WHEN INFORMATION BECOMES ACTION: HOW INFORMATION COMMUNICATION TECHNOLOGIES AFFECT COLLECTIVE ACTION DURING CRISES

by

Charles Patrick Martin-Shields
A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Conflict Analysis and Resolution

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Date: ________________________  Summer Semester 2016
George Mason University
Fairfax, VA
When Information Becomes Action: How Information Communication Technologies Affect Collective Action during Crises

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Summer Semester 2016
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DEDICATION

This is dedicated to the techies, peacebuilders and data nerds who have turned away from easier paths, instead putting their creativity and brilliance to work in service of humanity and peace.
I would like to thank the many friends, relatives, and supporters who have made this happen. Special thanks go to my parents, Victoria and Walter, for their sacrifices that have made the opportunity to pursue a Ph.D. possible. My committee, Dr. Thomas E. Flores, Dr. Agnieszka Paczynska and Dr. Todd LaPorte provided feedback, support and a willingness to organize Skype calls around what have often been extraordinary time differences. The quality of my research has grown significantly under their tutelage, and it has been a true pleasure learning from them. The data gathered in Kenya and Samoa was a huge team effort, and I count myself lucky to have had wonderful collaborators in my field work. In Kenya Dr. Elizabeth Stones of University College London, and Christopher Tuckwood and John Green from the Sentinel Project, all committed to exceptional timelines to run the multiple surveys used in Chapter 5. My colleagues in Samoa were equally critical, and were wonderful to work with during the data gathering process; Chapter 6 would not have been possible without them. Ronnie Aiolupotea, Gitta Lopautapu and Peseta Leuelu Seta from the Ministry of Communications and Information Technology gave me steadfast support, providing government contacts, giving me feedback and translations on survey instruments, and being fantastic friends and colleagues. Dr. Ioana Chan Mow, Dr. Lealaosau Fitu and Dr. Hobert Sasa from the National University of Samoa worked with me to organize a research team, develop a sampling strategy, and provided crucial feedback throughout the administration of the Samoa survey. They, and the enumerators who collected data and sat through many hours of visits with respondents in villages across Samoa, have my deepest gratitude. I also wish to acknowledge the mentorship of Dr. Abdul Aziz Said, Dr. Matthew Levinger, and Dr. Peter Weinberger, who saw me through my early graduate work and have provided advice and friendship since my time at the U.S. Institute of Peace and the School of International Service.

Last but not least, Anne, your love, support and encouragement kept me going through the ups and downs of field work in Samoa through the completion of the final manuscript.
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<td>Information Communications Technology</td>
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<td>Joint Mission Analysis Cell</td>
<td>JMAC</td>
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<td>United Nations Stabilization Mission in the Democratic Republic of Congo</td>
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<td>Non-Governmental Organization</td>
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<td>Qatar Computer Research Institute</td>
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<td>Subscriber Identification Module</td>
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<td>Short Message Service</td>
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<td>United Nations Development Program</td>
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<td>United Nations Educational Scientific and Cultural Organization</td>
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<td>United States Holocaust Memorial Museum</td>
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ABSTRACT

WHEN INFORMATION BECOMES ACTION: HOW INFORMATION COMMUNICATION TECHNOLOGIES AFFECT COLLECTIVE ACTION DURING CRISIS

Charles Patrick Martin-Shields, Ph.D.

George Mason University, 2016

Dissertation Director: Dr. Thomas E. Flores

Over the last 10 years, the dramatic increase in access to information communications technologies (ICTs) in developing countries has spurred popular efforts to use them for crisis response and violence prevention. As access to mobile phones and the internet has expanded, a key question remains: Do people actually use these tools for participation in governance processes? The results from my case studies and survey data strongly indicate that they do not. Even among groups we expect to be technologically savvy, for example the young, urban and/or wealthy, patterns of information gathering during crisis are still oriented toward traditional broadcast media and elite messaging. Instead, the evidence from my case studies and surveys indicate that people make decisions about the validity and actionability of information during crises based on complex social and political factors that are tangentially related to technology access.
This dissertation contributes deeper theorization of the role of ICTs in crisis response, drawing on the political science and sociology literature on collective action and violence prevention. This social-theoretical grounding is important because while technologists and engineers have pushed for innovative use of ICTs in crisis response and international development more widely, there remains limited understanding of how these technologies, and the information shared across them, are used by communities to support socio-political processes, including violence prevention and disaster response. To make my theoretical argument I frame crises and crisis response as a collective action problem; communities who are trying to have a peaceful election or manage limited resources after a natural disaster have to keep people engaged in the collective process of maintaining stability. What ICTs should do in this scenario is lower the barriers to information sharing across large populations and wide geographic spaces, which is a key aspect of maintaining a collective action process.

Using case studies of election violence prevention in Kenya and disaster response in Samoa, as well as survey data on the preferred sources and mediums of information people use to take action during crisis, I hypothesized that when people have access to a full spectrum of ICTs they will prefer gathering information through horizontally integrated digital social networks, instead of via vertically integrated broadcast media. I also hypothesize that these effects will be larger among younger, more urban, and wealthier survey respondents. In both the samples from Kenya and Samoa, people across all demographic groups overwhelmingly prefer broadcast and official information when making decisions about what to do during elections and after natural disasters, which ran
contrary to my expectations. What is more important to respondents when deciding which information to trust and act on is their previous social and political experiences during elections and post-disaster recovery. Access to government services, political representation, and the geographic distribution of social and familial networks were more salient to respondents when they were deciding where to gather information and how to act on it.

To bring the theoretical and empirical analysis back to the larger question about the use of ICTs in crisis response and violence prevention, I analyze a selection of interventions where international organizations used ICTs in crisis response and violence prevention, discussing how different agency programs encouraged (or failed to encourage) local level information sharing and collective action. This will provide theoretically grounded context for how peace and humanitarian operations practitioners can better develop and tailor technology-supported programming to be more congruous with local information sharing behavior. The dissertation closes with an analysis of the overall findings, implications for the field of technology for peacebuilding and disaster response, and future avenues for research.
CHAPTER 1: INTRODUCTION

The modern world of telecommunications, internet access, social media, text messaging, and global connectivity has led to innovation across development and crisis response agencies as people affected by conflict and disasters increasingly have access to mobile phones, social media and internet connectivity (Bott and Young 2012). This has been spurred by an expansion of information communication technologies (ICTs) globally, and has been particularly pronounced in the developing world, where access to mobile phones has increased dramatically since the early 2000s. Along with mobile phones, high speed internet is increasingly available to even the most remote communities. This has come from both an expansion in wired internet, as well as the growing market for data-enabled mobile phones that can access the internet. While the commercial and economic benefits of increased mobile phone and data connectivity have been evident to agencies such as the World Bank and the telecommunications industry since the early 2000s (Eggleston et al 2002; Kirkman et al 2002), the benefits of these technologies with regard to governance, crisis response and peacebuilding have only started to emerge in the last five to seven years.

