak alliance is ignored (Bosnia Respondent 1, 2011).

At the same time as the airstrikes, Croatia launched Operation Storm that conquered the Republic of Serb Krajina (RSK), the remaining Serbian enclave in the internationally recognized Croatian borders. Croatia had been unable to seize control of this largely Serb-populated statelet during its own war for independence, and so had been forced to accept an autonomous region within Croatia. In 1995, Operation Storm eliminated the RSK and exposed the VRS's eastern flank. That summer, Operation Mistral followed Operation Storm as a combined and coordinated Bosniak and Croat attack drove through Serb-controlled lands in western Bosnia, nearly reaching the large cities, including the Serb capital, Banja Luka, in the Bosnian Krajina, in northwest Bosnia. This offensive relieved the Serb siege of the Bosniak-held Bihac pocket in the far northwest corner of Bosnia, thereby freeing the forces necessary to finally lift the siege of Sarajevo that had started in 1992, and put sufficient pressure on Serb forces and population centers to drive the Serbs to the peace table in earnest (Bosnia Respondent 1, 2011; *Balkan Battlegrounds, Vol. 1,* 2002). The Dayton negotiations had already begun by the time this operation ended, so that it was a lasting ceasefire that would lift the siege of Sarajevo, not military force.

This resolution asserted a military balance of power that left no clear winner to the war. The war had been fought over national goals, to establish and validate a national majority for the would-be winning side. The remaining power of the VRS and the memory of its effectiveness from the first year of the war meant that the Croats and Bosniaks were ready to negotiate, even

as they had established an advantage on the battlefield of sufficient strength that the Serbs were forced to recognize their vulnerability (*Balkan Battlegrounds, Vol. 1*, 2002; Chandler, 2000; Burg and Shoup, 1999). The result is that the main issue that led to the war was not resolved on the battlefield (Chandler, 2000). Instead, the new state would have to find a way to peacefully include all sides of the former combatants, with each asserting some claims to victory.

In this kind of ethnic war, infrastructure was not a main target, but the very population itself was. It was that goal, the adjustment of the national balance and the establishment of a majority nation, which made the ethnic cleansing activities that would grab the attention of an international audience so desirable to the belligerents. The most infamous event is, without a doubt, what happened in the UN enclave around Srebrenica, in 1995, but it is far from the only incident, and no side was innocent of ethnic cleansing (*Balkan Battlegrounds, Vol. 1*, 2002). Refugee populations streamed from every corner of Bosnia, drawing the attention of the UN High Commission for Refugees (UNHCR). In connection with UNPROFOR, the UNHCR, already active in the region following humanitarian efforts in Croatia and based in Sarajevo, began humanitarian efforts to support civilian populations. The most visible part of this effort was the UNHCR-organized and operated airlift, which ultimately delivered more aid than any airlift in human history, including the 1948 Berlin Airlift, to the population suffering under the longest siege in human history[13] (Andreas, 2008; *Balkan Battlegrounds, Vol. 1*, 2002; Burg and Shoup, 1999). Despite their efforts, UNPROFOR and the UNHCR would be unable to prevent ethnic cleansing, including failing to defend the UN Protected Area in Srebrenica.

[13] Andreas (2008) also argues that the airlift was a key factor in allowing the siege to last so long, since it allowed the citizens of Sarajevo to hold out against the siege far longer than they would otherwise have been able without the supplies that the airlift provided.

4.2.5 Post-War Political Organization

Fighting in the Bosnian War ended with the 1995 Dayton Accords. By the time the leaders in Bosnia reached this agreement, they had already negotiated several different cease fires with international involvement, none of which had held (*Balkan Battlegrounds, Vol. 1*, 2002; Burg and Shoup, 1999). The various armies had, instead, used them as a way to try and buy time for themselves to gain tactical and strategic advantages on the battlefield while not courting the kind of international opposition that the Serbs would eventually garner following the events in Srebrenica. In the end, a combination of strategic balance and war weariness allowed the ceasefire and accords to hold (*Balkan Battlegrounds, Vol. 1*, 2002). The main document of the Dayton Accords contains little more than agreements to adhere to various main pieces of international law, such as the United Nations Charter, and to cooperate fully with all involved parties. The main substance of the Accords is in the 11 Annexes, which defined the post-war political structure.

4.2.5.1 The Bosnian Constitution

The current Bosnian Constitution is Annex 4 to the Accords, signed by heads of government of Bosnia, Croatia, and Yugoslavia.[14] The Bosnian Constitution is designed to protect the access to power for all three nations, while also balancing them against each other. The main feature split the country into two entities: the Republika Srpska (RS) and the Federation of Bosnia and Herzegovina (FBiH). The RS was reserved as the Serb entity and

[14] This was prior to the renaming of Yugoslavia as Serbia and Montenegro that followed the ouster of then-Yugoslav President Slobodan Milosevic and the international conference in Rambouillet, France that ended fighting in Kosovo.

accorded 49% of the territory of the Republic of Bosnia and Herzegovina (BiH). The FBiH contains the rest of the territory of BiH and is further subdivided into 10 cantons, 5 of which are Bosniak majority, 3 Croat, and 2 mixed between Bosniaks and Croats. The Constitution also features a tripartite presidency, with one seat reserved for each of the nations, and a bicameral legislature with one house, the House of Peoples, which has five members from each nation, and the House of Representatives, with five members from the RS and ten members from the FBiH. In line with the goal to protect the rights of each nation, the Constitution created a federal structure that placed the majority of governing powers at the entity level, with many of the powers further devolved to the cantonal governments in the FBiH (Dayton Accords, 1995). This created a weak central government that is often undermined by uncooperative members of one nation or another and a lack of will for governing (Bosnia Respondents 8 and 9, 2011; OHR Media Round-ups; Chandler, 2000).

4.2.5.2 The Office of the High Representative

Annex 10 defines what it calls "Civilian Implementation." What this means in practice is the structure and powers of the Office of the High Representative. The office is held by an international official, appointed in conjunction with the United Nations and the European Union, and answerable to various international bodies, but not any BiH official or organization. The purpose of the office is to ensure nationalist pressures do not again create the atmosphere for war. To this end, the OHR is granted the power to do what it deems necessary to implement the Accords (Dayton Accords, 1995). Though these powers are not mentioned, that has meant in practice the ability to control access to the ballot, removing those who the office deems are unacceptable, and cancel laws and legislation that contravene peaceful goals and compel laws in

support of those goals in BiH (Hayden, 2011; Bose, 2002; OHR Media Round-ups; Chandler, 2000).

4.2.5.3 The IPTF, UNMIBH, and IFOR

Annex 11 established the International Police Task Force (IPTF) that would later join with UNPROFOR to the United Nations Mission and Bosnia and Herzegovina (UNMIBH). Formally established in UNSC Res. 1035 (1995), its inclusion in Annex 11 gave the IPTF legal grounds under Chapter 6 of the UN Charter. Under the IPTF, the mission had jurisdiction to advise, train, and support local law enforcement. When the IPTF expanded into UNMIBH, it added UNPROFOR activities including demining, humanitarian relief and refugees, human rights activities, oversight of elections, and physical reconstruction. These activities were to be done in close coordination with the OHR and NATO's IFOR ("Bosnia and Herzegovina," 2003), the military peacekeeping force, established under Annex 1A of the Dayton Accords (Dayton Accords, 1995). Between the four major international actors, OHR, IPTF, UNMIBH, and IFOR, the international community would oversee or control a large portion of post-war governance. The mandates for all of these stated outright that the goal was to hand over these tasks to the local government as the government became ready to handle them (OHR; "Bosnia and Herzegovina," 2003; "SFOR Mission," 2003). To date, only IPTF/UNMIBH has closed its mission. OHR still operates; IFOR became SFOR in September, 1996, which, in turn handed its responsibilities to the EU Force (EUFOR) on 2 December 2004, which still operates. These organizations formed a strong international contingent, legally established with ratification of the Dayton Accords.

4.3 INITIAL CONDITIONS IN HAITI

In its broadest strokes, the initial conditions of the UN stabilization and reconstruction in Haiti lie in the turbulent, and frequently violent, political climate that emerged in Haiti during the Duvalier dictatorship, but which continued well after the dictatorship's end. The main cleavage of Haitian society is that between the rich and the poor (Haiti Informants 1, 2, 3, and 6, 2010), which, like the fracture lines in Bosnia, played an important role in driving the conflict (Haiti Informants 2 and 5, 2010; ICG, 2004). The political, economic, and organizational conditions that existed in Haiti at the start of stabilization and reconstruction efforts will, therefore, be the conditions that existed following the on-going political instability that persisted after a series of electoral crises, and the level of infrastructure dilapidation following decades of neglect that were both cause and effect on decades of economic stagnation and extreme poverty.

4.3.1 Political Conditions

The roots of the 2005 uprising lie in the on-going turbulence of the Haitian polity following the ouster of the despotic Duvalier regime. A popular uprising in 1986 drove out "Baby Doc" Duvalier (ICG, 2004), offering the promise of peace and democracy. Instead, it ushered in a period of political turmoil and instability, with occasional violence, that has led many Haitians to remember the Duvalier years with surprising fondness, since, as repressive as it was, government at least functioned at that point, when today the political environment is defined by government and police corruption, organized crime, and a lack of faith in government by all segments of society (Haiti Informant 3, 2010).

4.3.1.1 Recent Historic Political Context

Haiti saw its election to be considered fair and free in 1990. It followed the departure of Jean-Claude "Baby Doc" Duvalier in 1986 and four years of troubled transition. Jean-Bertrand Aristide, the former Catholic priest and the leader of a center-left coalition, won a strong majority in the election, with 67% of the vote (ICG, 2004). Bridging a fundamental divide in Haitian society by being able to speak Haitian Creole in addition to the French spoken by the standing Haitian Elite, Aristide provided promise for reform and advancement in the lives of non-elite Haitians. He lacked, however, strong support from the very elite that had held power in Haiti, including the army and the business community. This lack of support turned into a military coup in 1991 that controlled the government until a UN-backed, US-led intervention deposed the military rulers and restored Aristide, in September, 1994 (ICG, 2004). The violence of the Duvalier's had driven a mass revolt against them, but then dissatisfaction among the elite had driven out Aristide. It required international intervention to restore him to power. While presenting the appearance of success, this was to be only the first act of on-going drama that has yet to resolve.

The second act would occur at the constitutional end of Aristide's first term. In an effort to promote the rule of law, the US secured Aristide's agreement to resign at the end of his term, in 1995, without the additional three years in power to replace his time in exile that Aristide wanted. This was only achieved, though, through strong diplomatic pressure. Aristide's desire to hold on to power would soon after produce a split between him and his hand-picked successor, Rene Preval (ICG, 2004). Aristide then withdrew his supporters from the coalition that supported Preval and started a governing crisis that, in 1998, would prevent effective rule by preventing the post of Prime Minister from being filled, stalling the government and

undermining foreign aid and credit (ICG, 2004). This time also saw a rise political violence as paramilitary gangs rose in prominence and impact, and drug trafficking and corruption spread in the Haitian National Police (HNP). The process finally ground to a complete halt when the Preval government was unable to organize local and parliamentary elections in late 1998. When the elections finally did occur, along with a presidential election, in 2000, voter turnout was low, monitors reported widespread irregularities, and the opposition largely boycotted the election. Aristide was re-elected with a huge, but questionable electoral margin (ICG, 2004). Aristide's return to power and the economic impacts of five troubled years in an already desperately poor country set to stage the third act of political crisis starting in 2001, and culminating directly in the fourth act, the armed insurgency of 2004, both of which will be discussed below.

4.3.1.2 Political Climate Prior to 2004

Table 4-2. Pattern of Haitian Social Cleavage

	Haitian Elite (the "Have's")	Haitian General Population (the "Have-not's")	International Actors
Wealth Level	High	Very Low	Variable/High
Language	French	Creole	English (Spanish in Caribbean interstate organizations)
Political Power	Yes	No	Limited

Much of Haitian political and economic activity is defined by the politico-economic cleavages that define Haitian society. Table 4-2 describes these cleavages. There are three separate, primary groups operating in Haiti, the "Have's," the "Have-not's," and the international actors. Their separation from each other is near complete, with only special cases and certain

sub-classes each group having much interaction across dividing lines, which will be discussed in Chapter 6. The two fundamental divisions are language and wealth. Wealthy Haitians, the Elite, of either race, whether white or black, live in large estates in the hills outside above cities like Port-au-Prince. The property they do hold in the city is behind the walls of gated compounds, and their wealth allows them to hire private security firms to protect both, and to maintain private sources for utilities, such as electrical generators, so that they are not subject to inconsistent Haitian utility infrastructure. Finally, they signal to all their status by speaking French. In these ways, they create a segregated community for themselves, separated from the crime and poverty on the streets (Haiti Informants 1, 2, and 3, 2010), and do so in ways that are clearly observable from the street.

This is set in opposition to the Haitian poor, who lack any resources to have recourse to escape the daily challenges created by overly crowded streets, unreliable utilities, and densely packed, overcrowded housing. Theirs is the Haitian Creole that identifies them to each other in unregulated street business and any political discourse. Aristide endeared himself to this population by using that Creole. For the urban poor, they are subject to the crime and poverty in which they are perpetually embedded, and which makes it difficult for any one individual to escape this circumstance. For the rural poor, access to utilities and services such as health and education is unlikely, living in small villages largely disconnected by poorly maintained roads that make travel difficult much beyond the village (Haiti Informant 3, 2010). In some ways, these are two separate communities of the poor, who face different kinds of poverty, but still both face extreme poverty, and have more in common with each other than with either the wealthy or the international community.

Finally, the international community operates within its own sphere. Though some small aid groups do embed themselves in the Haitian population, primarily outside of Port-au-Prince in both small cities and in rural areas, the international community generally walls itself off from the local population. The aid community does this due to the history of crime and violence, including kidnapping for ransom (Haitian Informant 5, 2010). Most interaction with either of the other groups that does occur courts involvement and support of Haitian governing institutions under considerations of international law to gain legal basis for their operations. They too separate themselves by language as well, primarily working in English, and sometimes in Spanish. Though the separation here is not by means of geography and physical walls, the way it is for the Haitian wealthy, it is just as complete with language and security cordons.

4.3.2 Economic Conditions

The story of Haiti's economic conditions is well known. Among development researchers, Haiti's status as being among the poorest of the poor is well established. As of 2004, the World Bank listed Haiti officially as a Low Income Country. That category is defined as the countries with annual per capita income of less than US$765 (Sachs, 2005, Map 9). As of 2005, 54% of the Haitian population lived on less than US$1 per day, and 78% on less than US$2 per day, with a Gross National Income (GNI) per capita of only $450 per year. Through the middle of the 1990's, Haiti saw four continuous years of economic contraction, with one of those, 1992, seeing a greater than 10% drop in Gross Domestic Product (GDP) and GDP per capita, and another, 1994 seeing almost a 10% drop in both GDP and GDP per capita. Haiti did see small amounts of economic growth after 1995, but only until 2000, when it against turns negative, but only small amounts of contraction until 2005, when the data again shows growth ("Haiti at a Glance,"

2006). The picture is even worse when viewing World Bank Governance Indicators. These are five indicators that rank countries relative to each other on Voice and accountability, Political stability, Regulatory quality, Rule of law, and Control of corruption. Ranked in 2000 and in 2004, only Regulatory quality increased, and only the 2000 ranking on Voice and accountability reached the 25th percentile of countries. By 2004, Voice and accountability, Political stability, and Control of corruption all saw stark drops in the percentile obtained ("Haiti at a Glance," 2006). A participant in the World Bank's Heavily Indebted Poor Countries program ("Heavily Indebted Poor Countries," 2012), the picture these data paint is a clear one of extensive poverty. There is, effectively, no middle class to speak of (Haiti Informants 2, 3, and 4, 2010). A more detailed picture includes the large social and economic divide between Haiti's rich and poor, discussed above. In this revision, the picture shows a small portion of the population rich enough to completely control a country, the rest of whose population is too poor to be able to take a significant role in politics and policy.

4.3.3 Organizational Capacity

The organizational picture in Haiti is much the same as the economic picture, except that there is some more promise for future improvement. By 2010, cellphones and cellphone coverage had become ubiquitous, particularly in Port-au-Prince, but it is unclear how thorough this penetration was in 2004. In 2000, the most recent year with data, only 24.3% of roads were paved. In 2005, 54% of the population had access to improved water sources, and only 30% had access to improved sanitation facilities ("Haiti at a Glance," 2006). What infrastructure is present, including roads, power grid, and the hydroelectric plant that serves Port-au-Prince, is aging and dilapidated. Road beds are heavily pock-mocked with holes, and sometimes the entire bed is

gone. Foundations on power lines are insecure, and, even without earthquake trembling, will sometimes fall over, and remain upright only by the surrounding poles that are still standing. Sewage flows through the streets nightly, even in the relatively affluent Port-au-Prince suburb of Petionville, and rain collection cisterns are visible throughout the city. The aging hydroelectric plant that serves the city only provides a fraction of the power it once provide (Haiti Informants 3 and 4, 2010); during a week-long trip in May, 2010, our research team's accommodations had power from the city grid for only about two hours on one day, over the course of the week. The rest of the time, an on-site generator provided any and all electrical power. The response to this pattern of those who ran these accommodations indicated that this had been the pattern since long before the earthquake that had devastated the country four months before the trip. Similar to the economic conditions, the organizational structure in Haiti is in very poor condition, dramatically increasing the difficulty of operating in country.

4.3.4 The 2004 Armed Insurgency and the Second Ouster of Aristide

The immediate cause of the post-conflict stabilization and reconstruction mission that this study examines is the 2004 insurgency that drove Aristide from office a second time. This insurgency flows from the third act of the Haitian political drama that would play out during Aristide's second term, starting in 2001. That year, the Organization of American States (OAS) stepped in to try and find a negotiated solution. It soon became clear that no side, not international donors and financial institutions, nascent Haitian political opposition, nor Aristide, was truly willing to compromise. A further increase in political violence, particularly in violence aimed at the HNP and at opposition groups, did much to undermine any willingness to compromise that might have developed and only further entrenched each side of the steadily growing conflict (ICG, 2004).

This culminated in a confused incident in which the leader of a pro-Aristide paramilitary group in Gonaives, Amiot Metayer, was killed in what is widely suspected as a government-sanctioned murder. This turns the formation of the Gonaives group against Aristide and its initiation of the armed insurgency would become the fourth and final act of the political drama in Haiti prior to the initiation of the UN stabilization and reconstruction mission (ICG, 2004).

Once the insurgency in Gonaives began, events moved quickly. Metayer's murder occurred as part of violence in the summer and fall of 2003. Violent protests followed in October while pro-government armed groups attacked a demonstration at a university that was led by student-groups on 5 December. OAS efforts at a negotiated settlement resumed in January, 2004, but found little traction prior the full uprising in February. Metayer's followers seized control of Gonaives on 5 February 2004, driving out police. The HNP attempted to retake the following day, but failed. At this point, prominent figures from the fight against the previous military coup returned from exile to join the fight against Aristide, and the insurgency began to take small towns beyond Gonaives. On 22 February, the insurgency captured Cap Haitien, Haiti's second largest city, unopposed, and, indeed, welcomed in places along the way as they drove out pro-government paramilitary groups and the HNP. Despite preparing to defend Port-au-Prince, starting on 25 February, Aristide signed a resignation on 29 February and left the country immediately. He, nevertheless, insisted afterward that he had not actually agreed to the resignation and had been "kidnapped" (ICG, 2004). Whether or not that was true, Aristide was now out of office, and the insurgency ended, even as violence continued in a less organized fashion. The transitional government immediately invited UN peacekeepers, initiating the stabilization mission that study utilizes as a case.

4.3.5 Prior UN Involvement and MINUSTAH

UN involvement in Haiti was not new in 2004. Four previous missions had operated in country, with the first entering in 1990 ("MINUSTAH"; ICG, 2004). Despite the US efforts to restore Aristide in 1994, which was viewed as a success, the missions had been unable to affect much actual and lasting change in Haiti. This left the UN viewed as unpopular and untrusted by both segments of the Haitian population; rightly or wrong, they were perceived as having made many promises but delivered on few (Haiti Informants 3 and 4, 2010). At the request of the Haitian interim president, immediately after Aristide's departure, the UNSC approved a military peacekeeping force, the Multinational Interim Force (MIF) and laid plans to establish a stabilization force at the end of the peacekeeping force's three month tenure (ICG, 2005; ICG, 2004).

The United Nations Stabilization Mission in Haiti, its acronym being MINUSTAH under its French-language name, took over on 1 June 2004 ("MINUSTAH") to support a newly established transitional government in its efforts to end the violence that would continue into 2005 (ICG, 2005), begin the reform of the institutions that had been so heavily damaged in the insurgency, including the Haitian judiciary and the HNP (ICG, 2004). To this end, the initial mandate empowered a broad mission for peace and security, reforming the HNP, disarming former army elements, promoting rule of law, supporting the transitional government, protecting UN personnel, and promoting and monitoring human rights ("MINUSTAH," UNSC Res. 1542, 2004). As of 2012, the MINUSTAH mission is on-going, and complicated by the devastation of the 12 January 2010 Haitian earthquake. This study examines MINUSTAH's process and progress through the end of the 2010 calendar year.

4.3.6 The 12 January 2010 Earthquake

While not strictly part of the initial conditions of this study's Haiti case, since it occurred six years after the initial date of the case, the Haitian Earthquake did much to define the operating parameters of the last year of the case and to set the context for the case's network analysis portion. It undermined MINUSTAH's operation by killing several of its highest officials in country. It also destroyed much of what governance capacity the Haitian government had regained since 2004. Despite all the damage that it did, the earthquake has the potential to help improve the situation with the massive influx of donor aid and organizations that it generated.

4.4 BASELINE ANALYSIS

The first point of possible comparison between these two cases is in identifying the similarities and differences between the two baselines. It is largely inappropriate to say that one baseline is higher or lower than the other or that one is better or harder than the other. This kind of comparison is the trap that has led the researchers applying the traditional approach to admit defeat on cross-case comparisons. What can, instead, be compared is the systematic structures and challenges that each case faces that will bear on situation that the stabilization missions must face. These are the same situations listed above, the political, economic, and organizational contexts, and how they converge and diverge from each other across the two cases.

4.4.1 Convergent Challenges to Coordination

4.4.1.1 Legally-Established Peacekeeping

The cases have some important similar aspects and challenges. The first is a fundamental similarity that allows for their comparison at all, and, indeed, their inclusion in this study. First and foremost, each is a case where a political conflict generated violence that drew international attention, and ultimately, international intervention. In both cases, the peacekeeping missions, IFOR/SFOR in Bosnia and the MIF in Haiti, and the long-term stabilization and reconstruction missions, UNMIBH in Bosnia and MINUSTAH in Haiti, were formally invited by the local parties, even if they were less than truly welcome. This gave the missions more latitude for legal action and a basis for expecting cooperation, at least from local officials, as they fit the definition of UN peacekeeping under Chapter 6 of the United Nations Charter. Initial actions, particularly UNPROFOR's maintenance of UN Protected Areas may not have met the requirements for Chapter 6, and may require creative arguments to meet Chapter 7 requirements, but the reconstruction and stabilization missions, technically, meet the requirements for Chapter 6 peacekeeping. This does not mean that local officials always delivered that cooperation or that the intervening missions always acted in their best way to court and promote that cooperation.

4.4.1.2 Deep Social Cleavages

In both cases, the conflict is driven by deep social cleavages. In Bosnia, this is between the three main constituent nations, the Bosnian Serbs, Bosnian Croats, and Bosniaks. In Haiti, this is between the rich and the poor. Interventions are inherently highly political. Astute political operation and the shape of structural and governmental reforms are defined by sensitivity to positions relative to these cleavages. The cleavages may be different, but their

presence and general impact are the same, though that says nothing about the how well the operators in each system will understand and account for these cleavages.

4.4.1.3 Lack of Infrastructure

In both cases, local infrastructure had been largely destroyed. This was more extreme in Haiti than in Bosnia. The pre-conflict state of Bosnian infrastructure had been much more advanced than the pre-conflict state in Haiti. In Haiti the conflict did not target infrastructure in any way, but did contribute to its continued dilapidation. In Bosnia, the war did target infrastructure, but only as tactical military targets. Its strategic targeting was only as collateral to the strategic targeting of population centers. The causes of a lack of infrastructure, and so what is needed to establish reliable infrastructure, may be different, defining a similar aid task with different requirements for its completion, but the fact of a lack of reliable infrastructure following the end of the conflict is the same across cases.

4.4.2 Divergent Challenges to Coordination

4.4.2.1 Economic Conditions

On their surface, immediate post-war economic conditions in each case are similar, but, in fact, they have important structural differences. In both cases, the immediate post-conflict period saw little formal economic activity and high unemployment. In both cases, the immediate post-conflict period would see an enormous inrush of aid groups bringing donor monies and manpower. In Haiti, this would enter a situation where the informal economy dominates the formal economy because many of the poor do not have access to the formal economy, and the government has long been too weak to drive informal economic activity into the formal economy

(Haiti Informants 2, 3, and 4, 2010). In Bosnia, the majority of post-war activity was also informal and often illicit (Andreas, 2008; Dobbins *et al*, 2003; *Balkan Battlegrounds, Vol. 1*, 2002), but this was a product of economic dislocation from the war, declaring independence from Yugoslavia, and the transition to a market economy. While never among the richest of countries, Yugoslavia, and Bosnia included, had been an advanced communist country with an evident history of large engineering projects and functional economic oversight and relatively easy access to European markets, due to its location. This provides a basis for economic restoration without the fundamental structural reforms required in Haiti.

4.4.2.2 Political Paralysis

Political paralysis played a role in both cases, but a very different role in each. In Bosnia, events moved quickly to war when the Bosniak-dominated government declared independence from Yugoslavia. After the war, continued animosity between the ethnic groups, and towards the international intervention (Bose, 2002; Chandler, 2000), led to political obstructionism from multiple sources. In Haiti, the political paralysis aided and abetted the developing conflict, forming a more consistent structural feature of the Haitian political context, just as on-going poverty is a more structural feature of the Haitian economic condition than it is of the Bosnian economic condition.

4.4.3 Taking Baselines Forward in the Analysis

The next two chapters will build from the analysis presented here. As discussed at the beginning of these chapters, the next of the analysis will assess system effectiveness relative to the baselines presented here. Chapter 5 will analyze the UN stabilization and reconstruction mission

that occurred in Bosnia. Chapter 6 will analyze the UN stabilization and reconstruction mission that occurred in Haiti. Each of these chapters will measure effectiveness from these baselines for their respective missions. Chapters 7 and 8 will then compare the extent of this effectiveness and its sources in each mission.

5.0 CASE STUDY: WAR IN BOSNIA AND HERZEGOVINA

Network and simulation analysis are useful tools, but they only produce meaningful results when they are interpreted in their context (Butts, 2009). Providing this context is the role that the IAD and *Harnessing Complexity* frameworks play in this study. These frameworks, though, do provide more than just the context for the network analysis. They provide insights of their own in understanding the system that the network analysis and simulations cannot provide. They provide unique substantive analysis that provides for richer results. The role of the networks and simulation is to then take the substantive results and apply them to make a fuller model that is grounded in objective methodology. For the final analysis, the frameworks provide the rules for how the simulation handles the actors and the results of the actions, while the network analysis provides the measurements necessary to program the simulation's parameters. Without either step, no simulation would be possible.

This chapter applies the IAD and *Harnessing Complexity* frameworks to the UN stabilization and reconstruction mission in Bosnia and Herzegovina that first began initially in 1992, and expanded in 1995. Discussed in Chapters 1 and 3, the frameworks pose six questions:

- Who are the actors?
- What are the system rules?
- What are the patterns of interaction?
- How do actors select actions?
- How do actors select which actors with whom they will interact?
  What are the patterns of variation in the data covered in the preceding questions?

This chapter will use the frameworks and network analysis to answer these questions in the context of the mission in Bosnia and Herzegovina. After providing those answers, the chapter presents the lessons for the simulation design that this case provides.

5.1 FRAMEWORK-GUIDED ANALYSIS

Systems are built from several separate building blocks. These blocks cross the borders of the questions above, but the questions are designed to elicit a description of the system that allows the contents of those building blocks to emerge. There are only two primary blocks that can describe the whole of the system. The two blocks are structure and process. The first question speaks to structure, by defining who is involved. The latter five questions all describe details of the process (Ostrom, 2005; Axelrod and Cohen, 2000). The task of this chapter, then, is to present content and basis of the structures and process of the UN stabilization and reconstruction mission in Bosnia and Herzegovina.

It is not enough, though, to claim to be presenting the process of the mission, because there are two different types of process, formal and informal. In natural systems, the only rules involved are those that are observed; natural systems have no mechanism for defining exogenous rules, so they must all be endogenous to the system. Computer systems are the opposite. In computer systems, an external programmer, or team of programmers that may or may not be coordinating with each other, define the rules that the computer must follow, though observed can still be complex, depending on the way the rules are written (Holland, 1995, 1992). Human social and administrative systems lie somewhere in between these two extremes, where the systems can have exogenous rules that they actors may not always follow (Comfort, Wukich *et*

al, 2011). These systems will have a combination of written and unwritten rules that the actors are supposed to follow, sometimes under the threat of sanction, but which they will not always follow. The written rules constitute formal process. They are the rules that the actors are expected to follow, and which will carry the most clearly defined sanctions for their violation. This set includes laws, but it is not necessarily limited to them. Formal rules of action are those to which computer systems must adhere. The unwritten rules are the informal rules. These are analogous to the rules of natural systems; they are only identified by following the patterns of behavior that actors actually follow, regardless of what formal rules may or may not exist. As a human system, stabilization and reconstruction missions will have both formal and informal rules of action. To fully describe the system in Bosnia, this chapter describes the structure, formal rules, and informal rules of the stabilization and reconstruction mission in Bosnia and Herzegovina.

5.1.1 System Structure and Actors

The overarching structure of stabilization and reconstruction missions comes from their conception as international administrative interventions in a given state, all within the context of the overarching international system of states (Dobbins *et al*, 2008; Hippler, 2005, Dobbins *et al*, 2004; Dobbins *et al*, 2003). This larger system is not of concern to this study, except to the extent that it is the context and source of some of the specific organizations that are involved in the specific mission. This creates a situation with two, parallel administrative structures in those areas where the international bodies work during the mission. The first structure is the local administrative structure that retains formal governing power, but is shadowed by the second structure, the international administrative oversight and support structure. This forms a

complicated official structure, which can quickly morph into a range of different shapes, depending on the behavior of the specific actors while the mission proceeds.

5.1.1.1 State Structure

As discussed in chapters 1 and 2, the goal of these missions, often explicitly, but occasionally implicitly, is to expand the governance capacity of the local government. For this reason, the intervention is nearly always designed in such a way to support or oversee local administration, not to replace it (Dobbins *et al*, 2008; Hippler, 2005, Dobbins *et al*, 2004; Dobbins *et al*, 2003). This is in addition to the dubious legality of any international administration that would seek to replace local administration (Malanczuk, 1997; UN Charter), and the political risks that any government choosing to turn over full administrative power and responsibility to any international body would face from its own polity. Either way, organizations will continue to operate with bases in the international system or in the local system. In Bosnia, the following jurisdiction levels were observed, along with their definitions:

- International: States, organizations, and groups with impacts in Bosnia, but whose actions have implications far beyond Bosnia or the Balkans, or organizations whose basis is in other international organizations
- International – Regional: States, organizations, and groups with impacts across the whole of the Balkans region, including but not limited to Bosnia; they typically have more direct involvement and interests in Bosnian conflicts due to geographic and/or ethnic ties, or at one time, directly governed Bosnia-Herzegovina
- BiH State Level: Actors whose actions and interactions have implications across Entity borders, but not state borders, whether those implications are formally established in the Dayton Accords or the product of the realities of Bosnia politics
- Entity: Actors whose actions and interactions have implications that do not cross entity borders
- Canton: Actors whose actions and interactions have implications that do not cross cantonal borders within the FBiH

- Municipal: Actors whose actions and interactions have implications that do not extend beyond the municipality in which the actor is located

With the numbers taken from the network data sources listed in Chapter 3, Table 5 – 1 lists the count of each jurisdiction observed in Bosnia. This list of jurisdictions is closely related to the structure of Bosnian administration. Discussed in Chapter 4, the Dayton Accords split Bosnia and Herzegovina into two administrative jurisdictions, called Entities, the Republika Srpska (RS) and the Federation of Bosnia and Herzegovina (FBiH). The FBiH is further subdivided in cantons, which are not used in the RS. For the most local governance, the FBiH cantons and the RS are subdivided into municipalities that govern individual population centers. This creates the several levels of local administration, below the state level, that are listed above. Any aid project will have to take into account the administration that oversees the specific location of the aid project, along with any state-level structures and processes.

Table 5-1. Frequency in Organization List: Bosnian Jurisdictions

Jurisdiction	Count	% of Dataset
Municipal	15	7.25%
Canton	5	2.42%
Entity	36	17.39%
State	61	29.47%
Regional	2	0.97%
International	88	42.51%
Totals	207	100%

5.1.1.2 International Actors

Along with this state and local structure is the set of international organizations that function in the stabilization and reconstruction mission. The foremost of these are the ones listed in the Dayton Accords: the Office of the High Representative (OHR), the International Police Task Force (IPTF) that would later become the UN Mission in Bosnia and Herzegovina (UNMIBH), and NATO's Implementation Force (IFOR) that would later become the Stabilization Force (SFOR). This is far from a complete list, and indeed a complete list is nearly impossible to compile. To the extent that it is possible, that list is included in the up-coming network analysis. Though not mentioned in the Dayton Accords, the United Nations High Commission for Refugees (UNHCR) played an integral role in the international response to the Bosnian War, carrying out an airlift that lasted longer and carried more goods than any other airlift in human history as a humanitarian effort to support the besieged population of Sarajevo (*Balkan Battlegrounds, Vol. 1*, 2002; Burg and Shoup, 1999). Their efforts continued into the post-war period as the lead organization of several Dayton Accord annexes that included humanitarian goals, efforts that continue to this day (Bosnia Respondents 6 and 7; Dayton Accords, 1995). These form an official core of the international organizations involved.

5.1.2 Rules of Action: Formal Processes

Working within this structure, the organizations have several roles to fill, some defined by the Dayton Accords, some defined by established practice for humanitarian interventions. These include how organizations determine what roles they will play, how they will obtain the resources and funding they need to carry out their actions, how administration will be organized and performed, and what powers and responsibilities the international organizations will have.

5.1.2.1 Funding and Organization Roles

In addition to the administrative agencies so far discussed, which are working to extend governance capacity, there will be many organizations with non-administrative missions. These include humanitarian aid groups, academic groups, and private businesses, to name a few of the types of organizations present. These latter groups are unlikely to be included in official governance structures and processes, but will play key roles in developing observed processes and in completing the specific aid tasks that will be necessary for reconstruction. This formulation indicates two characteristics of the actors, the actor's source of funding, and its mission category which, along with jurisdiction, are known as actor attributes. There are only three sources of funding that are possible, and align the economic sector to which the organization belongs: public, private, and non-profit. Table 5-2 reports the breakdown of sources of funding observed in the network data for Bosnia. Mission categories are much more complex attributes, indicating what substantive area an organization works in and whether or not the organization is designed to work in the field directly, completing projects and engaging the local population, performing administrative tasks in government, organizing and directing field operations but not directly performing them, or engaging in advocacy and fund-raising that directs the resources necessary for the field and organizing actors to perform their tasks. Appendix C contains the list of mission categories observed in the Bosnia network data.

Table 5-2. Frequency in Organization List: Bosnian Source of Funding

Source	Count	% of Dataset
Public	130	62.80%
Private	19	9.18%
Non-Profit	58	28.02%
Totals	207	100%

5.1.2.2 Rules for State and Local Administration

The formal rules for state and local administration were set out in the Dayton Accords and many of these were discussed in Chapter 4. Since they continued in force throughout the study period, they merit a brief a review here. The fundamental logic of Bosnian political organization, presented in Chapter 4, "the Bosniaks, Croats and Serbs form separate groups and the politics fall into line accordingly" (Hayden, 2011) continues to hold in the Dayton Accords. In a case where the informal structures of Bosnian society dictated the formal structures, the Accords were designed to adhere to this rule under the belief that peace would only hold with the political protections assured by having national representation through all levels of government (Bose, 2002; Chandler, 2000; Burg and Shoup, 1999). This formulation carries through all levels of Bosnian administration. Individual jurisdictions are designated with a single leading nationality. In the RS, this is the Serbs. In the FBiH, each canton is designated as being either Bosniak, Croat, or Mixed. The Dayton Accords then devolve most governing powers to these nationally-designated jurisdictions in a federal structure. The principle applied is that by governing locally, the members of the ruling nationality will ensure their interests in the places that they control (Burg and Shoup, 1999; Dayton Accords, 1995).

At the same time as they grant considerable local autonomy, the Dayton Accords provide additional protections for each nation at the state level and for the members of local minority groups in the nationally-designated jurisdictions. In the state government, all three nationalities are represented in all the institutions, and their presence and support is necessary for actions to proceed. The Bosnian presidency is a rotating tripartite presidency with a member from each nation, and a chairmanship that rotates (Dayton Accords, 1995). The legislature requires that a

certain number of the membership from each nation be present, as well as a certain portion of each house's membership overall, to have a quorum. No legislation can be passed by the legislature without support from the membership of each nation without that legislation being sent to the Constitutional Court, which itself contains membership from all three main nations. At the local level, Annex 6 to the Dayton Accords defines a list of rights for all Bosnian citizens, regardless of nationality and location of residence. This includes rights to life, liberty, education, and freedom of religion, assembly, and expression. To protect this, the Annex creates a Human Rights Chamber, made of six Bosnian members, two from the RS, four from the FBiH and eight members who are not Bosnian, appointed by the Committee of Ministers of the Council of Europe. Annex 6 also creates a Human Rights Ombudsman, who is appointed by Chairman in Office of the Organization for Security and Cooperation in Europe (OSCE). All citizens of Bosnia and Herzegovina have official recourse to these two bodies in the case of a violation of the human rights enumerated in Annex 6 to the Dayton Accords (Dayton Accords, 1995). This creates a system where protections for all the nationalities are built into all levels of governance under the official rules.

5.1.2.3 Rules for International Organization Activities

Along with laying out the rules for action of the Bosnian state and local administration, the Dayton Accords laid out roles for a small group of specific international organizations and rules for the interaction between state administration and international organizations. The main section of the Accords, the General Framework Agreement for Peace in Bosnia and Herzegovina contains language that obligates cooperation and coordination between all of the official parties that are named in or signatories to the Accords. This lays out an official obligation to cooperate between the various agencies of administration in Bosnia and Herzegovina with the OHR,

NATO IFOR/SFOR, and the IPTF/UNMIBH, which are, as mentioned above, the named international organizations in the Accords with defined roles in Bosnia and Herzegovina. More specifically, the Accords give each of these organizations a specific role to play in the post-war regime. The most expansive role is given to the OHR, which has the role of overseeing Bosnian administration to ensure that nationalist sentiments and voting do not threaten to rip the country apart again the way analysts and scholars believe it did in 1992 (Hayden, 2011, 2000; Burg and Shoup, 1999). IFOR is granted explicit powers to maintain physical security, including seeking war criminals, while the IPTF is granted oversight and support powers over Bosnian police forces. In doing this, the Dayton Accords defined a specific role for international institutions and for their relations with local institutions that both were expected to follow.

5.1.3 Rules of Action: Informal Processes and Observed Behaviors

As discussed above, just because law and policy expects or obligates certain actions, does not mean that the identified local actors will necessarily meet those obligations and expectations. This section will review what expected patterns discussed above broke down and what patterns filled the gaps between expected and actual behavior of the actors.

5.1.3.1 Administration

As has been stated multiple times, the design of the Dayton Accords was to balance power among and ensure the security of the three main nationalities. The role of suppressing nationalism in government fell to OHR. In pursuit of that, the Dayton Accords include an Article V in Annex 10 that states, “Final Authority to Interpret: The High Representative is the final authority in theater regarding interpretation of this Agreement on the civilian

implementation of the peace agreement" (Dayton Accords, 1995). The holders of the Office of High Representative have interpreted this article in light of their goal of limiting nationalism to provide the OHR with the power to nullify and compel laws as well as to approve ballot access to candidates and remove officials from office who too flagrantly violate precepts of cooperation between the nations and with the international community and its representatives ("OHR Media Round-ups;" Bose, 2002; Chandler, 2000). Even with that power, nationalist parties retained popularity and prominence, and so electoral victories. For the analysis, this continued prominence indicates that it is important to record the nationality of the organizations involved. The nationality data extends well beyond the three main groups of Bosniaks, Bosnian Croats, and Bosnian Serbs, to include neighboring Serbian and Croatian actors, as well as international private and governmental organizations, and organizations from many different countries. Like mission categories, this is a long list, and is reported as Appendix D. The result of the continued prominence of nationalist sentiment in terms of administration was an ineffectual government with little will to govern that has been a challenge for international humanitarian organizations (Bosnia Respondents 8 and 9, 2011).

5.1.3.2 Communication and Coordination Patterns

The patterns of nationalist separation also have ramifications for patterns of communication and coordination. The most immediate impact is the almost tautological implication that nationalist groups refuse to coordinate with each other. This undermines information flow about the realities of the groups, generating and perpetuating high levels of distrust and misinformation. This plays out in separate utility firms for the members of each nation that were discussed in Chapter 4, including telecommunications companies and railroads ("OHR Media Round-ups"). Subtle linguistic differences would also aid in perpetuating this

pattern of distrust and misinformation. The spoken language, Serbo-Croatian, is the same for all three groups. Aside from small dialectic differences, the only difference between Serbian and Croatian is in the alphabet; Croatian uses the Latin alphabet while Serbian uses the Cyrillic alphabet. There is no linguistic difference between the language spoken by Bosniaks and Bosnian Croats, nevertheless national politics is strong enough that the OHR website recognizes and applies a third local language, Bosanski, that Bosniaks claim as separate from Serbian and Croatian (Bosnia Respondent 2, 2011). Additionally, the continued prominence of nationalist parties created strife between Bosnian government agencies and the OHR, as well as undermining any popular support that there might have been for the international organizations involved in administration ("OHR Media Round-ups;" Bose, 2002; Chandler, 2000). Despite all of these tensions, periods of extended peace can lead to the growing patterns of nationally mixed marriages that were discussed in Chapter 4 (Burg and Shoup, 1999). The nationalist divide has extensive ramifications through all aspects of Bosnian life, as listed throughout this section.

5.2 NETWORK ANALYSES

Network analysis can then provide documentation of the actual patterns of interaction, showing both the confirmation of the divide as well as its limits. Network measures allow for identifying the patterns of interaction, the key actors in the network and the grouping patterns among the actors. This section will run this analysis, looking first at the pattern for the overall network and then how those patterns changed over time using the time slices identified in Chapter 3 and recorded in Table 3-3. Data for these networks come from three sources: OHR Media Round-ups, SFOR CIMIC reports, and situation reports from humanitarian organizations. Table 5-3

contains the full list of data sources, including listing the specific organizations whose published situation reports were used, along with how many documents were used for the static network analysis and each timeslice of the dynamic network analysis. This will document the patterns observed in the framework-guided analysis while also extending the analysis to provide parameters and parameter measures for the simulation that will be developed in full in Chapter 8.

Table 5-3. Breakdown of Network Data Sources for Bosnia-Herzegovina

Data Source	Static Network Analysis	Timeslice 1: Dec., 2000	Timeslice 2: July, 2001	Timeslice 3: Jan., 2002
OHR Media Round-ups	37	17	11	9
SFOR CIMIC Reports	9	1	5	3
DisasterRelief	1	1	0	0
Global IDP Project	1	1	0	0
International Committee of the Red Cross	1	0	0	1
Total for Each Timeslice	**49**	**20**	**16**	**13**

5.2.1 Static Network Analysis

Table 5-4. Bosnian Network Map Key for Source of Funding and Jurisdiction

Source of Funding	
Source	Color
Public	
Private	
Non-Profit	

Jurisdiction	
Jurisdiction	Shape
Municipal	Square
Canton	Down Triangle
Entity	Diamond
State	Up Triangle
Regional	Box
International	Circle

5.2.1.1 Network Map Groups and Patterns

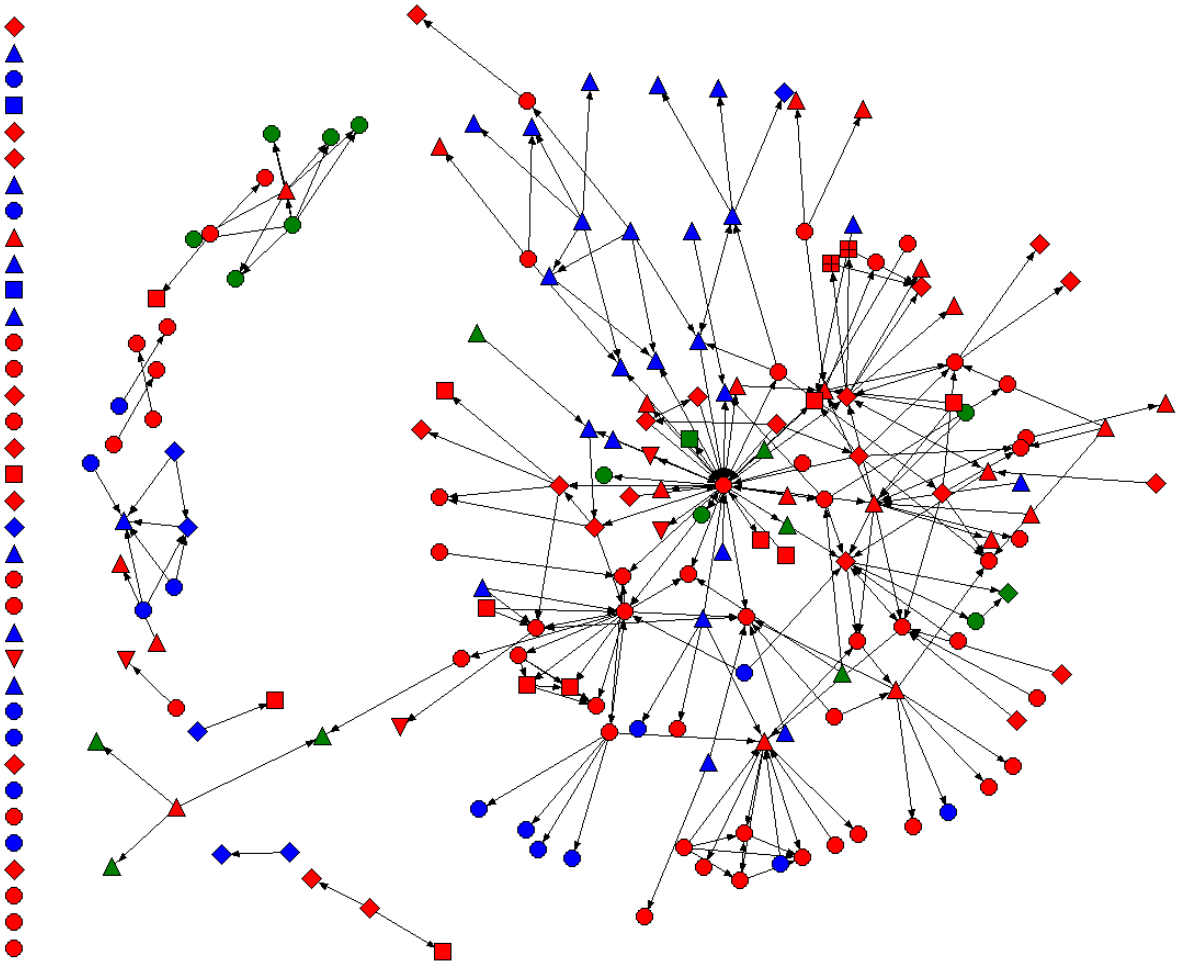


Figure 5-1. Static Network Map for Bosnia-Herzegovina

Network analysis typically begins with a review of the visual network map and basic network measures. Figure 5-1 contains the network map for all the network interactions coded in all three timeslices of the Bosnia data while Table 5-4 presents the key for the shapes and colors that will represent different organizational Sources of Funding and Jurisdiction that will be used

throughout this chapter.[15] This network contains 207 organizations in 429 network interactions. Of all the potential links between these observed organizations, only 241 links, or 0.56%, of the links were empirically observed. This is the network density, and this is a remarkably sparse network.

Visual inspection of the map reveals several relevant features of the reconstruction system. Like many empirical response networks to extreme events, the network contains what network analysts refer to as a "great component" that contains the largest amount of the nodes in the network, as well as several separate components that are far smaller than and not connected to the great component and a list of isolates (Comfort, Oh *et al*, 2010). However, the map also includes several unusual aspects, which are often more informative that commonalities across networks. The clearest indication of the map is the large number of isolates, arranged in a column of organizations along the left side of Figure 5-1. The network map also exhibits an unusual pattern amongst the disconnected components. Typically, these components are made of only 2 or 3 nodes, often connected in series. Figure 5-1 contains separated components that consistently contain a greater number of nodes with more complex patterns of links between them than is typically observed. First indicated by the density measure, these patterns indicate a highly disconnected network that is unlikely to exhibit high levels of communication and coordination.

Actors in a network are known to act with two, inverse properties in pursing links. Either they prefer connections with similar actors to themselves, a property known as homophily, or to prefer dissimilar actors, a property known as heterophily (Hanneman and Riddle, 2005; Wasserman and Faust, 1994). A careful inspection shows many groupings in the network where

[15] A different key will be used for Jurisdiction in Chapter 6 for the Haiti networks, since the relevant jurisdictions will be different.

organizations of like sources of funding, like jurisdictions, and, in one section, both attributes, group together. This is the two sets of state-level non-profit organizations in that group together in chains moving upward from the central organization of the great component. These are Bosnian political parties. Though not shown in this map, the two separate strings of connections are of different nationalities; one is formed of Bosniak parties, the other of Bosnian Serb, and small set of Bosnian Croat parties form a separate group between the two others. This is even more true to the separated components, where only one link is between two organizations with different values for both attributes presented in this map. This provides the first evidence of a strong trend towards homophily in this network.

5.2.1.2 Network Key Entities

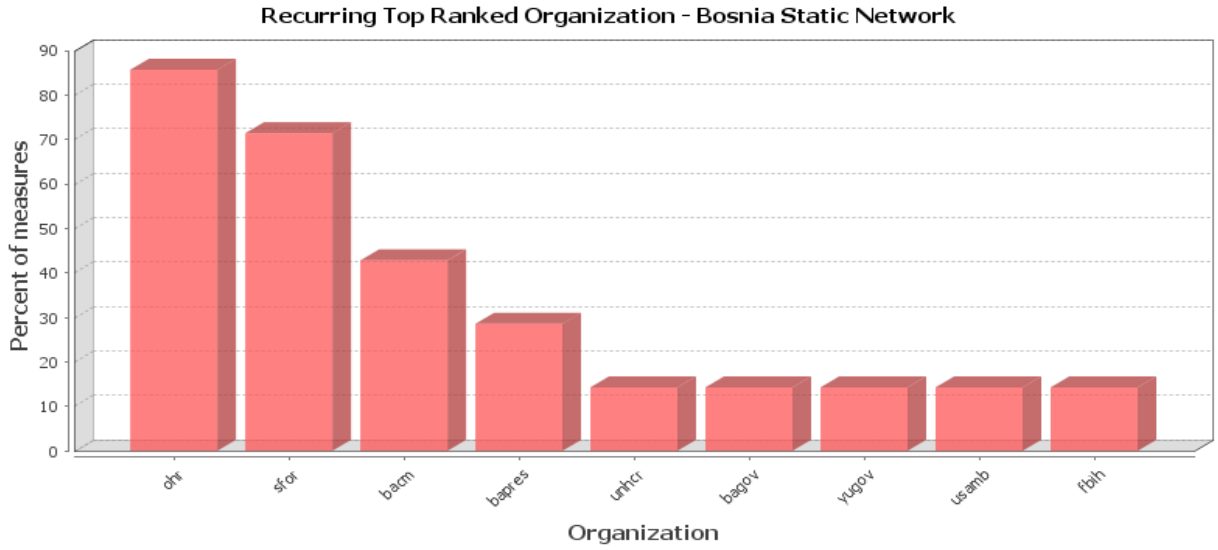


Figure 5-2. Most Central Organizations in Bosnia-Herzegovina[16]

[16] Organization Acronym Key: ohr: Office of the High Representative; sfor: NATO Stabilization Force; bacm: Bosnian Council of Ministers; bapres: Bosnian Presidency; unhcr: UN High Commission for Refugees; bagov: Bosnian Government; yugov: Yugoslav Government; usamb: US Ambassador to BiH; fbih: Federation of Bosnia and Herzegovina.

After reviewing network maps, the next step is to review centrality measures for the network to identify the network's key actors. This is done by producing a Key Entities report for the ORA network analysis program (Carley, 2011). This report calculates the following measures:

- Controlling Agency (total degree centrality)
- Inter-organization Leader (eigenvector centrality)
- Acts as a Hub (hub centrality)
- Acts as an Authority (authority centrality)
- Information Conduit (betweenness centrality)
- Connects Agencies (high betweenness and low degree)

The report includes the organizations with the ten highest values for each of these centrality measures while the graph contained in Figure 5-2, which is generated in the report, indicates the organizations that showed up in the top ten for each measure the most, including the percentage of the measures for which that organization has a top ten score. The top four organizations in this graph are more thoroughly connected to other organizations than any other organization; the other six in the graph all have roughly the same level of centrality. These top four contain two international organizations, OHR and SFOR, and two Bosnian state governmental organizations, the Bosnian Council of Ministers (*bacm*) and the Bosnian Presidency (*bapres*).[17] These are the organizations that have the most connected locations in the network map, but this connectedness is only one aspect of effectiveness; it does not speak to the usefulness of the organization's actions, the extent of its capacity, or its presence in the field actually attempting to complete aid tasks, repair the built environment, or build institutions. These aspects will be examined later in this chapter and in Chapter 7.

[17] For this research, the data did not always clearly differentiate which member of the tripartite presidency took the reported action. For this reason, the constituent parts of the presidency were left as one organization rather than being separated into three the nationally-defined offices that make up the presidency.

5.2.1.3 Network Structure

Table 5-5. Small World Ratio Calculations for Bosnian Networks

Small Word Measures	Static Network	Timeslice 1: Dec., 2000	Timeslice 2: July, 2001	Timeslice 3: Jan., 2002
Node Count	207	83	104	77
Density	0.0056	0.011	0.0101	0.0101
Number of Ties	241	76	110	60
Clustering Coefficient	0.271	0.218	0.132	0.231
Average Distance	3.318	2.44	2.161	2.286
Ave. Clustering (Random Graph)	0.0065	0.00866	0.01044	0.0025
Ave. Distance (Random Graph)	3.977	2.704	3.023	2.36
Clustering Ratio	41.69	25.17	12.64	92.40
Distance Ratio	0.83	0.90	0.71	0.97
Proximity Ratio	49.97	27.90	17.69	95.39

Along with the node-level statistics just examined and the features of the network map before that, the final step of the network analysis is to examine the network's macro-structures. These macro structures define the pattern of the links across the entirety of the network, with implications for patterns and rates of information flow through the network. There are two relevant macro-structure types for any response mission to an extreme event like a conflict or natural disaster. The first is referred to as a small world network. Conceptually, this type of network is contains what network theorists call clusters and spanners. That is, the network contains batches of nodes that are tightly interconnected while some nodes will have links that reach all the way across the network, allowing information to traverse the network by crossing only a few ties (Newman *et al*, 2006; Watts and Strogatz, 1998). To determine if a network is a small world network, Watts and Strogratz (1998) proposed a Proximity Ratio that is a ratio of two other ratios, the ratio of the observed graph's clustering coefficient to that of a random graph and the ratio of the observed graph's average distance to that of a random graph:

$$\mu = \frac{\frac{C}{C_{rg}}}{\frac{l}{l_{rg}}}$$

After calculating this ratio, a research can conclude that a network is a small world network if the ratio has a value of 4.75 or greater (Kilduff *et al*, 2008). Table 5-5 records the proximity ratio for the all four of the Bosnia networks, including looking ahead to the dynamic analysis by including the timeslices. For all of the calculations, 50 random graphs were calculated using UCINet's method of calculating Erdos-Renyi random graphs (Borgatti *et al*, 2002). The formula uses an average of the distance measures and clustering coefficients from all 50 graphs to calculate its random graph values. The resulting values are all well above 4.75, indicating that the static network and all the timeslices are small world networks.

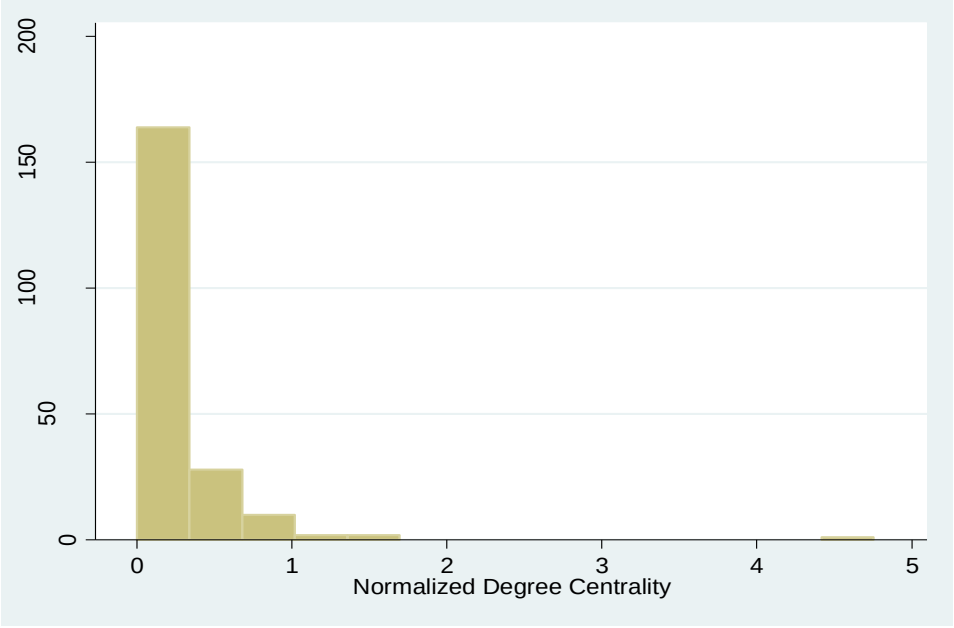


Figure 5-3. Histogram of Normalized Degree Centralities: Bosnia Static Network

The other kind of network macro-structure is a scale free network. Conceptually, this kind of network structure features a limited number of hub notes, each with a large number of connections, and a large number of more non-hub nodes, each with a small number of connections. The distribution of node centralities follows a power law distribution, where, if graphed, there is a spike in the centrality score near the X-origin and a long tail to the right of the graph (Newman *et al*, 2006). This method uses the degree centrality measure for each node, which is nothing more or less complicated than the number of connections that each node in the graph has (Hanneman and Riddle, 2005; Wasserman and Faust, 1994). For this study, that value is then normalized in UCINet to allow for comparability across networks with a vastly different number of nodes, since networks with far more nodes have far less central nodes that still have higher degree centrality measurements. The count of nodes with each degree centrality is plotted on a graph using either a line graph or histogram, which is less exact, but still as clear as a line graph. Figure 5-3 includes the histogram of normalized degree centralities for the static network in Bosnia. With a large number of nodes with a centrality less than 1 and with one node with a centrality of almost 5, this network is a scale free network as well as a small world network.

5.2.2 Dynamic Network Analysis

Table 5-6. Bosnian Dynamic Network Basic Measures

Measure	Static Network	Timeslice 1: Dec., 2000	Timeslice 2: July, 2001	Timeslice 3: Jan., 2002
Node Count	207	83	104	77
Isolates	36	19	14	20
Isolates (% of Nodes)	17%	23%	13%	26%
Entering Organizations	N/A	83	76	48
Network Fragmentation	0.554	0.634	0.529	0.836

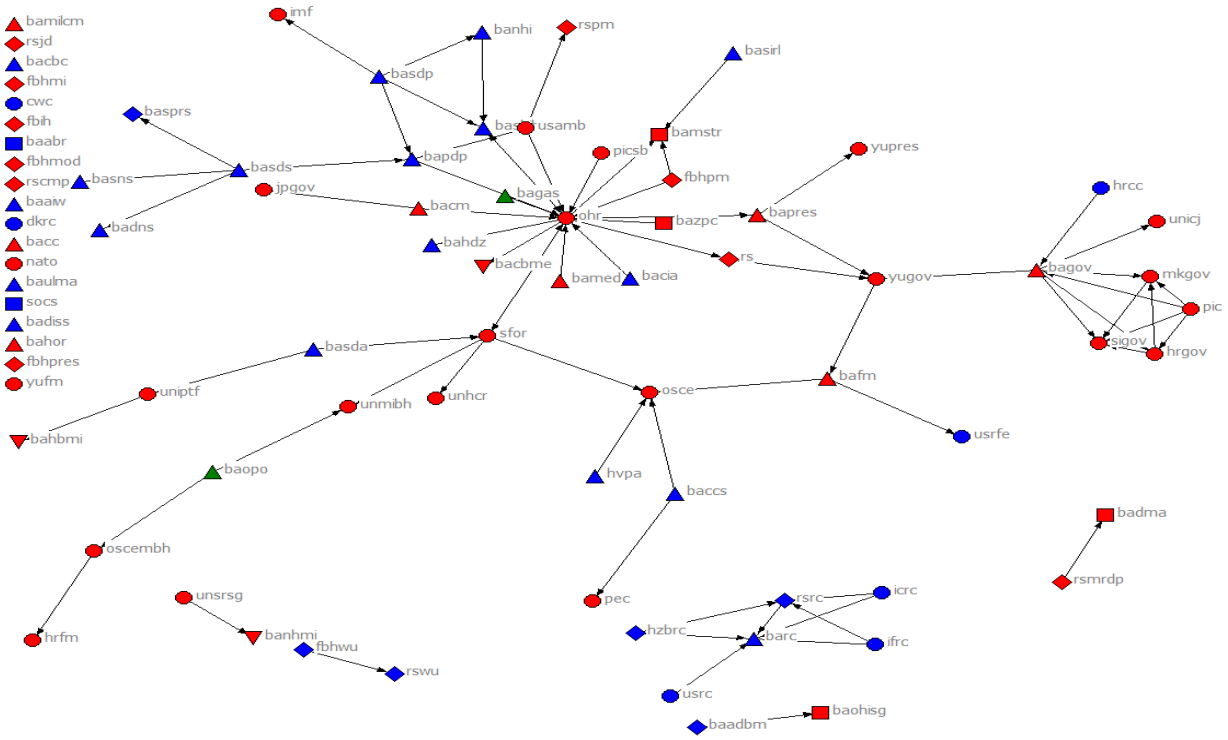


Figure 5-4. Bosnia Dynamic Networks: Timeslice 1 (Dec., 2000)

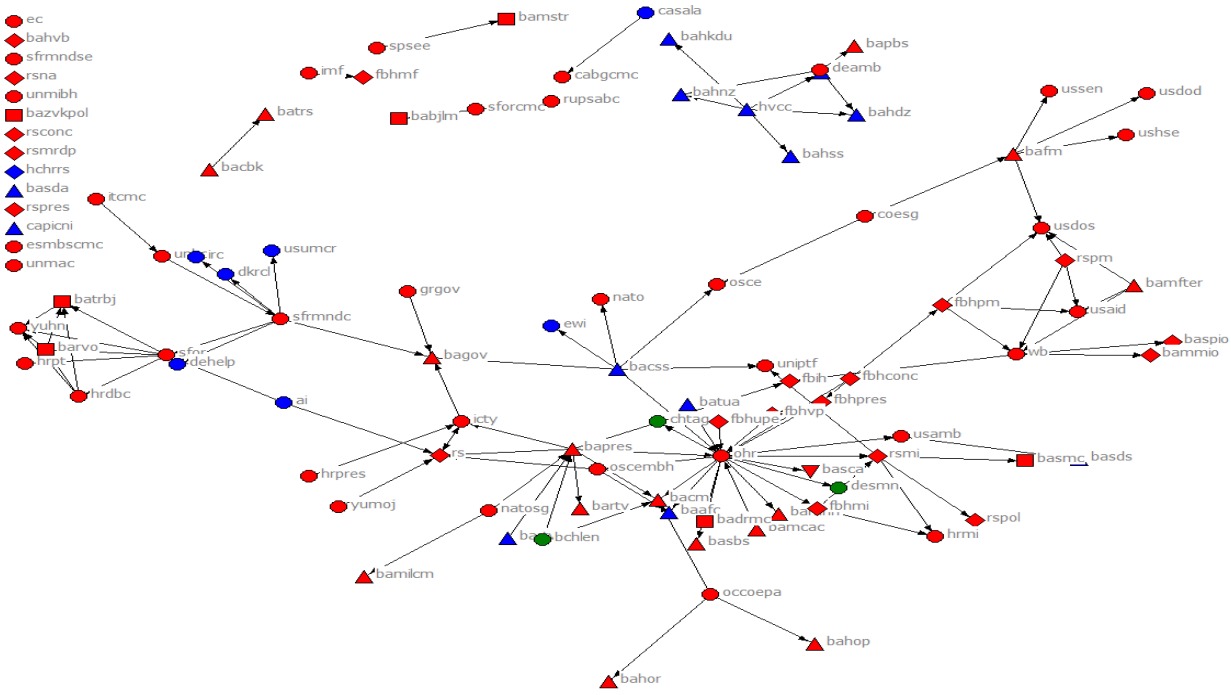


Figure 5-5. Bosnia Dynamic Networks: Timeslice 2 (July, 2001)

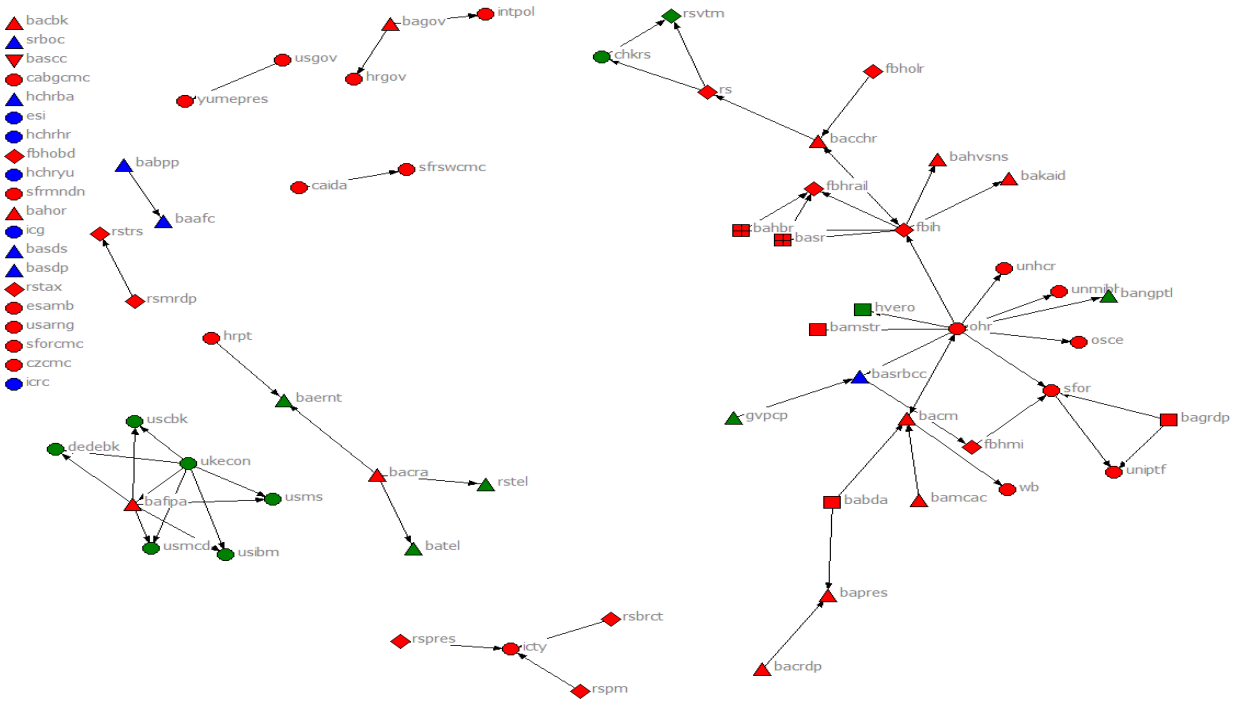


Figure 5-6. Bosnia Dynamic Networks: Timeslice 3 (Jan., 2002)

The process of dynamic network analysis is fundamentally the same static network analysis. The difference lies in examining the network at discrete timeslices to chart change across time with the goal of trying to correlate these changes with system events that precipitated the changes.

5.2.2.1 Dynamic Network Maps and Groupings

The first step is to repeat the first parts of the static analysis, examining basic measures and the network maps. Table 5-6 reports the basic measures of for all of the timeslices and the static network. This includes the percentage of network isolates, which remain very high, particularly in the third timeslice where more than a quarter of the nodes are unconnected. Figures 5-4, 5-5, and 5-6 contain the network maps for the dynamic network analysis. These maps contain many of the same patterns of grouping and homophily as the static network, but

not all of them. Homophily on Source of Funding appears consistent across all of the dynamic maps, but homophily on Jurisdiction only appears in the first timeslice of the dynamic networks. The maps also contain many disconnected network components. The dynamic maps can indeed be expected to contain more of these, since the static network will often connect components that are disconnected in the dynamic networks by combining links across all the dynamic networks. The network fragmentation measure aids in assessing this by reporting the percentage or nodes that are disconnected from the network's great component. In the first and third timeslices, this figure is particularly high, correlating to periods where, based on network's task categories, which code what of activities the actors are performing (See Chapter 3, Section 3.2.3.2, and Chapter 7), the data observed more political maneuvering by officials and political parties, while the second timeslice, which focused more on developing and enacting rule of law and enacting foreign policy. Nevertheless, all three timeslices still contain a high number of isolates and more than half of their nodes separated from the giant component. Timeslice 2 is a more coherent network, but they are all still highly disconnected and fragmented networks.

5.2.2.2 Dynamic Network Key Entities

To simplify the analysis somewhat, rather than reporting three separate figures for network centralities, Table 5-7 reports the top ten eigenvector centralities for each of the timeslices. Eigenvector centrality is measure of centrality that is based in degree centrality but also factors the centrality of the other nodes to which a given node is connected (Hanneman and Riddle, 2005; Wasserman and Faust, 1994). This aids in recognizing leaders between organizations and within groups in the network (Carley, 2011). The patterns of inclusion reflect the activities noted above. Timeslice 1 contains mostly political parties while Timeslice 2 contains many governmental organizations, both Bosnian and international, while Timeslice 3

contains a mixture of these, since it saw a great deal of political activity on combining infrastructure organizations like railways and telecommunications companies as well as the governmental organizations involved in bringing about those combinations.

Table 5-7. Top 10 Eigenvector Centralities in the Bosnian Dynamic Networks

Rank	Timeslice 1 (Dec., 2000)		Timeslice 2 (July, 2001)		Timeslice 3 (Jan., 2002)	
	Organization	Value	Organization	Value	Organization	Value
1	ohr	0.838	ohr	0.879	ohr	0.825
2	basbih	0.523	bapres	0.539	fbih	0.724
3	picsb	0.436	bacm	0.438	fbhrail	0.295
4	bapdp	0.367	rsmi	0.225	sfor	0.272
5	basdp	0.362	oscembh	0.219	bahbr	0.247
6	banhi	0.307	fbhpres	0.218	basr	0.247
7	basds	0.233	rs	0.205	basrbcc	0.244
8	usamb	0.215	fbhmi	0.203	bacm	0.244
9	sfor	0.186	fbhconc	0.197	bacchr	0.201
10	bamstr	0.181	bacss	0.193	bamstr	0.200

5.2.2.3 Dynamic Network Structures

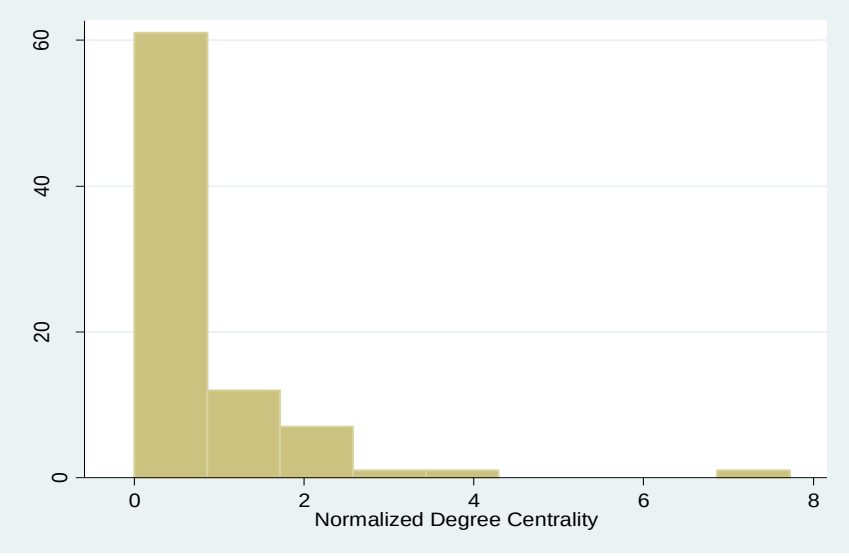


Figure 5-7. Dynamic Scale Free Analysis: Bosnia Timeslice 1 (Dec., 2000)

Like the other measures before this, the process requires taking multiple measurements of the same measures as the static analysis of structures. Already reported in Table 5-5, during the static analysis, the proximity ratios of the small world analysis showed that all the timeslices contain small world networks. Figures 5-7, 5-8, and 5-9 repeat the analysis for scale free networks in each timeslice. Like so many of the measures already presented, the result remains consistent across the timeslices; each timeslice, along with the static network contains a scale free network, since all of the histograms exhibit the shape of a power law distribution in the centrality scores. This pattern, networks in response to extreme events that are both scale free and small world, is common and holds through many responses to extreme events (Comfort, Siciliano, and Okada, 2011; Comfort, McAdoo *et al*, 2011; Comfort, Wukich *et al*, 2011; Comfort, Oh *et al*, 2010), and so is not a surprising result in this data, though it is certainly an important result for modeling and understanding the operation of the system, one that will be revisited in Chapter 8.

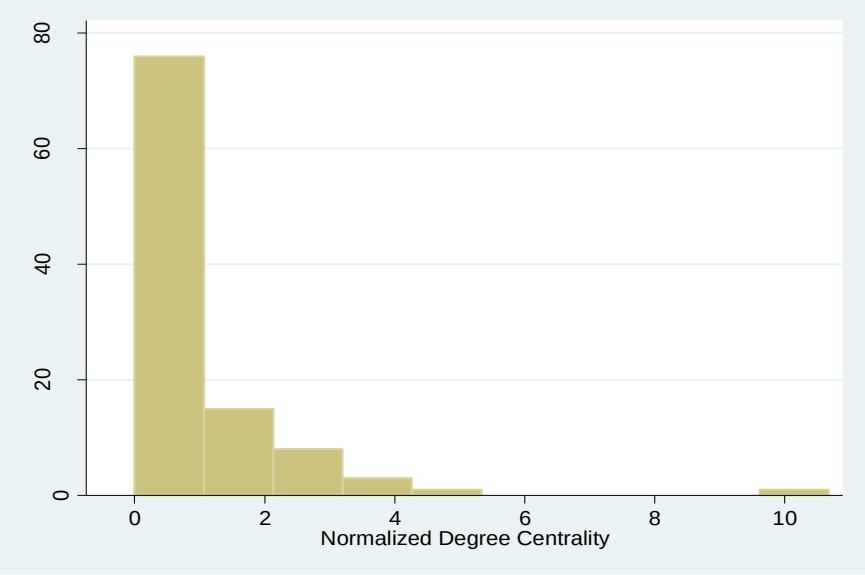


Figure 5-8. Dynamic Scale Free Analysis: Bosnia Timeslice 2 (July, 2001)

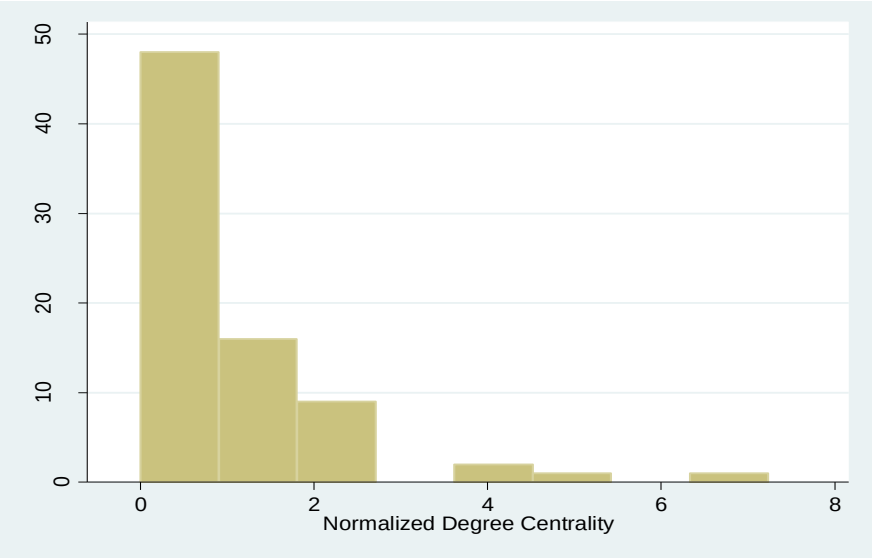


Figure 5-9. Dynamic Scale Free Analysis: Bosnia Timeslice 3 (Jan., 2001)

5.3 SITE VISIT LESSONS

The kind of network data, formal reports, and academic studies that have so far been used are indispensable sources of data, but remain partially removed from the locality and the population. They provide detailed data on organizations, events, actions, and emerging processes. They do not provide full data on how organizations acquire and process their data in the field, and how operators, particularly those below managerial levels, understand and assess their operations. This requires speaking with those operators, since these understandings are often politically sensitive and seldom committed to open source documents even as they provide context and validate the data in the open sources. To gain access to some of this data, this study conducted a field visit to Bosnia and Herzegovina. This trip occurred in September, 2011, and centered on the city of Sarajevo, where most of the international organizations involved have or had their

headquarters, while also including travel to city of Mostar, to gain additional views from another city and the from the country side in between.[18] Interviews were conducted with current staff of several international organizations located in Sarajevo, following the interview protocol in Appendix A. These were semi-structured interviews, focusing on how lessons learned during the post-war period influenced current practices, since no organization was able to provide staffers who had been part of the organization during the study period. Those who were available still had important in-country experience, often for several years, and some were local Bosnians or from neighboring Balkan states who had experienced the war and study period first hand even while not working for international organizations during the study period. Observations from this trip extend the analysis from above, providing insights into the functioning of the local economy and the practicalities and importance of local partnerships for international organizations.

5.3.1 Economics

The economy in Bosnia and Herzegovina began the study period in a difficult situation, attempting a transition from its communist-era economy to a market economy and then separated from economic links in the break-up of Yugoslavia, and finally badly damaged during three years of active war. Today, the built environment is largely recovered but scars still remain and the economy is still weak. Access to European markets aided recovery through the first decade of the 21st century, but the world-wide downturn hit Bosnia hard following 2008; official

[18] These two cities, Sarajevo and Mostar, represent the local centers of the Bosniak and Bosnian Croat communities in Bosnia. Several logistical aspects of the trip, including available travel time, travel funds, access to interviews, and logistics of local travel during the trip prevented visiting Bosnian Serb areas, including the primary Bosnian Serb city, and capital of the RS, Banja Luka.

unemployment stood at 43.3% for 2011, and at 43.1% in 2010 ("Bosnia and Herzegovina," 2012). Nevertheless, there is little or no sense of idleness in Sarajevo (Bosnia Respondent 2, 2011). Shops and stores are not overly full during the day, but street cafes fill up every day around the close of regular business hours, and infrastructure is reliable. Still, signs of damage and decay can be found throughout the city. War damage has been covered over and hidden where it has not been fully mended, but communist-era high-rise apartment buildings in central and western Sarajevo show signs of external damage that does not display any signs that indicate whether or not is unaddressed structural decay or war damage.

This appearance of economic progress, however, covers over a more fragile reality just as it hides last scars to the built environment. The majority of economic activity in Sarajevo still focuses around international organizations and their local spending. As the capital of BiH, and the focal point of both a long and brutal siege and the international response to the war that that siege partly brought on (*Balkan Battlegrounds, Vol. 1*, 2002), Sarajevo was the focus of the international response and locus of international headquarters and organizations, and news coverage. In essence, Sarajevo became center stage for the both the people of BiH and for the international organizations attempting response and reconstruction, both during and after the war (Bosnia Respondents 2 and 7, 2011; Andreas, 2008; Bose, 2002; Chandler, 2000), and like the stage during a play, all parties worked hard to make sure the city looked like it was flourishing event when it was not clear if it actually was. This had the goal of ensuring continuous inflow of funds from abroad from both donors and travelers; Sarajevo had long had a large tourist industry and is attempting to rebuild it (Bosnia Respondent 2, 2011), utilizing that influx of funds to rebuild the economy. It is likely that if international involvement in BiH were to end, the economy, particularly around Sarajevo would suffer heavily.

The picture, however, is starkly different outside of Sarajevo. The international involvement in economic reconstruction has been sharply smaller in other cities and even more so in areas outside of the cities (Bosnia Respondent 7, 2011). This pattern is even starker in the RS, where international views of the Bosnian Serbs as aggressors in the war led to greater reluctance amongst international aid groups to engage in aid projects in the RS (Bosnia Respondent 1, 2011). War scars are far more evident today in Mostar than they are in Sarajevo. In that area, international involvement was not enough to drive the same kind of rapid reconstruction that occurred in Sarajevo. Nevertheless, large firms are starting to emerge in BiH (OHR Media Round-ups), many centered in Mostar, where their headquarters are observable. Since these firms do not rely on international involvement to sustain their operations, they represent a slower but more robust firm of economic redevelopment.

While this is promising, the economic situations remain particularly difficult outside of the cities where the people in more rural villages still face severe hardships (Bosnia Respondent 7, 2011) that are exacerbated that weak transportation infrastructure that is reliable but has only limited capacity for moving goods and people and is subject a shortage of state support services in handling heavy weather that is frequent during the winter. This has left a sense of unease and even foreboding amongst all segments of the Bosnian population for what events may develop in the future; all segments of the population are war weary, but fear that the current time is an inter-war period, not a lasting peace (Bosnia Respondent 2, 2011).

5.3.2 Local Partnerships

In BiH, international organizations focused not on working in the field themselves but on establishing local partnerships where the international organization would supply and coordinate

the actions of local organizations which would work in the field. Multiple international organizations reported focusing on this method of operation as a way of working with the three main Bosnian nations (Bosnia Respondents 3, 4, 5, 6, 7, and 8, 2011). Local partnerships with local organizations from each nation allowed the international organizations to access different segments of a distrustful local population through mechanisms that they do trust. This method allowed the international organizations to bypass a government that lacked any will to govern and maintain effectiveness (Bosnia Respondent 8, 2011) and to gain the support of large sections of the population (Bosnia Respondents 3, 4, 5, 6, and 7, 2011) that is necessary for any international organization to provide humanitarian aid. It was not enough, though, just to decide to reach out to local organizations. Doing so required a great deal of professional courtship, most often carried out over coffee in the same cafes that operate on the streets of every Bosnian city today. Only with this face-to-face outreach were international organizations able to arrange for local partnerships (Bosnia Respondent 8, 2011) without which they could not have completed any aid tasks.

5.4 CONCLUSIONS AND LESSONS FOR THE SIMULATION

The UN stabilization and reconstruction mission in Bosnia and Herzegovina has been a difficult and complex mission operating in a complex situation. It is built around a slate of international actors who are pursuing goals that are only sometimes shared by varying segments of the Bosnian population. It is a mission with political, military, economic, and social dimensions since it pursues goals with political, military, economic, and social dimensions in stabilizing Bosnian politics, improving administration, protecting human rights, and supporting economic

development. The relationship between the Bosnian Serbs and each of other segments of the mission, the Bosnian Croats, Bosniaks, and international organizations, are the most contentious (OHR Media Round-ups), though both of the other nations have also clashed with international organizations and with each other (OHR Media Round-ups). Nevertheless, progress has been made; refugee populations are a small fraction of what they were at the height of the Bosnian War, though refugee returns remain contentious (Bosnia Respondents 6 and 7, 2011; OHR Media Round-ups). The economy has shown signs of improvement but remains fragile, and on-going political conflicts threaten to reignite violence (ICG, 2012). Even though the formal UN mission departed Bosnia about a decade ago, marking the end of the study period for this analysis, the efforts remain on-going; the OHR is still in operation and international organizations still form a key piece of the local economy today, 17 years after the end of the war.

5.4.1 Network Structures

Still, the case remains instructive. Details of the network interactions allow for measurements of resilience and effectiveness, using the definitions presented in Chapter 3, and will be analyzed in Chapter 7. The results from the framework-guided and network analysis presented here also sheds light on the relationships between resilience, capacity, and effectiveness that will be detailed in Chapter 8. These implications will be examined in through the use of simulation analysis built from these empirical conclusions. The simulation tool to be used, AnyLogic, allows for agent-based modeling that includes networks of agents. The network analysis performed here will provide several aspects of the data necessary in making validated choices on the parameters and rules chosen for the networks in the simulation. This includes the small world and scale free network structure analysis performed above. The software allows the use of

both of these structures, but only at separate times. Since both accurately describe the empirical networks, both structures will be used at different times with the results analyzed and compared.

5.4.2 Simulation Structures

The framework-guided analysis provides additional directions for structuring a simulation that develop uniquely from this case. This analysis provides several important aspects to the structure and functioning of a stabilization and reconstruction mission that are shared by both cases. These results will be examined in Chapters 7 and 8. The most important lesson this case provides is the presence of a reverse flow in aid completion. With organizations, some shadowy, hidden organizations, others main organizations in the system, sometimes working against the aid agencies, it is important for any simulation of a post-conflict stabilization and reconstruction mission must include a function that describes this behavior and measures its rate. This is not a situation the faces organizations responding to a natural disaster, and so marks a critical difference between the two types of extreme event response efforts.