This surge of interest has been spurred by projects such as Ushahidi, the open-source mapping software that was developed by a small team of Kenyan lawyers, journalists and software engineers in a few days to visualize reports of the 2007-8 post-
election, election violence, and the role of social media such as Twitter and Facebook in the organization of resistance movements in Tunisia and Egypt that overthrew governments in both countries. This is the context from which I derive my core question: While people could potentially connect directly with each other and rapidly solve problems at the local level using mobile phones and social media, do they? Is access to new technologies enough to lead to changes in how people gather data during crises? Extending this, what sources of information do people trust enough to act on? These question has implications for how we understand collective action issues during crises, as well as the propensity of people to develop cooperative, violence-preventing behavioral patterns given enough time and information.

The results of the case studies and survey data in this dissertation indicate that at a macro level people still rely heavily on traditional media and information sources during crises, while at a micro level people we would expect to be the natural users of new technologies are not necessarily so. This is an important finding because it is easy to assume that when people have access to new technologies, their information gathering and sharing behavior will change. To a degree this is true; on a macro level we are seeing how social media, full-time connectivity, and access to mobile technology are changing how we behave in many ways, from how we learn to how we perceive global events through the lens of social media. But when it comes to high-risk decision making during crises the results of this project indicate that the use of different information mediums and technologies is contingent on a mix of social, political and geographic factors, which can be difficult to measure in aggregate terms.
Like many surges in popular interest, the opportunities for doing empirical social science research have lagged behind as news media pushed the story. When talking about ICTs and development it is important to differentiate between social and technological research. A great deal of excellent research and development has gone into software and hardware for development and crisis response; the Qatar Computer Research Institute (QCRI) is leading efforts to automate the tracking and coding of Tweets from disaster zones (Meier 2013), Ushahidi has developed a brick-sized device that acts as a remote internet hotspot1, and data science continues to expand our understanding of how to use the vast amounts of data generated via ICTs (Crawford 2013).

This project builds on technical research and field experience, focusing on the micro-dynamics of technology use among individuals in different countries using surveys and qualitative interviews in the field. By implementing these surveys in two different places, Kenya and Samoa, I aim to develop a deeper understanding of the micro-dynamics of which technologies people adopt and trust, as well as the socio-political and economic factors unique to each country that are descriptive of people’s technology use. Using this frame I can explore questions related to how people use information technology to overcome collective action issues during crises that can lead to violence, and when in an information stream people switch from passively consuming to acting on information.

This can help us better understand one of the key theoretical and practical issues surrounding ICTs in the development and crisis management contexts. Leading thinkers in the field of crowdsourcing argue that ICTs provide the capacity for local actors to

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1 More on the BRCK product can be found here: [http://www.brck.com](http://www.brck.com)
communicate and cooperate directly with each other, responding to crises faster than government or international actors can (e.g. Meier 2006, 2008; Letouze, Meier and Vinck 2013). These claims are true from a mechanistic perspective; people have access to these data streams, they have access to the technologies, and hypothetically they could (and in anecdotal cases) use them for crisis management and violence prevention.

1.1 The literature review and argument

The opening chapters will cover a literature review of ICTs and crisis response, looking at examples of crowdsourcing and digital organizing from the last 5-7 years. They will examine the claims made by thought leaders and practitioners about how and why these tools have, or could have, positive effects on governance, crisis response and development. This chapter will frame these claims and observations within the literature of violence prevention, collective action problems and cooperation theory, allowing me to develop a set of hypotheses concerning people’s use of ICTs during crises that could lead to violence. I will look specifically at the literature on collective action problems, signal and information sharing, and opportunities for iterative learning and collective process management using ICTs. To close this chapter I will set up my argument based on the literature review and explain my empirical approach used in the third chapter.

The first set of literature I will review covers the uses and analyses of ICTs used in political organizing, peacebuilding and disaster response. I am starting with it in order to frame the problem, which is a lack of theoretical continuity around the claims that are made about the ways ICTs change or enhance peacebuilding and disaster management. At times
the excitement around ICTs for social good can feel ‘TED talk-y’. What I mean when I say this is that the focus tends to be on what the technologies could do if used as creatively as possible for ends that are of interest to the democratization and peacebuilding communities. The narrative has been prospective, which is exciting but not well connected to robust theories of change. While this kind of excitement plays a constructive role in getting people and organizations interested in innovative ways to spur social change, build peace, or respond to disasters, without some framing in political and social theory technology ends up having the agency in the change process. This is an important point: without placing ICTs in a social theory of change, we start to ascribe change to the technologies themselves instead of the preferences of the citizens who want the change.

To address this problem, I will review the available literature on how ICTs have been used in real social, political and peacebuilding/disaster response processes. I will also discuss the peer-reviewed literature that has built on these real-world cases to see how others have grafted theory onto observed experience. Much of what we see in the literature focuses on empowering local actors by providing faster, better information sharing, and improving the response time of donor-provided security (e.g. peacekeepers) by making information feedback loops smaller and faster. This leads me to believe that aspects of iterative learning and collective action processes in violence prevention could be useful places to frame ICT-in-violence prevention theory.

To understand violence prevention as a ‘thing’ that happens as a function of a symmetric, or close to symmetric, information environment, I will position violence prevention as a collective action process. This makes it something people do, instead of
'no violence’ being coded as ‘nothing happened’ which can be a problem in conflict data coding. Collective action problems focus around the management of a shared resource or good; I will argue that stability during times of social stress is the collective good that communities try to manage. What we see in the ICT literature is that information sharing, whether among policy makers or between local actors, is one way these technologies have a tangible impact on social change. Since violence prevention is the phenomena I am focusing on, and I am treating violence prevention as a collective action process, I will review the literature on information sharing in collective action and iterative social processes. I am particularly interested in the problems associated with the costs of information sharing in large groups, and the role of iterative information sharing and cooperation in scenarios such as prisoner’s dilemmas (e.g. Axelrod 2006).

It is important to note upfront the types of information sharing systems I will be referring to throughout the document. Often there will be terms like “crowdsourcing” and “crowdseeding” which are often associated with social media, mobile phones and open source software. These generally describe a process by which crowds of citizens contribute information to support anything from marketing efforts, public policy town halls and crisis response. In this study I will not use these terms because they are inconsistently defined and it could lead to confusion switching between them. Instead I will code communication systems as either being vertically or horizontally integrated. Vertically integrated systems in this study are what we would traditionally think of as broadcast media; information is edited by a producer and then broadcast to the audience who then hear, analyze and take action based on the information.
In a vertically integrated system an event takes place and the news and official media organizations gather the relevant information before broadcasting news and information to the general public. I think of this as being ‘vertical’ because the flow of information is from an official source down to the listeners. In a system like this the general public cannot intervene directly in the message; they could phone into the radio station or post to its Facebook page to provide on-the-ground information to reporters but they cannot directly influence changes to the information that is broadcast. Mediums that fall into a vertical category include radio, TV and newspaper. In this system people take action after hearing information from a source such as the radio or TV. At time zero the news reporters gather, edit and prepare for broadcast. In step one the information is broadcast to all the communities.
communities at one time, and the communities take the information and formulate a plan of action.