This is most extreme when conflicts resume or first become violent. During the war, the humanitarian aid lift had to cease operations under Serb shelling many times (Andreas, 2008) and few organizations could maintain any meaningful operations through the war. This indicates that should any violent conflict resume, aid agencies working in the field will be forced to exit the field and await a chance to resume operations. This further indicates the importance of calculating the completion of aid tasks from the number of organizations operating in the field, as opposed to including only those that are organizing the response effort or running administration. These are not unimportant tasks, but only field operations can complete tasks

which have their locus of operation in the field. These, too, are key aspects of the functioning of the system that must be included in any validated simulation.

5.4.3 Data for Simulation Parameters

Finally, this case provides a great deal of detailed information that is necessary to define the specific, mathematical parameters of a simulation. The network analysis performed here provides data on network densities that will guide the assignment of parameter values on the number of network connections and the rate at which organizations will contact each other during their efforts. Coding the components of each of the concept variables provides insights on the necessity of using simulation analysis, discussed in Chapter 3, and provides guidance on what portions of the organizations should be involved in differing tasks of administration, organization, and field work, aid task completion, and anti-completion, rates, and the rates and uses of aid resources in the system. The values for all of these parameters, taken from both cases, Bosnia and Haiti, will be presented in Chapter 8, along with how they are varied during the final simulation analysis to measure the impact on the final outcomes of the system dynamics that develop from the aggregate impacts of each aid agency attempting to complete its work in country.

6.0 CASE STUDY: CIVIL CONFLICT AND NATURAL DISASTER IN HAITI

Following the modeling methods and analyses presented in Chapter 3 and performed in Chapter 5 on the UN stabilization and reconstruction mission in Bosnia and Herzegovina, this chapter applies the IAD and *Harnessing Complexity* frameworks to the UN stabilization and reconstruction mission in Haiti that began in 2004, and then faced additional and extensive new challenges following the 12 January 2010 earthquake.[19] The analysis in this chapter will extend the analysis of the previous chapter by adding additional data that will play the same roles for Haiti as the data presented in Chapter 5 did for Bosnia. The frameworks provide insights of their own in understanding the system that the network analysis and simulations cannot provide. They provide unique substantive analysis that provides for richer results. The role of the networks and simulation is to then take the substantive results and apply them to make a fuller model that is grounded in objective methodology. For the final analysis, the frameworks will provide the rules for how the simulation handles the actors and the results of the actions, while the network analysis will provide the measurements necessary to program the simulation's parameters. Discussed in Chapters 1 and 3, the frameworks pose six questions:

[19] Much of the analysis of this chapter was first prepared for as Scheinert and Konstantinova (2011). This includes the following depictions of the UN Cluster System, the Static Network Analysis, the Daily Dynamic Network Analysis, and the Site Visit Lessons. Scheinert and Konstantinova (2011) focused their analysis on measuring gaps between the cluster system's response plans and the responses actual structure. This is a different question than those addressed here, though related; see Chapter 4, Section 4.3. The text included has been re-edited to fit the analysis performed here.

- Who are the actors?
- What are the system rules?
- What are the patterns of interaction?
- How do actors select actions?
- How do actors select which actors with whom they will interact?
  What are the patterns of variation in the data covered in the preceding questions?

This chapter will use the frameworks and network analysis to answer these questions in the context of the mission in Haiti. After providing those results, the chapter presents the lessons for the simulation design that this case provides.

6.1 FRAMEWORK-GUIDED ANALYSIS

In a similar section, Chapter 5 presented a brief rationale of how the frameworks are applied in this study. This chapter is repeating the same kind of analysis and analytic steps performed in Chapter 5, analyzing a different UN mission in Haiti. In this way, Chapters 5 and 6 are parallel chapters; the rationales for each step of the analysis in this chapter are the same as those in the previous chapter, and so this chapter will refer back to those rationales, rather than repeat them. In that vein, the task of this chapter is to present the content and basis of the structures and process of the UN stabilization and reconstruction mission in Haiti. To fully describe the system in Haiti, this chapter describes the structure, formal rules, and informal rules of the stabilization and reconstruction mission in Haiti.

6.1.1 System Structure and Actors

Just as was discussed in the Bosnian context, stabilization and reconstruction missions exist in the greater context of overarching system of states and the laws that those states have developed for that system. The relevant details of that system for the structure of stabilization and reconstruction missions is the differentiated legal standing that it creates for local and international organizations operating in country. The result is that in both Chapters 5 and 6, the structure of the system is defined by the structures of the local administration and the presence of the international community.

6.1.1.1 State Structures

The formal state structures for Haiti are deeper than those in Bosnia, with a greater number of local jurisdictions, but their organization is simpler, since it is consistent across the country. Haiti utilizes four levels of political subdivision below the state level. In descending order, these are: *départements*, *arrondissements*, communes, and *sections communales*. There are 10 *départements*, and each covers a large portion of the country. Communes generally correlate to municipalities and *sections communales* to villages or sections of municipalities (Haiti Informant 7, 2010). However, as will be discussed more directly below, these jurisdictions were not necessarily those observed in the network. These are the jurisdictions that were observed with their definitions:

- International: States, organizations, and groups with impacts in Haiti, but whose actions have implications far beyond Haiti or the Caribbean, or organizations whose basis is in other international organizations. The role of the United Nations is so extensive in Haiti that a data

point is recorded for the number of UN organizations present, as a subset of the international organizations.

- International – Regional: States, organizations, and groups with impacts across the whole of the Caribbean region, including but not limited to Haiti
- National: In the Haitian context, the term nation is used synonymously with the term state. Organizations with National jurisdiction have impacts across the whole of the area of Haiti, including state governmental bodies.
- Subdepartmental: organizations with impacts across a part of a *département*, but not affiliated with any administrative divisions below *département*.
- Local: Roughly equivalent to municipal jurisdiction, but including organizations that cover neighborhoods of Port-au-Prince, since those neighborhoods can be similar in size to more rural villages and towns.

Table 6-1 lists the frequency for each of the observed jurisdictions in Haiti.

Table 6-1. Frequency in Organization List: Haitian Jurisdictions

Jurisdiction	Count	% of Dataset
Local	20	3.62%
Subdepartmental	3	0.54%
National	49	8.86%
Regional (Caribbean)	79	14.29%
International	402	72.69%
International Subset: UN Organizations	91	16.46%
Totals	553	100%

6.1.1.2 International Actors

In Bosnia, the international community was built around two main international bodies, the United Nations and NATO. In Haiti, the international community has a larger base. The UN is still present, maintaining the main stabilization mission, the United Nations Stabilization Mission in Haiti (MINUSTAH). Following the earthquake, the UN's Office for the

Coordination of Humanitarian Affairs (OCHA) initiated the UN Cluster System, which will be more fully explained below, that formed the backbone of the international humanitarian response to the earthquake. This system is designed to facilitate and coordinate a wide base of international aid donors and humanitarian aid groups, coordinating aid appeals and the aid received, as well as coordinating field operations. The donor community, however, is made up of both large and small donors, with differing resources and differing access to the international humanitarian aid community, which will be discussed in more detail below.

Separate states play a larger role in Haiti than they do in Bosnia. They do play a role in the international community in Bosnia, but they did so largely through either NATO or the UN. In Haiti, the United States is a major, direct player. It is located geographically close to Haiti, and the United States Army played a leading role in the military forces present in Haiti (Dobbins *et al*, 2003). In the immediate aftermath of the earthquake, then-Haitian President Rene Preval invited the US Army to take control of Port-au-Prince's airport and coordinate its operations. The US 82nd Airborne Division stepped in to fill this role (Comfort, McAdoo *et al*, 2011). While the US's role in Bosnia, particularly during the peace negotiations was substantial, the direct involvement of US military forces under US, and not NATO, banners, gives the US a much more direct, and so more relevant, role in the Haiti stabilization and reconstruction mission.

6.1.2 Rules of Action: Formal Process

As with the analysis of the stabilization mission in Bosnia, this list of organizations sets the main structure of the system by establishing the actors who work in the system. The formal rules of action then describe the kinds of actions that the organizations are established to take and the legal structure in which they can take their actions.

6.1.2.1 Funding and Organizational Roles

The organizations in Haiti have the same list of attributes as the organizations in Bosnia have, and for many of the same reasons. The two attributes relative to formal roles are the same as in Bosnia, the organizations' sources of funding and mission categories. Like in Bosnia, the sources of funding match to economic sectors, and their observed frequency is reported in Table 6-2. Mission categories are reported in Appendix E.

Table 6-2. Frequency in Organization List: Haitian Source of Funding

Source	Count	% of Dataset
Public	371	67.09%
Private	42	7.59%
Non-Profit	140	25.32%
Totals	553	100%

6.1.2.2 Devolved State Powers

After years of trying different political and economic development strategies, the Haitian state is currently organized under one of the popular decentralization models. The model used is the devolution model where powers are transferred from the central government to the local governments, similar to a federal system, except that devolved systems still maintain a unitary system where the central government can recall those powers (Olowu and Wunsch, 2004; Schroeder, 2000). This devolution has been done such that the powers are confused and often the powers necessary to maintain any one policy or program are spread across multiple governments. Two examples of this are illustrative of the point. Communes and *sections communales* are supposed to do most of the policing, and the *sections communales* are supposed to do so without having the use of weapons (Haiti Informant 7, 2010), all alongside the HNP. Education is even more convoluted. Communes build the schools, *sections communales*

maintain the schools and *départements* pay for the teachers (Haiti Informant 7, 2010). This creates a structural challenge and requires arrangements with multiples levels of government in order to complete any one aid project.

6.1.2.3 Rules for International Organization Activities

Over the days following the earthquake, OCHA and the World Food Program (WFP) initiated the UN's system for disaster response coordination, the UN Cluster System (WFP, 2010; USAID, 2010, 2010a), forming the context in which response and recovery efforts took place. As soon as a disaster happens, a huge number of organizations mobilize to provide aid both locally and internationally. In Haiti, using software from the Sahana Foundation, the WFP documented nearly 700 organizations taking part in the response (Sahana, 2010). Since resources and information are distributed throughout the response system and no organization has all the information or resources that it needs for its response efforts, all the organizations to continue to respond appropriately and effectively, it must learn what tasks other organizations have and have not been able to complete and why (Comfort, 1999; Hutchins, 1995). The goal of the cluster system is to facilitate this kind of coordination between organizations.

Based on the functional needs and experience as outlined in the OCHA guidelines, the clusters organize around substantive areas of response. In Haiti, these areas are Agriculture; Camp Coordination/Camp Management (CCCM); Early Recovery; Education; Shelter and Non-Food Items; Emergency Telecommunications; Food; Health; Information Management; Logistics; Nutrition; Water, Sanitation, and Hygiene (WASH); and Protection. Each cluster has a either a non-governmental organization (NGO) or a UN organization that oversees and manages that cluster as the cluster lead. In principle, the clusters are supposed to coordinate with the appropriate local administrative agency. In Haiti, each cluster holds regular meetings on the

United Nations Logistics Base (Logbase) to coordinate the activities and resources of the organizations that are working in that cluster's substantive area.

In addition to the clusters, OCHA operates two different websites where it and the international organizations publish documents related to their operations. The better known and longer-standing of these is ReliefWeb,[20] which maintains records well back into the early and mid-1990s. The second and newer site, having only begun with Haiti, is OneResponse.[21] ReliefWeb contains data from many different response efforts and collects all the documents together in a database that can be searched by a variety of characteristics, such as country, type of document, crisis or disaster, and several others. OneReponse organizes its documents by cluster within pages specific to each disaster or crisis. These websites are aimed at facilitating communication and coordination between cluster meetings, and as a way to share information across clusters, much as might happen in an Emergency Operations Center (EOC) in the United States operating the Emergency Support Function (ESF) system, though over a longer time period. The rest of this paper will document the shape of this coordination both through and outside of the cluster system, as documented by direct observation and the situation reports that many organizations published during their response efforts.

6.1.3 Rules of Action: Informal Processes and Observed Behavior

Just because law and policy expects or obligates certain actions does not necessarily mean that the identified local actors will necessarily meet those obligations and expectations. This section

[20] ReliefWeb is online at: www.reliefweb.int.
[21] OneResponse's main site is http://oneresponse.info. The Haiti-specific site can be found at: http://haiti.humanitarianresponse.info.

will review which expected patterns discussed above broke down and what patterns filled the gaps between expected and actual behavior of the actors.

6.1.3.1 Social and Political Segregation

In Bosnia the defining rule for understanding the function of local administration and social organization was the cleavages between the nationalities. In Haiti, the analogous rule is the separation between the Haves and the Have-nots. In different language, that is the gap between rich and poor, including the gaps between those two and the international community, which forms a third group (Table 4-2). The most visible aspect of this split is the language differences. Rich Haitians speak French. Poor Haitians speak Haitian Creole. The aid agencies speak primarily English. Language choice, in this way, becomes a marker to which community any one individual belongs. This split is then reinforced through political and physical barriers. The poor are left to rely on a largely ineffectual government, some of whose subdivision institutions, particularly the *arrondissement* assemblies, have never actually sat, and so do not actually exist in practice even when they do on paper (Haiti Informant 7, 2010), and other institutions are at least viewed as, if not actually, highly corrupt (Haiti Informants 2 and 3, 2010). The Haitian rich are able to sidestep these issues by being able to hire private security forces or being able to afford the construction of high walls, topped by broken glass, barbed wire, or razor wire. This private security at the gate and razor-wire topped walls enforces a physical separation between the rich and the poor in the cities. The rich are further able to afford to live in large country estates, up in the hills, completing the physical separation between rich and poor. This pattern continues even into the international aid community. Despite the requirement to work with the local government, only two clusters actually maintained closer interaction: the WASH cluster with the National Directorate of Water Supply and Sanitation (DINEPA) and the health

cluster with the Haitian Ministry of Health. Humanitarian principles dictate that humanitarian workers are to be embedded in the local population, with little to no separation, but in Haiti security fears lead the aid groups to rely on the US Army and MINUSTAH to provide a security cordon around aid workers and projects (Haiti Informant 6, 2010). Only small groups, ones who chose not to connect to the major UN aid apparatus will work without security cordons, and, even then, only in places well away from Port-au-Prince. The result from all of this is a clear distinction and differentiation between the three groups.

6.1.3.2 Communication and Coordination Patterns

Like the national split in Bosnia, the ramifications of this split in Haiti are extensive. As Table 4-2 notes, governing power is held in the hands of the Haves alone. Indeed, much of the conflict that surrounded Aristide's tenure stemmed from the appearance to the Haves that Aristide would meaningfully spread power to the large majority of Haitians who are poor, and the threats that this implied to the wealth and safety of those who are rich (Haiti Informant 4, 2010; ICG, 2004). Without the promise of access that Aristide provided, poor Haitians remain very distrustful of both their government in general and of the specific officials and politicians who make it up (Haiti Informants 1, 2, 3 and 4, 2010). In addition, just as in Bosnia, the split creates a situation rife with false and misleading information that reinforces distrust across groups. There is extensive belief among the wealthy of Aristide holding dark rituals to maintain power (Haiti Informant 4, 2010) or of Preval selling out the country to the United Nations, which no segment of the Haitian population has any trust in, due to historic underperformance, lack of access, corruption, and impunity amongst officials. Meanwhile, the international aid community fears poor Haitians, as just discussed above, for the prevalence of crime and violence, particularly kidnapping, which is not as widespread as feared, though it does occur. Like in

Bosnia, patterns of distrust have led to a lack of communication which has reinforced the patterns of distrust that have continued to undermine communication and coordination.

6.2 NETWORK ANALYSES

Table 6-3. Breakdown of Network Data Sources for Haiti

Organizational Source	Static Network	Timeslice 1a: Jan., 2010	Timeslice 1b: 1 Feb. 2010	Timeslice 2: June, 2010
Caribbean Disaster Emergency Management Agency (CDEMA)	11	11	0	0
UN Health Cluster	13	12	1	0
UN Logistics Cluster	24	20	1	3
United Nations Stabilization Mission in Haiti (MINUSTAH)	1	1	0	0
UN Office for the Coordination of Humanitarian Affairs (OCHA)	20	17	1	2
Pan-American Health Organization (PAHO)[22]	17	17	0	0
United Nations Environmental Program (UNEP)	1	1	0	0
United Nations Children's Fund (UNICEF)	7	6	0	1
Office of Foreign Disaster Assistance (OFDA), USAID	24	19	1	4
Water, Sanitation, Hygiene (WASH) Cluster	12	10	2	0
World Food Program (WFP)	13	12	1	1
Totals	144	126	7	11

Just as with the analysis of the system in Bosnia and Herzegovina, network analysis can document the observed cleavages, and chart their details. For the Haiti analysis, data comes

[22] PAHO is also the local division of the World Health Organization. Most actions by either PAHO or WHO were reported as having been done by PAHO/WHO or WHO/PAHO.

from 144 situation reports downloaded from ReliefWeb. Table 6-3 details the number of sources or each of the timeslices for Haiti, including the static network. Haiti's first timeslice is broken into two parts through much of the analysis. This is a product of how the software used to construct the data, ORA, treats time data. ORA allows for time stamping by date, all the way down to the second. The first Haiti time slice covers the three weeks immediately following the 12 January 2010 earthquake; that is, the timeslice runs from 12 January through 1 February. The change in month leads to another time slice being created in ORA, creating Timeslices 1a and 1b, that will be included below. Additionally, the first timeslice provides sufficient data for a daily analysis of that timeslice, which will be conducted below. This was not done for the Bosnia data, as the data did not provide sufficiently complete data to support such an analysis.

6.2.1 Static Network Analysis

Table 6-4. Haitian Network Map Key for Source of Funding and Jurisdiction

Organizational Source of Funding	
Source	Color
Public	
Private	
Non-Profit	

Organizational Jurisdiction	
Jurisdiction	Shape
Local	Square
Subdepartmental	Down Triangle
National	Up Triangle
Regional	Box
International	Circle

6.2.1.1 Network Groups and Patterns

Figure 6-1 visually depicts the results for the static network model for all the situation reports. Coding these situation reports reveals 3344 unique network interactions from one or more of 552 organizations identified in the data. The color of each node in the network map represents its source of funding while the shape represents the jurisdiction. Table 6-4 contains

the full list funding sources, jurisdictions, and the colors and shape used to represent each. The most striking feature of this map is its degree of fragmentation. As is typical, and which has been observed in previous disasters, there is a single, large interconnected map that contains most organizations (Comfort, Oh *et al*, 2010). What is not typical is the number of small side groupings that contain only one or two dyads. What is even less typical is the large number of isolates, the organizations that are not connected to any other organization in the network. These are the nodes organized in a list down the left side of the network map. Isolates are common in a response network (Comfort, Oh *et al*, 2010), but there are rarely this many of them. A response system this disconnected will have difficulty managing itself as the lack of linkages undermines the ability of organizations to learn from, and adapt to, each other's actions.

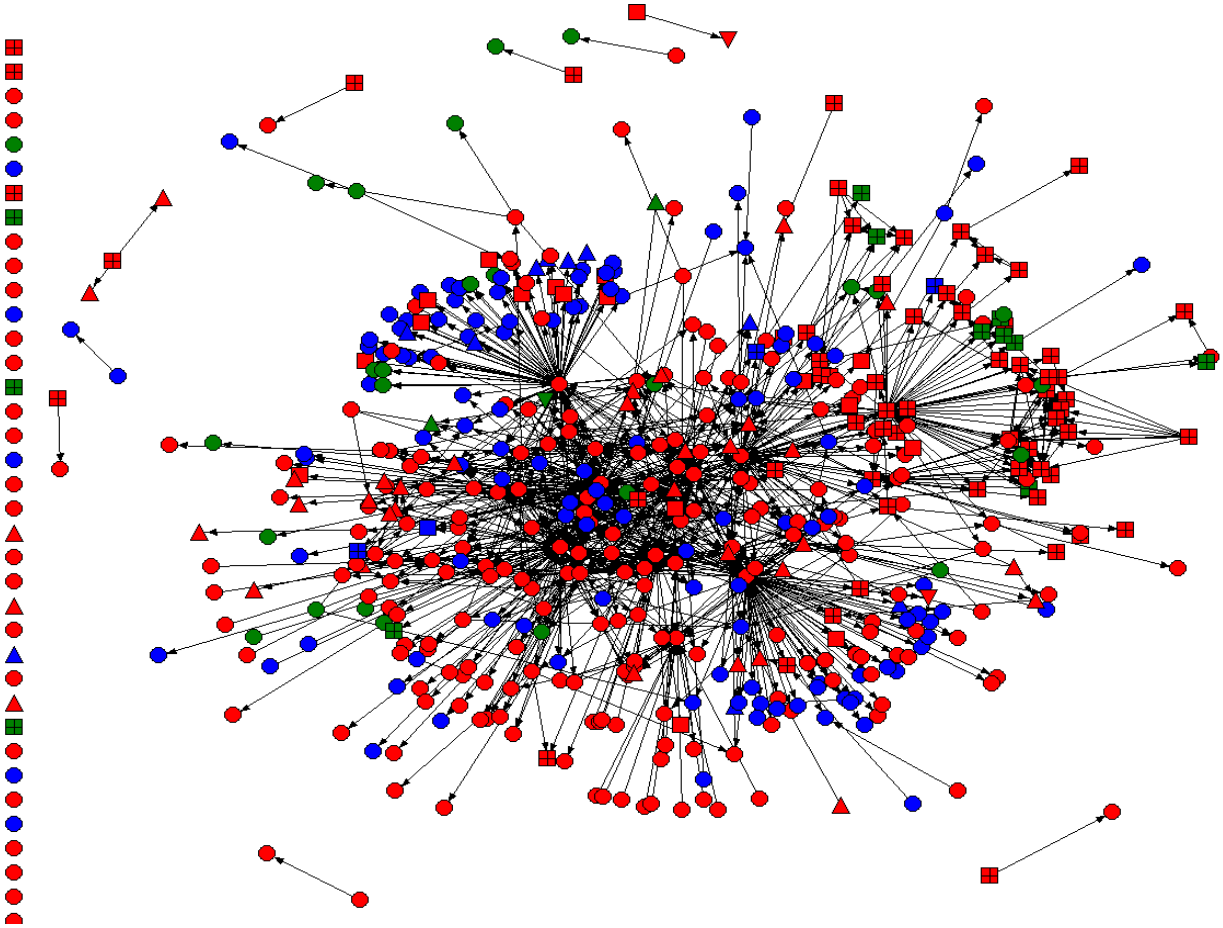


Figure 6-1. Static Network Map for Haiti

6.2.1.2 Network Key Entities

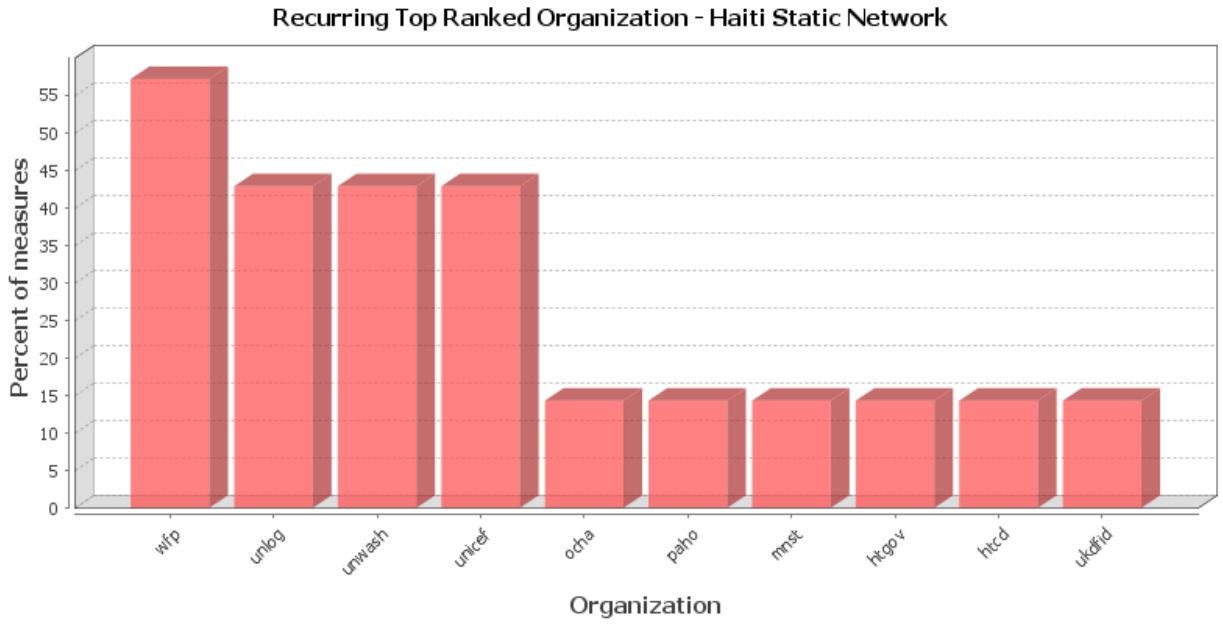


Figure 6-2. Most Central Organizations in Haiti[23]

Again, using ORA (Carley, 2011), a "Key Entities" report calculates a set of centrality measures to identify which organization or organizations are the most connected. These organizations have the most ability to monitor and direct information flows and reach to other organizations to perform tasks and gain resources. As mentioned in Chapter 5, the centrality measures taken in the Key Entities report are:

- Controlling Agency (total degree centrality)
- Inter-organization Leader (eigenvector centrality)
- Acts as a Hub (hub centrality)
- Acts as an Authority (authority centrality)
- Information Conduit (betweenness centrality)
- Connects Agencies (high betweenness and low degree)

[23] Organization Acronym Key: wfp: World Food Program; unlog: UN Logistics Cluster; unwash: UN WASH Cluster; unicef: UN Children's Fund; ocha: UN Office for the Coordination of Humanitarian Affairs; paho: Pan-American Health Organization; mnst: MINUSTAH; htgov: Haitian Government (General); htcd: Haitian Civil Defense; ukdfid: UK Department for International Development

Figure 6-2 presents the percent or measures for each organization in the figure that measured in the top ten organizations for each centrality measure. Under the cluster system's official organization, the lead organizations are OCHA and the Logistics Cluster. The data show that the most central organizations during the response were the WASH Cluster and UNICEF, closely followed by the World Food Program. OCHA only reaches a position where it is tied with several other organizations that are in the top ten of only 15% of the centrality measures.

6.2.1.3 Network Structure

This section repeats the structural analysis that was performed in the previous chapter on the Bosnian static network. Table 6-5 repeats the small world small world network structure analysis. In this case, the proximity ratios are enormous, particularly for the static network and Timeslice 1a, though this timeslice dominates the static network, containing the vast majority of its data, as seen from the data source counts presented in Table 6-3. The results here are far stronger than they were in the Bosnia data; the Haitian networks are small world networks.

Table 6-5. Small World Ratio Calculations for Haitian Networks

	Static	Timeslice 1a: Jan., 2010	Timeslice 1b: 1 Feb., 2010	Timeslice 2: June, 2010
Node Count	552	487	117	98
Density	0.004	0.0044	0.0086	0.0136
Number of Ties	1214	1042	118	131
Clustering Coefficient	1.27	1.198	0.299	0.4
Average Distance	3.694	3.762	1.641	3.454
Ave. Clustering (RG)	0.00496	0.00478	0.0145	0.01156
Ave. Distance (RG)	7.513	7.528	4.409	6.872
Clustering Ratio	256.05	250.63	20.62	34.60
Distance Ratio	0.49	0.50	0.37	0.50
Proximity Ratio	520.76	501.52	55.40	68.84

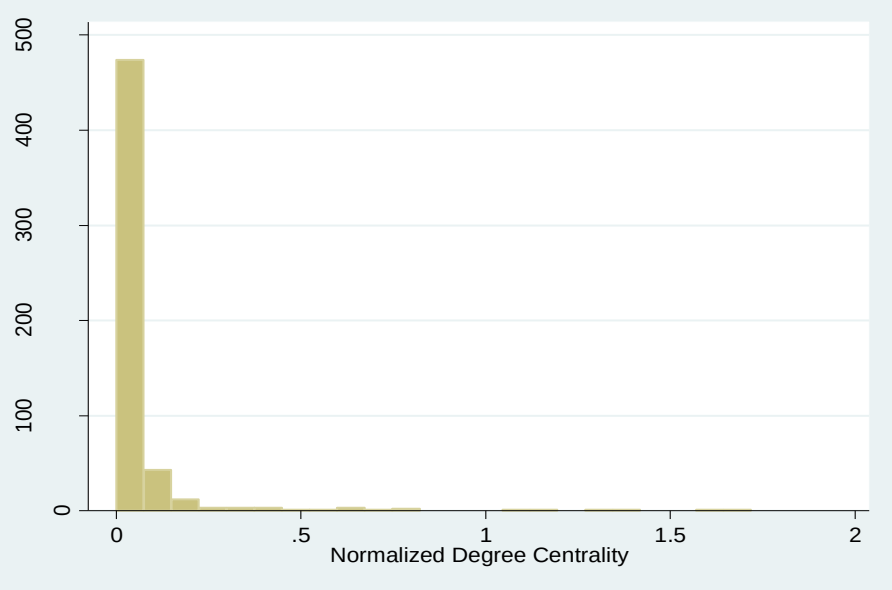


Figure 6-3. Histogram of Normalized Degree Centralities: Haiti Static Network

Figure 6-3 presents the results of the analysis for a scale free network structure in the Haiti Static Network. In matching the results of the small world analysis, the graph shows the pattern of power law distribution of network centralities that is both the same substantive results with a more extreme mathematical result; this graph approaches the intercept of the axes much more steeply from the horizontal while having a shorter vertical tail. This shows a clearer result than the Bosnian networks did; the Haiti networks are clearly both small world and scale free networks.

6.2.2 Dynamic Network Analysis: Timeslice 1 Daily Networks

The richness of the data in Haiti Timeslice 1 allows for a deeper analysis than was possible for any of the Bosnia data. Timeslice 1 corresponds to the immediate aftermath of the 12 January 2010 Haitian Earthquake. During this time, a huge number of organizations rushed into Haiti to

establish response operations. Current practice includes publishing a large number of widely available situation reports on the ReliefWeb site. The study period for the Bosnia analysis closed before this website was initiated, following the 2004 Indonesian Tsunami, so this level of detail is not available for Bosnia. This provides a detailed look at the initial development of a response network, providing insights that the Bosnia data cannot.

6.2.2.1 Network Fragmentation

As was discussed in Chapter 5, a static network will look more thoroughly connected, and so have a higher network density than will the separate dynamic networks. All the connections that appear in any time slice of the dynamic network will appear in the single static map. This can give a false impression of the degree of connectedness by showing connections between organizations that may only have occurred briefly and at widely separated time frames, limiting the amount of actual interaction. Figure 6-4 presents the basic node counts for each time slice, including the total number of nodes in each time slice, the number of isolates, and the number of new organizations that enter the system each day. The network maps for each time slice for the dynamic network analysis are contained in Appendix G. These maps contain the same pattern of highly disconnected networks and a large number of isolates that are observed in the static map, and indeed, the separated network sections show even more clearly in the dynamic maps than the static map. Though using news reports from the Caribbean News Online, Figure 6-4 confirms the pattern of organizational entry into the system that Comfort, Siciliano, and Okada observed (2011), that is, an initial rush of organizations followed by a steady decrease in new organizations, representing a steady decrease in additional personnel, knowledge, and skills.

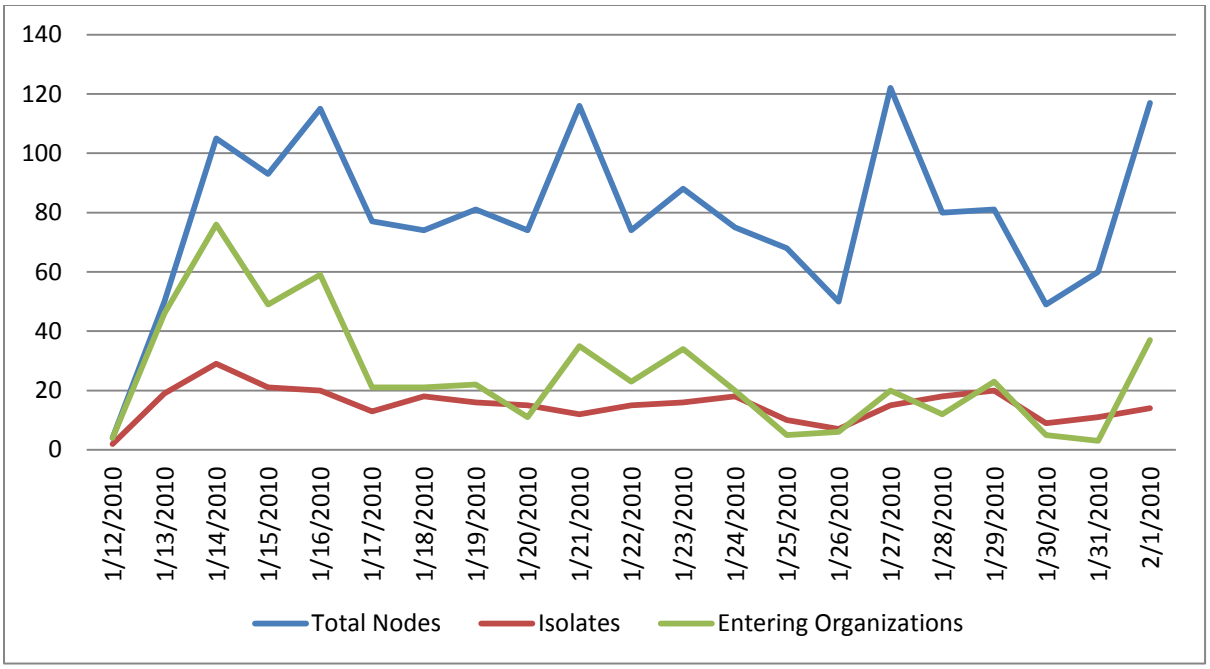


Figure 6-4. Haiti Daily Dynamic Networks: Node Counts

Nevertheless, a continual measure of new organizations entering represents an expanding response system. Taken together, the network graphs and Figure 6-4 show that the total number of nodes in the main components of the networks remains roughly constant. The spikes tend to match rises in both new organizations and isolates in the first half of the response and large donor meetings in the second. The valleys in the number of nodes match to periods of few new organizations and smaller numbers of isolates. This suggests a pattern of organizational exit from the official coordination structures, even as the data show that few organizations completed their goals, when those actions included more than making statements of sympathy and support. The network interactions were coded by status of the task. A code of 7 indicated completion. Of 3088 network interactions in Timeslice 1, only 650 entries recorded a completed action or interaction. Of those, the few that do not represent damage assessments or the initiating of a

cluster primarily refer to opening refugee camps or the delivery of food, fuel, or medicine, and so represent the completion of the tasks necessary to perform other tasks.

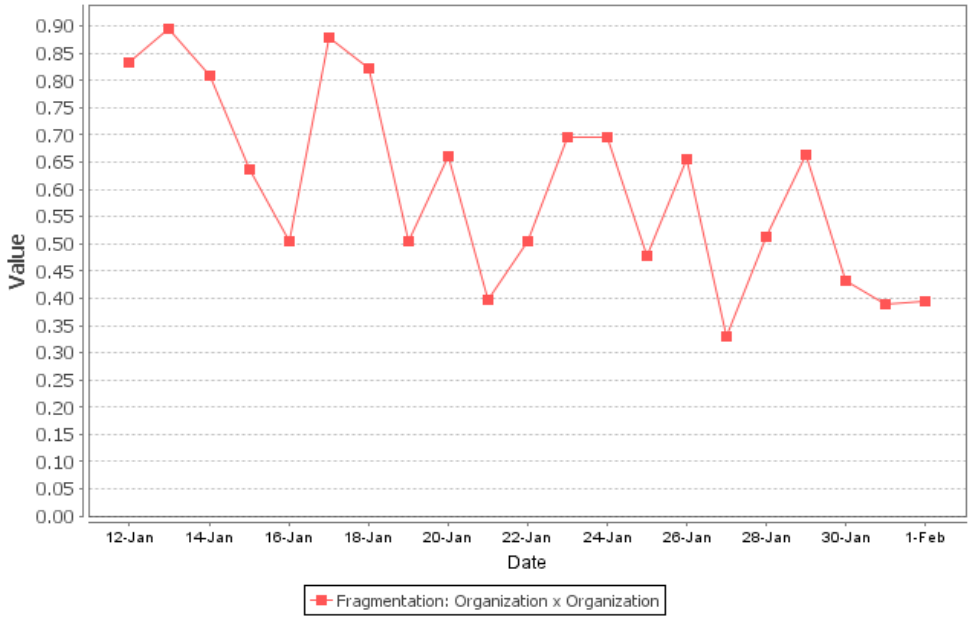


Figure 6-5. Haiti Daily Dynamic Networks: Network Fragmentation

Figure 6-5 shows the network fragmentation, the percent of nodes that are disconnected from the main portion of the network, for each time slice of the dynamic network, while Figure 5 provides the percentage of isolates for each time slice. In comparison, the fragmentation of the static network is 0.24, well below the lowest fragmentation of any time slice in the dynamic network. The network for all of Timeslice 1 has 52 isolates. Figure 6-6 shows that while this may be higher in absolute count than any time slice, the far greater number of organizations in the static network produces a smaller percentage of isolates, often much smaller, than are found in all of the time slices.

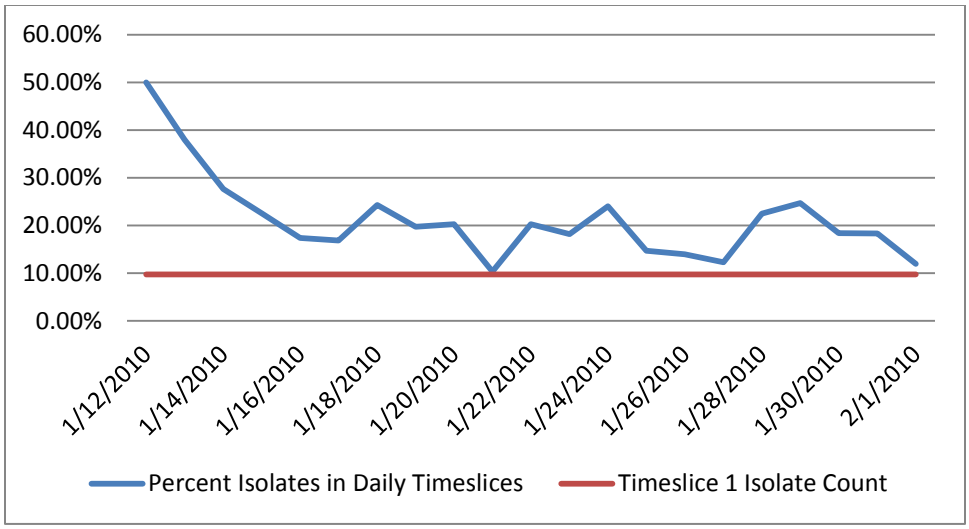


Figure 6-6. Isolate Percentage of Haiti Daily Dynamic Networks

6.2.2.2 Daily Dynamic Network Centralities

The time slices of the dynamic networks also show a similar pattern to the static networks in which organizations were most central, while showing the change across the time period of the response. Figure 6-7 presents the eigenvector centralities from the time slices of the dynamic network. This measure of centrality includes two parts: how many connections the given organization has to other organizations (degree centrality) and the degree centrality of the organizations to which that organization is connected. This allows for greater accounting for hierarchical network structures that commonly develop. Using a selection of the organizations that emerged in Figure 6-2, Figure 6-7 shows both the initial and continuing prominence of the WFP as a central organization, but also the emergence of PAHO and the UN WASH Cluster later in the response, and the episodic, but inconsistent centrality of OCHA.

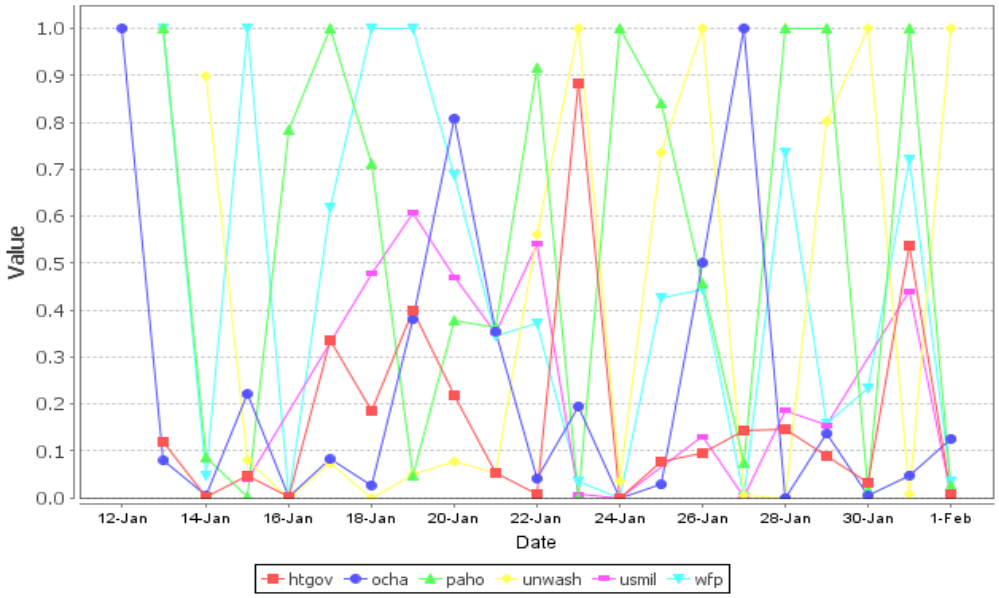


Figure 6-7. Eigenvector Centralities across Haiti Timeslice 1

6.2.3 Dynamic Network Analysis: Changes in Timeslice 2

Along with allowing for an in-depth analysis of the initial formation of a response system, Haiti provides data that shows how that system changes after the initial rush of organizations. Access to sufficiently detailed data to support a network analysis in Bosnia do not become available until five years after the end of the war, and eight years after the start of the study period. This means that the initial rush of organizations is already long past. Events at the start of the Haiti study period follow this same pattern; sufficiently detailed data are not available until the period following the earthquake, but it is the earthquake that provides the catalyst for a new rush of organizations and a large reshuffle of the system. Section 6.2.2 took advantage of this to examine the initial rush of new organizations and aid. This section will examine the network as it existed in June, 2010, after the earthquake rush, but before the complicating events of the cholera outbreak that struck Haiti in the fall of 2010.