Horizontally integrated systems are rooted at the individual or community level. An event occurs at \( t \)-zero that initially impacts Community 1. This event is likely to also impact Communities 2-5 so people in Community 1 share information directly with Communities 2 and 3, in step two. These communities then share their information with Communities 5 and 6 in step three, who then share information directly with each other. By sharing information horizontally communities develop a shared local understanding of the event they are dealing with, and then cooperatively organize action. They do not require radio or TV broadcast because they are sharing information horizontally using SMS text messaging, social media, and internet-based forums. Technologies that are included in the horizontal category include mobile phones, social media and open source mapping software (broadly, the internet).
Horizontally integrated communication is what we see referred to as ‘crowdsourcing’, ‘crowdseeding’, and other variations of systems that describe publicly contributed information. Because there are slight variations in definition between these terms, if I use them in the text I will make a note that they are horizontally integrated systems. An important component of a horizontal system is that the narrative of an event can be influenced by people joining the discussion and providing immediate feedback about what they are seeing. Unlike broadcast media where a single producer or reporter determines the message, horizontal systems generally provide a space where the whole
group can see and contribute to the evolution of the event’s narrative in near-real time. The decision to collectively act emerges iteratively out of the rapid process of inter-community information sharing. To clarify how different sources and mediums of information map onto vertical and horizontal systems, I have created two figures to show where they fit individually and interactively:

![Figure 3: Sources and mediums grouped by direction](image-url)
Having laid out three streams of literature, I will then lay out my argument and methodology. The primary question is: how do people value, assess and act on information during periods of social and political stress? Do they prefer vertically integrated systems such as radio and TV, or will they act on horizontally integrated (crowdsourced) information that comes to them via mobile phone or social media? This has important implications theoretically and practically for how we use ICTs to prevent violence and manage crises. To study these questions I frame them as trust issues. We assume that for someone to take action they have to trust the information they are receiving. Do people trust vertically integrated and horizontally integrated information in different ways? Do they act on one tranche of information over the other? I said earlier that I am treating
violence prevention as a collective action process, something that people do instead of something that happens passively when people do not resort to violence.

Since one of the main challenges in a collective action process is managing the costs of sharing information and maintaining participation groups grow in number of geography, ICTs should play a critical role in lowering the marginal cost of information sharing across large groups. But to prevent violence it is not enough just to share the information; people have to trust the information source and medium enough to then act on it. This could mean choosing not to join a mob during a heated election because I trust information that says a rumor of violence is not true, or not hoarding resources after a natural disaster because I trust the information telling me when new resources will be available. To understand how people make these decisions, and whether or not certain modes of information gathering are more trusted than others, I will look at two different cases and perform surveys in both on information trust and taking action. There is also an important caveat to all these assumptions: People must prefer cooperation and stability to violence. Throughout this study, I assume that violence is not the preferred outcome among individuals.

1.2 Case studies and surveys: Trust and collective action in violence prevention

Kenya and Samoa will provide context for how people use ICTs and information to manage crises. I will focus on how information preferences are affect during two different types of crises, in very different contexts. In Kenya we will be looking at election violence prevention, where ethnic identification and rumors are used to create a sense of
insecurity at the local level that can lead to violence. Samoa on the other hand faces natural disasters as their primary crisis driver. What I am interested in in both cases is how people use as assess information gathered using ICTs to manage the collective action process of maintaining stability or non-violence. Comparison will be made of the survey data collected in both countries, since the surveys will ask similar questions about information trust and actionability as a function of source and transmission medium.

In order to answer the questions about trust and action as functions of information trust, I am taking a case study and survey approach. I find this to be more compelling than using historical data to build a quasi-experimental model because it allows us to explore individual level socio-technical behavior as a function of macro-social, political and stressor contexts. Supporting the decision is Meier’s (2011a) attempted econometric analysis of the impact of ICTs on political organizing in repressive environments. His results were inconclusive, while his case study analysis proved useful in understanding the role of ICTs in anti-government organizing. My aim is to understand how people trust and value information during periods of stress as part of the collective process of violence prevention, so taking a survey approach and gathering quantitative data on individual preferences could provide micro-level insights that country-level data would miss.

I will use two case studies which are different in nature to explore how people in different socio-political and risk contexts evaluate, trust and use information during crises that can turn into violence. The first case is Kenya, the second is Samoa. In Kenya I am concerned with violence that is the outcome of the politics of electioneering and elections. Within the field of conflict analysis and resolution this is a more ‘traditional’ type of
violence cycle. Samoa by comparison is peaceful and politically stable. The threat they have to deal with is natural disasters, particularly cyclones and tsunamis. The violence cycle I am analyzing in the case of Samoa is micro-level outbreaks of violence over resources like water and food in the aftermath of a disaster. This is a less traditional type of violence for the field of conflict analysis and resolution, but is violence none-the-less. Indeed, as we have seen a decline in inter-state and dyadic intra-state (e.g. defined rebel group versus government) violence, micro-violence in post-disaster situations may become an important area of conflict analysis in the future.

In both countries I did a survey asking individuals about the sources and technology mediums they get their news from, which ones they trust for information during an emergency, which ones they act on, and what source and medium is the most important during an emergency. Sources included government, professional reporters, friends, family, and local leaders. Mediums included mobile phones, radio, newspaper, TV, and the internet. I selected these sources and mediums because they represent vertically and horizontally integrated information streams. One of the key arguments we see in the ICT for peace and disaster response communities is that horizontal technologies (e.g. cellular phones, social media) allow local actors to take control of conflict prevention or disaster response. They also lower the necessity for elite-level action, such as third party intervention, since they increase local capacity to organize. But for these assumptions to hold up in practice it is not enough for the technologies to allow these things; people have to choose to act on horizontal information flows. In this study, I am assuming that action is a function of trust. What I aim to understand through the survey data is whether or not
people trust vertically and/or horizontally integrated information, and whether they would act on one or both. By using two different cases I can explore whether there is variance in the survey results based on differences in context, whether that context be social, geographic or stressor.

Kenya is a natural choice for any research project on the effects of ICTs on social development, including violence prevention and peacebuilding. Referred to as the ‘Silicon Savannah’ Kenya has one of the most developed technology sectors in Africa, including modern telecommunications and fiberoptic internet connectivity. It is also the place where the Ushahidi crowdsourcing and mapping software was developed; from the perspective of violence prevention and crisis response this was a significant event since it was a Kenyan team of developers who put the platform together in a matter of days so that people could share information about the election violence in real time. As a country case it represents a more traditional phenomenon, inter-ethnic election violence. There is a great deal of literature on interethnic violence, as well as elections and good governance so this is a good baseline case for framing ICTs within the process of violence prevention.

My second case is Samoa. While this might sound like an odd comparator my goal is not to compare it with Kenya per se. My goal is to compare how people assess and trust information based on source and medium, across different contexts. Samoa faces a different stressor than Kenya, natural disasters. While Samoa does not face the same threats of violence as Kenya, in post-disaster situations a lack of resources can lead to collective action problems, security dilemmas and micro-level outbreaks of violence over scarce resources. The results paint an interesting picture. In both cases there was a strong
preference for vertically integrated information, such as radio and government broadcast, but the political and social factors driving these preferences were highly localized. Experience with previous government services, geographic dispersion of social networks, and the level in which information sharing authority is vested were all far more important to people’s preferences than whether they had access to the technologies.

1.3 Institutional approaches to ICTs in violence prevention

Having laid out both a theoretical argument and case analysis, I will revisit the review of technology in crisis response. To do this I will focus on deeper analysis of the technology-supported interventions discussed in Chapter 2. While the analysis in Chapter 2 focuses more on the arc of how technology has been integrated into crisis response and peacebuilding, as well as the embedded narratives about local empowerment and ‘digital revolutions’, this chapter of the dissertation unpacks the interventions themselves. These interventions include crowdsourcing election violence and local violence in Kenya, mapping post-cyclone damage in Samoa, and United Nations uses of horizontally integrated technology for surveillance in conflict zones. I will analyze these examples using the theoretical approach and data used in the case analysis. The goal is to shift the analytic focus away from how the technology is deployed, and instead critically analyze what happened as a result of the technology being used. Who was empowered? What types of social and institutional dynamics emerged during the deployment?
Tying the theoretical and case analysis back to the larger narrative and experience with technology in crisis settings will set up the concluding chapter where options for further research will be discussed.

1.4 Conclusions and Implications

The closing chapter of the dissertation will serve a few purposes. The most important is to synthesize the findings, and then frame them within the larger theoretical and policy debates currently going on in the technology-for-peace community. While the results do not necessarily prove that people do not use horizontally integrated communications systems for crisis response and violence prevention, what they do indicate is that how and why people trust different mediums and sources of information is contingent on complex social, political and economic factors in their community and wider polity.

While the overall theme of this dissertation is the relationship between the way that people assess and value information versus how institutions conceptualize techno-social behavior, the second concluding section will look at the way technology effects the economies of countries as they recover from conflict. I will use peacekeeping operations as an example of how spending on commercial technology could have an endogenous growth effect in countries recovering from conflict. By supporting endogenous growth, the economy of a country is stronger and has wider opportunity for both domestically and internationally funded growth. This section of the chapter will look at the general impacts of peacekeeping on post-conflict peace, the observed ways that technology has spurred
economic growth in developing and post-conflict countries, and will combine these two streams of literature to argue that when conflict intervenors use technology in their post-conflict processes it can have a positive systemic effect on the economy, as well as allowing for greater participation in peacebuilding by individual actors.

To close the dissertation, I will discuss how the research informs both conflict resolution and analysis theory and practice. While it can at times feel like practice/policy implication sections are afterthoughts, in this is case it is critically important to discuss them because policy makers and practitioners are actively using these technologies in conflict settings. This research can help directly inform policy and practice in agencies that work in development and conflict mitigation. Theoretically this paper adds to the literature on collective action problems, information ecosystems, and our understanding of how people manage the collective process of stability maintenance. It will close some final thoughts on the findings and suggestions for further research.
CHAPTER 2: ICTS FOR PEACEBUILDING AND CRISIS RESPONSE: OVERVIEW AND APPROACH

The overarching argument of this dissertation is that in the last ten years, as ICTs have become highly available in conflict and disaster-affected developing countries, there has been a popular narrative that people can now use these technologies to solve their social, political and economic problems. In many ways this position contains truth; activists have adopted new technologies for organizing in contentious political settings, NGOs have begun using mobile phones and social media to intervene at the local level in conflictual behavior, and disaster response organizations are increasingly integrating new technology into their field work. As these anecdotal uses of technology become more commonplace in the wider discussion of crisis response and violence prevention, it has become increasingly important to understand whether people on the whole view these technologies and tools of empowerment for crisis response and whether or not they trust and act on the information that they get through horizontally integrated digital networks.

In this section I will discuss and provide examples of how the narrative of local empowerment through ICT access has taken root. It is a compelling narrative, especially because it frames the issue of ICTs in crisis response as the empowerment of individuals to make decisions and organize responses at the local level. In countries where government has been unable to meet local needs or international organizations have lacked the agility to respond to rapid-onset crises, the idea of that local actors can organize responses among
themselves using horizontally integrated communication systems is legitimately exciting. The key problem is that while this narrative is compelling, it is driven by the assumption that access to ICTs inherently leads to collective behavior change. Relative to the excitement and integration of these tools into crisis response, there has been comparably limited research on how people actually gather, trust, and act on information when facing an immediate crisis.

To bound my argument, I will provide technical explanations of the technologies I will be dealing with in this study, as well as the recent history of their applications in violence prevention and crisis management. There are a variety of technologies that are being used for violence prevention and disaster response that have been ‘hacked’ or innovatively modified for this use, and these modifications and adaptations are often not well understood by practitioners and researchers outside the technology community. I will use this chapter to give some basic explanation of the technologies I will be researching, and what their technical attributes are. While the process of developing knowledge and practice in the ICT for peacebuilding space has been decentralized, there has been a major effort in the last 5-7 years to begin codifying and standardizing the knowledge and experience that has been gained in the ICT for peace space. Thus, I will also use this chapter to talk about the ways that different tools can be used to share information systematically within a polity, further discussing the concepts of vertically and horizontally integrated communication flows.
2.1 The Narrative of the ‘Power of the Crowd’

The problem that I unpack in this dissertation is about the potential disconnect between what these technologies could do for people working to manage crises and prevention violence, versus how people actually make decisions to act based on information gathering in high-risk situations. Do people actually use horizontally integrated information to make decisions during crises? Popular media and the policy community increasingly have said ‘yes’, and while there are excellent examples of ICTs being used to manage crises and support political engagement there has been relatively little analysis of whether people actually use these tools to make decisions during crises. While the observations that organizations and local actors are using ICTs to solve a variety of social challenges, including crisis response and violence prevention, are valid, there is a deeper question about whether these technology-enabled changes are influencing the way that people respond to information. What media and policy organizations seem drawn to is the access to, and use of, available technology in countries where access is often difficult and people can use ICTs to broadcast information between each other as well as out to the media and international organizations. In many ways the popular discussion of ICTs for crisis response has equated what could be done with what is being done; while that is not necessarily false, this assumption does provide an opportunity to test whether people use information and ICTs in the way that the media and policy organizations assume they will.

Since the early 2000s there has been an increase in the use of ICTs in countries across Africa, Asia and the Middle East, with telecommunications markets being privatized and new cellular carriers and service providers gaining licenses to operate. Certain events,
including the election violence in Kenya in 2008, uprisings in Iran in 2009, earthquake response in Haiti in 2010 and the Arab Spring in 2011 all created socio-political spaces for mobile phones, social media and open source mapping software to be used for violence prevention, disaster response and political organizing. The ways that ICTs were used during these events caught the attention of media, policy and think tank communities, leading to a shift toward the increased pushed for integrating horizontally integrated communication technologies into development and crisis response programming. This chapter will look at the narratives that developed out of events in Kenya, Haiti, Iran and North Africa, highlighting the way that interest in horizontally integrated communications systems grew. It will then discuss the different ‘innovation’ hubs and tech offices that emerged during this time period at bilateral and multilateral aid agencies.