6.2.3.1 Haiti Timeslice 2 (June, 2010) Network Map and Groupings

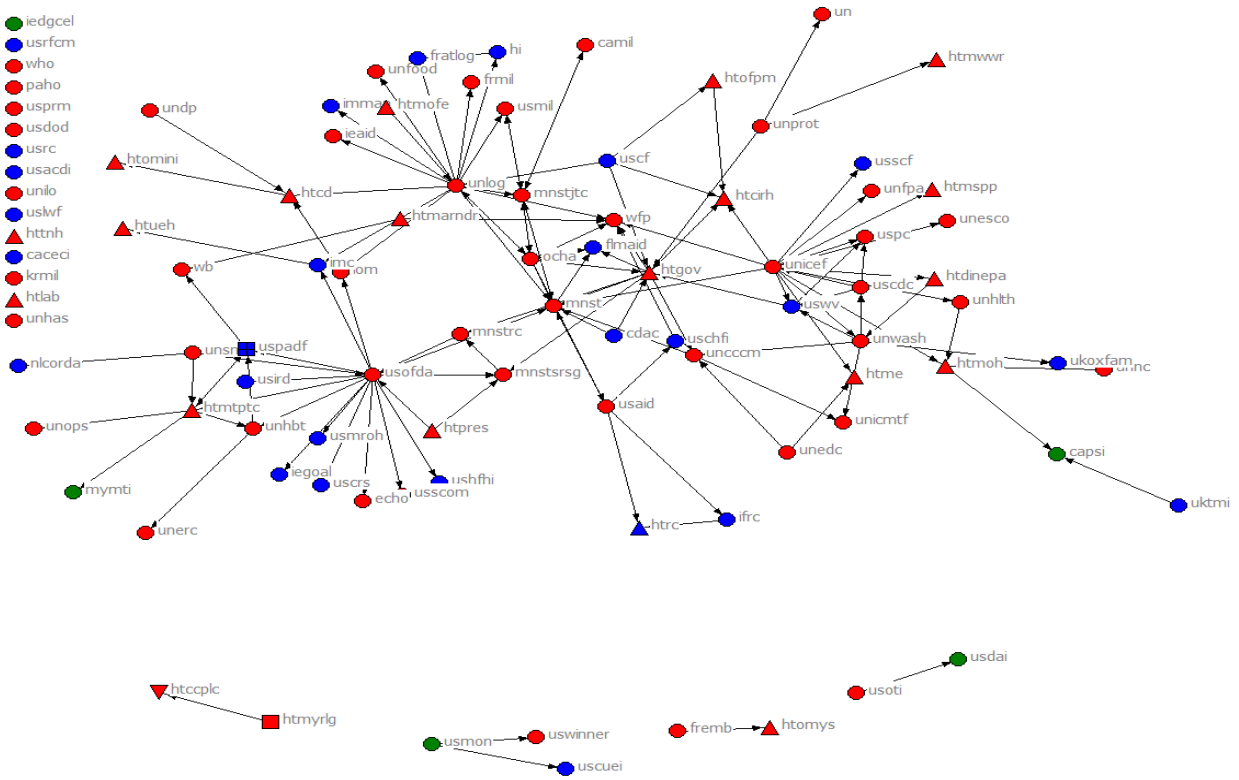


Figure 6-8. Haiti Timeslice 2 Network (June, 2010)

Figure 6-8 contains the network that existed in June, 2010 in Haiti. At this point, the network has undergone several changes, some of which increased its separation, some of which brought the network closer together. Table 6-5 provides evidence of these changes, along with providing evidence that this is a small world network. First, the number of organizations has dropped precipitously; Timeslice 1b is exactly 1 day long, and has 117 nodes while Timeslice, at a month long, has 98 nodes. The network has also lost nearly all of its private organizations, and the few that remain are in either separate network components or only on the fringes of the great component. Additionally, the clustering coefficient has dropped from Timeslice 1a and the static

network, showing less grouping. However, the network density has increased, suggesting a greater number of long paths across this network. This fits with a network map that shows several different clusters in the map, none of which are closely connected to the others.

6.2.3.2 Network Key Entities for Timeslice 2

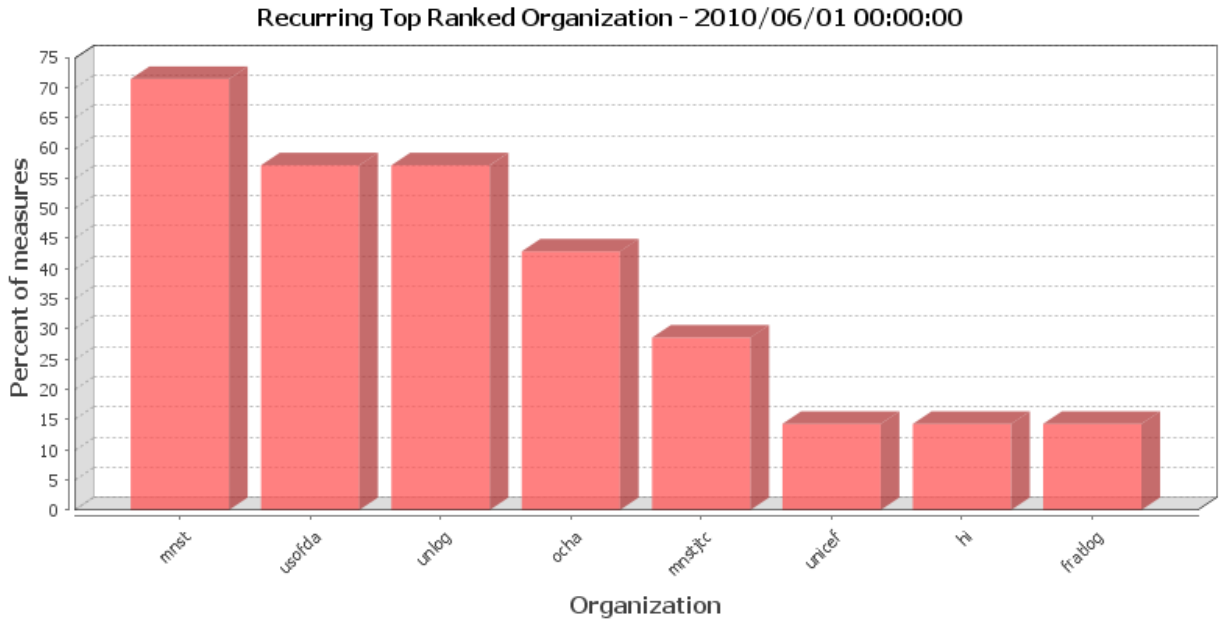


Figure 6-9. Key Entities in Haiti Timeslice 2 (June, 2010)[24]

Figure 6-9 presents the key entities for Timeslice 2. While several key organizations have remained on the list, several important organizations for the long term development have not. The most important of these organizations not on the list is the Haitian government; this set of key entities contains no Haitian government bodies. The Haitian Government (*htgov*) remains near the center of the map and shows up in four lists of top ten centralities, but its highest centrality is only as a connecting agency, with high betweenness and low degree centralities, and

[24] Organization Acronym Key: mnst: MINUSTAH; usofda: OFDA (USAID); unlog: UN Logistics Cluster; ocha: OCHA; mnstjtc: MINUSTAH Joint Operations Tasking Center; unicef: UNICEF; hi: Handicap International; fratlog: Atlas Logistique

still only ranks 4th on the list of connecting agencies. This is the highest that any Haitian organization reaches in that timeslice on any centrality measure, and only two others, Haitian Civil Defense and the Ministry of Public Transportation and Communication,[25] even show up more than once in the top ten centrality scores. The organizations that have become more central in this time slice are military and logistical organizations, suggesting a greater focus on aid logistics and identifying high capacity organizations that can support actions. OCHA has also become more central by showing up in the top ten of more centrality measures, suggesting that its coordination activities have increased.

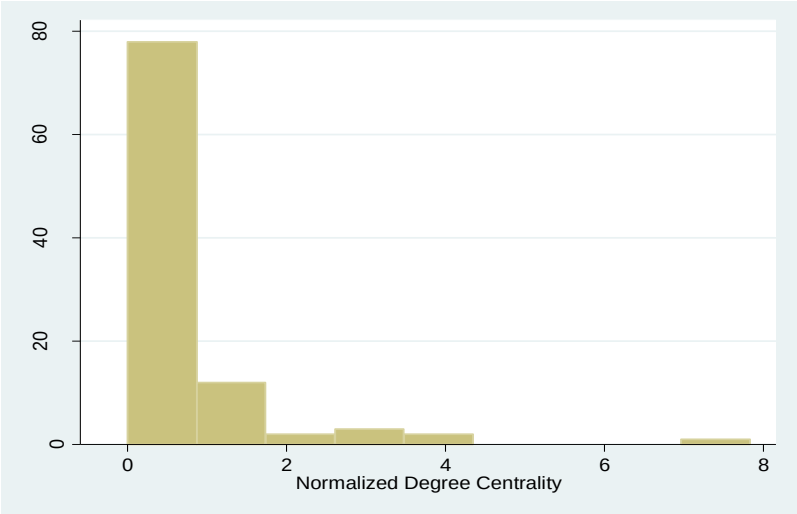


Figure 6-10. Histogram of Centralities: Haiti Timeslice 2 (June, 2010)

6.2.3.3 Network Structures

Network structures have now been discussed several times, allowing for a move directly to the results. As mentioned twice above, Haiti Timeslice 2 is a small world network, as shown from the proximity ratio calculated in Table 6-5. Figure 6-10 reports the histogram of

[25] French official name: Ministère des travaux publics transports et communications (MTPTC).

normalized degree centralities across the organizations in that timeslice. It is the one histogram that does not follow a strict power law distribution, with a small rise in normalized degree centrality at a measure of 3. This indicates the presence of the intermediate hub organizations that have been hinted at in the network grouping and key entities analysis. The pattern of the graph still closely fits a power law and the idea of intermediate hubs fits with the definition of a scale free network presented in previous chapters. These two points allow for the conclusion that the network in this time slice is also a scale free network.

6.3 SITE VISIT LESSONS

On-site observation took place during May, 2010. It involved attending cluster meetings at Logbase, and visiting and interviewing officials in the Haitian government and at Logbase to gain their insights and understandings of the response and reconstruction effort. Earlier publication documented the primary conclusions from this trip (Comfort, McAdoo *et al*, 2011). Some of the observations bear repeating here. Two of the primary observations of this effort were the extremely rapid turnover in cluster leads and the separation between international responders, the Haitian government, and the Haitian population. In the network maps for both the static and dynamic networks, this pattern continues to hold. While few groups in the network map are completely homogenous, they do tend towards being primarily from one jurisdiction or another. This is based on inspection of the patterns of the shape of the nodes (See Appendix G). At the same time, those organizations which are not public tend to group together and enter the network through only one or two public organizations. Similar to jurisdiction, this finding is based on pattern of color locations in the network maps (See Appendix G).

6.3.1 Methods of Communication

Many organizations did not take part in the cluster system. Some of their actions are recorded in the various situation reports published on ReliefWeb, or they would have been left out of this analysis. They emerged as the unusually high portion of isolates in both the static and dynamic networks. Despite the essentialness of communication and coordination to be effective (Comfort, 1999; Hutchins, 1995,), these isolates took part in the coordination. Still other organizations, either unable or unwilling to pass through the security checks at Logbase, or simply too small to be noticed or too cutoff to reach internet-based communications, were completely overlooked by any part of the central international response and its efforts to register all the aid actors that were either already present in Haiti at the time of the earthquake or entered following the earthquake. The steady number of organizations in the system, despite a continual flow of newly-entering organizations, suggests that many others were unable to maintain communication and coordination in the field, indicating that the communication system did not meet the challenges which conditions in Haiti imposed on the response.

6.3.2 Content of Communication

When coordination did occur, its content was often unproductive or untimely. Events change faster than weekly meetings can often accommodate. Wide-spread internet communication between meetings can mitigate that delay, but only if the communication carries the proper information, focusing on organizational activities and coordination, and can reach all the actors, including those in the field, who need the information. All too frequently this did not occur. Figure 6-5 shows more than just the large proportion of isolates in the network. It shows the

early pattern of a development of coordination. Through the first three weeks, the percentage of isolates first dropped towards the percentage of isolates shown in Timeslice 1, and would approach that level three more times over the course of the response, even though it never reached it. This finding shows intervals of coordination where organizations would coordinate once every few days. This observation fits the pattern of cluster meetings at Logbase. Each cluster would meet once per week, providing a venue for mass coordination. Some clusters would take advantage of this, with organizational representatives making requests or announcing projects at the meetings. Others, however, spent the meeting discussing policies, often in the most general of terms, such as agreeing to pay attention to issues of gender while mentioning no specifics.[26] Nevertheless, much of the content of cluster meetings was determined by documents that aid workers edited in advance and passed among each other using email and GoogleGroups. Even then, the aid workers, who quickly came to resemble "bureaucrats for hire," often took a surprisingly long amount of time to fill out documents and respond to email requests.

An example of this pattern occurred shortly after the CDM's reconnaissance trip to Haiti that illustrates common patterns in the response community, including another issue, the language divide. One cluster, attempting to coordinate aid projects, generated a word document where each member of the cluster was to fill in boxes indicating details of the project. The document was published to the membership through the GoogleGroup[27] with the request to the membership to complete it. The cluster leadership would then compile the responses and send out a completed document. This was in addition to the on-going Consolidated Appeals Process documents which OCHA published, and was not for use with donor agencies, but only for the

[26] This occurred at one cluster meeting, directly observed by an author of this paper.
[27] The author of this study had joined the group as part of observing and monitoring the response efforts and so received this document directly throughout its lifespan.

use of the cluster and its membership. After requesting for several weeks that organizations fill out the document, only a small fraction of the cluster membership returned any data. A partially completed document was published for the group, in French. No English-language version was ever compiled. Haiti is a French-speaking country, and earlier works have critiqued the over-reliance on English in the international response (Comfort, McAdoo *et al*, 2011). Excluding English, however, particularly in the primarily English-speaking aid community commits the same sin as excluding French while working in a French-speaking country. Indeed, it may even be worse in this case, since it alienates much of the aid and donor community while still not being accessible to the majority of Haitians, who actually speak Haitian Creole, and not French.

6.4 CONCLUSIONS AND LESSONS FOR THE SIMULATION

As was discussed in Chapters 3 and 5, analysis will conclude with the use of a simulation to test the relationship between resilience, capacity, and effectiveness. For that simulation to be valid, it must be based in empirical data. Bosnia provided insights into the impacts of groups struggling between each other. Haiti is conceptually simpler than Bosnia. Its groups are more easily defined by socio-economic status and each group's access to government and policy making is easily identifiable. Additionally, Haiti saw a new crisis force the development of a new response system that allows for observation and measurement of a system that has yet to mature, as the Bosnian system has done by the time network data becomes available. The result is that the Haiti case offers corroborating evidence for many conclusions about the simulation structure already drawn in Bosnia, and to be fully reviewed in Chapter 8. Further, it offers unique insights that make key contributions to developing an empirically-validated computer simulation model.

6.4.1 Network Structures

The results on network structures are corroborating results. All of the timeslices observed in both cases proved to be both small world networks and scale free networks under the mathematical definitions provided in the network methodology literature (Newman *et al*, 2006). What Haiti does offer that is unique is network growth and development. It shows how networks start with a small number of organizations with few connections. As the network grows, the number of organizations increases throughout the first few weeks, though Figure 6-4 shows that the rate of increase peaks in the first few days after the event, though the total number of organizations in the system remains relatively stable after a few days. This indicates that organizations will go in and out of the system, even in the first few days following an event. The second Timeslice, from June, 2010, shows that network density increases over time, though it does not necessarily centralize under any organizational leadership, let alone the one that the response plans might call for as the organizational lead. Any valid simulation will have to mirror these developments in order to be valid.

6.4.2 Simulation Structures

The Haiti data also provides a qualitative basis for several structures that must be included in the simulation. Logbase's insularity provides the implication that no organization that is only involved in organizing the response of other organizations can directly complete an aid task. Only organizations that are actively working in the field can complete aid tasks. These organizations can direct access to the field, and can move to the field to complete tasks, but only those that are in the field can complete tasks. The Haitian government is also known for

inefficiency and corruption (Haiti Informants 1, 2, 3, 4, 6, and 7, 2010). The impacts of this corruption will have to be operationalized in the simulation model in some manner. Finally, all aid organizations entering aid brought their own resources with them. The lack of local resources required this of these organizations. This means that organizations entering the aid system will bring resources into the system in the simulation model. In these ways, the Haiti analysis provides three key simulation structures for which the Bosnia analysis did not provide an empirical basis.

6.4.3 Data for Simulation Parameters

Chapter 5 indicated several parameters that the case study analysis will provide. These include aid completion rates, resource accumulation rates, the percentage or organizations that will be in the field versus the number that will be engaged in organizing a response, among others. Chapter 8 will provide the full list, along with the specific values that each case provides, which is chosen for the model, and why that value is chosen. In the final version of the model, these values will serve as guideposts in building a model that will endogenously generate many of these measurements. This will allow for a flexible model to test variations and generate empirically-valid hypothetical data while specific values generated in the empirical case studies will allow for validation tests of the model that will validate that those hypothetical results. In this way, the empirical case studies presented here in Chapters 5 and 6 will support analysis that extends behind the specific details and contexts of these two specific case studies.

7.0 MODELING RESILIENCE, CAPACITY, AND EFFECTIVENESS

Analyzing complex adaptive systems requires building a clear conception of the situation under study. Under IAD, these are the rules of the action arena (Ostrom, 2005). Under Axelrod and Cohen's framework, this is the process of identifying the patterns of variation, selection, and interaction in the model (2000). The analytic chapters to this point, Chapters 4, 5, and 6, have performed this analysis for the two empirical cases upon which this study builds. While each case has been examined, they still stand as separated cases, independent of each other with their own sets of conclusions and observations. This chapter draws these two cases together. First, it builds a single, conceptual model for post-conflict stabilization and reconstruction from the observations and analysis from each case, making conclusions where the cases support common conclusions and pointing out unique conclusions and deviations between the cases. The study then applies this conceptual model to support the component variables for this study's conceptual variables, and their measures, that were presented in Chapter 3, and analyze the correlations between the measured values for each of the component variables and the concept variables to draw conclusions about their relationships. The next chapter will recombine these results with the conceptual model to define and perform the simulation analysis.

7.1 A CONCEPTUAL MODEL OF STABILIZATION AND RECONSTRUCTION

Each of the previous two chapters examined a specific, empirical case of a United Nations-led post-conflict stabilization and reconstruction mission. As large and complex missions, this required careful analysis to understand each in its own context. One of the purposes of this study, though, is to expand beyond these individual case studies and draw cross-case conclusions that can provide guidance for the structure of future stabilization and reconstruction missions. This requires stepping beyond the individual cases, using their empirical results to define a cross-case model. This section develops the first part of that model. That first part draws together the results of the frameworks to develop the conceptual model that will lay the ground work for two ever more mathematically rigorous parts of the model, one that will follow in the next section of this chapter, and the other in the next chapter.

7.1.1 International Intervention in a Local Conflict

Chapter 1 laid out the primary context of stabilization and reconstruction missions that bears a brief review at this point. The kind of missions currently under study are international interventions designed at stabilizing the many aspects that can and do precipitate conflict within a state and lead to that conflict spilling over into other, usually neighboring, states. A great number of events can precipitate international involvement, and shape its initial format and function that are the initial conditions of each mission. There is already an extensive literature that examines how and when the UN and individual states decide to intervene (Beardsley and Schmidt, 2011), and it is not the intention of this study to expand on that literature. Chapters 6 and 7 of the UN Charter, along with the unwritten versions known as Chapter 6 and a half and

Chapter 7 and half, define peace keeping and peace making processes that can and often do lead to these missions. In Haiti, international involvement began with a US-led intervention in 1994, while the conflict which this study focuses on had largely played out in 2004 before accepting international intervention, even as many international organizations and missions were already present in Haiti, including at least one that was attempting to mediate the conflict (See Chapter 4, Section 4.3). The conflict had generated instability that undermined Haitian efforts at development, both economic and democratic, exacerbating an already desperate humanitarian situation that had already seen large numbers of refugees during the earlier phase of the crisis (Dobbins *et al*, 2003). This process provided for the most traditional arrangement, utilizing Chapter 6 peacekeeping, where the local government invites international intervention to help stabilize the situation after a settling a conflict. In Bosnia, events occurred differently, with the UN and NATO entering an on-going conflict and acting to bring about a peace that did not previously exist (See Chapter 4, Section 4.2; Hayden, 2011). This was a case of the unwritten Chapter 7 and a half peace keeping, that is really more of a peace making situation, though it is arguable that it was NATO or UN involvement that hastened the end of the conflict, as opposed to Bosnian Serb losses to Croatian, Bosnian Croat, and Bosniak military forces. With one being a civil conflict, and the other a civil war, and each ended by different conceptions of peace keeping, and indeed from opposite ends of the peace keeping spectrum, the cases included considerably different initial conditions for international involvement while still both being cases of international involvement in a local conflict, designed to stabilize the situation.

In whatever way the international intervention is initiated, by the time of the post-conflict situation, the intervention will have arranged for international legal standing. Despite being from opposite ends of the peace keeping spectrum, both cases saw their international interventions

clearly legitimated under international law. This occurred effectively automatically for Haiti, since the MINUSTAH mission began with an explicit invitation from the local government, even as many local Haitians from multiple segments of society saw that invitation as ill-gotten, illegitimate, or illegal (Haiti Informants 2 and 4, 2010). For Bosnia, the legitimation was written into the Dayton Accords. International forces faced mixed popularity there, since memories of the UN's failures in the UNPA's remained strong and NATO was popular with the Bosniak population, though less so with Bosnian Serbs (Bosnia Respondent 1, 2011). However they entered, international forces will be legitimated under international law in the post-conflict situation, though it is likely that only some segments of the local population will actually welcome them, if any segments do.

7.1.2 Political and Governance Aspects

Once the post-conflict portion of the intervention begins, its goals will be to reform and strengthen governance. This is the primary mission, since it is what brings about stabilization (See Chapters 1 and 2). In the initial phases, the international institutions will lead in administrative tasks, since they are often the only ones with enough capacity left after the conflict for full governance, and even then, only after a period of build up while aid agencies and international bodies dispatch teams and delegations to support reconstruction and stabilization (Haiti Network Data, 2010). The challenge in this part is for the international organizations to guide administrative development while empowering the local government to take over administration. At this point, much of the literature conflicts with itself, suggesting differing guidance on how to establish democracy and empower local government. The only current consensus is that local government agencies must be involved in order to gain capacity (See

Chapter 2). If the local government bodies are not involved, then governance will remain in the hands of the international organizations indefinitely as the international organizations will never perceive the development of those local institutions as being ready to fully take over administration, whether that perception is accurate or not. Current practice, as seen in both Bosnia and Haiti, involves international organizations partnering with local administrative agencies, matching local and international institutions by substantive fields, usually following the UN Cluster System's format for what those fields are. These partnerships then provide policy and practice guidance and material resources to the local administration from the international agencies. If this partnership breaks down, then the flow of resources and knowledge breaks down, and the system will lose its primary means of supporting the growth in governance capacity

This method remains controversial both internationally and within the targeted country as it assumes the international organizations have superior information about carrying out governance that is applicable within the borders of the local country. It is, nevertheless, the method upon which the OHR and Peace Implementation Council (PIC) in Bosnia, both defined and established in the Dayton Accords, are built and the implicit rationale upon which the international presence in Bosnia is predicated; the international actors understand better than local Bosnians how to balance Bosnia's mixture of nations and their relationships. With legally defined powers, such as that the OHR holds or has assumed, it is critical that the international organizations understand the realities of local administration, culture, and history, since, however inappropriate the assumption is that the international organizations know best is, and it is almost inherently false, their defined powers mean that they will certainly be part of the decision making and policy making process, to the extent that either exist. Indeed, if there is no domestic policy

process, then the international organizations will formulate a process themselves since they expect there to be one and will see its absence as a vacuum that must be filled at all the jurisdictional levels mentioned in chapters 5 and 6, even when local politics might suggest that such a process is left largely unutilized at any given level. It is then necessary for the international organizations with formalized influence to find ways to recognize when their understandings and expectations in a given theater are in fact misconceptions and require adjustment and adaptation to achieve any long term stabilization and to leave a government that is legitimate in the eyes of all segments of the local population.

7.1.3 Social and Humanitarian Aspects

7.1.3.1 Aid Task Categories

Table 7-1. Task Category Frequencies in Bosnia-Herzegovina

General Task Category	*Static Network*		*Timeslice 1: December, 2000*		*Timeslice 2: July, 2001*		*Timeslice 3: January, 2002*	
	Count	%	Count	%	Count	%	Count	%
Administration	152	35.43	54	33.33	65	40.12	33	31.43
Business	19	4.43	0	0.00	1	0.62	18	17.14
Communication	4	0.93	2	1.23	2	1.23	0	0.00
Field	78	18.18	25	15.43	37	22.84	16	15.24
Organization	106	24.71	33	20.37	38	23.46	35	33.33
Politics	60	13.99	48	29.63	9	5.56	3	2.86
Reconstruction	10	2.33	0	0.00	10	6.17	0	0.00
Total	429	100	162	100	162	100	105	100

While much of the focus on post-conflict stabilization and reconstruction is on the rebuilding of political and administrative organizations, the administrative tasks only take up a limited portion of the effort. The rest of the effort involves the physical reconstruction and

humanitarian aid tasks that international organizations engage in. Tables 7-1 and 7-2 detail the empirically observed task categories from both Haiti and Bosnia. Field tasks are those that involve performing a specific aid task in the field, whether the activities involve psychological support, humanitarian activities, or physical construction. The count totals in each timeslice are equivalent to the total number of network interactions in that timeslice. Like the mission categories described in Chapters 5 and 6, these categories detail both the broad area of operation and the specific substantive categories that, in this case, each network interaction aims at achieving. The charts only include the broad areas of operation, as there are many specific categories, and so a chart including them all requires extensive space. The complete charts of the task categories for both static networks are included in Appendix H and Appendix I, for Bosnia and Haiti, respectively. Administrative tasks are particularly common in the Bosnia data, accounting for a third or more of all network interactions. In Haiti, the majority of tasks involve organizing field aid operations, with the next most common activity being engaging in field aid activities. Building governance capacity and legitimacy may be the main objective of stabilization and reconstruction missions, but the majority of tasks focus around reconstruction.

Table 7-2. Task Category Frequencies in Haiti

General Task Category	*Static Network*		*Timeslice 1: 12 Jan – 1 Feb 2010*		*Timeslice 2: June, 2010*	
	Count	%	Count	%	Count	%
Administration	12	0.36	10	0.33	2	0.71
Business	2	0.06	2	0.07	0	0.00
Communication	24	0.72	23	0.75	1	0.35
Field	1334	39.89	1209	39.50	125	44.17
Organization	1971	58.94	1816	59.33	155	54.77
Politics	1	0.03	1	0.03	0	0.00
Total	3344	100	3061	100	283	100

This makes it very important to understand how aid tasks are completed in the field. Any effective modeling of stabilization and reconstruction will focus on these activities. Including the Field and Organizations categories in Tables 7-1 and 7-2, aid activities make up typically around 50% of the activities in the Bosnian network and around 98% of activities in Haiti, at least within the organized UN-based systems. Really, these figures should be higher. Every case of a natural disaster response contains a set of organizations that do not integrate with the main system structures. This means that situation reports will miss their involvement, since they do not coordinate in any way with the organizations that publish situation reports. News reports are more likely to reach these organizations and publicize their activities so that studies like this can learn of them. However, most of those organizations are small, so it is still difficult for news organizations to learn of them and reach them (Comfort, Siciliano, and Okada, 2011; Comfort, Wukich *et al*, 2011; Comfort, McAdoo *et al*, 2010; Comfort, Oh *et al*, 2010). All of these organizations work towards completing aid tasks, which is the most easily measurable of the tasks that a stabilization and reconstruction mission must complete.

7.1.3.2 Aid Organization and Coordination Activities

Organization activities in Tables 7-1 and 7-2 correspond to missions explicitly aimed coordinating or preparing field activities. This is the role that OCHA is intended to play in the UN Cluster system but which the WFP largely did play, as discussed in Chapter 6. It is the role the UNHCR took in the earliest days of the reconstruction mission in Bosnia, as discussed in Chapter 5. These organization activities often happen at centralized locations where aid agencies gather and base themselves in theater. In Haiti, after the earthquake, this is the Logbase discussed in Chapter 6. In Bosnia, there are two locations in Sarajevo that serve this purpose. One is the Business Center UNITIC, a pair of twin tower office buildings near the center of the

city. The other is the UN Country Team, located in an office building in the Austrian portion of the old city, near the western edge of the old city. In both cases, the central coordination location is separated from the surrounding areas and from open, public access by a security cordon. In Bosnia, this was nothing more than standard building security that required check in and an appointment. In Haiti, this included armed guards along with the similar check in requirements. No actual aid tasks are completed by the people working at this site; this is the location of the bureaucrats-for-hire discussed in Chapter 6. Still, the work done here is important, in principal, for coordinating aid activities in the field, but, as discussed in Chapter 6, performance in that coordination is inconsistent. This separation between the field operators and the organizational backfield must be included in the final model.

7.1.4 Unified Conceptual Model

The above sections describe the aspects of model of stabilization and reconstruction missions. This model must include separation between administrative, organizational, and field tasks that direct organizations to take task category appropriate actions for whatever category in which they operate. Field operating organizations perform aid tasks, driving one arm of a loop where organizations complete aid tasks while other organizations undo aid tasks in an effort to oppose and undermine the stabilization and reconstruction mission, as well as some completed aid tasks decay, leaving them to be recompleted. Organizations performing organizational tasks funnel resources and information to field organizations and administrative organizations and agencies while all organizations that enter the system bring resources with them for their own use or for sharing as a common pool resource for the aid community. This creates a resource flow where resources enter the system and are then either utilized for aid activities, transferred to

government, where they may be lost due to corruption, or remain in reserve for the organization owning them until that organization leaves the aid system. At that point, those organizations are removed from the system. Their transfer to government increases government capacity and allows government to both govern and complete aid tasks alongside aid agencies. This activity improves government legitimacy since it represents the actual delivery of goods and services to those in need of them. Since this delivery of goods and services, whether by government or aid agencies, is the actual completion of aid tasks, this brings together the full set of activities required of an effective stabilization and reconstruction mission.

7.2 MEASURING RESILIENCE, CAPACITY, AND EFFECTIVENESS

With the conceptual map laid out, the next step is to design and implement a system of measuring activity within the model of a stabilization and reconstruction mission. It would indeed be ideal if the measures could be simple and easily definable and identifiable. In a complex mission, the measures must be able to meet and address the complexity to be valuable. Moreover, this means that the measures must utilize a certain amount of complexity to fit common concepts across the varying forms and operations of the system. To do this, the measures require careful but thorough definitions. This section reviews the concepts and their definitions, all presented earlier in this study, that this study uses to measure the system and then presents the measurements found and analyzes their patterns and relationships.

7.2.1 Study Variables in the Conceptual Model

Table 7-3. Component Variables and Ranges

Resilience		Capacity		Effectiveness	
Components	**Range**	**Components**	**Range**	**Components**	**Range**
Presence on the Ground	1 – 8	Initiating Organization Resources	1 – 5	Completion of Aid Tasks	1 – 5
Internal Coordination	1 – 2	Initiating Organization Knowledge	1 – 4	Promoting Government Legitimacy	1 – 5
External Coordination	1 – 4	Responding Organization Resources	1 – 5	Expanding Government Resource Access	1 – 5
Adaptation	1 – 5	Responding Organization Knowledge	1 – 4		

Presented early in Chapter 1, this study examines the relationship between a mission's resilience and effectiveness, while controlling for its capacity. These represent the study's three main conceptual variables, which have been referenced many times throughout. Built from literature in Chapters 1 and 2 and presented in detail in Chapter 3, this system focuses on the key tasks that define effectiveness, the behaviors the constitute resilience, and the resource stocks that allow for capacity. Each of these conceptual variables contains several component variables which define and measure the constituent parts of that variable and which allow for measures of the performance of the system across all the components. Table 7-3 contains the list of components and their measurement ranges. Chapter 3 fully defines the ranges and how each value is defined and assessed. The earlier chapters carry complete discussions of the theoretical underpinnings for each conceptual variable and for its components, making it unnecessary to reestablish the grounds for each definition. More important for the discussion in this chapter is the location and

role that each of the component variables play in the conceptual defined above. This will establish their basis for being included in this study.

7.2.1.1 Conceptual Variables in the Conceptual Model

Each of the conceptual variables plays a key role in the model described above. The most obvious of these roles belongs to effectiveness, even as Chapters 1, 2, and 3 showed that effectiveness is probably the most complicated variable in the model to actually define and operationalize. The system that develops in the stabilization and reconstruction mission aims at completing aid tasks, stabilizing the governance and security situation, and establishing and expanding government legitimacy. The main action loops in the model, the aid task loop and the resource flow, feed directly into these goals, and so directly define the system's effectiveness, just as each organization's ability to drive these loops defines the organization's effectiveness.

Slightly less obvious than effectiveness is the role of capacity in the model. Chapter 3 provided a clear and direct definition of this conceptual variable, since it is the relatively easiest variable to define. Completing aid tasks requires resource input in terms of knowledge, manpower, and materiel. These make up the content of the resource flow; a flow that must progress in order for the aid task flow to progress. Without resources, the entire system would grind to a halt. In this way, resources take a critical role in the system. Knowledge fills an equally critical role, but, in the current model, only in the aid task loop. Organizations must have adequate knowledge of the tasks upon which they are working in to be able to properly complete that task. Any task improperly completed effectively remains uncompleted, as it will be unreliable, non-functional, or insufficient to meet the needs of those for whom the project was done. This includes being able to successfully navigate local political and cultural climates in which the organizations are working. Knowledge, in this way, is just as much of a resource as

manpower, money, or heavy lifting machinery, though its impacts and functioning is different from other types of resources.

Resilience is a more complex variable than both capacity and effectiveness in this model. Like effectiveness, resilience is a difficult concept to define and measure. Unlike effectiveness, it is also a complex variable to place in the model. This model operates at both a system level and an organizational level, otherwise known as an agent level. Resilience is not an explicit process in the model on either of these levels, but a characteristic of how organizations operate in attempting to complete their tasks. Each of the behaviors that constitute resilience must be operationalized separately, and some in different ways, since they have differing impacts on operation of the model and agent behaviors in the model.

7.2.1.2 Component Variables in the Conceptual Model

The relative simplicity of identifying effectiveness and capacity components in the model allows for a brief explanation of them at this point. Aid task completion follows from the aid task completion loop and connecting the government to resources is a key piece of the resource flow. Legitimacy then comes from the government's ability to secure support by delivering services. Capacity components have already been reviewed above, with the difference between the resources and knowledge of an initiating organization and a responding organization being only their position in the network dyads. For both sets, they represent the resources necessary to complete the tasks that make up effectiveness.

Resilience is left with four components that have four differing operationalizations in the model. The role of presence on the ground fits with other observations on the structure of the model. This component is designed to measure the mixture of organizations that are working together on any one aid task. This is part of the observation that only organizations working in

the field can complete aid tasks, and only those organizations will be able to recognize the information on changing situations and events that are occurring at or near the location of that aid task. Presence on the ground expands on this by factoring in coordination occurring between organizations in the field. Internal and external coordination are the most similar; they both correspond to the pattern and frequency of network connections, where greater coordination correlates with greater frequency of actual network ties (Comfort, Siciliano, and Okada, 2011; Comfort, Wukich *et al*, 2011; Comfort, McAdoo *et al*, 2010; Comfort, Oh *et al*, 2010; Comfort, 1999) between actors. In the model, these ties occur at a level below the agent-modeling level, defining the operation of the agent-modeling level. Finally, organizations utilize adaptation by responding to changes, changing their method of operation or the structure of their organizations. This is part of the process that they utilize to complete aid tasks, and so lies along the connection between organizations working in the field and the rate at which aid tasks are completed. With these three different spaces for operationalization in the model, resilience is a more complex variable to operationalize than capacity and effectiveness. Capacity and effectiveness can be located in the model at or near the conceptual level; resilience can only be operationalized through each of its components.

7.2.2 Correlations between the Components

Each of the four components for resilience, the three components for effectiveness, and the two initiating organization components for capacity are observed in every network interaction. The two responding organization components for capacity are only observed for interactions that have a responding organization, all for every timeslice. This produces an extensive amount of output; there are nine frequency tables for each of 5 timeslices and 2 static networks, making for

63 frequency tables for all of the components for all of the timeslices. For this reason, the output is not included directly in this chapter. Some review can still be made. For each of the resilience and effectiveness components, there is one ordinal category that pertains to either the behavior not being observed, for resilience, or no progress made or lost, for effectiveness.[28] These were always the most common codes for each component. In only one case of one component, external coordination in Haiti Timeslice 2 (June, 2010) was this measure not an absolute majority of the observed data; in June, 2010, in Haiti, no external coordination was observed at a low of 41% of network interactions, though it still represents the plurality of interactions in that case. In Bosnia Timeslice 2 (July, 2001), no internal coordination was observed in 100% of network interactions; in that timeslice, this component variable showed no variation. Together, it remained unclear if any of these component variables correlated with any of the others.

Moreover, despite careful efforts to define each concept and component such that they are clearly distinct from one another, there is still some overlap that cannot be avoided. Aid completion is almost inherently correlated with presence on the ground, as some presence is often required in the context of the network interaction for completion to occur, since organizations must be in the field to complete tasks. Additionally, presence on the ground will likely closely overlap with external coordination, since both involve the mixing and cooperation of organizations towards completing some common activity or task. Each component is also measured on an ordinal scale of different ranges and for which it is unclear, and, indeed, unlikely, that the transitions between any two values within one component has the same absolute change in value as the transition between any two values of another component

[28] For resilience, the corresponding ordinal code for "Not Observed" is always 1; for effectiveness, the "No Progress" code is always 2. For effectiveness, values of 1 are reserved for lost progress or undermined gains. See Chapter 3, Sections 3.2.3.1 and 3.2.3.3.

variable. These two factors make it impossible to simply combine the measures directly. Instead, a more complex method of combination is required, and which this study applies.

7.2.2.1 Factor Analysis Method

This problem and its solution were first presented in Chapter 3. At that point, it was noted that Cutter *et al* (2003) faced a very similar problem in identifying and measuring the social vulnerability of geographic locations in the United States. They solved it by using a principal components analysis to combine demographic and economic data. This method provides a guide that is used here to assess the correlation and overlap between the component variables and then to combine those into a single measure that, while its absolute value carries little explicit meaning, its relative value across network interactions and across timeslices can tell us something of how the system performed in during that timeslice. This analysis is performed in two steps that will be presented separately below.

7.2.2.2 Component Correlations

Table 7-4. Variable Names for Component Variables

Variable Name	Variable Label
ground	Resilience Component: Presence on the Ground
icoord	Resilience Component: Internal Coordination
xcoord	Resilience Component: External Coordination
adapt	Resilience Component: Adaptation
aidtask	Effectiveness Component: Completion of Aid Tasks
govtlegit	Effectiveness Component: Government Legitimacy
govtresource	Effectiveness Component: Government Connection to Resources
iresources	Capacity Component: IO Resource Level
iknowledge	Capacity Component: IO Knowledge Level
rresources	Capacity Component: RO Resource Level
rknowledge	Capacity Component: RO Knowledge Level

Table 7-5. Factor Results in the Bosnia Networks

Bosnia			
Static Analysis			
Factor 1		Factor 2	
ground xcoord aidtask		Adapt *iknowledge*	
Period 1			
Factor 1	Factor 2	Factor 3	Factor 4
icoord aidtask	govtlegit govtresources	ground adapt	iknowledge rknowledge
Period 2			
Factor 1	Factor 2	Factor 3	Factor 4
ground xcoord	adapt iresources *iknowledge*	govtlegit	*rresources*
Period 3			
Factor 1	Factor 2	Factor 3	Factor 4
xcoord aidtask govtresources	adapt iknowledge	ground iresources	govtlegit rresources

The first step of the factor analysis aims at determining the amount of overlap between the component variables and identifying the number of underlying factors that lead to overall performance of the system. Tables 7-4 through 7-6 present the patterns in these results. Table 7-4 provides a key for reading the variable names in Tables 7-5 and 7-6. Assignments to each factor are determined by the factor loadings. Each variable is assigned to a factor based on their factor loadings. Each variable is assigned to the factor for which it has the highest absolute value of its factor loadings, provided the variable had a maximum uniqueness score of 0.5 in a principal components version of a factor analysis. In these tables, variable names listed in italics have a negative relationship with the overall value of the factor while the rest have a positive relationship with the factor value.

Table 7-6. Factor Results in the Haiti Networks

Haiti		
Static Analysis		
Factor 1	Factor 2	Factor 3
icoord	ground	adapt
xcoord	aidtask	*iknowledge*
Period 1		
Factor 1	Factor 2	Factor 3
icoord	ground	adapt
xcoord	aidtask	*iknowledge*
Period 2		
Factor 1	Factor 2	Factor 3
ground	adapt	*icoord*
aidtask	govtresources	xcoord

The pattern of how the components fall across the various factors determines which components overlap while the method allows for combining the variables in a way that will control for that overlap. The key result, however, is that there is little to no pattern of overlap. There are only two sets of two components that consistently appear assigned to the same factor, even as that is not always the exact same factor. The first set is a combination of internal and external coordination. These two variables typically occur with opposite impacts on the same factor, indicating that organizations are typically engaging in either internal or external coordination when they are engaging in any amount of coordination. This is not a meaningful result, but rather an artifact of the coding process, which codes each separate organizational action as a separate network interaction. Since internal and external coordination are separate actions, they will very rarely be coded in the same network interaction. The other set is *ground* and *aidtask*, representing presence on the ground the completion of aid tasks. This is a meaningful result; it fits with the conclusion that has been reached twice before, providing for a

third, independent basis for the conclusion that only organizations working in the field can complete aid tasks. The indication is that the components are largely independent of each other. A further factor analysis was performed where the analysis examined the components for each concept separately, so that factor results pertained to only one component at a time. In four of the seven time slices, none of the analyses produced any results; all uniqueness scores exceeded the thresholds for being combined. Only Bosnia Timeslices 1 (December, 2000) and 2 (July, 2001) were there any results, and the results produced only one factor for each analysis, with no more than two components included. This provides further evidence that these are separate components of their respective conceptual variables that the literature tells us are important components of those concepts.

7.2.2.3 Unified Measure of Performance

Table 7-7. Descriptive Statistics of Combined Performance Measure

Timeslice	Number of Factors	Average Combined Performance Score	Standard Deviation	Minimum	Maximum
Bosnia Static Network	2	0.00	1.03	-2.98	2.81
Bosnia Timeslice 1	4	0.00	2.12	-6.35	2.95
Bosnia Timeslice 2	4	0.00	2.19	-5.28	5.28
Bosnia Timeslice 3	4	0.00	2.00	-7.97	3.41
Haiti Static Network	3	0.00	1.73	-3.81	9.17
Haiti Timeslice 1	3	0.00	1.59	-3.69	8.46
Haiti Timeslice 2	3	0.00	1.75	-8.38	8.28

Analyzing the component variables concludes with producing a measure of performance that is similar to the social vulnerability score that Cutter *et al* (2003) produced with their

method. In their method, after acquiring the factor loadings and predicting factor scores from the loadings, they combined their factors using basic mathematical methods. That is, using theory as a guide, they either added or subtracted each factor score to the other factor scores to produce an overall score for each jurisdiction. This method is repeated here; after using the principal factors version of factor analysis to determine the number of factors, this study applies a principal components analysis to actually combine the variables into a single measure. Each component is designed such that it is an ordinal scale with higher values of the component indicating higher measures of the conceptual variables. For this reason, in this analysis, the predicted factor scores are all summed to produce the final performance score. This analysis includes the responding organization components for capacity. Since these components are only measured when a responding organization is present; any interaction that lacks a responding organization produces missing values for the factor scores and resultant performance score. Therefore, in this analysis, network interactions refer only to network dyads, and not to network monads. This was done since the initial factor analysis that produced the number of factors for the principal components analysis included the responding organization components. The result is a rough measure of performance for each network interaction that can be compared within and across networks.