This project’s narrative of horizontally integrated communication systems being used for crisis response starts in Kenya, where a group of technologists, journalists and lawyers organized a digital map that could display text messages sent by members of the public about the violence they were seeing in their localities. This was the first Ushahidi map, and it garnered enough media attention to make the news cycle and catch the eyes of donors. This was not the full ‘coming out party’ for ICT enabled crisis response, but the media coverage was enough to give it life. The following quotes come from articles discussing ICTs in the context of political or crisis response. Some of these articles offer a wider critical view, with the quotes being indicative of the popular narrative that rapidly took hold from 2008-2011.
The way that the Ushahidi platform’s first deployment is framed as one of unparalleled impact. It is worth noting that in the quote below the key component in the success of the Ushahidi platform was the fact that people were submitting information through the web and mobile phones.

Three Kenyans – Uhuru Muigai Kenyatta, Francis Kirimi Muthaura and Mohammed Hussein Ali – are appearing at the International Criminal Court in the Hague charged with crimes against humanity. They are accused of contributing to an estimated 1,300 deaths in violence following the 2007 presidential election when they were deputy prime minister, head of the civil service and police commissioner respectively... *That we learned about the violence in the first place was in part due to the web and mobile phones...* An answer to this was the Ushahidi crowdmap – the crowd in this case being Kenyans across the country texting reports of violence from their mobile phones or supplying information via email. Ushahidi means witness in Swahili: the reports were added to an online map and within days all those individual witnesses had together compiled a more complete picture of the violence than any one organisation. (Jeffery 2011, emphasis mine)

The closing section of the paragraph notes that what was gathered and posted to the Ushahidi mapping platform was the most complete picture available. This kind of language is compelling and despite critical analysis began to stick.

Ushahidi enables the collection of eyewitness reports of incidents from hundreds or even thousands of citizens on the ground, which can be sent by SMS via mobile phones, communicated via email or twitter messages, or directly entered on the website. By creating a novel platform for collecting, visualising and re-distributing critical information in a timely fashion, Ushahidi [the organization] has indeed found a better way to address public problems that leads to better outcomes. (The Governance Report 2013, bracketed text mine)

The second quote follows the same pattern, highlighting how SMS and electronic messaging are collected on the mapping platform for wide analysis in short timeframes and provide a better analytics leading to better outcomes. One reason this type of analysis stuck was in part because it came at time when the policy community was coming to grips with the problems associated with early warning programs, and research on the impact of early
warning was addressing the limitations more directly (Schmeidl and Jenkins 1998; Austin 2004; Wulf and Debiel 2009). The 2010 earthquake in Haiti was when crowdsourcing and horizontally integrated communications took off among multilateral organizations (Munro 2010). An Ushahidi map was set up to tag data submitted by Haitians using SMS text messages and Twitter, and a team of volunteers was organized at Tufts University to monitor information and tag it to the map. Volunteers from the Haitian diaspora helped the team at Tufts parse messages written in French and Creole, identifying locally relevant information that would be useful for response organizations that might view the Ushahidi map. The uptick in interest among the aid community was significant. Patrick Meier, at the time a doctoral student at the Fletcher School of Law and Diplomacy who was researching the problems with conflict early warning, organized the volunteers who oversaw the data collection and analysis in response to the Haiti earthquake. He rapidly became the face of ‘crisis mapping’ and was quoted extensively in the media about Ushahidi and the practice of crowdsourcing in crisis environments:

The crowd-sourcing [in Haiti] represents what Meier sees as the future of crisis response. "We're going to need to collaborate, we're going to need to share data," he says. "The best way to provide humanitarian response is to be able to provide platforms" and tools that allow people to share on-the-ground information quickly. (Hesse 2010)

Again, the language used to describe Ushahidi’s utility in crisis settings focuses on the way that it can pull together large amounts of granular data and allow both responders and local actors to make sense of the situation:

While Haiti marked the first time this open-source platform technology has been used this extensively to inform rescue teams and save lives, it also provided a base of knowledge to respond to the earthquake in Chile...The lessons they [Ushahidi] learned in Haiti made it possible to do a week's worth of work in days, says Waters.
At this rate, Ushahidi will do in Chile what it did in Haiti: make sense of a disastrous situation—only faster. (Ramirez 2010)

Meier himself describes how the Ushahidi software and the concept of crisis mapping presented a significant change in what could be done by average people both locally and globally to respond to disasters and crises, and used the Haiti experience to push for the recognition of groups of volunteers who parse data for Ushahidi deployments.²

These incredible efforts following the Haiti earthquake demonstrated a huge potential for the future of humanitarian response. Student volunteers in Boston working online with the Diaspora using free mapping technology from Africa could help save lives in another country thousands of miles away without ever setting foot in said country. (Meier 2012)

As far as the two initial Ushahidi deployments were concerned the directionality of impact was the technology enabling outsiders to more efficiently gather and code granular data. In doing so the affected communities would receive better organized responses from the international community. The idea that these tools could be used by local actors to solve local problems took root during political uprisings in the Middle East that happened in conjunction with the Kenyan election violence and the Haiti earthquake.

Political events in Iran and the Middle East, while not ‘crises’ in the sense of violence prevention or disaster response, helped solidify the popular discussion around ICTs as tools for enacting political change. In Iran the Green Revolution emerged out of the contested reelection of Mahmoud Ahmadinejad, and suddenly protestors and news

² The Standby Taskforce (SBTF) and Digital Humanitarian Network (DHN) are digital volunteer networks that were formally established in the wake of the Haiti crowdsourcing projects. The value of having volunteers coding information that was then placed on the Ushahidi map of Haiti was tempered by the problems with having to train volunteers and account for the quality of their coding. The SBTF and DHN were established to have a trained and vetted pool of digital volunteers ready when humanitarian crises struck, so that organizations could rely on the quality of crowdsourced data and be able to address questions to a recognized source.
organizations were both using Twitter to share information. The volume of information moving inside and outside Iran on Twitter was so high that the U.S. State Department sent a formal request to Twitter’s headquarters asking that they postpone software updates and maintenance so as not to interrupt the ability of protestors to share information in Iran. This was a first major event in which a formal policy body recognized the importance of ICTs in political organizing. This narrative arc was solidified by events in Tunisia and Egypt, where protestors used Facebook and Twitter to organize and share information during movements that toppled the regimes of Zine el Abidine Ben Ali and Hosni Mubarak. Both movements made significant use of Facebook in the periods leading up to the protests, and Twitter again featured as a high volume tool for sharing information within the movements as well as with media sources. While the people reporting on the Ushahidi deployments in Kenya and Haiti tended to be technical experts, those writing about ICTs in the Middle East uprisings were reporters who were writing for wider audiences, with a correspondingly stronger tone:

Iranian protesters have found a new outlet to mobilize and take action. The presidential election has proved how much opposition supporters can demand change without necessarily taking to the streets. Just give them a computer and an Internet connection and watch what they can do. (Nasr 2009)

Digital photos and videos proliferated and were picked up and reported in countless external sources safe from the regime’s Net crackdown.’ Journalists even gave the unrest in Tehran a second moniker: the ‘Twitter Revolution.’ (Keller 2010)

The importance of the Middle East region also likely played a role in the State Department taking an interest in how social media and ICTs were being used in Iran in government protests:
The U.S. State Department doesn't usually take an interest in the maintenance schedules of dotcom start-ups. But over the weekend, officials there reached out to Twitter and asked them to delay a network upgrade that was scheduled for Monday night. The reason? To protect the interests of Iranians using the service to protest the presidential election that took place on June 12. Twitter moved the upgrade to 2 p.m. P.T. Tuesday afternoon — or 1:30 a.m. Tehran time. (Grossman 2009)

Media organizations and the State Department’s combined interest in the role of social media and ICTs in these movements helped set the narrative that these tools were key to the movements’ successes:

Ultimately, public information supplied by social networking websites has played an important role during modern-day activism, specifically as it pertains to the Arab Spring. In Arab countries, many activists who played crucial roles in the Arab Spring used social networking as a key tool in expressing their thoughts concerning unjust acts committed by the government. (Kassim 2012)

It is important to note that critiques of this narrative emerged relatively soon after the events took place. These critiques will be reviewed later in the chapter, since they highlight the competing narrative which states that social media and horizontally integrated communication networks were not key to the success of these movements, and that in fact can hurt them. Regardless, bilateral and multilateral aid agencies took note of the excitement generated around these tools. In many cases the agencies themselves were unprepared for ICTs to suddenly play such a large role in the narratives of these events. Many staff had (and continue to have) limited knowledge of how the technologies work, both from a mechanical and social perspective, and many agencies lacked the agility in their budgeting and project implementation processes to rapidly adapt to the rapidly changing technology environment (Martin-Shields 2013a).³

³ I can speak to these last two points from experience consulting with organizations including USAID, the World Bank and contractors such as Winrock and MSI. Generally their requests were for training and
For better or worse, this did not stop them from trying. Reflecting the sudden interest from both legislative bodies as well as private partners, agencies including USAID, the Department of State, UNDP, UNICEF and others set up new offices or labs that were tasked with specializing in technology applications within the larger institutional domains. USAID set up and launched the Global Development Lab in 2013, the Department of State now has an e-diplomacy office that specializes in digital technologies and public diplomacy, and UNICEF is the parent body of UN Global Pulse, a big data and innovation unit that serves multiple UN agencies. Much of the energy and excitement is based on the notion that the technologies being used are the same types normal people have. Ushahidi, for example, uses social media and text messages to gather data from average people; development agencies, often accused of not engaging with local populations or supporting local solutions now have a means to do so. The combination of major global events where these technologies featured heavily in the media in combination with a nascent but growing community of peacebuilding and development professionals who were already using ICTs in their work meant that the narrative rapidly evolved into one where technology would enable local communities to gather and share the information necessary to solve crises themselves, using locally developed solutions.

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general information for staff who would be developing programs that increasingly included ICTs in the projects. In many cases staff did not know how cellular phones worked, lacked the computer skills to run an Ushahidi deployment, and often had no knowledge of privacy laws and telecommunications regulations in the countries they were setting up projects in. This is not to lay blame on the staff members, but to note the speed with which ICTs were integrated into all facets of development and peacebuilding programming without corresponding training or staffing to meet the demand.

4 More information on these organizations can be found at:
USAID Global Development Lab: https://www.usaid.gov/GlobalDevLab
Department of State e-diplomacy: http://www.state.gov/m/irm/ediplomacy/
UNICEF/UN Global Pulse: http://www.unglobalpulse.org
As noted earlier one of the strongest voices for the use of new technologies in crisis response is Patrick Meier, formerly director of the Qatar Computing Research Institute’s humanitarian computing program. He has been involved with organizations such as Ushahidi and the Harvard Humanitarian Initiative, leading fieldwork such as the Haiti earthquake mapping project as well as being the leading public advocate for using new technologies to empower local actors during crisis response situations. His early writing focused on the problems with conflict early warning, drawing on the disaster response concept of community resilience to argue that increasing the capacity for communities to communicate amongst themselves would allow them to stop violence before it started (Meier 2006; Meier 2008). He later was a contributor to a landmark USAID/UNDP report (2013) on the use of technology and big data for peacebuilding, where he and his co-authors, Emmanuel Letouze and Patrick Vinck, argued that increasing the availability of data streams from social media in local communities could empower them to identify risks before they turned violent – they were careful to keep this claim framed in hypothetical terms since much of the evidence is anecdotal. He continues to be a strong proponent of the idea that these technologies fundamentally change the ways that communities can respond to crises, and over the last 5-7 years many of the large multi and bilateral agencies have incorporated his research into their work.

This narrative did not emerge unchallenged, though the voices of critique certainly were not as numerous. Paul Currion wrote a critique, unfortunately no longer available, of the Ushahidi Haiti deployment that called into question the actual value-added of the data that was collected and visualized. Essentially, he noted that much of the data mirrored
existing situation reports but came with an added layer of complexity since the texts and tweets were not uniform in the information they provided. Kate Crawford (2012) from MIT followed on this sentiment with a critical analysis of the role of big data in public policy. She noted that in many cases the data is severely biased, and is often not structured in a way that makes it valid for the kinds of analysis that guide public policy.

At a more macro level, Evgeny Morozov (2008, 2012) has provided a critique that is the antithesis of Meier’s position. Morozov (2008) argues that the use of digital technologies not only does not increase the chances of participatory democracy and equitable crisis response, but in the long run strengthens the state by providing it with large volumes of data as security apparatuses adapt to new information environments. He also makes an interesting argument about technology limiting individual freedom (2012). Essentially, he notes that in an increasingly connected environment businesses, governments and society generally will assume that sharing personal data is the norm, thus making privacy a deviant behavior. He goes on to explain how this limits freedom using health insurance as an example: People use FitBits, small bracelets that track movement, activity and vitals, to track their health. Data from FitBits is sold to insurance companies that can then take the activity logs and compare them to the demographic data of the bracelet’s owners.

This granular data can then be used to better tailor premiums for different demographics, and by sharing how healthy you are you get better premiums. But not everyone can afford a FitBit, so people who are poorer get punished with higher premiums for not being able to share their data. This applies as well to people who do not want to
share their activity and health data. In effect, Morozov argues that the assumption that technology increases personal agency within a socio-political system is only true for those who have the economic and social capacity to share data on the platforms favored by corporate interests. This is analogous to a hypothetical problem: If USAID deciding that a particular smartphone application will guide their aid distribution process and you are not wealthy enough to have a smartphone that supports the application, then your needs are less likely to be met. Far from increasing the voices of the poorest of the poor, technology can strip their agency further.