This is a performance score as it represents the overall levels of resilience, capacity, and effectiveness that are observed in each network interaction. The greater this score is, the greater change from the baseline that any individual network interaction generated. The more consistently higher scores are observed, the more effective a mission will be. This allows for comparison of change from the baselines presented in Chapter 4; the end of the study periods for each case are too different to assert comparability in levels of change, a difficulty that the events of the Haitian earthquake, so close to the end of the time period of the case study exacerbated.

Instead, the baselines set context for the case studies while the studies guide definition and measurement of the concept and component variables. The measures of the component variables then measure change from the baseline. Table 7-7 presents the basic descriptive statistics for each of these analyses, by timeslice. A 0-value for each timeslice indicates an average level of progress for that timeslice. With tighter standard deviations and higher maximum values, the Haiti system shows relatively better performance than the Bosnia system does.

7.3 RELATIONSHIPS BETWEEN VARIABLES

This analysis shows relatively little correlation between the various component variables. The conceptual model described at the beginning of the chapter lays out the general functioning of the system that develops between the organizations that take part in stabilization and reconstruction missions. These organizations split between several different task categories that require attention. Most of them split between three task categories: administration, organization, and field operations. The mission is then oriented to support the operations of the organizations working on administration and field operations. It is within this context that resilience, capacity, and effectiveness operate, as measures of the method of operations and the degree to which they achieve their goals, while controlling for the amount of materiel, knowledge, and manpower they have to pursue their goals. Each of these three conceptual variables is defined and operationalized through a range of component variables, whose role as a component are developed from theory, presented in Chapters 1 and 2, and operationalized from empirical data, presented in Chapter 3. This analysis in this chapter shows that these components largely do not overlap with each other. It does connect the ability to complete aid tasks with the location of an

organization's operational efforts; organizations in the field can and do complete aid tasks. This includes a factor of resilience, indicating some level of coordination in the field produces results.

However, there are three important shortcomings in this analysis method for the situations under study. First, the coding effort showed that many of the impacts of resilience fall in network interactions that occur later than the resilient behaviors. This disconnects the resilient behavior from its results. Second, like all statistical analyses, factor analysis and principal components analysis assume each observation is independent. In this analysis, each observation is a network dyad. It is a principle of complex adaptive systems and network theory that the network dyads are not independent of each other. Third, the inconsistent presence of interacting organizations prevents statistical analysis from using all the data available. Either responding organization capacity components are included, which results in network monads being excluded due to missing data in the observation. This excludes an extensive amount of data, since all these networks had very low densities and many isolates, meaning that much of the data is monads, and not dyads. Or, responding organization capacity components are excluded from the data, which allows for all observations to be used, but which directly excludes valid and relevant data as well as many of the effects of network connections. Either method excludes relevant data, undermining the validity of its results. Taken together, these three shortcomings in this analysis method lead to results that are likely to miss connections that are present in the data, while also limiting the validity of the conclusions that the data does support. This requires using an analytic method more aligned with the needs of complex systems. Network analysis allows for the case-specific, empirical analysis that Chapters 5 and 6 performed. Simulation allows for a generalization of the network results. The next chapter will expand on the analysis performed here to further test the relationships between the conceptual variables.

8.0 SIMULATING STABILIZATION AND RECONSTRUCTION MISSIONS

The models in Chapter 7 provided some basis for concluding that post-conflict stabilization and reconstruction missions are more effective when the organizations attempting them utilize resilient behaviors. This evidence, though, is not truly compelling evidence, due to the limitations of the analysis methods for studying the kinds of complex systems that stabilization and reconstruction missions are. Networks, applied in Chapters 5 and 6 go further than conceptual models and factor analyses, but are limited to specific cases and, even with dynamic network analysis, can only provide snapshots of the system. Like the factor analysis, this has the potential of still disconnecting the results for resilient action from the actual resilient action, depending on how granular the timeslices are made and where their borders fall; resilient action at the end of the timeslice is very likely to be disconnected from its results. This requires developing an analysis that utilizes continuous time. Simulation analysis allows for this; it applies complex system methods using continuous time chart developments in a system. As an analogy, dynamic network analysis is much like algebra, with discretely measured timeslices while simulation is the result of shortening those timeslices to an absolute minimum duration, which makes simulation resemble calculus in its relationship to network analysis. Like calculus in relation to algebra, simulation analysis rests on top of the conceptual, network, and factor analyses already performed. Simulations require developing an empirically-based and mathematically rigorous model. Building a model without those bases will result in little more

than a “toy community” that may or may not resemble the actual action sphere under study (Gilbert and Troitzsch, 2005). For this reason, all of the analyses of the previous chapters have led up to this analysis, and this study will draw on all them to perform a simulation analysis.

Chapter 7 opened with developing a conceptual model from the empirically observed cases in Bosnia and Haiti. This empirical model served as basis for describing and measuring resilience, capacity, and effectiveness using the factor analysis. It also serves as the basis for defining the structures of the simulation. Since it is empirically based, the simulation analysis uses it as a guide, developing a model that mirrors the empirically observed structures, processes, and linkages that defined the model. That model focused on the organizations in the system and how their individual actions and behaviors produced organization-level and system-level outcomes; resilience is a defined by organizational behavior but effectiveness is both an organizational attribute and a system attribute. This defines the largest structures of the simulation, that it must be able to model organizational behaviors as well as their systemic outcomes. This requires a simulation that uses two types of simulation methods. Agent-Based simulations model the actions of actors while system dynamics simulations model systems and their processes, outputs, and outcomes (Gilbert and Troitzsch, 2005). Envisioned in Chapter 1, with a study that focuses on organizations as the unit of analysis, but still examining the system that develops between the organizations, this study uses a simulation that builds a systems dynamics model on top of an agent-based model. Agent actions and behaviors in the agent-based tier will define the dynamics of the system tier; resilient action will occur in the agent-based tier while their resultant effectiveness will be determined by the observed processes of the system dynamics tier.

8.1 SIMULATION PARAMETERS

Each tier of the model is initially defined by a set of model parameters. These parameters provide the mathematical values and relationships that will determine how the model behaves and what results it shows, and so play the role of variables in the model. Each tier has its own set of parameters that define the model on their respective tiers.[29] The values reported below are measured as monthly rates, the empirical timeslices occur as months. The simulation allows for far shorter rates, while the longest available is weeks. Model time was, therefore set to weeks and the rates reported in the charts below set a ¼ of the numbers reported and model time interpreted in weeks.

8.1.1 Agent-Based Parameters

Table 8-1 lists the parameters that define the functioning of the Agent-Based tier of the simulation model. The operation of each parameter will be explained with the full exposition of the model in Section 8.2.1. Each parameter has some basis in the empirical data. The table lists that basis, including the actual measured values in both empirical cases and the explanation for why the model value was selected. Two parameters merit a more detailed explanation than that provided in the table. The *OfficeOrgEnterRate* and the *FieldOrgEnterRate* rely entirely on the Haiti data. This was done since the network analysis of the Haiti system examined a developing

[29] In AnyLogic, all experimental parameters are placed in the "Main" tab of the model, which is also the location of the system dynamics tier when constructing a combined agent-based and system dynamics model. Therefore, all agent-based parameters are defined in the system dynamics tier, while their variable definitions in the agent-based tier refer back to the system dynamics tier. These are still agent-based parameters that define action only on the agent-based level; placing them in the system dynamics tier in the program allows for their manipulation during simulation experiments.

system, meaning that its measures representing entrance rates for various organizations at the start of a mission. These were the data needed for these two parameters. The Bosnia data, on the other hand, examined a mature system, and so presented a target for where the values should resolve during the model's operations.

Table 8-1. Definition and Explanation of Agent-Based Parameters

Parameter Name	Data Definition	Bosnia Value	Haiti Value	Model Value	Explanation
ContactRate	Degree Centralities	2.5/mo	6/mo	Increase with time	Increasing activity with time (Section 6.4.1)
HelpResponseRate	Error Correction (*adapt* = 5)[30]	14.5%	18.2%	16.4%	Average of empirical cases
OfficeOrgEnterRate	Organization Task Categories	27.6%	32.7%	32.7%	Match to Haiti
FieldOrgEnterRate	Field Task Categories	17.9%	34.5%	34.5%	Match to Haiti
HighKRate	3 or 4 in Knowledge Component[31]	82.1%	86.2%	84.0%	Rounded average of empirical cases
LowKRate	1 or 2 in Knowledge Component[32]	17.8%	13.9%	16.0%	Rounded average of empirical cases
PublicOrgRate	Local Public Agencies	21.7%	10.5%	15%	Rounded average of empirical cases

8.1.2 System Dynamics Parameters

Table 8-2 repeats for the system dynamics tier what Table 8-1 did for the Agent-Based tier. In this tier, the parameters are less directly observed, and many fill the roles of exogenous factors that determine the impacts of the processes on the agent-based tier. In this way, they form parts

[30] See Table 7-4 and Section 3.2.3.1.
[31] See Section 3.2.3.2.
[32] See Section 3.2.3.2.

of the links between the tiers, translating the number of organizations that are engaged in each type of action on the agent-based tier into tangible results on the system dynamics tier.

This allows many of them to be defined using simplifying assumptions. This includes the number of organizations in the system and the number of aid tasks that must be completed. These numbers vary widely between the cases, and it is unclear that any of the documentation has a clear assessment of the total number of aid tasks that must be completed or how difficult those tasks will be to complete. For the number of organizations and aid tasks, this is resolved by interpreting the numbers as percentages of the organizations and tasks. For task size, the specific is less important that the variations across the model. Being able to change this value allows for adjusting the difficulty during the simulation, due to exogenous shocks, which should highlight the resource requirements and resilience requirements for effective action, and thereby take a key part of operationalizing resilience within the simulation model. The result is that the system dynamics parameters are largely experimental while the agent-based parameters are largely empirical.

Table 8-2. Definition and Explanation of System Dynamics Parameters

Parameter Name	Data Definition	Bosnia Value	Haiti Value	Model Value	Explanation
OrgCount	Size of Network	207	553	100	Set as 100%
NetConnections	Normalized Degree Centrality	0.796	0.415	0.606	Average of average normalized degree centrality across all networks
CrisisSize	Not Determined; cannot assume field assessments are complete			100	Set as 100%; Can be varied in experiment
TaskSize	Determine task difficulty	Not measured		10	Allows for changing task completion requirements
CorruptionFactor	Government resource loss (*govtresource* = 1)	None	3%	3%	Only available data

8.1.3 System Shocks

Ogata (2005) discusses at length the unexpected developments and difficulties that she and the UNHCR faced in attempting to respond to refugee crises throughout her tenure as the High Commissioner for Refugees. These developments included the breaking out of new wars, changing political conditions that increased the difficulty of performing their tasks, and many more complications. The model builds this kind of development into the system by incorporating events that impact the functioning of the model. Some of these events last for only a short time, while others permanently change some parameters.

This model includes one shock, which occurs once in the model and utilizes two events to complete the shock. At a model time of 30, a brief war breaks out that lasts for 5 weeks, ending at a model time of 35. During this time, the rate of completed aid task loss is greatly increased, the initial allotment of tasks doubles, since the new war creates new tasks as well as undermining current tasks. Moreover, the organizations present in the field are forced to exit as it is no longer safe for them to operate.[33] Additionally, during the war, the local government spends as many resources as it can to pursue its war effort. At the close of the war, organizations are allowed to reenter the aid system and resume completing aid tasks that have now increased in size, since new information and resources, as well as adjustments to changed political situations will have increased their difficulty. This provides the simulation with a built in method of assessing change in aid task size during the operation of the model.

[33] The parameters *WarActive* and *SafeToEnter* are dummy variables used to indicate war and peace states and facilitate the functioning of forcing all organizations from the field or allowing them entry, depending on the state of conflict in the model.

8.2 SIMULATION STRUCTURAL TIERS

As discussed above, the simulation model is designed as a model with two tiers, an agent-based tier and a system dynamics tier. The parameters just defined determine the flow of organizations, tasks, and resources through their portions of the model, following the processes that the also define the model and give structure to each tier. The full operation of the model requires that both the parameters and structures be in place for the simulation to be complete.

8.2.1 Agent-Based Tier

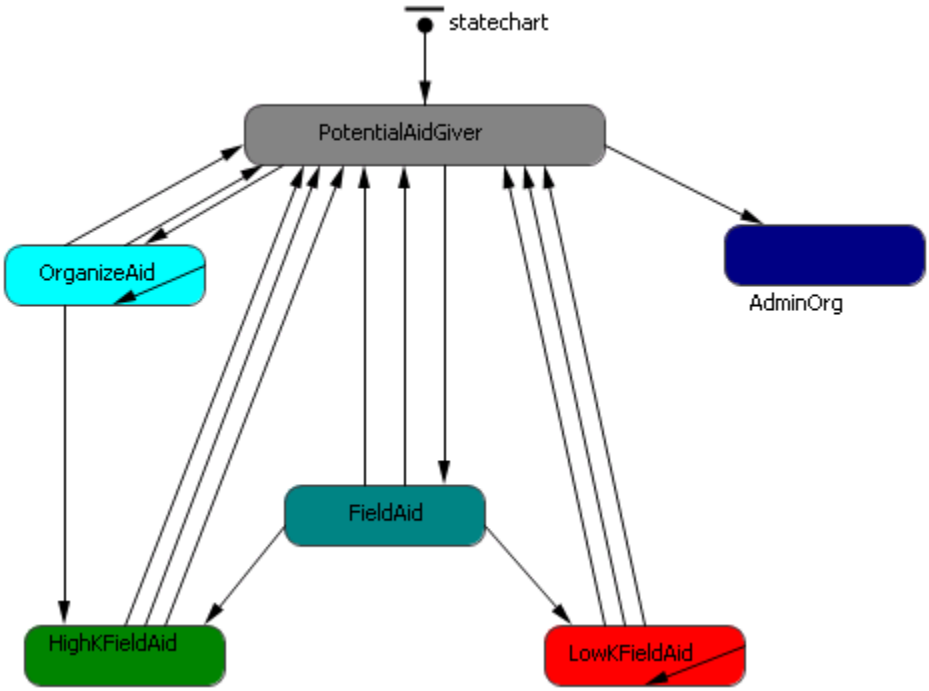


Figure 8-1. Agent-Based Tier Statechart

In an agent-based model, many uniform agents perform actions in the model that the model then measures and aggregates to determine the outcome. This includes determining such processes as

grouping behaviors or the perpetuation of species (Gilbert and Troitzsch, 2005). AnyLogic, the simulation program chosen for this study, defines its agent-based models by establishing a set of agents that move through a statechart. Defined as a percentage, the program sees 100 discrete agents. The agent's location in the statechart determines its actions and so also determines its impacts on the system dynamics model. Figure 8-1 provides the depiction of the statechart that this study developed based on the empirical observations discussed in Chapters 5 and 6, and the conceptual model in Chapter 7. The '*K*' in the LowKFieldAid and HighKFieldAid states refers to knowledge levels, using the same definition of low and high knowledge that define the *HighKRate* and *LowKRate* parameters in Table 8-1. AnyLogic also uses a network between the agents that allows for interaction, allowing the model to utilize many of the network analysis results, including the network structures examined in Chapters 5 and 6. These are the tools that this study uses to define the first tier of its simulation model.

The task of specifying an agent-based simulation model is determining the mixture of these tools that will be applied. The arrows between the states in Figure 8-1 indicate the state transitions. Arrows within the states, as seen in OrganizeAid and LowKFieldAid, indicate message transmissions to other organizations with which the transmitting organization has a network connection. Table 8-3 lists the states in this model, how organizations enter them, and how they exit. All but two states have either multiple entry sources or multiple exit locations. Dashed lines indicate multiple entry or exit directions to the state listed in the first column of the chart. Exit rules regarding the breakout of a conflict have been discussed above. Timeout exits occur when an organization has remained in a given state for the required length of time. The three week timeframe comes from direct observation of the response to the Haitian earthquake; aid organizations involved in the response cycled their on-site staff members on a regular basis

where no staff member remained for more than three weeks (Comfort, McAdoo *et al*, 2011). Additionally, if the mission runs out of operational resources, then the organizations are forced to abandon their efforts until new resources can be attained. This applies to all organizations except administrative organizations, while, even under conflict conditions, agents with organizational missions are able to continue operations. Administrative agencies are never forced to leave the system, and indeed, enter until they reach a maximum percentage of the number of organizations, set by the *PublicOrgRate* parameter, listed in Table 8-1, while having no defined exit conditions. Finally, the model uses a small world structure between the agents, based on the network structure analyses in Chapters 5 and 6. Together, these rules define how organizations move through the system, and so provide the underlying mechanics for the system dynamics tier.

Table 8-3. Statechart Transitions

State	*Entry From*	*Entry Rules*	*Exit To*	*Exit Rules*
Potential Aid Giver	Initial State	Starting Position	Admin Aid	Exit until reach *PublicOrgRate*
			Organize Aid	*OfficeOrgEnterRate*
			Field Aid	Message from Organize Aid
Admin Org	Potential Aid Giver	Entry until reach *PublicOrgRate*	No Exits	No Exits
Organize Aid	Potential Aid Giver	*OfficeOrgEnterRate*	Potential Aid Giver	Timeout (3 weeks); Out of Resources
			Field Aid	Message from Low K Field Aid
Field Aid	Potential Aid Giver	Message from Organize Aid	Potential Aid Giver	Timeout (3 weeks); War Breaks Out
			High K Field	*HighKRate*
			Low K Field	*LowKRate*
High K Field Aid	Field Aid	*HighKRate*	Potential Aid Giver	Timeout (3 weeks); War Breaks Out; Out of Resources
	Organize Aid	Message from Low K Field Aid		
Low K Field Aid	Field Aid	*LowKRate*	Potential Aid Giver	Timeout (3 weeks); War Breaks Out; Out of Resources

8.2.2 System Dynamics Tier

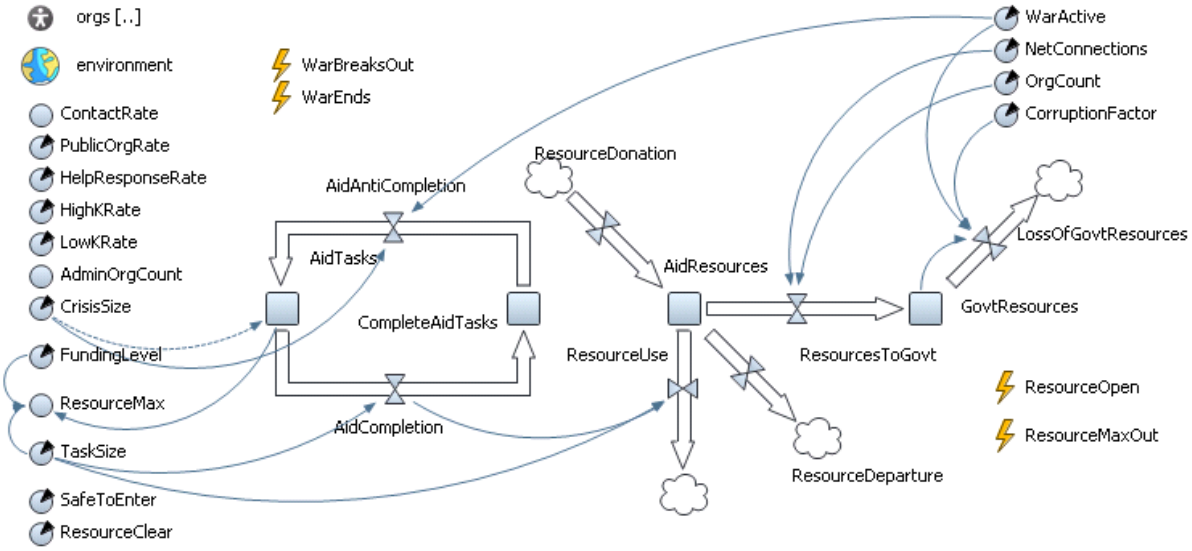


Figure 8-2. System Dynamics Tier Layout

System dynamics simulations utilize sets of stocks and flows to measure change in a system (Gilbert and Troitzsch, 2005). Stocks represent inventories of some item that exist in a certain quantity in the system. Flows measure the movement rate of those stocks into, out of, and within the system. These stocks and flows are set by the parameters of the model. Figure 8-2 contains the system dynamics model that this study applies. The model features two major processes, the aid task loop, to the left, and the resource utilization flow to the right. Parameters are listed in two columns, right or left, depending on which process they govern. The parameters for the agent-based tier are also listed here, allowing for greater control in the program, though they only govern the agent-based tier. Stocks are indicated by the squares. The arrows with the triangles depicting valves represent the flows, and the arrows without the valve indicate dependency relationships. Circles with a triangle in them indicate parameters. Circles without the triangle indicate auxiliaries. The difference between auxiliaries and parameters is that

auxiliaries are continually recalculated in the model while parameters are constants that only a direct command, such as those that events, like the WarBreaksOut and WarEnds events, can issue. The system dynamics tier is the aggregate of all of these processes and dependencies.

8.2.2.1 Aid Task Loop

The aid task loop determines the completion of aid tasks. It is made up of two stocks and two flows. The *CrisisSize* parameter determines the initial AidTasks stock, to the left side of the loop, by setting the two equal at the start of the model. The stock then expands when the conflict occurs. The AidCompletion flow determines the rate at which tasks move from the stock that yet requires completion, AidTasks, to the stock of completed tasks, called CompleteAidTasks, to the right of the loop. The number of organizations in the HighKFieldAid state in the agent-based tier determines this flow rate. In a simplifying assumption, each organization in that state applies 1 resource unit per week to aid tasks. The rate is then the quotient of the number of organizations in the HighKFieldAid state divided by the size of the aid task, set under the parameter *TaskSize*.

A key aspect of the analysis of this model is contained in the second half of the aid task loop. The obvious assumption is that once an aid task is completed, it is removed from the list of tasks to be done, and organizations move on to other tasks, with no need to revisit completed tasks. The first half of this is true; when a task is done, organizations will move on, even though it is not always clear when a task is done. The second half of the assumption is not necessarily true. As discussed in several places in this study, conflicts include actors who seek to undermine the stabilization and reconstruction mission. Even in natural disasters, completed aid tasks decay and can reach a state of sufficient disrepair such that they are effectively undone. This is especially true when the local public sector is unable to lay out sufficient resources to maintain

the projects after the aid organizations complete them. The flow from CompleteAidTasks to AidTasks models this impact. The component variable *aidtask* defines the flow rate; the rate is equal to the percent of network interactions where the variable takes the value '1' in the empirical data. The analyses for both Haiti and Bosnia found an average of 1% of network interactions across all of their timeslices that took a value of '1' on the *aidtask* component variable. For this reason, the model also uses a 1% per month, or 0.25% per week, rate for the AidAntiCompletion flow. Representing the clearest measure of effectiveness, the model continues until there are no more aid tasks to complete. The model time at this point determines the number of weeks that the mission requires for completing its goals.

8.2.2.2 Resource Utilization Flow

The resource utilization flow determines and charts the path of resources through the system. It is made up two stocks, one that stores the resources available for aid tasks, and the other the resources that have been provided to the local government for its capacity building. It includes five flows. Three flows define resource use in the system. Field organizations use the resources to complete tasks while organizing agencies provide resources to the local government while coordinating aid agency activities. Discussed in the above section, all aid organizations in the field use 1 resource unit per week, whether FieldAid, HighKFieldAid, or LowKFieldAid, though only those in the HighKFieldAid can complete tasks. Aid resources flow to the local government from the organizations in the OrganizeAid state. The logic is similar to ask tasks, that organizations in OrganizeAid pass one resource unit per network connection, assuming that their connections contain a representative number of public organizations. That is, the flow rate is the product of the number of organizations in OrganizeAid, the *NetConnections* parameter, and the percentage or administrative organizations in the system. The final use is the loss of

government resources. There two driving forces for this flow, corruption and war spending. Mentioned above, during the conflict modeled, the organization fully spends all of its resources in each time period. As discussed in Table 8-2, corruption is measured in the corruption factor. The flow is the product of the *CorruptionFactor* parameter, the number of administrative organizations, and a constant value, 4, which translates the number of organizations into the ordinal code used to measure organizational resources in the capacity components. These three flows, ResourceUse, ResourcesToGovt, and LossOfGovtResources define how organizations use resources in the system.

Resource entry and exit from the system is modeled in two flows that are actually placeholders in the system dynamics tier. They are listed in the system dynamics to indicate their presence, but organizational actions in the agent-based tier entirely define their rate. These are the ResourceDonation and ResourceDeparture flows. When organizations enter the system, they bring resources with them. A statistical distribution defines each amount, using the empirically distribution of the resource capacity components. These variables showed a distribution with a mean of 3.75 and a standard deviation of 1.1. Each time an organization enters either the OrganizeAid or FieldAid state, from the PotentialAidGivers state, the model randomly determines a resource value based on that distribution, and adds that value to the AidResources stock. When an organization leaves any of the field states or the OrganizeAid state, the model performs the same random calculation to remove resources from the system. This models the knowledge and resources, especially personnel resources, which organizations take with them when they leave the system. However, organizations will have spent some of their entering resources on aid tasks or transfers to government, so at departure, organizations take only ¼ of the randomly determined resource value out of the system. Over the course of

their three weeks of operations, organizations will have spent 1 unit per week of the potential units they brought with them. This leaves one remaining unit, based on a mean of almost four units, from entering. The statistical distribution accounts for the variation in how completely organizations use their resources and the range of the amount of personnel in each aid team. The model accounts for how organizations deposit the resources that fill the flows discussed above and the GovtResources stock with these two flows, while also removing the resources lost to the system when organizations depart for home.

It is an important aspect of stabilization and reconstruction that missions do not have access to unlimited resources. The model includes an algorithm for accounting for this dynamic. The organizations involved publish a consolidated appeals document through the OCHA to request aid. While they have undergone development over the years, with earlier documents containing far less detail, current versions contain full lists of the tasks and funding requirements for all the UN Clusters in a response mission, importantly including the level of met and unmet need (OCHA, 2010, 2010a, 2002, 2001, 2000). For the cases understudy, this level is as low as about 14%, of need that is met in Bosnia during December, 2000, and as high as 64% of need met in Haiti during June, 2010. Based on these numbers, the model applies a 30% funding rate, which is a rough median of the funding levels of all the study's empirical data; after calculating resource needs from the AidTasks stock and the *FundingLevel* and *TaskSize* parameters, it determines if the total resource stocks in the resource utilization flow exceed 30% of the resource need using the ResourceOpen and ResourceMaxOut events. When the system contains more than 30% of the needed resources, organizations cease to bring new resources with them, and continue to bring in resources until that threshold is met. This allows the simulation to model empirical limits on the resources available for this study's observed empirical cases.

8.3 OPERATIONALIZATION AND VARIATION OF CONCEPTUAL VARIABLES

As important as it is to clearly lay out the whole of the simulation model, it is only possible to assess the relationships between capacity, resilience, and effectiveness when those variables are operationalized in the model. Without that, it is unclear that the model can be effective for the study; if the variables are not operationalized, it is not certain that the variables will be present, no matter how accurate the model is to the real-world data generating process, the empirical cases of post-conflict stabilization and reconstruction missions. This study developed the model with an eye on both the empirical cases and the model's fidelity to the empirical data as well to the study's conceptual variables. The model handles each component of each variable separately, matching them to how they operate in the conceptual model presented in Chapter 7. While the variables have been referenced above, this section explicitly lays out just how each variable operates in the model and how the study assesses their variation.

8.3.1 Effectiveness

Effectiveness has three components in the factor analysis and serves as this study's dependent variable. The three components are the completion of aid tasks, connecting the local government to resources, and promoting and extending government legitimacy. Two of the components, the completion of aid tasks and the connection of the government to resources are directly identified and measured in the model. The third, government legitimacy, is a less clear and very difficult to measure concept. For this reason, this simulation model does not address government legitimacy. This is an extension of the current model that future research will pursue. The model does address the other two components of effectiveness.

The model examines the two clearly measurable components of effectiveness, aid tasks and government resources. As mentioned before, the most clearly identifiable and measureable component of effectiveness is the completion of aid tasks. It is still the case that some tasks lack a clear completion point. It is easy to see when a road is complete or a sewage system rebuilt. It is less obvious when an aid task aimed at rehabilitating social structures after extensive war crimes is complete, or when a town is safe for refugees to return, or even when refugee returns are complete, since many will chose to remain in their new locations (Bosnia Respondent 7, 2011; Ogata, 2005). Nevertheless, each of these cases poses identifiable actions and a measurable number of how many tasks must be done and a number of how many are done, even if that number is fuzzy. This is handled in the aid task loop, discussed above. The mission is effective on this component to the extent that it moves aid tasks from the AidTasks stock to the CompleteAidTasks stock. Resource availability is also easily quantifiable by counting the amount of money, materiel, and personnel available in the model. The model operationalizes connecting the local government to resources using the resource utilization flow. The mission is effective on this component to the extent that resources reach the local government to allow it to have sufficient capacity to govern.

8.3.2 Capacity

As has occurred throughout this study, capacity is the easiest conceptual variable to operationalize. However, splitting it into each component and operationalizing each has created additional challenges, since knowledge cannot necessarily be operationalized the same way as resources can be. Discussed in several sections above, the study operationalizes resources through the processes and dynamics of the resource utilization flow in the system dynamics tier.

This flow charts money, manpower, and materiel through the system. It can be interpreted as operationalizing knowledge, since increases in aid task size, which is operationalized in the *TaskSize* parameter, can represent new knowledge requirements from changing situations as well as greater money, manpower, and materiel requirements. The model takes on knowledge more directly in the agent-based tier. The separation of field organizations into Low- and High-Knowledge states, LowKFieldAid and HighKFieldAid, operationalizes knowledge. The model assumes that high knowledge is required to complete aid tasks, even while organizations in all field aid states attempt to complete tasks and so use resources, including Low- and High-Knowledge and the FieldAid state, where the model differentiates between Low- and High-Knowledge organizations. Differences in knowledge then lead to different behaviors; high-knowledge organizations complete tasks while low-knowledge organizations seek help, in a process that will be discussed further in the next section, which is on resilience.

8.3.3 Resilience

Where capacity and effectiveness each have at least some system level measures, leading to operationalizations in the system dynamics tier, resilience exists only in organizational actions and behaviors. With four components, this concept requires some extensive operationalization throughout the model, all of which operate on the agent-based tier. These four components break into three separate approaches that are operationalized separately, since internal and external communication and coordination are fundamentally the same activity, determined only by the location of organizational borders. The other two approaches, presence on the ground and adaptation require a different approach than communication and coordination.

8.3.3.1 Communication and Coordination

Throughout the agent-based model, organizations send messages to other organizations. The rates and patterns are determined by two parameters and the network structure. Network connections in the networks in Chapters 5 and 6 are defined as verified instances of communication and coordination, either in the field or in the local coordination centers, such as Logbase in Haiti or UNITIC in Bosnia. In this model, organizations can only pass messages to those organizations with which they have a network connection; following the definition of a network connection in the empirical cases, these are the only organizations with which they have active professional relationships. The rates at which these messages are sent and the number of organizations which receive them are governed by the *NetConnections* and *ContactRate* parameters. Greater resilience comes from greater communication and coordination (Comfort, Siciliano, and Okada, 2011; Comfort, Wukich *et al*, 2011; Comfort, McAdoo *et al*, 2010; Comfort, Oh *et al*, 2010; Comfort, 1999). The model can increase this coordination and communication by increasing the values of both of those parameters, providing an operationalization for the internal coordination and external coordination components of resilience.

8.3.3.2 Presence on the Ground

Chapters 5, 6, and 7 developed three different rationales for why only organizations in the field could complete aid tasks. Chapters 5 and 6 observed this directly during the field visits, whose lessons are included in those chapters. In Chapter 7, the conceptual model built on the conclusions of Chapters 5 and 6 provides a conceptual basis for this requirement while also providing further empirical evidence for the requirement with the factor analysis results. Discussed above, the agent-based model establishes several field aid states from which the

system dynamics model draws the rates for aid task completion; only those organizations that are operating in the High-Knowledge category for field operations, HighKFieldAid, can complete aid tasks, even as all field organizations consume resources in an attempt to complete tasks.

8.3.3.3 Adaptation

Adaptation comes from organizations recognizing deficiencies in their practices and changing to address them. The model, as it currently exists, provides space for determining changes in efforts to complete aid tasks for the organizations that are able to complete them. The highest level of adaptation comes from error correction (*adapt* = 5), where organizations recognize that they lack the knowledge to complete a task and seek out other organizations which have the requisite knowledge. Organizations in the Low-Knowledge field aid state can send messages to other organizations asking for help. When this reaches an organization in OrganizeAid, the organization enters the High-Knowledge state and begins completing tasks. This is the very process of error correction; a low-knowledge organization reaches a high-knowledge organization to find the knowledge and skills that a task requires to be completed. Like coordination and communication, error correction can be increased or decreased by changing the values of the *NetConnections* and *ContactRate* parameters, providing at least a partial operationalization of the adaptation component of resilience.

8.4 MODEL OUTPUTS AND RESULTS

With the structures, processes, and parameters set, running the model provides interpretable results that give further guidance on the relationships between resilience, capacity, and

effectiveness. In this model, both resilience and capacity components undergo certain changes that allow for conclusions to be drawn from a single run of the model. Density analyses in Chapters 5 and 6 showed that the number of network connections increased over time, lending support for a steadily increasing *ContactRate* in the model, which provides for measuring steady increase in resilience over time. Funding rates discussed above allowed for placing a cap on resources, allowing for an analysis of the impact of capacity. These are examined in this section.

8.4.1 Model Outputs and Patterns

Once the model runs, it produces a set of outputs that allows observation of the simulated interactions among the components and analysis of the results. To attain this output, I preprogrammed the simulation to display continuous graphs of the location of organization in the agent-based tier and to chart the quantities in all the stocks in the system dynamics tier. In addition, the simulation records the particularly important flow rate for aid tasks moving from the stock of incomplete tasks to the stock of complete tasks. In all the graphs in this chapter, the horizontal axis measures time out to 185 weeks over two graphs, covering a little more than three and a half years.

8.4.1.1 Organizations

The patterns in the model must be identified before any analysis of how the patterns compare with the steadily increasing resilience and capacity limits. These patterns start with the progression of organizations through the model. Figures 8-3 and 8-4 present this progression of organizations through the agent-based tier of the model. Each color in the graph represents the organizations in a given state, identified in the key in each figure. In figures 8-3 and 8-4, the

vertical axes are the percentage of organizations in the system. Three notable processes occur. First, the model starts with a ramp up where organizers enter the system at the same time as administrative agencies and begin to signal field operators that it is safe to enter. Second, at Week 30 (Model Time 30), the shock for initiating a war triggers and all field operators leave the system, as the model requires. Field operators return upon the termination of the conflict and resume their activities. Third, at approximately Week 102, roughly two years after the start of the mission, resources in the mission begin to systemically reach the resource maximum, indicating the time frame for donor exhaustion. At this point, the mission ceases to be able to maintain steady and consistent field operations. In effect, donor exhaustion determines the end of the mission; the mission still continues, but at only a very low level.

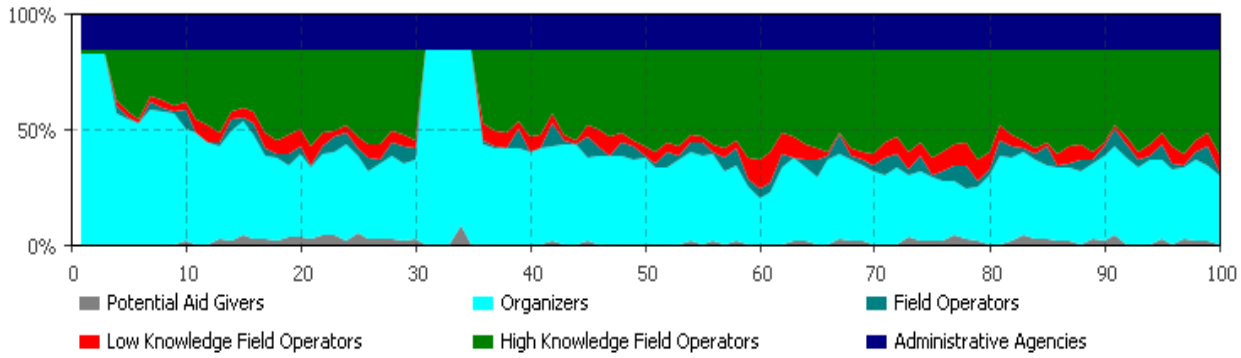


Figure 8-3. Organizations by State: Through Week 100

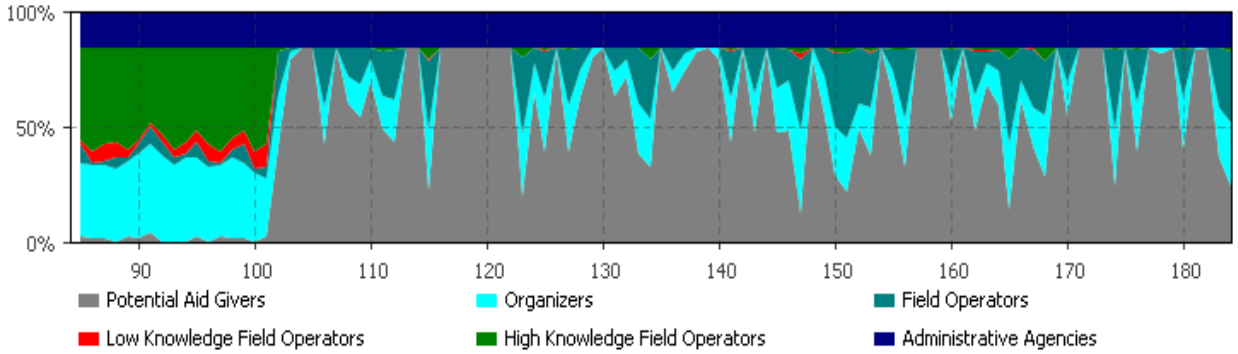


Figure 8-4. Organizations by State: Weeks 85 - 185

8.4.1.2 Resource Flows

Figure 8-5. Resource Utilization Flow: Through Week 100

Figure 8-6. Resource Utilization: Weeks 85 – 185

Following the movement of organizations, the next key input is resources. These play the dual role of being measures of both mission input and mission effectiveness. Figures 8-5 and 8-6

present the graphs of resource flows in the model. The vertical axes in these graphs represent total resource units available by interpreting each additional step along the ordinal scale of the organizational resource capacity component as an additional resource unit. This interpretation provides the basis for measuring resources based on organization size and resource base; the study calculates the mean and standard deviation of the distribution of observed values and then calculates a random value of resources with that distribution for each entering organization to bring into the system. The numbers for these values were reported above during the initial presentation. The axes in these graphs are the sums of the resources that organizations bring into the system and then how much they passed to the local government.

These graphs demonstrate donor exhaustion even more clearly than do the organization state graphs. At around week 70, or just short of 18 months, the model reaches the conditions for the consistent inability to obtain any further steady stream of new resources. The assembled stock of resources is not exhausted until around week 102, when figures 8-3 and 8-4 showed the mass exodus of organizations and the stock of aid resources reaches zero in figures 8-5 and 8-6. At this point, the flow of resources to the government also decreases in rate, though it does not cease.

8.4.1.3 Aid Task Completion

With a progression of organizations through the system and a predicted stop time for the model, the next question to examine is the patterns in aid task completion. Figures 8-7 and 8-8 present the graphs of task completion up through 185 weeks. In these graphs, the vertical axes are the absolute count of aid tasks, where 100 represents 100% of the initially-assessed aid tasks with which the mission starts. In these graphs, task completion displays a very consistent push to completion, even after the size of the task increases following the war that causes the sudden

spike in the stock of aid tasks and a drop in the stock of completed aid tasks. This holds up until the model reaches resource exhaustion at around two years into the system. At this point, as mentioned above, the mission is unable to maintain sufficient activity to progress, and the aid decay process becomes dominant over the aid completion process; from this point on, the mission fails to make any further progress and slowly, but steadily loses what progress it did make.

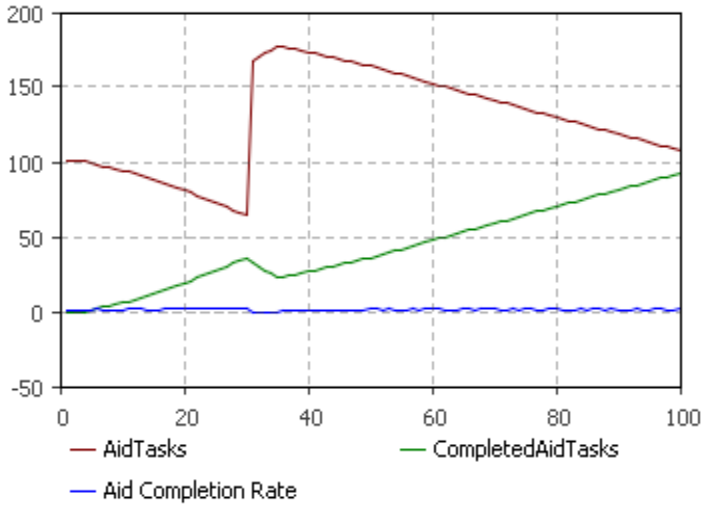


Figure 8-7. Aid Task Stocks: Through Week 100

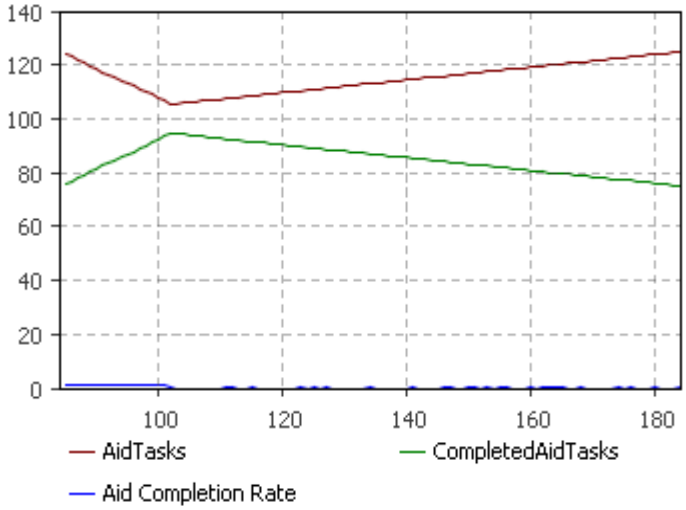


Figure 8-8. Aid Task Stocks: Weeks 85 – 185

8.4.2 Resilience

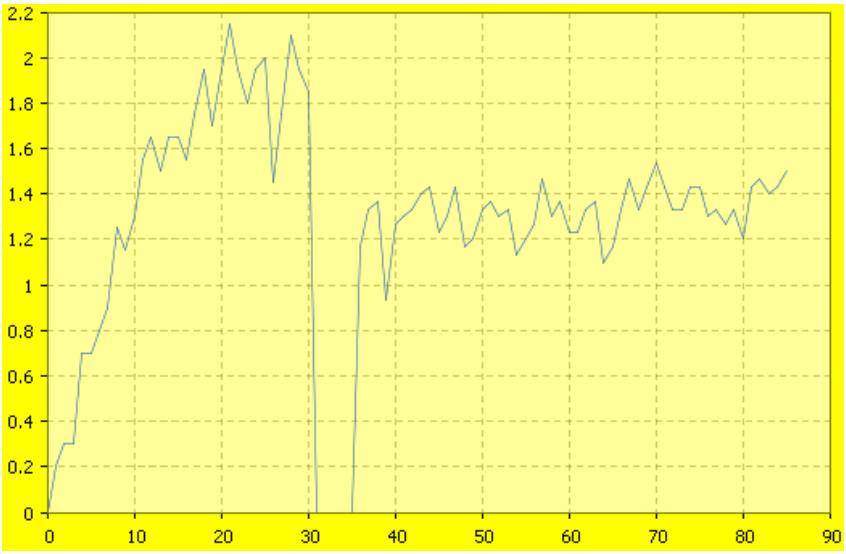


Figure 8-9. Focus on Aid Task Completion Flow Rate

This study's key relationship is the one between resilience and effectiveness. Figure 8-9 presents a graph on the flow rate of tasks from the incomplete aid task stock to the complete aid task stock. It focuses on the time during which the mission has sufficient operating resources, ending at about Week 85, about three months after the donor exhaustion point, but prior to the resource exhaustion point at around Week 102. This does cover the time of the armed conflict shock, from Week 30 through Week 35. During that time period, no tasks are completed. Through the rest of the graph, field operators see a slow and steady, if somewhat inconsistent growth in their numbers leading up to the conflict and in the period following the conflict. The inconsistency comes from the noise that organization turnover generates, since no organization lasts in the field for longer than three weeks at a time, and some do not return directly to the high-knowledge field states, but to either the low-knowledge or the organizers state. The steady increase the rate of task completion is a function of the steadily increasing value for *ContactRate*, which increases in a linear relationship with model time. Since an increasing contact rate corresponds to an

increasing resilience, as explained in Section 8.3.3.1, above, this indicates increase effectiveness, at least with regards to aid tasks, for increasing resilience.