Both sides of this debate have strong arguments, but up to now there has been relatively little research on how the ostensible beneficiaries of ICT-supported crisis response actually behave from a techno-social standpoint. The relative volume of field activities where these tools have been used is fairly limited, both because the availability of ICTs in developing countries is relatively recent and because many aid agencies have lacked staff knowledge of how to use these tools (see Footnote 4 on Page 31). This makes institutional analysis difficult. Very few people have done surveys of how end users gather and use information in local settings, so it is also difficult to argue that people are spontaneously collectively organizing using horizontally integrated information systems. This does not mean though that these things are not happening. In the following sections I will discuss examples of how organizations have used ICTs in their work, including successes and examples of well-designed interventions.

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5 Exemplars of organizations that have done this kind of research include Internews, which gathered multiple panels of survey data in Kenya and South Sudan on news gathering behavior.
2.2 Tools and Technologies

There are a particular set of tools and technologies that we associate with modern ICT for crisis response. These are mobile phones, social media, open source mapping and data software, and radios and TV. In this section I will focus on a more technical explanation of these technologies, and then provide some deeper analysis of how they were used in specific settings in a practical way. This will help transition us from the previous section which is a general background on the concepts of ICTs for peace and crisis response, and help us understand how the technologies operate before discussing the ways they integrate into socio-political behavior at the individual level.

The first place to start is with mobile phones. I consider this a fundamental technology that will be covered in this dissertation, since mobile phones are both increasingly ubiquitous in the developing world and are being used to support web-based services like social media. At a basic level mobile phones operate by connecting to a network of transmission towers and then passing data from point to point through the towers. Individual phones are identified by the network with SIM cards, which are what tell the phone’s software which network to transmit on and act as the phone’s unique identifier.

It is important to define mobile phone types, since these differences can be significant from an access standpoint. Many people in the developed world are using smart phones, which are devices that have internet and computing capabilities. These are still unusual in the developing world, but are becoming more common. In greater use is what is referred to as a feature phone. It can send and receive phone calls and text messages,
and has a camera, can connect to the internet, but lacks the computing interface of a smartphone. Basic dual-band phones can only make calls and receive text messages; they often lack color screens and cameras. These are common phones in the developing world, and because of this many of the tools we will look at in this section are optimized to work with these.

Cellular phones, regardless of type, rely on a network to transmit data and voice calls. They can do this in two ways; wired towers, or mesh networks. Wired towers are what we are used to seeing, along highways or in right of ways for transmission systems. The towers have radio transmission equipment that phones on different networks ‘talk’ to. For example, an AT&T customer’s mobile phone will be sending a radio signal telling the nearest tower that it is in the vicinity. When a call, text or data packet is initiated by the phone, it sends a radio signal that the receiver on the tower passes down a copper or fiber optic cable to a server that passes the signal to the tower nearest to the phone receiving the call or text message. A backhaul server\(^6\) receives this call data, and many other calls, and processes it back to the radio transmitter for broadcast to the recipient. Alternatively mesh networks are based from a backhaul server, but each phone in the network has its own wireless internet transmission chip. In effect, each phone in a mesh network is both a receiver of calls and data, and a radio transmitter. This is particularly useful in regions where there is limited underground wiring, or terrain makes line of sight transmission difficult. If there is one backhaul server on one side of a mountain and everyone around

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\(^6\) A backhaul server is the point in the system that connects phones and computers to the wider internet through the cellular tower.
the mountain has mesh-enabled phones, each phone acts as a ‘tower’, retransmitting calls and data around the mountain. The network is based on the shape and density of the population using the network; the more phones there are, the faster the network since there are more radio-enabled phones to retransmit calls.

Social media is the second technology sector I am interested in. I place it as the second technology since many people in crisis-affected contexts access social media through their mobile phones. There is significant debate about the role social media played in the uprisings across the Middle East; in Tunisia and Egypt specifically, it helped protestors organize and broadcast their messages and images to the outside world, while by comparison it had no impact in places like Yemen. It also played a role from the outside in; diaspora groups and foreign news organizations could pick up localized information from the protests and protestors could see news from the outside via these same channels. Social media is now a key part of response organizations’ outreach and public relations strategy, with Twitter being a particularly powerful tool. Twitter is a short message service, with posts being 140 characters or less. A social media platform that has gained less notoriety but holds some interesting potential is live streamed video. Services include Bambuser, an app that allows people to use their smartphones to live-stream events globally, and Periscope, an app built by Twitter that allows users to live stream and alert followers to their activity. Bambuser gained some exposure as an effective platform for activists when it was being used extensively in Syria to broadcast damage, protests,

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7 Almost every major bilateral organization, and in many cases bureaus in organizations, have Twitter handles to share and receive public information.
funerals and other conflict-related events (Shanley 2012). Part of the limitation with using streaming services in developing countries is access to high speed cellular data service, though this is changing.

Radio and TV are the third set of communication technologies I am going to be highlighting throughout this study. In the context of developing countries radio is particularly important. According to UNESCO approximately 75% of households in developing countries have access to a radio, and AM/FM transmission accounts for 86% of all listening (when compared with satellite or internet radio) (UNESCO 2016). Companies like FrontlineSMS that provide SMS text messaging services are building software applications that allow radio stations to aggregate and manage text messages sent in to live programs8. Radio can also be picked up in places that digital transmission services like mobile telephony cannot reach. An average transmission range for a mobile phone tower is 50-70km depending on terrain and power; by comparison AM radio broadcasts can be picked up thousands of miles from the broadcast center.9 Particularly for rural communities in developing countries, or countries recovering from conflict or disaster, the accessibility of radio makes it a key communication and information system.

I will address this again later in the Chapter 3, but it is important not just to think about the technical attributes of these different mediums but also the systemic and political nature of each other them. When I say ‘systemic’ I am talking about how the information

8 For more on FrontlineSMS:Radio see: http://radio.frontlinesms.com
9 While I was in Samoa doing the ICT survey, I worked with the Ministry of Communications and Information Technology, which oversees the national AM radio station. Their broadcasts were routinely picked up by listeners in the Cook Islands, almost 1,000 miles away.
diffuses from them, either vertically or horizontally. In the case of radio or TV, we are looking at a vertically integrated communication system; information starts at a single point and then diffuses out to the listeners. Mobile phones and social media are horizontally integrated; messages or information can start from any point within the community, and then be rebroadcast and modified from user to user. If people are attempting to use these technologies to manage social or political crises, the process by which information flows outward horizontally or vertically is going to have a significant impact on the outcome of any collective effort to maintain stability.

2.3 ICTs for Peacebuilding and Crisis Response

Using ICTs for peacebuilding is rooted in this longer history of Information Communication Technology for Development (ICT4D) which first came into the lexicon of development in the early 1990s when email and computing were expanding in the public sphere. Richard Heeks (2009) refers to this time period as ICT4D 1.0, when the focus was on the development of computer centers paid for with large aid budgets, demanding large scale infrastructure which proved unsustainable as a mechanism for development. Heeks would claim that we have reached ICT4D 2.0 which is being driven by emerging mobile technology and is in many ways more sustainable as a development enterprise since the level of investment in infrastructure and maintenance is much lower (Martin-Shields 2011).