8.4.3 Capacity

The graphs describing the resource utilization flow above indicates that the mission cannot continue to operate at its full capacity forever, and the graphs depicting the progression of organizations through the model and the rate of aid task completion show that it does not. These graphs indicate that the mission will come to an effective end when the resources run out. They also show that the mission never completely ends. Organizations remain involved and a trickle of resources continues even after the points of donor and resource exhaustion that produce the effective end. The most immediate indication of this result is that these missions can only expect to be effective within the time frame of donor interest and participation. This may be extended if donors are made to understand that a great deal of time is needed to complete these missions. More likely will be that the mission passes enough resources to the local government to establish the government's capacity to complete aid tasks and lead development, since only the local administrative agencies will have the resources to maintain meaningful operations. Still, the trickle of resources, which also includes a trickle of resources to the local government, indicates that international organizations will remain as a resource base and support for the local economy so long as they are present. This matches the observations made during field research in Sarajevo, Bosnia-Herzegovina. If the government does not wisely use these resources, then the aid agencies will become a critical source of funds, without which the government will be unable to function, but it is insufficient to generate sustained efforts at growth and development for more than a few years following a conflict.

9.0 A NEW UNDERSTANDING OF POST-CONFLICT STABILIZATION AND RECONSTRUCTION

This study builds three separate models of post-conflict stabilization and reconstruction missions in an effort to better understand how resilience in the system can lead to a more effective mission. The study begins with modeling these missions as closely to empirical cases of stabilization and reconstruction as possible. These are the framework-guided analyses and empirical network analyses of the missions in Bosnia-Herzegovina and Haiti. These analyses examine how organizations act in their attempts to pursue stabilization and reconstruction. This understanding allows for the expression how those actions build a system with certain processes and parameters that describe and define how that system behaves. This model then provides the basis for a network and statistical model that combines the lessons of each empirical case to support measures of the concepts and components of resilience, capacity, and effectiveness. Finally, the study combines the logically rigorous network model with the empirically-driven conceptual model to generate a computer simulation model that can provide understanding of past cases of stabilization and reconstruction and guidance for future cases without being so bound by the idiosyncratic contexts of each case that its lessons are limited to only one case of stabilization and reconstruction. This model shows how increasing network activity leads to increasing effectiveness in completing aid tasks while also showing how donor exhaustion limits the length of any mission.

9.1 AN EXPANDED MODEL OF STABILIZATION AND RECONSTRUCTION

Chapter 7 developed the analyses in Chapters 4, 5, and 6 into a unified conceptual model of post-conflict stabilization and reconstruction. This model focused on observed behaviors; it focused on how organizations conduct themselves and how those behaviors combine to form of single, identifiable, and measurable system. It only concerned itself with coordination activities between organizations to the extent that they were observed. This took the form of the set of organizers in the system that monitor and maintain organization entry into the system and coordinate aid requests and, in Haiti, the UN Cluster system. This model provided the bases for the factor analysis that established the independence of each of the components of resilience, capacity, and effectiveness, with the single exception of the correlation between agency presence in the field and the completion of aid tasks. This model also provided the structural components of the simulation model, for which the factor analysis supplied the measurements and mathematical relationships.

9.1.1 Non-Cooperative Organizations

These two extensions to the conceptual model provide additional insights that the conceptual model was unable to provide. Research and theory on disaster management and response provides guidance on what it means for a response system to be resilient; as discussed in Chapters 1, 2, and 3, this literature provided the set of component variables that define and measure the resilience conceptual variable. The conceptual model then provided the framework for adapting a definition developed following disasters for the systems that follow conflicts. This did not require extensive redevelopment, though, since post-conflict and post-disaster

situations are largely similar. In both cases, effective governance and large portions of infrastructure have been destroyed. If the disaster is large enough it can also rip through social structures the way an armed conflict does. So, while the source of the destruction is different, post-disaster and post-conflict situations have many relevant similarities.

This difference in cause does lead to some important differences in the situation that bear further study, and which this study took aim at better understanding. In post-disaster situations, every organization involved has the same goal; all organizations are involved to provide humanitarian assistance in one form or another, from social support to physical reconstruction to economic rehabilitation, even when the label applied is more often "disaster relief" in US domestic responses. This unity of purpose has provided support for policy recommendations that call for maximal information sharing for the largest possible common operating picture (Scheinert and Konstantinova, 2011; Comfort, Siciliano, and Okada, 2011; Comfort, Wukich *et al*, 2011; Comfort, McAdoo *et al*, 2010; Comfort, Oh *et al*, 2010; Comfort, 1999).

There is no such unity of purpose in a post-conflict situation. It is likely that most organizations involved will support the primary goals of the stabilization and reconstruction mission, to rebuild the physical infrastructure and rehabilitate the economy. In the cases analyzed, only the Bosnia network data found organizations fundamentally opposed to this mission, and even then, only a few openly opposed and pursued activities contrary to the mission. What is more likely, and more common in the data, are organizations that will resist cooperation or inadvertently undermine the mission through poor planning or poor execution of their actions. In the Haiti network data, all the interactions that undermined overall effectiveness, that is all the network interactions that saw a score of '1' on one or more on the effectiveness components, received that coding because the transaction produced unintended

adverse actions or because an organization took resources with it when it left the system. This matches the unity of mission in a post-disaster situation, which was what the network analysis in Haiti observed, even as that response was embedded in a long-standing, unresolved political conflict. This was not the case in the Bosnia network data. In these data, organizations from across the system, including organizations from all the Bosnian nations, and Bosnian state-level administrative agencies, sometimes acted to undermine aid tasks and government legitimacy, though none ever undermined resource flow. Interestingly, it was the Bosnian state-level agencies that did this the most, followed first by Bosnian Serb organizations, then Bosnian Croat organizations, with Bosniak organizations being the least frequent, but, again, all the nations had organizations that sometimes undermined the mission. Only the Bosnian Serbs, though, had organizations whose only efforts were to undermine the mission, and then, only a very small number of very small organizations did so. The lack of extensive efforts to undermine these missions in the cases observed prevented extensive analysis of the effects of greater communication and coordination that matches with greater resilience in a situation with implacable adversaries, even as these data confirmed the presence of these non-cooperative organizations.

9.1.2 Re-conceptualizing Field Operations and Coordination

The computational models, the factor analysis and simulation model, which extended the conceptual model, did allow for careful analysis of the development of a stabilization and reconstruction mission over time and the patterns and roles of communication and coordination in those missions. Direct observation showed that integration with the system required registration upon arrival, though neither OCHA nor Sahana kept complete and up to date records

in Haiti. Nevertheless, the organizations involved required careful collaboration to reach local populations. This was especially true of the organizations in Bosnia, such as OSCE and UNHCR, which relied on local implementing partners that could reach local populations (Bosnia Respondents 3, 4, 5, 6, and 7, 2011), which were often fearful of outsiders, including other nationalities and international agents. Without these partners, it is likely that these organizations could not have completed the work which they have completed.

The computational models then places this communication and coordination in their larger roles and context. The system requires coordination for field entry as a way of ensuring that organizations would know when it was safe to enter and so that the model stuck to the empirically-observed official systems. Organizations attempting tasks that they did not know how to handle could appeal for assistance by sending messages to other organizations, with which they shared a network connection. If this was successful, they would receive that aid in the form of an organization leaving the organizers' back room and entering the field. Greater contact rates leads to greater quantities of organizations entering the high-knowledge field aid state in the simulation, and so increases the rate at which aid tasks complete. The model includes this as a built-in process as each separate step in the process was observed empirically; the result may be relatively easy to predict without a simulation model to demonstrate it, but it is still a key piece of the operation of the model.

9.2 REVIEW OF ANALYSES AND RESULTS

This study builds its analysis over several steps, with each step leading to and informing the next. Each step presents one type of analysis that provides its own conclusions. Some of the

conclusions speak directly to the overarching research questions, presented in their short version in Chapter 1, and in their full version in Chapter 3. Other conclusions from each step only provide guidance for the next step. The conceptual model provides a necessary grounding for both of the computational models that followed. The factor analysis, as the first computational model, built measures that were necessary to specify the computer simulation. The computer simulation, in turn, provides access to conclusions that are not subject to the specifics of any one case, providing the study with some access to forecasting and providing grounds for external validity. These results are the kind which this study seeks, to provide policy guidance on post-conflict reconstruction and stabilization missions, which, as Chapter 1 shows, are an increasingly common policy tool for international affairs and foreign policy.

9.2.1 Case Studies and Networks

For any research to be relevant to actual policy making, it must be based in empirical data. If it is not, then there is no reason to expect that its results will be applicable to actual policy problems. To ensure its relevance, this study builds all of its analysis from the two empirical cases of post-conflict stabilization and reconstruction. The first case that this study examines is the mission in Bosnia-Herzegovina that began with the establishment of UNPROFOR in 1992 and took full form in a post-conflict environment with the establishment of UNMIBH in 1995. This case ends with the termination of UNMIBH and its mandate in 2002. The second case is the mission in Haiti that began with the establishment of MINUSTAH in 2004, and suffered an enormous shock to its system with the 12 January 2010 Haitian Earthquake. This study ends this case at the end of 2010, though events in Haiti continue on well after the end of the study period.

These cases provide the study with that empirical grounding that is necessary not only for policy relevance but also its internal validity.

Examining the cases takes two steps to provide conclusions. The first step is the framework-guided analysis. This step identifies the classes of actors and how they operate within the mission. This analysis defines the key structures and processes in the empirical cases. It identifies the UN Cluster system and OCHA as central defining aspects of the Haitian case while identifying the social cleavages of both cases: the nationality divide in Bosnia and the divides between rich, poor, and international aid workers in Haiti. The frameworks also define the methods by which organizations establish and execute their aid programs, providing a guide to the structure of donor agencies, organizers, and field operators. The network analysis then examines detailed data of organizational interactions that allows for documenting the specific patterns of interaction that actually occurred and the gaps between planned and actual performance in each mission. Together, these methods define the initial conditions for each case and chart the path from those conditions that each takes. These analyses provide wide-ranging conclusions and implications that form the basis for the structures and processes that the conceptual model specifies in Chapter 7.

9.2.2 Factor Analysis

The framework-guided analysis and network analysis showed that not only do stabilization and reconstruction missions have a structure that develops between the organizations involved, but also that the elements of the structure are similar across missions, including classes of actors, such as field operators and organizers, aid appeals and self-financed organizations, and changing patterns that respond to shocks and organizations reevaluating their efforts in pursuit of aid tasks

and increased government stability. It develops from a combination of conscious and considered policy decisions in organizations like OCHA, WFP, UNHCR, and USAID, and it emerges as a property of the system as organizations select their own actions and interactions in pursuit of their goals. These consistent elements define the operation of the system and support the definition of variables that measure both organizational actions and system-level emergent characteristics. These actions and characteristics include both organizational and system level resilience, capacity, and effectiveness.

Each of these three conceptual variables combines several components, with each having a different number as is appropriate for each concept. Chapter 3 presents the full definition and operationalization of each concept and of each component. Using those definitions, this study measures each component in the network data, using each network interaction as the independent observations of a factor analysis that seeks out the correlations between each component. This method uses a principal factors analysis to explore those correlations and only finds consistent correlation between presence on the ground and aid task completion. With those correlations, this study then constructs an overall performance score. This score is the sum of the factor scores calculated using a principal components analysis and measures the relative performance of each interaction to the others in its timeslice, scoring higher those interactions with larger measurements across all eleven component variables. Although the absolute value of the score has little meaning, the size and shape of the distributions show greater performance in Haiti than in Bosnia, at least during the period immediately following the earthquake, even as reports show weak performance of the Haitian response (Comfort, McAdoo *et al*, 2011; Comfort, Siciliano, and Okada, 2011; Scheinert and Konstantinova, 2011). This provides a potential route for future

research to identify a means to measure network performance in response missions that could be comparable across cases and events.

9.2.3 Simulation Analysis

As interesting as the results of the factor analysis are for this study, and as promising as they potentially are for future research and policy analysis, the method has fundamental flaws for analyzing stabilization and reconstruction missions. The frameworks and networks methods for analysis were chosen precisely because they are designed to analyze a particular type of system whose definition accurately describes stabilization and reconstruction missions. Described in detail in Chapters 1 and 2, complex adaptive systems include unique properties of multiple threads and directions of causality, self-aware and learning actors that seek to maximize their performance in the system while responding to the actions of other actors, and a pattern of emergence that show evolving orders that arise organically and which no one actor does or can maintain. Stabilization and reconstruction missions are a grouping term and concept that researchers and policy professionals use to refer to efforts by a set of organizations that are seeking to maximize their performance in pursuing the goals of stabilization and reconstruction. These organizations self-consciously seek to maximize performance while the system forces them to respond to the actions of the other self-consciously adapting organizations in the system. Overall effectiveness and resilience emerge as products of the actions of individual organizations, only a few of whose missions involve overseeing the whole of the system. This constitutes a complex adaptive system, and so the study of stabilization and reconstruction missions requires the use of methods designed for complex adaptive systems.

These methods include the frameworks and network analysis methods already discussed but reach their maximum extension in computational simulation modeling. The measures from the factor analysis and the structures and processes of the conceptual model combine to form a computational model that estimates system outcomes from organizational behavioral rules and patterns. The patterns drive a loop that measures the completion of aid tasks and the flow of resources into, through, and out of, the system. The model shows that donor exhaustion sets a time limit on the mission, after which the mission cannot continue at full operational levels, even as a trickle of resources allows missions to go on indefinitely. At the same time, the simulation shows that steadily increasing organizational coordination does lead to steadily increasing effectiveness, at least in terms of completing aid tasks. This provides empirical support for conceiving these missions as complex adaptive systems, since a model that was designed to mirror empirical data in endogenously producing the same outcomes that the empirical systems produce endogenously does produce results that match the predictions of complex adaptive systems theory. This is a new approach to understanding stabilization and reconstruction missions that explains the variations across missions and across time within missions that has led so many post-conflict reconstruction scholars to abdicate in their efforts to find externally valid policy conclusions in case study analysis after case study analysis. This study re-conceptualizes these missions to find new policy approaches with externally valid conclusions that can aid future missions.

9.3 FINAL INTERPRETATIONS

This study addresses a very complicated study area in studying a complex adaptive system. The frameworks for studying these situations ask a range of questions, all of which must be answered to fully understand and model the complex system. The effort to answer all of these questions has played out over three different phases of analysis, including the conceptual frameworks, networks, factor analyses, and simulation analysis. Each step has yielded additional results, building to a result that is both internally and externally valid. Nevertheless, all empirical research takes place using data that is less than ideal, since all empirical data is messy and epistemologists and methodologists design and test their theories using idealized data. This means that an empirical researcher must make compromises between the data available and the methods to have any ability to perform the research. The result is that all research has limits, shortcomings, or blind spots that circumscribe its conclusions. Even after accounting for these, this study maintains important implications, particularly for policy makers contemplating or actually engaging in post-conflict stabilization and reconstruction missions and setting the groundwork for future research.

9.3.1 Research Questions

Chapter 1 presented a range of research questions. It broke the primary research question on the relationship between resilience, capacity, and effectiveness in post-conflict stabilization and reconstruction missions into six intermediary questions. Answering the primary question required first answering these intermediary questions. The analysis was designed to answer these questions first and Table 3-5 broke down how this study seeks the answers for each

question. Together, these answers add up to the models and describe the relationship between this study's conceptual variables.

9.3.1.1 The Actors

The IAD Framework focuses on two aspects of a system, the actors and the rules. In an international response to any kind of extreme event, whether a conflict or a natural disaster, organizations take the leading role. Analyzing this kind of response then requires identifying the organizations and what roles they play. The framework-guided analysis and the network analysis took the lead role in this study in answering the questions. The network analysis identified hundreds of actors in both empirical cases, defining large systems of interacting organizations. In each mission, one or more organizations took leading roles in coordinating these missions. In both cases, this was a humanitarian organization from the UN system; this was the UNHCR in Bosnia and the WFP in Haiti. Neither was the officially planned coordinating agency; in Bosnia, under the Dayton Accords, this was to be the OHR, while in Haiti, under the UN Cluster System, this was to be OCHA. The rest of the organizations involved took one of three roles, either 1) joining the central coordinating agency as system organizers or 2) taking on field missions while 3) local governmental agencies attempt to resume administrative activities. The result is a system with three classes of organizations directly involved, organizers, administrative agencies, and field operators, all supported by a rear echelon of donor agencies that finance the mission.

9.3.1.2 The System Rules

The system operates under a set of both formal and informal rules, which Chapters 5 and 6 examined directly. Many parts of the analysis uncovered these rules. This includes the

preliminary analysis to describe and define stabilization and reconstruction missions, analysis of the history and literature of the missions that comprised much of the framework-guided analysis and the field visits. These missions take the form of internationally legitimized interventions into local conflicts. This defines roles under international law. The local government maintains local administrative powers while the international organizations pursue aid tasks and the administrative roles that peace documents or the initial request from the local government allow. The details of these rules are case-specific, as each government structures itself differently and is willing to accept greater or lesser roles for international actors. The consistent pattern is that the international organizations will have established a legitimate role under law that has certain bounds. In this way, the formal rules have a restrictive application, as they allow for a large range of actions.

9.3.1.3 Patterns of Interaction

The informal rules describe a far greater range of action, as they define actual practice rather than just the laws that govern action. The research into the rules identified the social cleavages in both cases, identifying the three nations in Bosnia and the three groups of actors in Haiti. It did so by identifying the cleavages in qualitative research, following the guidance of previous scholars and studies which this study verifies using the network analysis. The networks further showed interactions followed the patterns described by scale free and small world network structures and that network density increases over time during a mission. At the same time, the expert interviews stressed how some of the organizing agencies work by developing local partners that they then fund and coordinate. These patterns appear consistently in the networks and interview data; cleavages persist and limit the effectiveness of the mission by sequestering information and resources within certain segments of the network.

9.3.1.4 Selection of Action

Organizational knowledge guides the selection of actions. Organizations each have a certain set of skills, whether health, search and rescue, economic development, food, or sanitation, and each specializes in pursuing that goal either in the field, administration, or coordination. The vast majority of organizations, more than 80% in both cases, do work that matches closely, if not always exactly, with the kind of work they are setup to do.

9.3.1.5 Selection of Interaction

Generally, organizations will seek out a niche in the response system that best suits them. Once that position is found and entered, the organization will use whatever pattern of interaction suits that position. Organizers will reach out to other organizations to facilitate coordination, usually in the guise of large coordinating meetings that occur with the mission's central location, which was Logbase in Haiti and the UNITIC towers and UN country team building in Bosnia. Field organizations will move into the field and begin working. Larger organizations, including the teams from large NGO's and governments, will check in with the organizers while smaller and less experienced organizations will go straight the field, either unable to access the organizers or not knowing that they should. This leaves these smaller organizations separated from the main network and presents a difficulty for researchers and operators in finding them for inclusion in either research like this or for coordination activities, respectively. When faced with a situation that they do not know how to address, organizations will sometimes seek out other organizations to cope with the situation. Other times they will continue to try to manage the situation themselves, with varying degrees of effectiveness. This tendency produced the pattern of error correction activities coded in the network data, analyzed in the factor analysis, and built into the simulation. These actions represent a range of both planned and impromptu interactions

that organizations will use to support their operations when they believe they need them and can find coordination partners.

9.3.1.6 Patterns of Variation

The empirical cases show consistent structures that can be measured in consistent ways, even as many of the specific details of the missions are very different across the missions. Both missions see the same system roles and both missions must face some kind of social cleavage. Both missions rely on external donors and the United Nations, even as the donors and which UN organizations were involved vary. In this way, both are subject to donor exhaustion while facing challenges from organizations that either fail in their efforts so badly as to undermine overall progress or organizations that actively seek to undermine the mission. The balance of these tensions versus effective field organization determines the rate at which the mission makes overall progress in aid tasks, after controlling for research need and availability. The existence of this balance and its role in the system is consistent across cases, even as that balance changes across cases. These variations do correlate with effectiveness; resilience increases with greater coordination and greater coordination correlates with greater effectiveness, all provided that the system and the organizations in it have access to sufficient resources to carry out their tasks.

9.3.2 Study Validity

All research studies require internal validity for the results to be believable. Those studies that seek to extend their conclusions beyond the restrictive set of case studies that they use to develop their results need external validity to argue that their results are generalizable. As discussed above, imperfect data for theoretical methods require the researcher to make certain assumptions.

With each of those assumptions, the researcher can lose validity if the assumption is not handled well. Throughout this study, assumptions had to be made, particularly in constructing the simulation. The study finds and states a basis for each decision regarding an assumption, and presents them through all the previous chapters, in their appropriate context. This section reviews several key decisions regarding the overall internal and external validity of the study.

Imperfections in the data created situations that require careful approaches. Based in theory from distributed cognition and by direct observation, no set of situation reports or news reports carries all the data necessary to construct networks that are sufficiently complete to support meaningful analysis alone. This requires that multiple data sources be combined to form the basis of the networks. Both cases in this study used a range of data sources, listed with their roles, in Tables 3-2, 3-5, 5-3, and 6-3. Formal reports, including other research studies and documents like the consolidated appeals documents, present a range of data, including structures, processes, and funding levels. News and situation reports support networks while expert interviews in the field verify and validate the rest of the data. By triangulating sources, this study sought to access as much of the data as exists and to ensure its accuracy.

Triangulation is useful for addressing the limits in more than just data sources. No one method currently provides full empirical grounding for both internally and externally valid results of analysis for complex adaptive systems. The frameworks provide structures and the networks document them, but can only apply those results to the specific cases. Factor analysis, as a statistical method, applies assumptions such as the independence of observations. In an analysis where those observations are network ties and their characteristics, as they are in this study, with the component variables designed as the network tie characteristics, this independence is not just a potentially invalid assumption, but is fundamentally inappropriate as it

is a basic principle of network and complex systems that these ties are not independent. The method can provide some guidance, but its results can easily be over-interpreted and over extended. By limiting the range and application of these results, this study avoids that shortcoming, even as the numeric definitions of the component variables provides greater detail and measurement to the largely qualitative frameworks and measurement to the networks that extends beyond standard network measures. The factor analysis cannot provide fully internally valid results and the networks and frameworks cannot provide externally valid results.

Both methods can, and in this study do, provide a basis for the simulation analysis. The results are internally valid to the extent that the simulation structures, processes, and parameters adhere to the empirically observed structures, processes, and rates. The results are externally valid to the extent that the simulation is able to endogenously produce the variations seen in the empirical data by limiting input parameters and maximizing endogenously calculated parameters. As a first construction of such a simulation, this study pursues these two goals. Chapter 8 lays out the large number of assumptions and decisions required for constructing the simulation, even after the completion of the analyses were used to build the simulation. A simulation is a model, and all models are wrong, as they as simplifications. Some models are useful, but only to the extent that they are reasonably complete and accurate, that their constructs closely match their empirical equivalents, and the relationships between those constructs are accurately reproduced. Testing those requirements is the role of the frameworks, networks, and factor analyses in building to the simulation. If the assumptions underlying those analyses are valid, then their conclusions are valid while each method's strengths ameliorate the shortcomings of the other methods to ensure that both the quantitative and qualitative bases of the simulation

are validated, while the simulation, itself, as a method that operates at a level of abstraction above the individual empirical cases provides this study with external validity.

9.3.2.1 Alternative Hypothesis: Poor Preplanning

It is not enough for this study to find the evidence that it finds for the relationship between resilience and effectiveness. This conclusions must also be subjected to competing hypotheses to ensure that the data and explanation that this study offers is the best available to explain the observed behaviors. Section 3.3.6, Expected Findings, offers two alternative hypotheses for the failures of post-conflict stabilization and reconstruction missions: poor planning of mission structures and processes and inappropriate or unachievable goals.

Both of the alternatives presented in Chapter 3 represent forms of poor preplanning. The 'lessons learned' literature, discussed in Chapters 1, considers this possibility extensively. It regularly identifies a lack of preplanning as part of why missions failed. Lack of accurate information leads planners to misidentify the tasks that need to be done and the best ways to do those tasks (Dobbins *et al*, 2008, 2004, 2003) This problem in mission performance is embodied in the sixth of the seven bullet points which Dobbins (2004; See Section 1.1.2.2) identifies as consistent lessons learned. This lack of knowledge results in poor selection of tasks and faulty beliefs in what ultimate can be achieved. As an identified deficiency, policy makers have already made efforts to address it. As discussed in Section 1.1.2.2, responders in East Timor took great care in preplanning their mission, but it still failed in the long run, establishing the policy problem that this study addresses. Aggressive preplanning worked in the short- medium-term, lasting for nearly ten years, but broke down eventually. This indicates that preplanning is still not enough to produce missions that are effective in the long-term.

Furthermore, organizations are better prepared for their field work than this alternative explanation suggests. The network data from Bosnia and Haiti show that a very high percentage of the organizations involved in the response will have a high level of knowledge about how to perform the tasks which they are performing in the field. The networks in this study show that organizations self-organize in ways such that they seek out niches for which they are well suited. Their history in doing these tasks will give them familiarity with how they work and just what goals they can hope to achieve. What they will likely lack is knowledge about how local culture and social cleavages will affect their work and possibly limit goals in the current mission.

For this reason, this study first measures organizations' extent of task knowledge and then assumes little to no local knowledge. It then asks how organizations can fix the gaps and errors in their knowledge in how it defines resilience; highly resilient organizations will identify gaps and errors by applying communication and coordination and then adapt to fix those gaps and errors. In this way, preplanning is not actually an alternative hypothesis, but is, instead, a basic assumption of the study's conceptual model of stabilization and reconstruction; so many missions have suffered from this deficiency that this study assumed any new mission will also suffer from it, and so sought ways to overcome it so that the benefits of better planning that East Timor saw in the short- and medium-term can be retained over the whole of the mission.

9.3.2.2 Structural Differences between Conflicts and Natural Disasters

A greater threat to the validity of this study's conclusions comes from the differences between natural disasters and politically-driven conflicts. This study asserts that these are comparable, but they are different phenomena that develop for different reasons, providing different histories while complexity theory asserts that those histories are relevant. The most fundamental difference is that some organizations will act as "spoilers," trying to undermine

reconstruction for their own political ends. This study attempts to address this throughout by considering non-cooperative organizations and aid anti-completion processes during the simulation. Being drawn primarily from news reports and situation reports collected after a natural disaster, the Haiti network data did not include such "spoiler" organizations. The Bosnia did include, them, but only in small numbers. Several organizations did regularly take non-cooperative actions, and are discussed in Chapter 5, but they do not act in outright opposition to the international mission. Only one organization in the data acts as an outright spoiler, seeking to undermine the international mission as well as any domestic cooperation with it, and it only appears once in the data, and has little to no impact. This indicates that non-cooperative organizations are an important aspect of post-conflict stabilization and reconstruction, but that its extent does not make it fundamentally different from natural disasters, which can still have non-cooperative organizations even as they lack spoilers.

Further, this study does not rely on the comparability of post-disaster and post-conflict response efforts. Both of this study's cases, Haiti and Bosnia, examine post-conflict situations. Bosnia begins with a war; Haiti begins with an armed insurgency. The difference comes from the situation in Haiti where network data does not become available in sufficient detail to support network analysis until after the 12 January 2010 earthquake. The result is that the Haiti network data empirically examine a post-disaster response, embedded in a long-term post-conflict stabilization and reconstruction mission. With this difference present, this study does not draw conclusions from direct comparisons of the two networks. Rather, it uses the two cases independently as data sources for the models presented here and giving those models greater external validity. This generates a model of post-extreme event stabilization and reconstruction

that is valid over a greater range of stabilization and reconstruction missions, making the study's conclusions applicable to a wider range of empirical events.

9.3.3 Research Results Implications

This study provides evidence that there is a relationship between resilience and effectiveness in post-conflict reconstruction missions, after controlling for the capacity level. It applies carefully constructed definitions of these three conceptual variables, each measured with a range of components variables. These definitions are detailed and complex for all three concepts as well as of their components. This is necessary since these variables have complex definitions in the literatures that support them as well as measuring their complex concepts in complex situations. The results indicate that a more resilient system is one that includes greater portions of its organizations engaged in field operations, with greater coordination within and between organizations both in the field and in coordinating roles, and is a system where organizations which lack the knowledge to complete their tasks reach out to other organizations that do have the knowledge to complete the tasks.

These conclusions indicate certain policy decisions. To increase effectiveness, increase resilience. To increase resilience, facilitate more rapid and more complete communication and coordination between organizations. This will expand information flow and organizations will be able to improve their operating picture and therefore be better able to identify changes and respond to them by changing or expanding coordinating partners, changing strategies to complete a given project or abandoning an outdated or outmoded project in exchange for a newer and now more appropriate project. This is an endeavor that closely resembles military intelligence operations. With their distaste for any effort that resembles military operations,

humanitarian organizations have been hesitant to think in these terms or apply their lessons. On-site observations in Haiti revealed that such an effort had been established following the earthquake, in the first time that any humanitarian mission included an intelligence gathering effort (Haiti Informants 8 and 9, 2010). Providing organizations with greater means to rapidly adjust allows a system to take greater advantage of the self-organizing properties of networks and complex systems, particularly when it is done with the knowledge, but without the direction, of any central organizing agency. This emergent property of self-organization is one of the greatest strengths of network organization. Any mission that does not seek to maximize and harness this property is undermining its own operations.

The presence of the intelligence operation in the Haitian response indicates that organizations in humanitarian missions have begun to recognize the importance of this effort and operate in more flexible ways as befits operations in a complex adaptive system. That the response to the Haitian earthquake still produced only limited results over a long period time (Comfort, McAdoo *et al*, 2011; Comfort, Siciliano, and Okada, 2011; Scheinert and Konstantinova, 2011) indicates that more needs to be done in that and future response efforts. This study illustrates why this is the case: post-extreme event responses, including post-disaster and post-conflict responses, form complex adaptive systems that require organizations to operate in adaptive ways that utilize information flows as a guide for adaptation.

9.3.4 Future Research

This study set out to test a theory on the relationships between resilience, capacity, and effectiveness in post-conflict stabilization and reconstruction missions. It is still largely an exploratory study. The nation-building literature currently lacks research based on the premises

of complex systems. This study proposes a new conception of these missions and tests its accuracy in describing these missions. This opens a new research agenda that applies the precepts of complex systems to post-conflict stabilization and reconstruction.

9.3.4.1 Expansion of Cases and Models

This agenda should start with expanding the methods used here to additional stabilization and reconstruction missions, listed in Table 3-1; while there still are not many cases to examine, this study examines only two cases, leaving several more available for expansion of data and additional hypothesis testing. Additional methods can also provide additional insights. Developments in network analysis have generated further analyses that have not been used here. Particularly relevant among these is Exponential Random Graph Modeling (ERGM), with uses non-stochastic statistical methods to determine how combinations of node attribute values describe the position of network links. This study attempted a less rigorous method of this analysis with the visual inspection of the network graphs in Chapters 5 and 6. The results of visual inspection are less reliable and limited in the number of attributes that can be analyzed at one time, since network maps have only node shape, color, and size available for visually depicting attributes. This limits inspection to three attributes, and one must be coded as a continuous numeric variable for node size to be meaningful. ERGM offers a way testing relationships that is more rigorous and less limited in the number of attributes that it can consider. This additional data and tool will also allow for additional refinement of the simulation that forms the capstone of this study is this study's best source of externally valid conclusions.

9.3.4.2 Timing of Donor Exhaustion

In the models in Chapters 7 and 8, donor exhaustion ultimately determines the length of the mission. By determining the length of the mission, donor exhaustion also determines the ultimately level of effectiveness of the mission. Resilience can move that level, but the ultimate arbiter is when the mission runs out of resources and can no longer complete any further tasks. This study did not gather data on how and when donors chose to stop providing funds. Aid professionals working on delivering aid generally believe that aid will continue to flow so long as they show progress, an understanding which underlies OCHA's consolidated appeals process (Haiti Informant 7, 2010). However, those documents show that organizations do not receive all the aid for which they ask; this study found caps in those documents that it used to define its funding limits in the simulation model. This very effort, though, implements funding levels as an exogenous variable in the model. Future research will examine how donors make their decisions and identify if it is exogenous or endogenous to actual, or perceived, performance of the post-extreme event stabilization and reconstruction mission.

9.3.4.3 Small World Network Subgroups

The macrostructures analysis in Chapters 5 and 6 give very clear evidence that the networks in both Bosnia and Haiti meet the mathematical definition of a small world network. This definition is designed to mathematically demonstrate the accuracy of a network concept that has both network spanners and cohesive subgroups for describing the structures of an observed network. Network analysis also offers tools to identify the existence and memberships in the cohesive subgroups. If a network is a small world network, then the analysis, known as block modeling (Wasserman and Faust, 1994), should be able to identify the cohesive subgroups and

their delineation in the network maps. An inability to do that brings into question the accuracy and appropriateness of the formula.

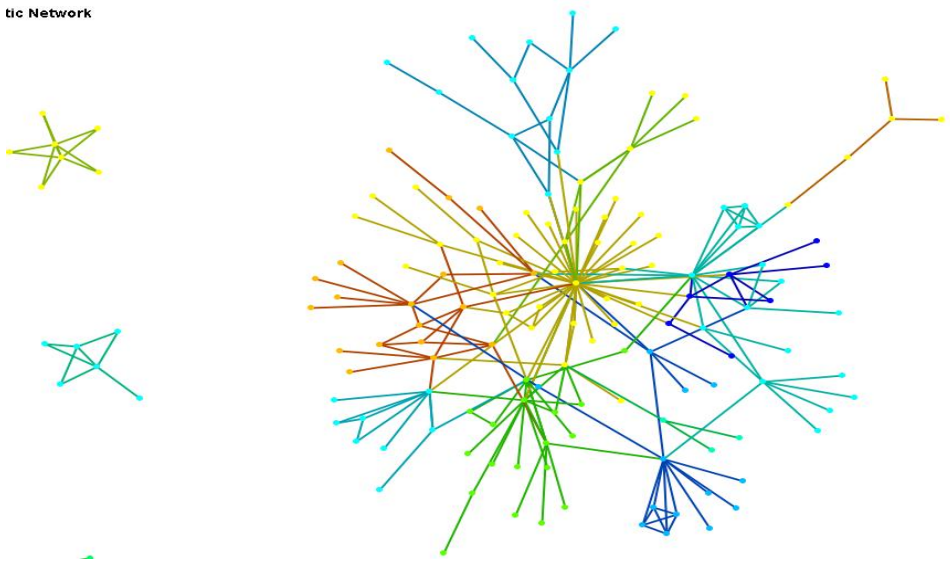


Figure 9-1. Newman Groups in Bosnia Static Network Great Component

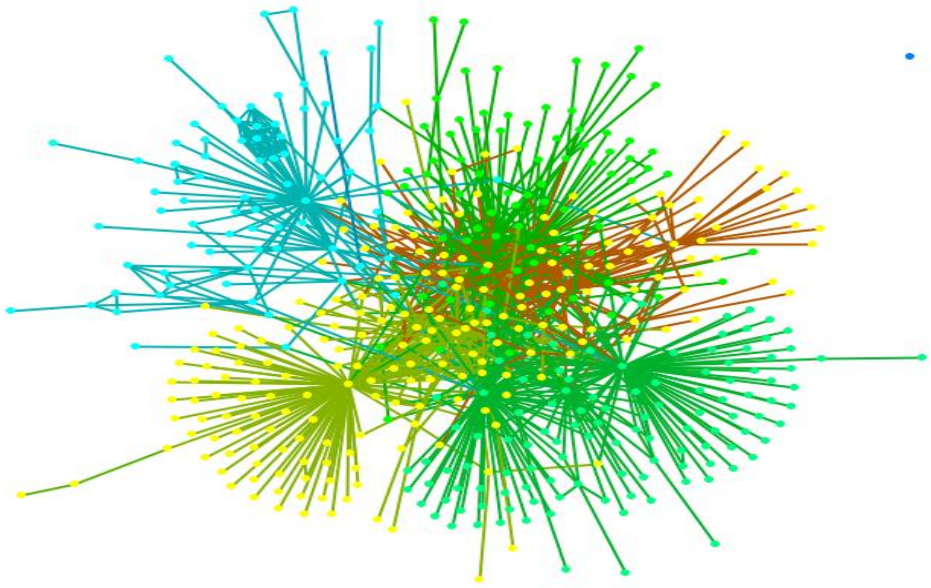


Figure 9-2. Newman Groups in the Haiti Static Network Great Component

Actually running the block analysis on this study's empirical networks shows that the subgroups are not as readily located as the small world analysis results suggest they should be. Figures 9-1 and 9-2 depict this analysis. They use Newman groups, which find groups by applying an algorithm that identifies boundaries between highly cohesive subgroups, and then colors the nodes and links in the network according to group membership. The algorithm also determines the number of groups endogenously (Carley, 2011). The figures show that the networks contain a reasonable number of groups for analysis, but that they overlap extensively and lack the kinds of clear borders that the definition of a small world network envisions. This refocuses the analysis on the other part of the definition, the nodes that can quickly reach across this network. The groups do show that the network contains these nodes in how interconnected the groups are. Future research will examine the discrepancy between these two results, the very high proximity ratios found and reported in Chapters 5 and 6 and the lack of clear group delineations found here and will examine the applicability for small world networks in describing post-extreme event response systems.

9.3.4.4 Organizational Knowledge

Organizational knowledge in these systems includes different classes of knowledge. This study operationalizes knowledge in a way that rests entirely on task-oriented knowledge, where higher scores code indicate an organization that is skilled in performing the tasks it is attempting. This is important, but it is incomplete. Organizations must have knowledge about local society and administration and about on-going events. The latter component, knowledge about on-going events, overlaps with resilience, and this study examines that component of knowledge as part of resilience. This study, though, does not include any coding for knowledge of local society and

administration. Future research should revisit the operationalization of knowledge to include this component.

9.3.4.5 Aid Delivery Process

Several aspects of this model include simplifying assumptions that are a result of limited data and the logistics that governed how this study was done. The first expansion available in this set is a very important expansion. Though it aimed to examine non-cooperative organizations in the network, this study did not succeed in gathering sufficient data on the behavior of these organizations. Non-cooperative organizations tend to operate as or within dark networks, that are hidden from view of the major actors. Since the data gathered for this study primarily comes from official sources, it largely misses these dynamics. Future research can and should dig deeper into this aspect of post-conflict missions.

Related data can provide another extension. Resilience is operationalized in this study through message sending in the simulation, with adaptation only operationalized by a specific set of messages sent by low-knowledge organizations. This is an accurate but incomplete operationalization of adaptation. Much of adaption, as it is defined and operationalized in Chapter 3, includes how organizations change strategies and structures; error correction is only one part of adaptation. Future research will examine more closely the specific processes that organizations use to complete aid tasks to examine adaptation in those processes. Doing so will provide additional examination of the relationship between resilience and effectiveness, which is the primary focus of this study and represents an option for the best indicator of whether or not a mission can and will achieve the goals it sets out to achieve.

APPENDIX A: Interview Protocol

Dissertation Study, Case Studies
Graduate School for Public and International Affairs, University of Pittsburgh

Protocol for Semi-Structured Expert Interviews
Case Study: UN Operations, Bosnia – Herzegovina, starting 1992
Unit of Analysis: Organization (System)
Unit of Observation: Manager for Response/Reconstruction Operations

I am a doctoral student from the Graduate School for Public and International Affairs at the University of Pittsburgh, conducting dissertation research in the response to and recovery from armed conflicts. I am particularly interested in how international response and recovery missions organize themselves to respond to ever changing environments and how they adapt their mission goals to that environment. This survey is intended to focus on the systems that developed in Bosnia-Herzegovina following the start of the 1992 UNPROFOR expansion and the 1995 UNMIBH mission.

This questionnaire will not ask for any personal information. If you are willing to participate, you will be asked about the extent to which your organization has interacted with other organizations while pursuing its goals in Bosnia and about what factors have influenced those interactions.

I request your permission to record the interview for the purpose of making a transcript that will serve as the record for analysis. If you are willing to be recorded, a copy of the transcript will be provided to you for your records and approval. The recording will be destroyed at that time. If you are not willing to be recorded, then only notes will be taken during the interview. No personal information will be connected to these formal records. These records will not be provided to any third party at any time.

Your responses to this survey will greatly help our understanding of how response and recovery missions operate and how they achieve what they can and determine what they cannot achieve. They will be used for scientific purposes only and kept in strict confidence in accordance with professional standards. Any participation is completely voluntary, and you may stop the interview at any time. If you have questions, you may contact me at [email omitted].
Thank you for your time and for contributing to this project.

Steven Scheinert, [email omitted]
[phone number omitted]

1. What is/was the mission of your organization in Bosnia?
    a. Did it change over time? If so, how?
    b. What factors contributed to any change in mission?
2. What are your primary responsibilities in your organization?
    a. When did your organization establish operations in Bosnia?
    b. Has your organization ever ceased or interrupted operations in Bosnia at any point? If so, why and for how long?
    c. When does your organization expect to leave Bosnia?
    d. What are the criteria for leaving (Were they/Did they include "success")?
    e. To what extent would you rate your organization's performance as successful? If so, why? If not, why not?
3. What are the primary organizations with which you interact and why and how frequently?
    a. For the chart in 3b, please use this list for indicating often:

1: Several times per day	2: Once daily	3: Multiple times per week (less than daily)	4: Once per week	5: 2 – 4 times per month (less than weekly)
6: Once monthly	7: Once every 2 – 4 months	8: Twice per year	9: Yearly	10: Less often than yearly
11: Other (please describe)				

    b. Please the chart for the most important organizations that your organization interacts with:

Organization	Why/What tasks	How Often
1.		
2.		

3.

4.

5.

4. With what organizations does your mission not interact?
    a. Does this pattern of interaction vary by time period? If so, please describe how and when those changes happened.
5. What are the major means of communication used among units within the mission?
6. What are the major means of communication used between the mission and the wider environment in which you are conducting operations?
7. What are the major factors that have contributed to your capacity to carry out the mission?
8. What have been the major difficulties that your organization has encountered in its operations in this/these responses?
    a. What methods did your organization use to identify emerging difficulties?
    b. How effective were your detection methods?
    c. How has your organization met those difficulties?
    d. What have been the most effective strategies?
    e. What have been the least effective strategies?
9. How many personnel were assigned to:
    a. Bosnia?
    b. outside of Bosnia?
10. How many resources were provided?
    a. Money?
    b. Materiel?
    c. Equipment?
11. What recommendations would you make to improve the process?

12. Are there any key aspects to understanding you and your organization's operations in Bosnia? For examples, consider:
    a. Key factors in understanding why/how things developed the way they did
    b. Military situation/Troop levels
    c. Levels of destruction in the country
    d. Level of functional administrative capacity
13. Please provide some information on your level of experience:
    a. Years of service: ____
    b. Age: ____
    c. Number of UN/aid missions participated in: ____
    d. Level of education: _____
    e. Years and type of training:

APPENDIX B: Simulation Design Notes

Simulation V.1/Date: 25Feb2012

- Basic Structure
  - Agents
    - Unit of Analysis is Org; Orgs set as agents
    - Primary source of system operations
    - State Chart used to place orgs in system
    - Org behavior, and resulting system behavior based on org state
    - Network Structure
      - Small world network structure, since small world proven in empirical data
      - Network Connections defined in parameter
        - Based on average degree centrality in empirical data
        - Contact Rate set at 1 per week
  - System Dynamics
    - Location for measuring effectiveness
      - Org behavior drives system behavior
      - System state generates measures of effectiveness
        - Aid tasks still need to be done
        - Resource availability
    - Two key tasks
      - Aid Tasks
      - Government Resources
      - Government Legitimacy
        - Left off for simplification
        - Built from complex web of politics and rule of law
          - too complicated to fit in current simulation
          - will review in future (post-dissertation) work
  - Model allows for up to weekly time counts
    - A count of 1 in model time equals 1 week
    - All rate numbers built from monthly empirical data which was divided by 4 to calculated a weekly rate
  - Main Variables
    - Resilience
      - Relevant Parameters
        - Contact Rate

        - Network Connections
    - Higher values represent greater resilience
- Capacity
    - Resource numbers
    - Org Counts
- Effectiveness (see System Dynamics bullet above)

- Agent-Based Modeling
    - System defines number of agents in the system with parameter *OrgCount*
    - Organizations enter state chart and divided between two groups
        - OrganizeAid
            - Entrance rate based on percent of organizations with "Organization" mission categories in the empirical data
                - Haiti: 32.73%
                - Bosnia: 27.54%
                - Model uses Haiti number
                    - Haiti study included aid operation start time
                    - Bosnia was a mature system
                        - rates lower since some have left
                        - lower numbers derived in model with organization exit over time
            - Exit Rules
                - To Field Aid (see field aid section for explanation)
                - Time out
                    - 3 weeks
                    - Based on field observations in Haiti
                - Resources exhaustion
                    - leave operation when resources in System Dynamics exhausted
                    - prevents further aid action when there are no more available resources
        - FieldAid
            - Entrance Rules
                - Entrance based on percent of organizations with "Field" missions categories in empirical data
                    - Haiti: 34.54%
                    - Bosnia: 17.87%
                    - Haiti number used again for same reason as it was used for OrganizeAid entry rate
                - Entrance from OrganizeAid
                    - Message sent from orgs in FieldAid to all network connections at *ContactRate*
                    - When message received by org in OrganizeAid, org enters FieldAid
            - Exit Rules
                - Time out: Same rules and basis as time out for OrganizeAid

- Resource exhaustion: same rules and explanation as under OrganizeAid

- System Dynamics Modeling
  - Aid Task loop
    - Parameter *CrisisSize* defines number of aid tasks
    - Completion process takes tasks from stock of undone tasks to stock of completed tasks
    - *TaskSize* parameter records number of resources needed to complete each task
    - Flow rules
      - Completion
        - Tasks completed by orgs in FieldAid only
        - Rate is number of orgs in FieldAid divided by *TaskSize* parameter
        - Concept is that each org applies 1 resource unit during each time frame while each task takes *TaskSize* resources to complete
      - Anticompletion
        - Models decay in completed work
        - Models organizations actively undermining aid efforts
        - Based on percentage of 1's in Aid Task Completion component in empirical data
        - Currently set at a fixed rate
  - Resource use diagram
    - Model starts with no resources dedicated to aid activities
    - Resources stock
      - Adding resources
        - added to resource stock whenever an org enters either OrganizeAid or FieldAid state
        - when enters, org gives an amount determined randomly following a normal distribution of mean 3.75 and standard deviation of 1.1
        - numbers derived from distribution of component scores in empirical data, calculated in Stata
          - Bosnia
            - *iknowledge*
              - mean: 3.87
              - st. dev: 1.01
            - *rknowledge*
              - mean: 3.79
              - st. dev: 0.99
          - Haiti
            - *iknowledge*
              - mean: 3.69
              - st. dev: 1.28
            - *rknowledge*

        - mean: 3.81
        - st. dev: 1.12
    - Subtracting resources
        - Whenever an org leaves either OrganizeAid or FieldAid for PotentialAidGivers, resources are subtracted
        - Amount is calculated as ¼ of a recalculated normal distribution with the same mean and standard deviation as used for adding resources
        - Rationale is that resources are consumed, but also include personnel, and personnel leave
  - Resource use for aid
        - As aid tasks are done, resources are consumed
        - Resources removed from system as consumed
        - Simplifying assumption: Flow rate set equal to task completion rate; 1 resource unit needed to complete 1 aid task
  - Resources to Gov't
    - FieldAid orgs complete aid tasks; OrganizeAid orgs pass resources to the local government
    - From AidResources stock, aid passed to GovtResources stock
    - Rate is product of number of organizations in OrganizeAid, *ContactRate*, and percent of public organizations with a jurisdiction of National/State or lower
    - This is since orgs can only pass resources to the government agencies they are connected to; formula calculates average number of such organizations each org is connected to
    - Percent of local government organizations derived from empirical data
        - Bosnia: 21.7%
        - Haiti: 10.5%
        - Set to 15%
    - Can be varied with experiment
- On-going development/Ideas for model refinement/expansion
  - Incorporation of knowledge
    - High knowledge would lead to an organization being more effective in completing tasks
    - Method envisioned involves splitting FieldAid into two sub-states
      - High Knowledge FieldAid
      - Low Knowledge FieldAid
    - Resources will not be added for sub-states, only at main state, which will be a through-put state for knowledge-based states
    - Error correction will be done through messaging similar to FieldAid orgs requesting aid from OrganizeAid orgs. *ContactRate* and *NetworkConnections* will still govern this process, allowing for additional vehicle for resilience while maintaining its basis in two key parameters

        - Current arrangement of transitions in state chart makes adding this addition complicated; still assessing how best to do it
    - Opposition organizations
        - Will control AidAntiCompletion flow rate
        - Plans had been to include these in the organization state chart, but inclusion of knowledge states may make this too cluttered a chart to be pursued at this time. I'm considering omitting for a fixed rate of anticompletion
        - Final plans undecided yet
    - Shock events
        - Model can include events that would provide a sudden shock to resource and aid task stocks
        - Examples
            - Earthquake aftershock: new aid tasks added
            - Donor conference: new resources added
            - War resumption: a whole of potential ramifications
        - Interesting, but probably not necessary at this phase
    - Experimental run
        - Run model with varying parameters
        - Which parameters and how varied will allow for conclusions about changes in independent conceptual variables (resilience, capacity)
        - I want to finish the model before I examine this step

Simulation V.1.1/Date: 27Feb2012

- Knowledge States added to Org statechart
    - FieldAid transfers immediately to either LowKFieldAid or HighKFieldAid
        - High Knowledge defined as having a 3 or 4 on capacity knowledge component
        - Low Knowledge defined as having a 1 or 2 on capacity knowledge component
        - Rate from empirical data
            - Haiti
                - High: 86.2%
                - Low: 13.9%
            - Bosnia
                - High: 82.1%
                - Low: 17.8%
            - Model uses
                - High: 84%
                - Low: 16%
        - Rate can be varied in experimental setting
    - Timeout from FieldAid moved to Knowledge states
    - Resource exhaustion stop condition set into all 4 Aid states
    - TaskCompletion rate set to function of HighKFieldAid and *TaskSize*
        - Assumed that sufficient knowledge must be necessary to complete task
        - Only those with high knowledge rating have the necessary knowledge

    - Error Correction
        - Organizations in LowKFieldAid can send a message to OrganizeAid requesting support
        - If message received, organization from OrganizeAid enters HighKFieldAid
        - Message sent to network connections at a rate of *ContactRate* * *HelpResponseRate*
- Govt Resource Loss Rate added
    - No loss in Bosnia data
    - Haiti data had a rate of 3%
    - Set to 3% of stock of GovtResources lost per month (0.0075/wk)
- Aid task anti-completion rate updated
    - Fixed rate adjusted for size crisis
    - Rate set at 1% of tasks undone per month
    - Rate/wk = 0.0025 * *CrisisSize*
- Resource use rate updated
    - Previously was equal to aid task completion, assuming a task used 1 resource
    - Contradicted assumption on *TaskSize* parameter
    - Restored to original value: ResourceUse = TaskCompletionFlowRate * *TaskSize*

Simulation V.2/Date 29Feb2012

- Exogenous Shock method added
    - Modeling for exogenous shock of a war beginning
        - Effects
            - Sharp rise in aid tasks
            - All field agencies must leave the field
            - 90% of orgs in the system leave for duration
            - AidAntiCompletion rate spikes
            - Tasks become more difficult; *TaskSize* increases by 50%
        - Duration
            - Currently set at timeout = 30
            - Ends at timeout = 35
            - Parameter and auxiliary present for random end time, but having trouble w/ this: randomizer either never produces and end or produces an immediate end
    - Other shocks under consideration
        - Political change
        - Natural disaster
        - Increasing prevalence of graft/corruption
- Field entry adjusted to messaging
    - Message sent from OrganizeAid to PotentialAidGivers proceeds all FieldAid entry
    - Entry to FieldAid upon reception of message
    - Message passed over network at *ContactRate*
        - Message is conditional on *SafeToEnter* == 1
        - Specific math: message sent at rate = *ContactRate* * *SafeToEnter*

Simulation V.2.1/Date 5Apr2012

- Attempt to adjust field entry: *NetConnections* varies with time
  - Reviewed pattern of NrmDegree Centralities for all networks
  - average of averages, ie, periods weighted equally
    - Bosnia: 0.796
    - Bosnia Dynamic Only: 0.980
    - Haiti: 0.415
    - Haiti Dynamic Only: 0.535
    - All: 0.606
    - Dynamic Only: 0.756
  - Internal variable version of *NetConnections* does not work
    - Cannot make it work as integer
    - SmallWorld and ScaleFree models require integer arguments
    - Instead varying *ContactRate* over time while varying *NetConnections* between model runs
    - Level of communication/coordination is function of both
- Adjust field entry: *ContactRate* varies with time
  - *ContactRate* set to base rate plus time factor
  - $ContactRate = 0.625 + \frac{rint(time(\ ))}{2}$
  - *time*() function returns model time while *rint*() rounds time to nearest integer value
  - division by two slows advance
  - plans
    - review specific formula relative to dynamic network changes
    - verify/validate shape of dynamic *ContactRate*
  - increase rate over the model support coordination if AidCompletion rate increases over time
- Begin rethinking process of gov't resource loss
  - Current pattern has spike followed by long, slow fade away
  - Process may be artifact of constant rate of resource allocation attenuated by loss rate that is a function of resource stock
  - Consider making loss function of inflow; would model corruption; certain amount of inflow lost to corruption
  - Consider making loss function of both resource stocks to also model corruption

Simulation V.3/Date 28Apr2012

- Programming fixes
  - Timeout for HighKFieldAid corrected; set to 3
  - Resource use rate corrected: all field orgs use resources, only HighKFieldAid orgs complete tasks
- Adding in AdminOrg state on state chart
  - Entry Condition is that the number of Admin Orgs is less than *PublicOrgRate*
  - Define parameter *PublicOrgRate*
    - Rate or organizations in the dataset that are public
    - Empirical:

                - Bosnia: 21.7%
                - Haiti: 10.5%
            - Model splits difference: 15%
        - Entry consumes 4 resources in GovtResources
- Rethinking Government Resource Flow
- Rethinking gov't resource loss
    - Corruption
        - Organizations control 4 resources, based on Org Capacity components
        - Reset to 3% of organizational resources/month or 0.75% per week
        - Rate is changed to a parameter called *CorruptionFactor*
        - Set at NAdminOrgs * 4 * *CorruptionFactor*
    - War Spending
        - All government resources are expended during war
        - Set as *WarActive* * GovtResources
    - Total loss is combination of corruption and war spending
        - Overall formula LossRate = Corruption + War Spending
        - Specific formula: LossRate = (NAdminOrgs * 4 * *CorruptionFactor*) + (*WarActive* * GovtResources)

Simulation V.4/Date 1May2012

- Model still is overly deterministic in completing tasks
- Developing resource maximum
    - Exhaustion of donor resources
    - Events added that monitor development of resource base
    - Funding level
        - Haiti
            - Timeslice 1: 46%
            - Timeslice 2: 64%
        - Bosnia
            - Timeslice 1: ~13.6%
            - Timeslice 2: ~32%
            - Timeslice 3: 51.85% (all of SE Europe)
    - Funding requirement is product of AidTasks stock and *TaskSize*
    - Max funding is funding requirement times funding level
    - Using above numbers as a guide, funding level is set 30%
        - When funding max exceeded, organizations cease to bring in funds
        - When under funding max, organizations bring resources

Simulation V.4.1/Date 7May2012

- Reformat RMax calculation method
    - Previous version had max as numerical constant in formula
    - Design changed so that RMax is a parameter: *FundingLevel*
    - *ResourceMax* = *FundingLevel* * *TaskSize* * AidTasks
- New formation integrated into dissertation document

APPENDIX C: Mission Categories in Bosnia-Herzegovina

Category	Frequency	Percent of Dataset
Administration	26	12.56%
Administration: Communication	2	0.97%
Administration: Education	2	0.97%
Administration: Finance	5	2.42%
Administration: Foreign Policy	7	3.38%
Administration: Housing	1	0.48%
Administration: Intelligence	2	0.97%
Administration: Law	14	6.76%
Administration: Local	12	5.80%
Administration: Military	3	1.45%
Administration: Planning	1	0.48%
Administration: Railways	3	1.45%
Administration: Refugees	4	1.93%
Administration: Social Security	2	0.97%
Administration: Trade	2	0.97%
Advocacy: Human Rights	5	2.42%
Advocacy: Security	2	0.97%
Business: Finance	4	1.93%
Business: Food	2	0.97%
Business: Fuel/Energy	1	0.48%
Business: Information Technology	2	0.97%
Business: Lodging	1	0.48%
Business: Logistics	3	1.45%
Business: Telecom	3	1.45%
Communication: Broadcast	2	0.97%
Communication: Reporting	2	0.97%
Field: Business	1	0.48%
Field: Communication	1	0.48%
Field: Health	6	2.90%

Field: Humanitarian	1	0.48%
Field: Labor	4	1.93%
Field: Law	3	1.45%
Field: Military	12	5.80%
Field: Military, Law	1	0.48%
Field: Political	3	1.45%
Field: Refugees	3	1.45%
Field: Religion	2	0.97%
Organization: Cultural	7	3.38%
Organization: Finance	3	1.45%
Organization: Health	2	0.97%
Organization: Humanitarian	8	3.86%
Organization: Law	3	1.45%
Organization: Military	2	0.97%
Organization: Politics	9	4.35%
Organization: Religion	1	0.48%
Organization: Security	6	2.90%
Political Party	16	7.73%
Total	**207**	**100%**

APPENDIX D: Frequency of Organizational Nationalities in the Bosnia-Herzegovina Mission

Nationality	Frequency	Percent of Dataset
Bosnia	58	28.02%
Bosniak	9	4.35%
Bosnian Croat	21	10.14%
Bosnian Serb	29	14.01%
Canada	3	1.45%
Croatia	7	3.38%
Czech Republic	1	0.48%
Denmark	2	0.97%
Germany	4	1.93%
Greece	1	0.48%
IGO	28	13.53%
INGO	10	4.83%
IPO	1	0.48%
Italy	1	0.48%
Japan	1	0.48%
Macedonia	1	0.48%
Montenegro	2	0.97%
NGO	2	0.97%
Russia	1	0.48%
Serbia	4	1.93%
Slovenia	1	0.48%
Spain	2	0.97%
Switzerland	2	0.97%
USA	15	7.25%
United Kingdom	1	0.48%
Total	**207**	**100%**

APPENDIX E: Mission Categories in Haiti

Mission Category	Frequency	Percent of Dataset
Administration	58	10.49%
Administration: Agriculture/Rural Development	1	0.18%
Administration: Aviation	3	0.54%
Administration: Children	1	0.18%
Administration: Culture/Communication	1	0.18%
Administration: Development	1	0.18%
Administration: Economy	1	0.18%
Administration: Education	2	0.36%
Administration: Finance	1	0.18%
Administration: Food	1	0.18%
Administration: Foreign Policy	7	1.27%
Administration: Geology	1	0.18%
Administration: Health	15	2.71%
Administration: Labor	2	0.36%
Administration: Law	2	0.36%
Administration: Local	13	2.35%
Administration: Military	1	0.18%
Administration: Preparedness	1	0.18%
Administration: Preparedness/Response	1	0.18%
Administration: Refugees	1	0.18%
Administration: Response	5	0.90%
Administration: Sanitation	3	0.54%
Administration: Security	6	1.08%
Administration: Transportation/Communication	1	0.18%
Administration: Women	1	0.18%
Advocacy: Children	2	0.36%
Advocacy: Development	1	0.18%
Advocacy: Elderly	1	0.18%
Advocacy: Haiti	3	0.54%

Advocacy: Human Rights	1	0.18%
Advocacy: Meteorology	1	0.18%
Advocacy: Sanitation	1	0.18%
Business: Shipping	1	0.18%
Business: Agriculture	1	0.18%
Business: Aviation	2	0.36%
Business: Banking	3	0.54%
Business: Chemical	1	0.18%
Business: Communication	1	0.18%
Business: Construction	1	0.18%
Business: Development	1	0.18%
Business: Education	4	0.72%
Business: Education/Research	1	0.18%
Business: Engineering	1	0.18%
Business: Finance	1	0.18%
Business: Fuel/Energy	1	0.18%
Business: Insurance	1	0.18%
Business: Logistics	4	0.72%
Business: Shipping	1	0.18%
Business: Telecommunications	2	0.36%
Business: Water	4	0.72%
Business: Water/Sanitation	1	0.18%
Communication: Broadcast	5	0.90%
Communication: Health	1	0.18%
Communication: Technical	3	0.54%
Field Health	1	0.18%
Field: Agriculture	2	0.36%
Field: Aviation	5	0.90%
Field: Children	7	1.27%
Field: Communication	1	0.18%
Field: Cultural	1	0.18%
Field: Debris Removal	1	0.18%
Field: Development	20	3.62%
Field: Disability	1	0.18%
Field: Education	2	0.36%
Field: Finance	1	0.18%
Field: Finance/Women's Rights	1	0.18%
Field: Fire and Rescue	7	1.27%
Field: Food	4	0.72%
Field: Health	72	13.02%
Field: Health/Damage Assessment	1	0.18%

Field: Housing	1	0.18%
Field: Humanitarian	6	1.08%
Field: Law	2	0.36%
Field: Logistics	11	1.99%
Field: Military	14	2.53%
Field: Nuclear Power and Weapons	1	0.18%
Field: Preparedness/Response	1	0.18%
Field: Refugees	3	0.54%
Field: Refugees (OPT)	1	0.18%
Field: Response	6	1.08%
Field: Sanitation	3	0.54%
Field: Search and Rescue	5	0.90%
Field: Security	3	0.54%
Field: Supply	5	0.90%
Field: Surveillance	1	0.18%
Field: Water	1	0.18%
Organization: Agriculture	1	0.18%
Organization: Aviation	1	0.18%
Organization: Charity	1	0.18%
Organization: Child Security	1	0.18%
Organization: Children	3	0.54%
Organization: Communication	4	0.72%
Organization: Communication/Assessment	1	0.18%
Organization: Coordination	2	0.36%
Organization: Damage Assessment	2	0.36%
Organization: Data	1	0.18%
Organization: Development	30	5.42%
Organization: Development (Consulting)	2	0.36%
Organization: Development (Political)	1	0.18%
Organization: Development (Technology)	1	0.18%
Organization: Education	2	0.36%
Organization: Electricty	1	0.18%
Organization: Engineering	1	0.18%
Organization: Environment	2	0.36%
Organization: Finance	5	0.90%
Organization: Food	10	1.81%
Organization: Food/Agriculture	2	0.36%
Organization: Funding	3	0.54%
Organization: Health	35	6.33%
Organization: Health (AIDS)	1	0.18%
Organization: Human Rights	2	0.36%

Organization: Humanitarian	7	1.27%
Organization: Labor	3	0.54%
Organization: Law	2	0.36%
Organization: Local	2	0.36%
Organization: Logistics	3	0.54%
Organization: Military	2	0.36%
Organization: Politics	5	0.90%
Organization: Preparedness	2	0.36%
Organization: Preparedness/Response	6	1.08%
Organization: Reconstruction	1	0.18%
Organization: Refugees	3	0.54%
Organization: Religion	1	0.18%
Organization: Response	10	1.81%
Organization: Sanitation	4	0.72%
Organization: Search and Rescue	1	0.18%
Organization: Security	7	1.27%
Organization: Shelter	1	0.18%
Organization: Shelter/Supply	1	0.18%
Organization: Supply	3	0.54%
Organization: Women	2	0.36%
Total	**553**	**100%**

APPENDIX F: Organizational Nationalities in Haiti

Nationality	Frequency	Percent of Dataset
Anguilla	3	0.54%
Antigua and Barbuda	3	0.54%
Argentine	1	0.18%
Australia	2	0.36%
Austria	2	0.36%
Bahamas	1	0.18%
Barbados	6	1.08%
Belgium	4	0.72%
Belize	1	0.18%
Bermuda	1	0.18%
Bolivia	2	0.36%
Brazil	4	0.72%
Canada	12	2.17%
Chile	1	0.18%
China	2	0.36%
Colombia	5	0.90%
Cuba	3	0.54%
Czech Republic	1	0.18%
Denmark	2	0.36%
Dominica	1	0.18%
Dominican Republic	20	3.62%
Estonia	1	0.18%
Finland	3	0.54%
France	23	4.16%
Germany	9	1.63%
Greece	1	0.18%
Grenada	2	0.36%
Guyana	2	0.36%
Haiti	71	12.84%

IGO	119	21.52%
INGO	25	4.52%
IPO	7	1.27%
Iceland	2	0.36%
Indonesia	2	0.36%
Ireland	4	0.72%
Israel	2	0.36%
Italy	6	1.08%
Jamaica	7	1.27%
Japan	2	0.36%
Kuwait	1	0.18%
Luxembourg	1	0.18%
Mexico	3	0.54%
Netherland	3	0.54%
Norway	4	0.72%
Philippines	1	0.18%
Poland	1	0.18%
Portugal	1	0.18%
Russia	2	0.36%
Slovakia	1	0.18%
South Africa	1	0.18%
South Korea	1	0.18%
Spain	6	1.08%
St. Kitts and Nevis	2	0.36%
St. Lucia	2	0.36%
St. Vincent and the Grenadines	1	0.18%
Suriname	3	0.54%
Sweden	3	0.54%
Switzerland	7	1.27%
Taiwan	1	0.18%
Trinidad and Tobago	1	0.18%
Turkey	2	0.36%
Turks and Caicos Island	3	0.54%
UK	16	2.89%
USA	118	21.34%
Vatican	1	0.18%
Venezuela	1	0.18%
Virgin Islands	1	0.18%
Totals	**553**	**100.00%**

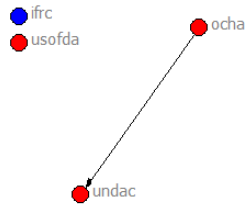
APPENDIX G: Daily Dynamic Networks for Haiti Timeslice 1 (12 Jan – 1 Feb 2010)

Key for all following maps:

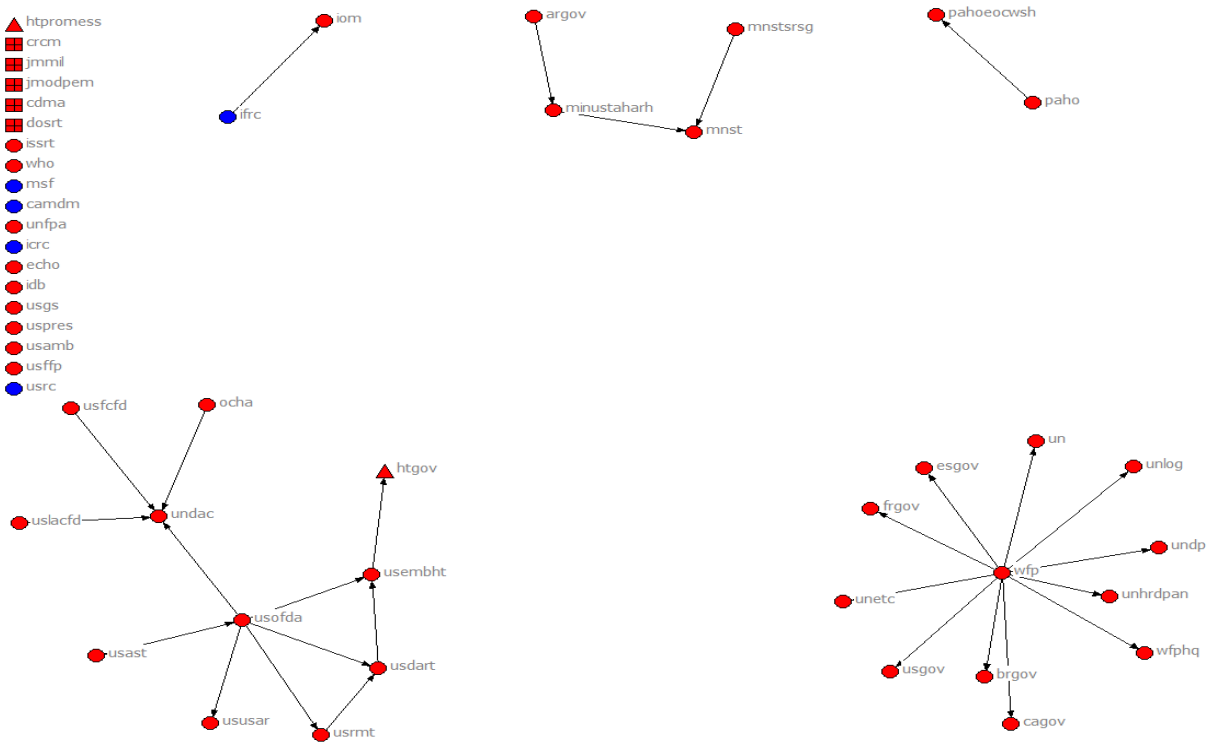
Organizational Source of Funding	
Source	Color
Public	
Private	
Non-Profit	

Organizational Jurisdiction	
Jurisdiction	Shape
Local	Square
Subdepartmental	Down Triangle
National	Up Triangle
Regional	Box
International	Circle

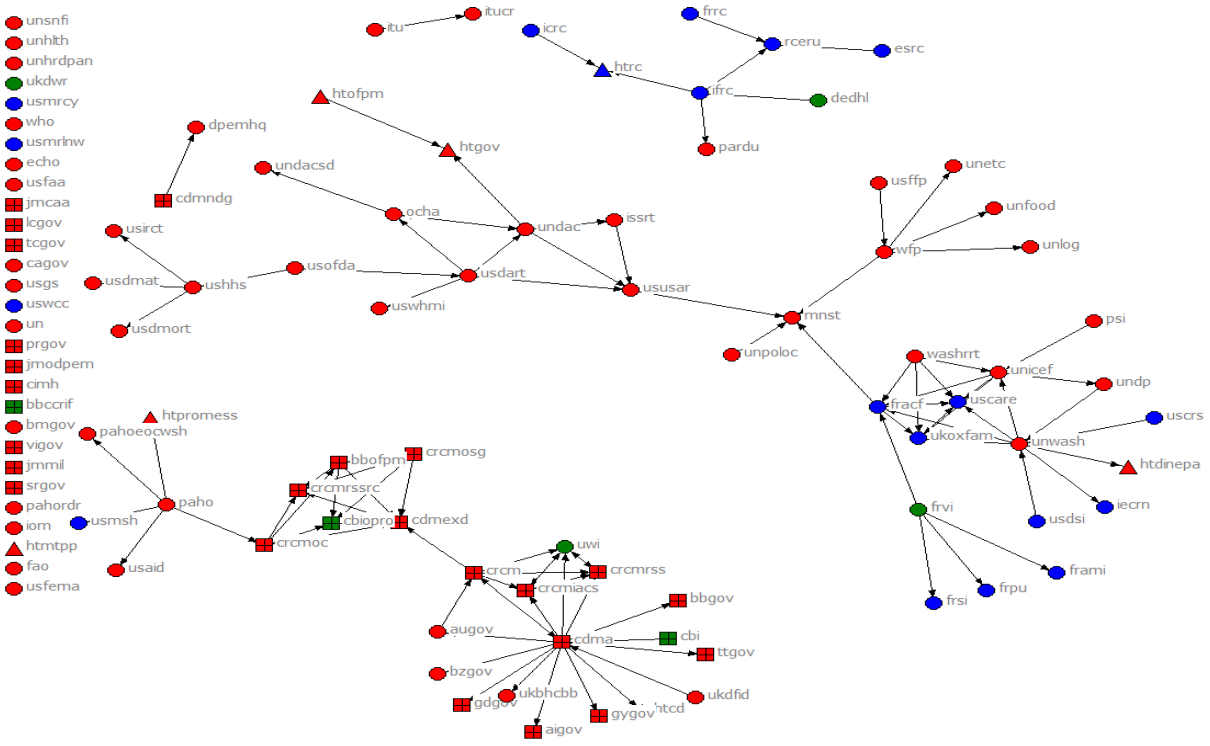
January 12th



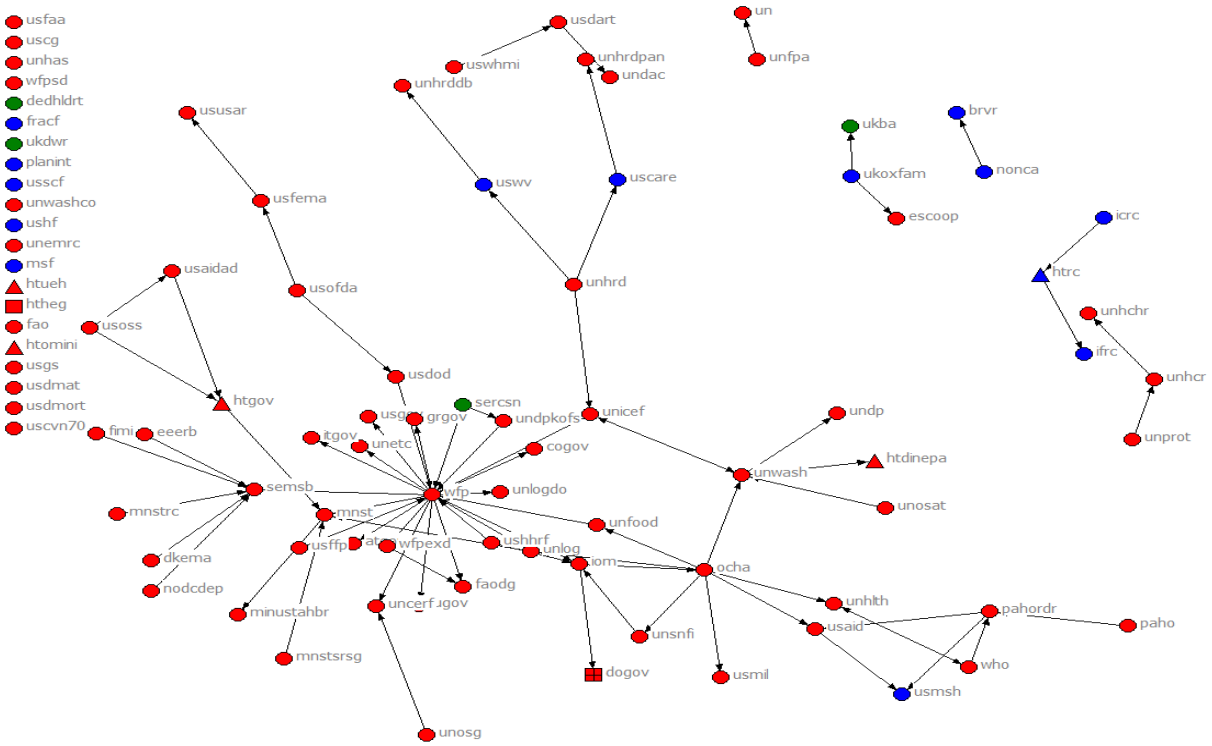
January 13th



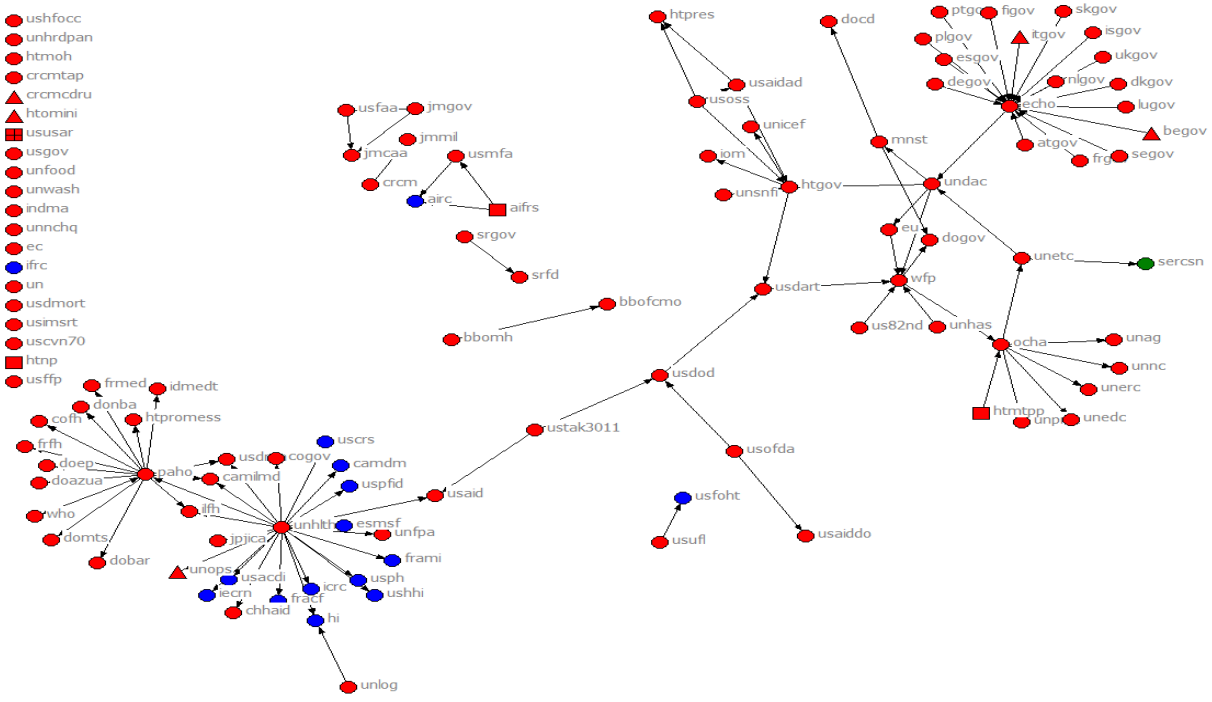
January 14th



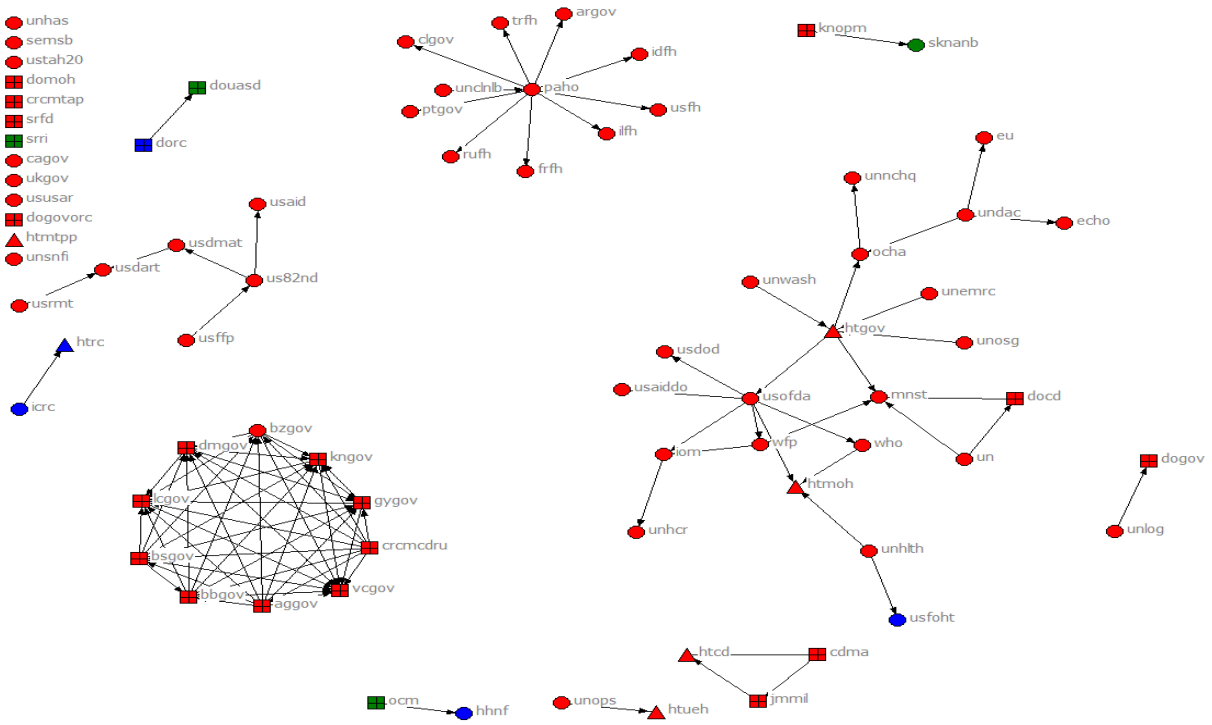
January 15th



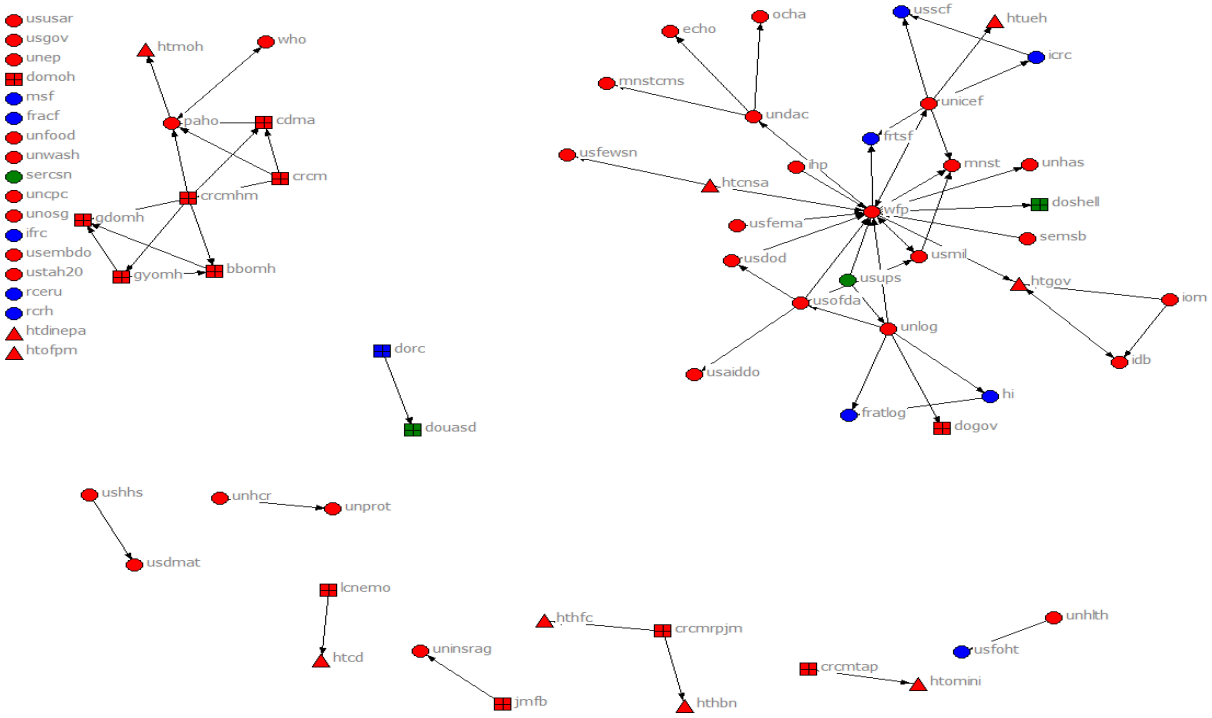
January 16th



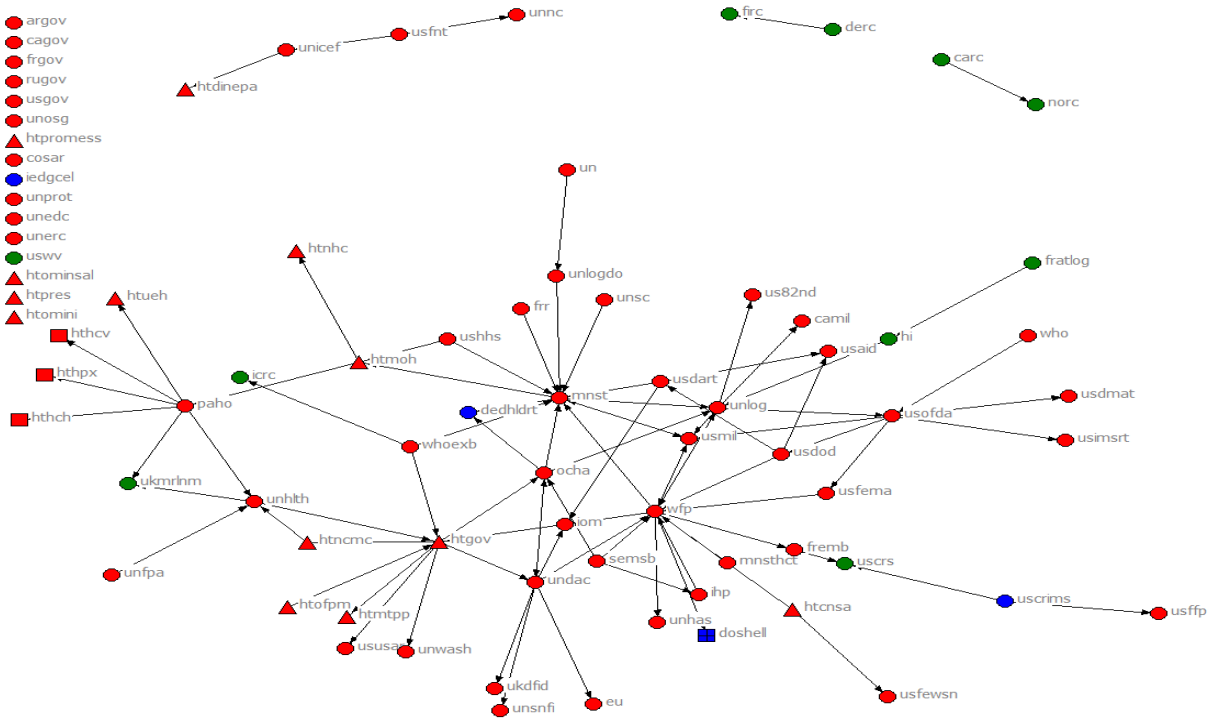
January 17th



January 18th



January 19th



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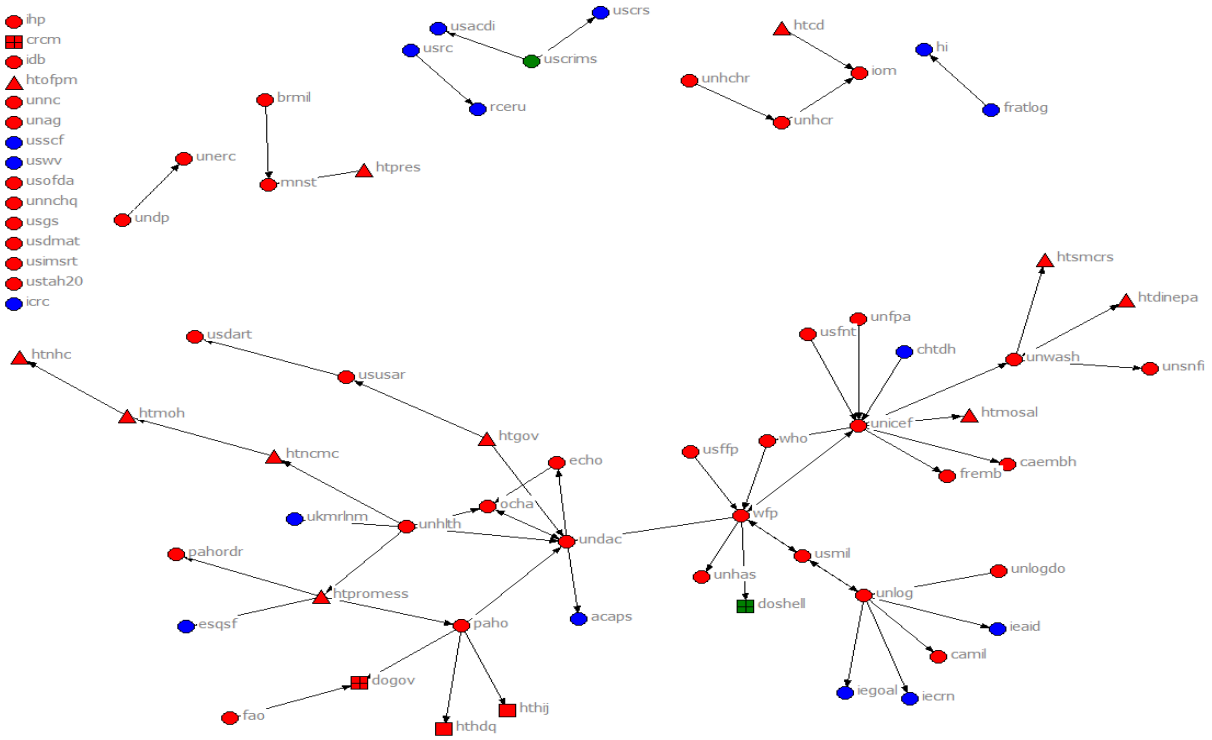
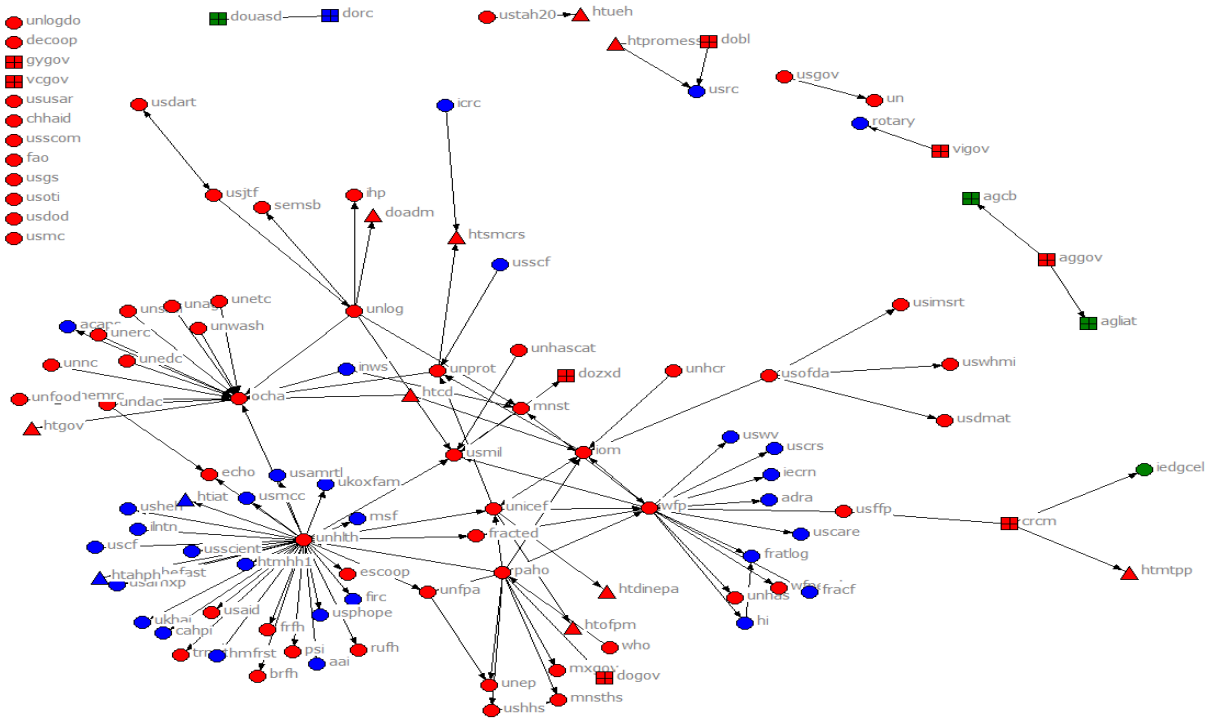
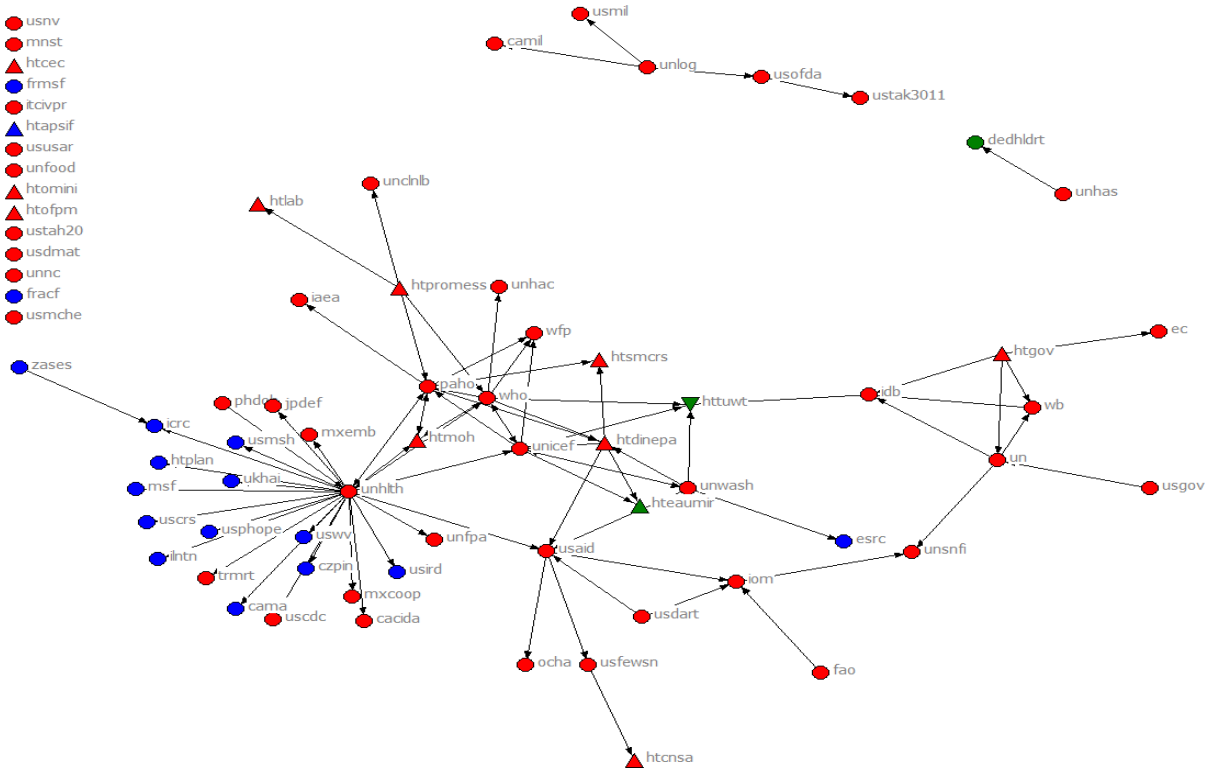


January 21st



January 22nd



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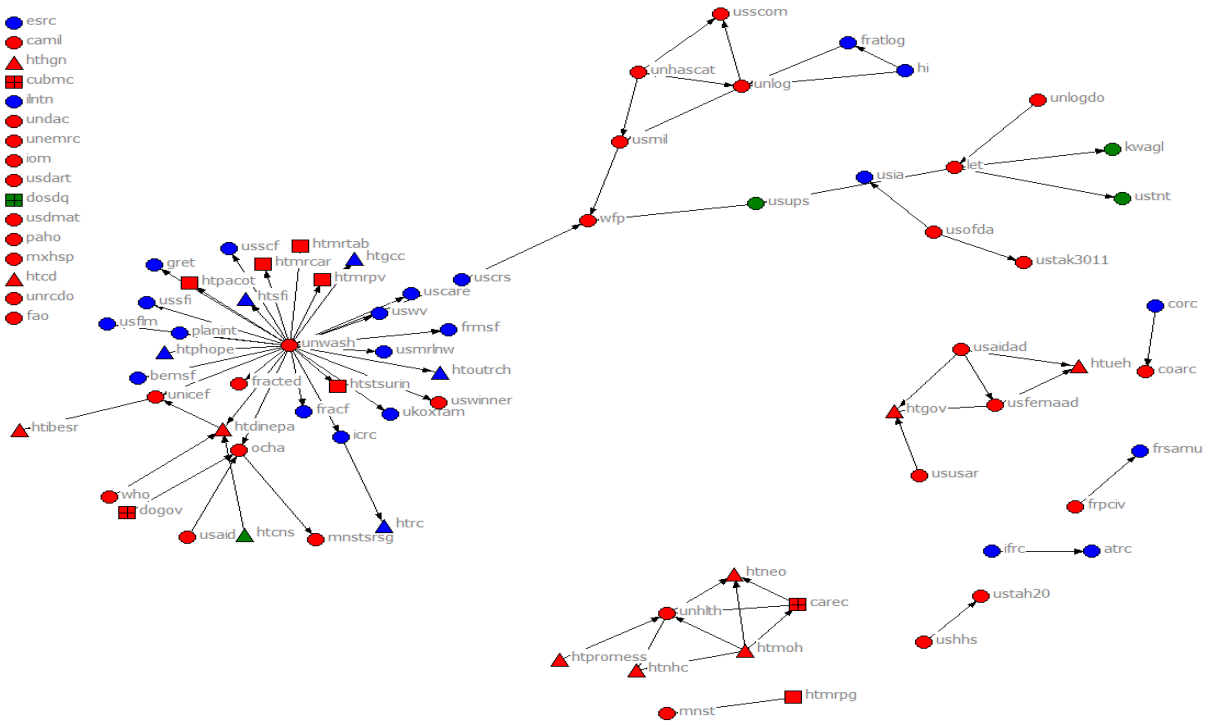

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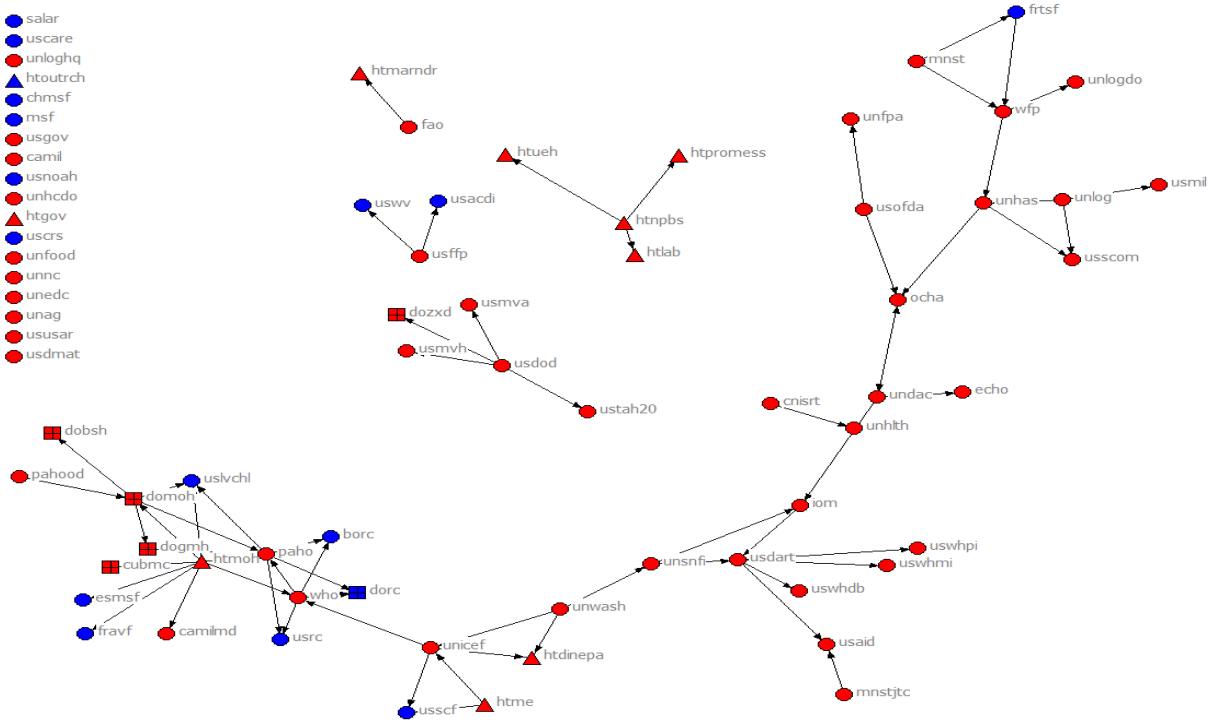

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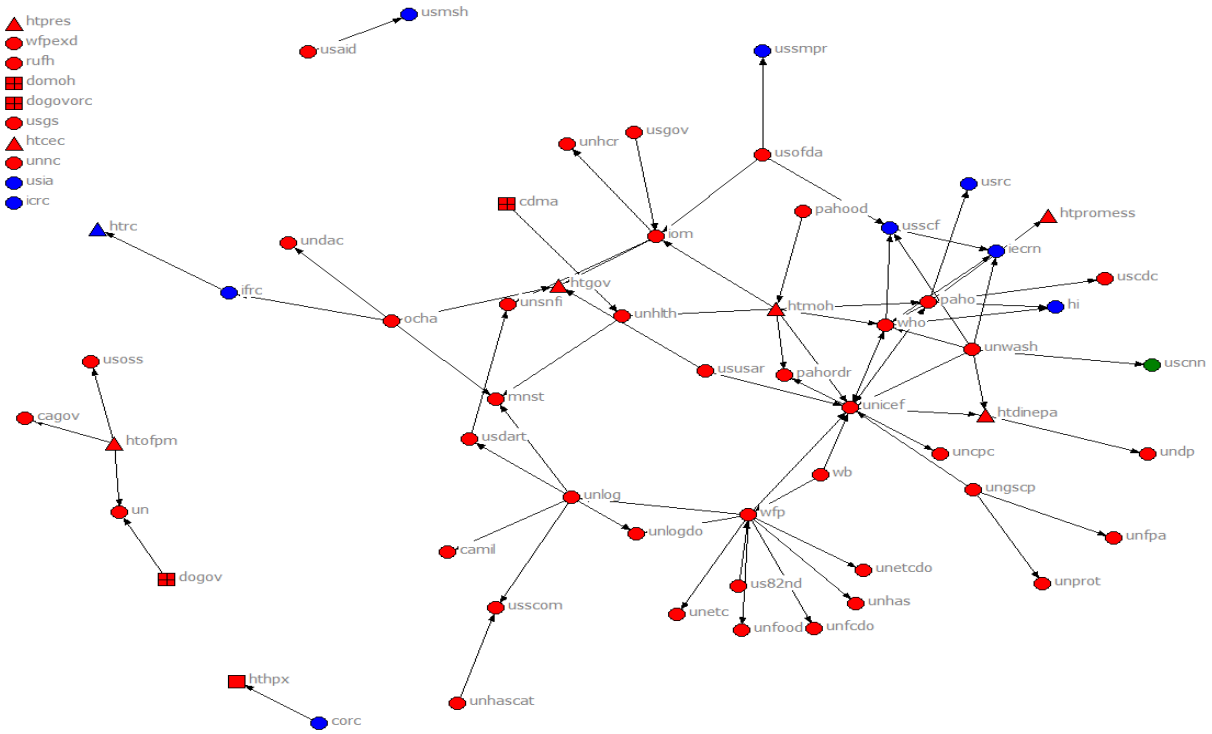

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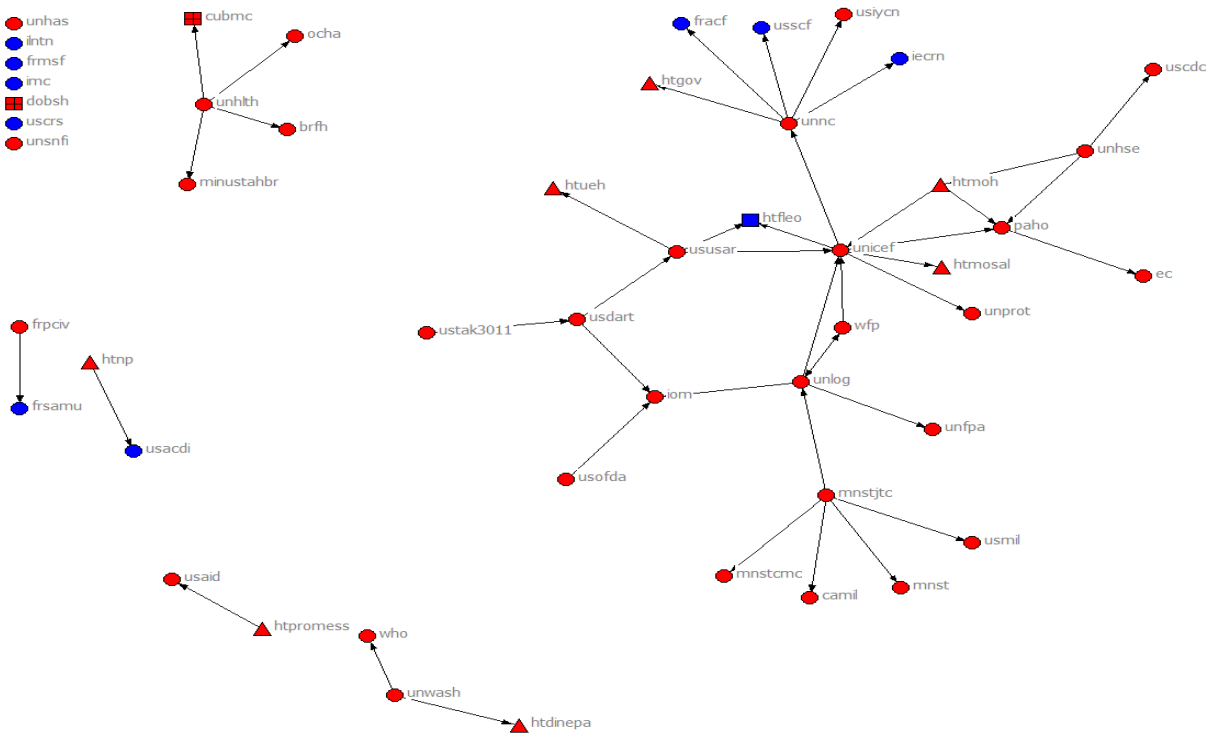
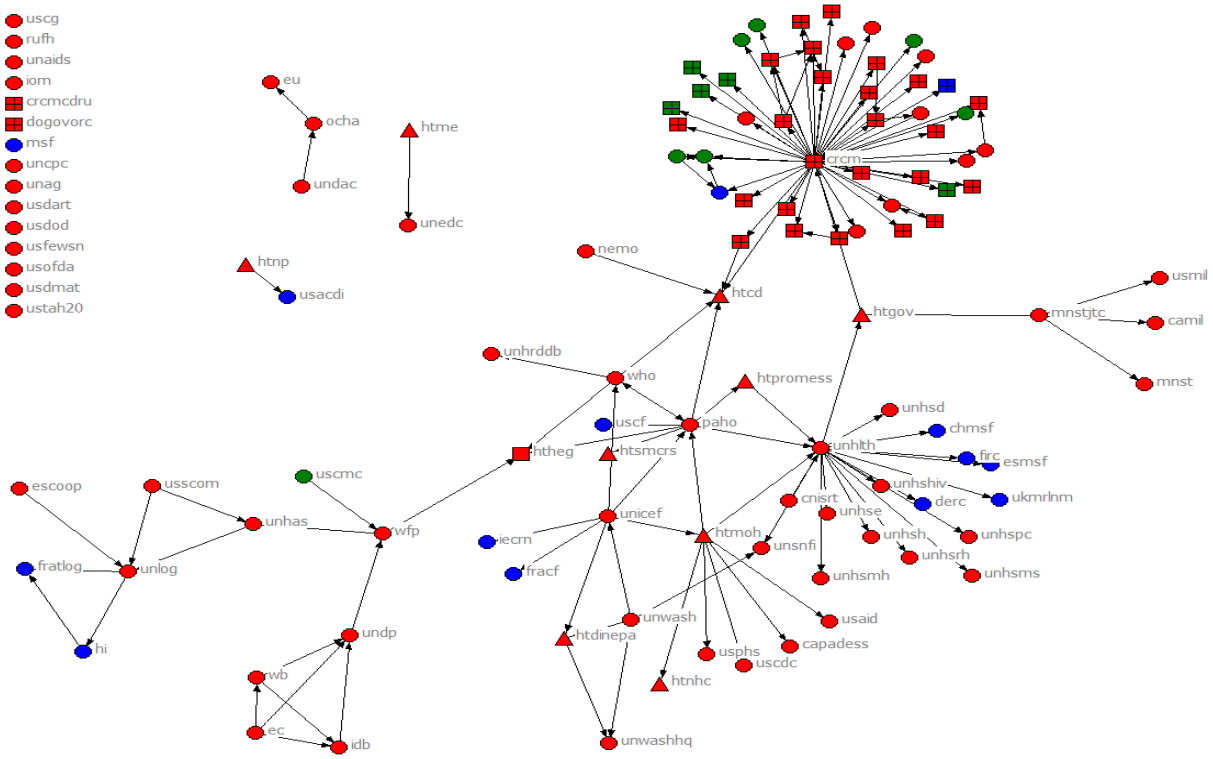
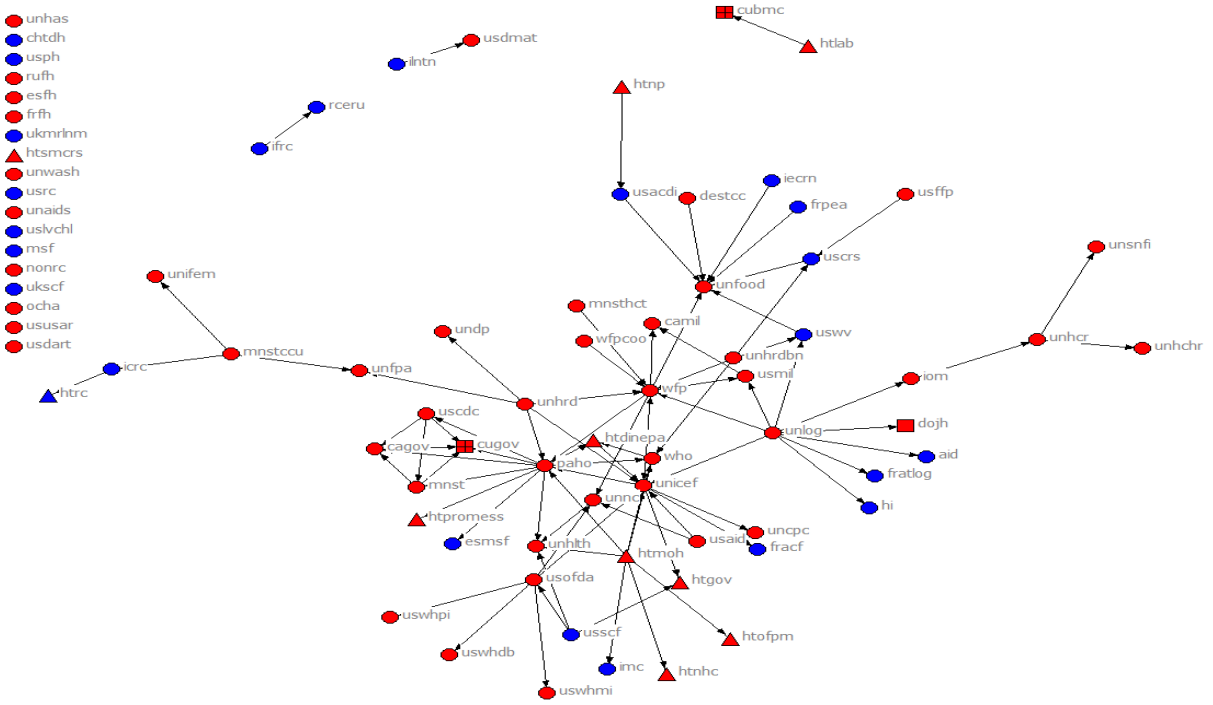


January 27th



January 28th



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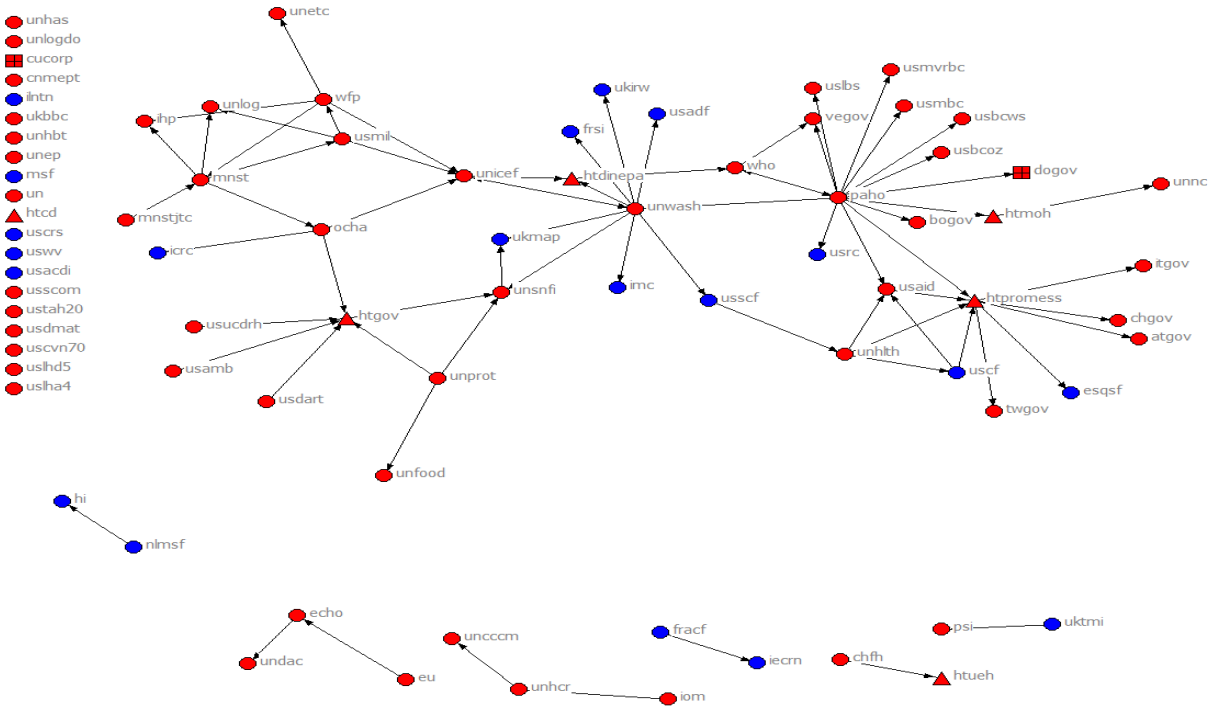
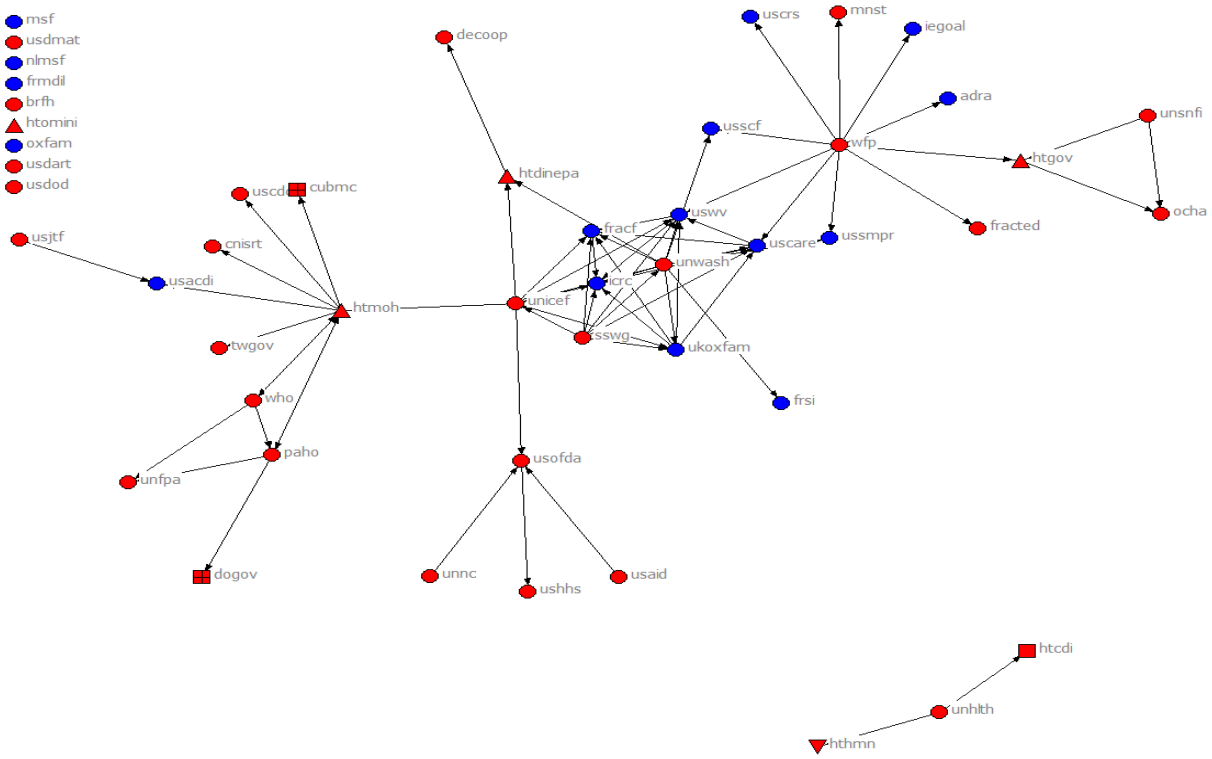
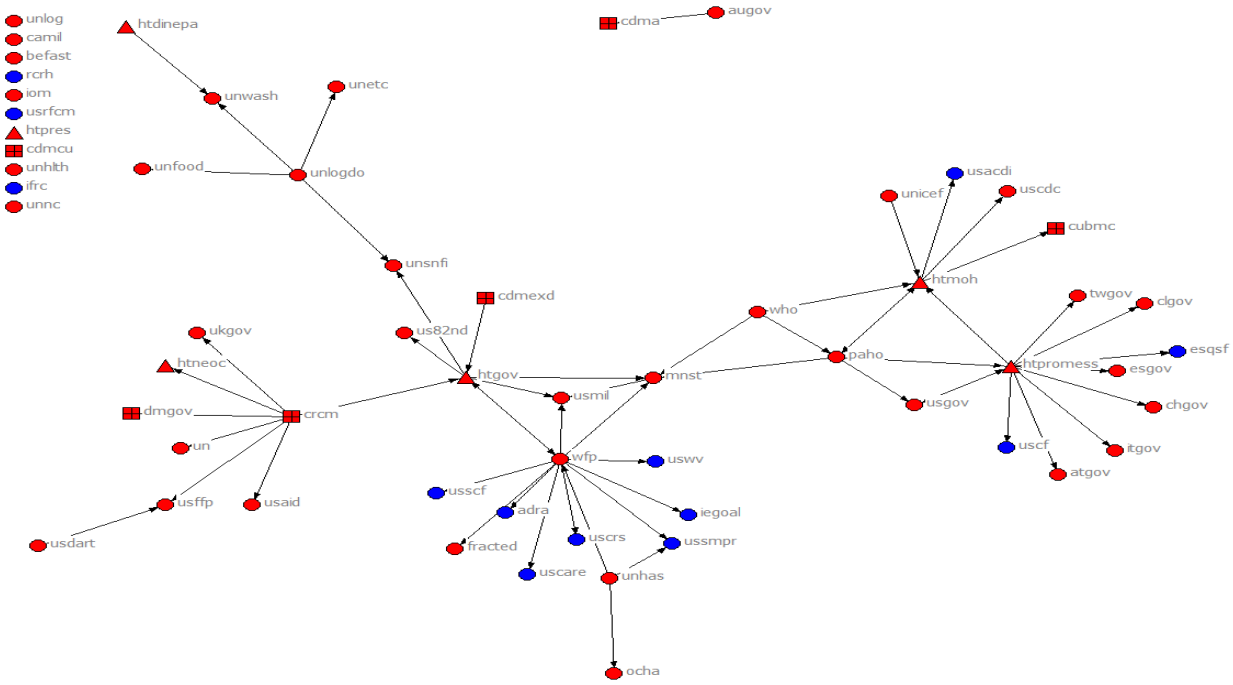


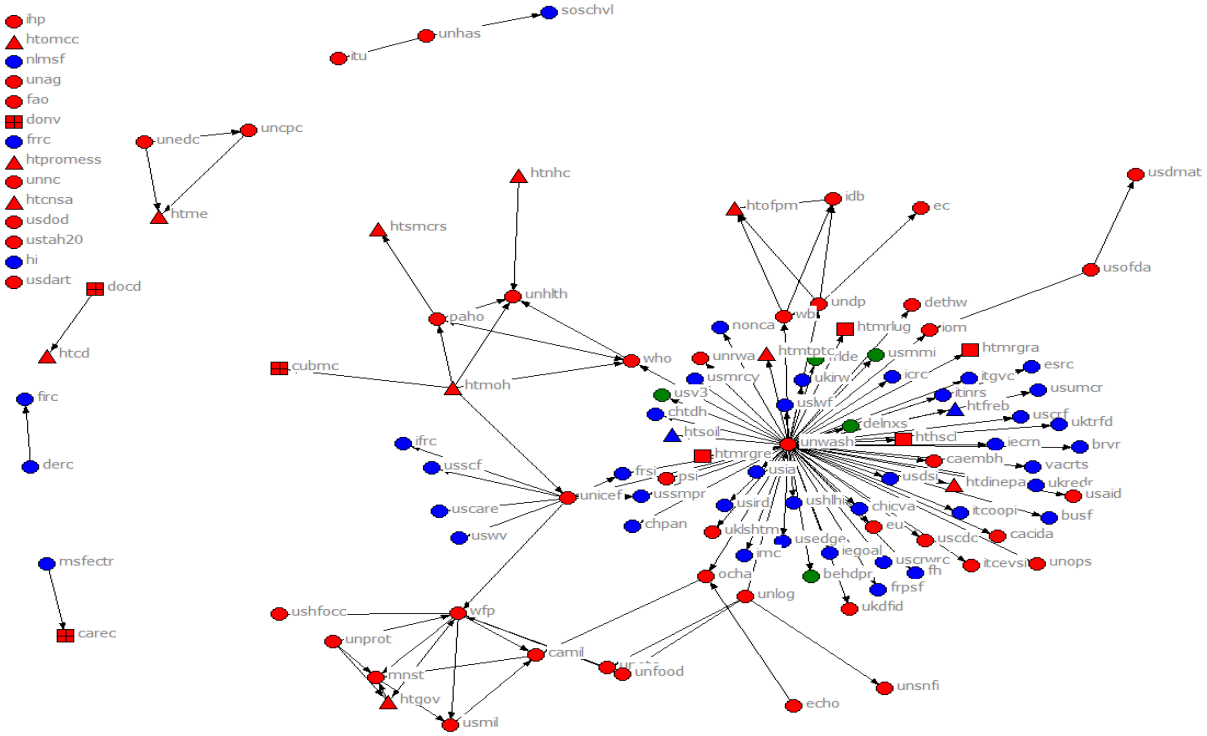
January 30th



January 31st



February 1st



APPENDIX H: Task Categories in Bosnia Static Network

Task Category (Network Ties)	Frequency.	Percent of Dataset
Administration	15	3.50%
Administration: Business	1	0.23%
Administration: Communication	6	1.40%
Administration: Education	1	0.23%
Administration: Elections	2	0.47%
Administration: Finance	31	7.23%
Administration: Foreign Aid	3	0.70%
Administration: Foreign Policy	29	6.76%
Administration: Foreign Policy/Politics	1	0.23%
Administration: Human Rights	2	0.47%
Administration: Intelligence	2	0.47%
Administration: Labor	2	0.47%
Administration: Law	17	3.96%
Administration: Local	14	3.26%
Administration: Logistics	5	1.17%
Administration: Military	7	1.63%
Administration: Privatization	3	0.70%
Administration: Railways	5	1.17%
Administration: Refugees	2	0.47%
Administration: Security	2	0.47%
Administration: Trade	2	0.47%
Business	1	0.23%
Business: Finance	14	3.26%
Business: Fuel/Energy	2	0.47%
Business: Labor	1	0.23%
Business: Lodging	1	0.23%
Communication	1	0.23%
Communication: Reporting	1	0.23%
Communication: Technical Systems	2	0.47%

Field: Communication	2	0.47%
Field: Environment	1	0.23%
Field: Health	2	0.47%
Field: Heavy Logistics	7	1.63%
Field: Humanitarian	1	0.23%
Field: Labor	2	0.47%
Field: Law	22	5.13%
Field: Law/Security	1	0.23%
Field: Logistics	1	0.23%
Field: Military	1	0.23%
Field: Reconstruction	3	0.70%
Field: Refugees	16	3.73%
Field: Religion	1	0.23%
Field: Security	18	4.20%
Organization: Administration	2	0.47%
Organization: Coordination	1	0.23%
Organization: Cultural	4	0.93%
Organization: Finance	3	0.70%
Organization: Foreign Policy	1	0.23%
Organization: Health	10	2.33%
Organization: Law	51	11.89%
Organization: Law/Security	1	0.23%
Organization: Military	1	0.23%
Organization: Politics	9	2.10%
Organization: Reconstruction	1	0.23%
Organization: Refugees	9	2.10%
Organization: Security	13	3.03%
Politics	46	10.72%
Politics: Ethnicity	10	2.33%
Politics: Religion	4	0.93%
Reconstruction: Cultural	8	1.86%
Reconstruction: Logistics	2	0.47%
Total	**429**	**100%**

APPENDIX I: Task Categories in Haiti Static Network

Task Category (Network Ties)	Frequency	Percent of Dataset
Administration	7	0.21%
Administration: Education	1	0.03%
Administration: Finance	1	0.03%
Administration: Foreign Policy	3	0.09%
Business: Insurance	1	0.03%
Business: Telecommunication	1	0.03%
Communication: Broadcast	5	0.15%
Communication: Reporting	16	0.48%
Communication: Technical	3	0.09%
Field: Assessment	341	10.20%
Field: Aviation	50	1.50%
Field: Children	19	0.57%
Field: Communication	4	0.12%
Field: Coordination	75	2.24%
Field: Debris Removal	3	0.09%
Field: Education	3	0.09%
Field: Food	159	4.75%
Field: Food/Security	2	0.06%
Field: Health	190	5.68%
Field: Health/Assessment	1	0.03%
Field: Health/Security	2	0.06%
Field: Law	2	0.06%
Field: Logistics	43	1.29%
Field: Preparedness	4	0.12%
Field: Reconstruction	10	0.30%
Field: Refugees	25	0.75%
Field: Relief	18	0.54%
Field: Response	7	0.21%
Field: Sanitation	47	1.41%

Field: Search and Rescue	49	1.47%
Field: Security	43	1.29%
Field: Security/Health	1	0.03%
Field: Shelter	12	0.36%
Field: Supply	133	3.98%
Field: Travel	44	1.32%
Field: Water	46	1.38%
Field: Women	1	0.03%
Organization: Agriculture	7	0.21%
Organization: Assessment	66	1.97%
Organization: Aviation	11	0.33%
Organization: CIMIC	1	0.03%
Organization: Children	53	1.58%
Organization: Communication	38	1.14%
Organization: Coordination	164	4.90%
Organization: Debris Removal	3	0.09%
Organization: Development	7	0.21%
Organization: Education	9	0.27%
Organization: Food	85	2.54%
Organization: Funding	113	3.38%
Organization: Funding/Supply	1	0.03%
Organization: Gender	3	0.09%
Organization: Health	343	10.26%
Organization: Health/Security	1	0.03%
Organization: Health/Supply	1	0.03%
Organization: Humanitarian	1	0.03%
Organization: Logistics	169	5.05%
Organization: Preparedness	39	1.17%
Organization: Reconstruction	6	0.18%
Organization: Refugees	50	1.50%
Organization: Relief	6	0.18%
Organization: Response	256	7.66%
Organization: Response/Health	1	0.03%
Organization: Risk Assessment	1	0.03%
Organization: Sanitation	207	6.19%
Organization: Search and Rescue	15	0.45%
Organization: Security	35	1.05%
Organization: Shelter	44	1.32%
Organization: Supply	195	5.83%
Organization: Travel	1	0.03%

Organization: Water	30	0.90%
Organization: Women	9	0.27%
Politics	1	0.03%
Total	**3344**	**100%**

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