During the 1990s the expansion of networked capitalism and globalization meant that economic development would be driven by digital socio-economic networks as much as trade and capital allocation. By the late 1990s it was apparent that the core mechanism
for encouraging socio-economic networking and knowledge sharing would be access to ICTs (Castells 1999). Castells notes that the growth of networked ICTs would have the same disruptive effect on the global economy that production lines had during the late 1800s and early 1900s. He argues, however, that disruption is not synonymous with the decentralization of capital and that there is a risk of a digital divide that would lead to economic exclusion for those lacking access to ICTs and networked information (ibid).

While there are risks of digital divides and exclusion in a networked global economy, there are also benefits. Efficiency and information sharing were the initial benefits of ICTs in developing economies; for example even in the early 2000s the presence of mobile phones in developing countries could be linked to more efficient distribution of food commodities across domestic markets (Eggleston, Jensen and Zeckhauser 2002). At a macroeconomic level this trend has continued, with an increase in mobile phones and access to ICTs correlating with increased economic output in developing countries, when controlling for the varying statistical effects of the costs of capital and labor (Sridhar and Sridhar 2007).

Perhaps the most important thing about mobile communication technology and digital aggregating systems is that they provide a system that can handle fine grained data in a way that makes information sharing across groups easy and manageable at a technical level.

In the modern era, which Heeks calls ICT4D 2.0, the mobile phone is the dominant platform for information communications in the developing world. Thus, it makes sense that many of the tools that are being used for conflict prevention and good governance are in some way linked to a mobile phone platform. For example, we can look at the evolution
of crisis mapping as a process managed from Washington, D.C. with pre-identified reporters feeding information to analysts at the U.S. Holocaust Memorial Museum where data is loaded onto Google Earth10, to the coding and launch of the Ushahidi platform which drew on Google’s mapping architecture to provide a system for receiving text messages from an unbounded crowd to be loaded onto a live map viewable by the public.

The integration of the mobile phone was what made the first Ushahidi map of the electoral violence in Kenya so significant; anyone with a mobile phone could report on an event and it could be publicly displayed. The original Ushahidi map was coded during the election violence as a place to gather data on events from the “crowd.” What the tool did was receive a text message, and an administrator could approve the message (or not approve it), and if the message was approved as viable it would be put on the digital map for the public to be able to see (Ushahidi 2011). Since then, Ushahidi has been used to respond to victims of Haiti’s earthquake (ibid), and to track the violence in Libya during the uprising against the Gaddafi regime (Meier, 2011b). Along with being one of the first of its kind, it is also garnered so much attention because it interfaces with SMS text messages and mobile phones. This means that a huge portion of the Kenyan public were able to report on what they were seeing. Mobile phones and mapping technology were recently integrated effectively to prevent violence during Kenya’s 2010 constitutional referendum; the project was called Amani 108, and used an integrated system of mobile phones, broadcast radio and an open digital map to provide the public with updates and to

10 See earlier discussion of the Darfur mapping project at the USHMM in endnote 1.
receive information so that responses to violence could be managed quickly (UNDP 2011). This program will be discussed in further depth in Chapter 8.

Outside the localized peacebuilding sector, mobile phones are being used in peacekeeping operations as a tool for monitoring situations where larger scale information systems are not practical (Dorn 2011). The idea is to use mobile telephony as a secondary mechanism for intelligence gathering in peacekeeping operations, where the intelligence is not great to begin with (ibid). A case study of mobile phones being used in peacekeeping operations is in the Democratic Republic of Congo’s MONUC mission; peacekeepers used mobile phones to communicate and receive information from local actors about militia activity and violence (ibid). Peacekeepers in Liberia used crowdsoucing techniques to gather information on the election process in 2012 (Etherton and Foster 2012). They used a mixed process for gathering information, allowing for the general public to report information while also using a network of vetted informants to corroborate events on the ground. This data was all analyzed in the joint mission analysis cell (JMAC) and then posted to an Ushahidi map – this project is described in greater detail in Chapter 8.

Along with mapping and SMS text messaging, the recent events in the Arab world demonstrated the impact that social media such as Twitter and Facebook can have on the development of political movements and public voice. These social media platforms are most abundantly used in the developing world through mobile phone networks. People with smart phones can use Facebook and Twitter on the internet through purpose built applications. This is the expectation of technology in the ‘ICT4D 2.0’ operational landscape: These technologies and software provide connectivity in a way that is
sustainable, and can be leveraged on increasingly affordable internet enabled mobile devices instead of hard wired internet data centers and still-costly computers.

Patrick Meier, mentioned earlier for his involvement in Ushahidi’s Haiti earthquake response, is one of the intellectual leaders of the ICT-for-crisis-response domain. Meier’s early work, primarily during his doctoral studies, focused on the problems of conflict early warning from a socio-political standpoint; essentially conflict early warning is useful at the donor level, but is of little value to the communities who will experience the conflict that is either not predicted or for which there is no political will on the part of donors to intervene (Meier 2006). He used this as an opportunity to argue for a people-centered approach to conflict prevention, where the local community should have the primary agency in the process (ibid). Meier later argues that disaster response had moved from a centralized to a localized approach and that in doing so focuses on fostering resilience in communities, providing the information sharing tools so that they can quickly and effectively manage a response immediately instead of having to wait for outside help (2008). For conflict early warning to achieve the same objective of localizing response capacity, ICTs act as the scaffolding that helps a community communicate quickly when the risk of violence or natural disaster becomes apparent. Using ICTs to support local capacity can also have the benefit of helping connect state-level or elite organizations to the local communities they are ostensibly helping. Meier and Leaning (2009) provide examples and analysis of how ICT-supported conflict prevention at the local level can useful connectedness between elite and local actors, enhancing the overall process of violence prevention and disaster response.
While Meier may have been one of the most outspoken voices in the ICT4Peace space in the mid-2000s, others were doing interesting work that grew the conversation beyond just focusing on early warning and community resilience. Schuler (2008) ran a successful crowdsourcing and mapping program for the National Democratic Institute in Sierra Leone, using SMS text messaging to monitor events at polling stations. George Washington University’s Matthew Levinger directed the United States Holocaust Memorial Museum’s (USHMM) Darfur mapping project\(^\text{11}\), which used a crowdseeding\(^\text{12}\) methodology to gather data on violence in Darfur and then map those reports onto high definition satellite imagery of the region. Levinger (2009) argues that this project would have an impact on violence prevention using the imagery of Foucault’s Panopticon; if leaders like Omar al Bashir know that they are being watched, but don’t know when they are being watched, they are less likely to commit atrocities. Along with policy initiatives like the USHMM Sudan project, the peacekeeping community is beginning to use ICTs to do community outreach, intelligence gathering, and community level peacebuilding (Dorn 2011).

Theory continued to develop from these early efforts. Bock (2012) has written extensively on how ICTs can support nonviolence, citing examples of how trained intervenors use mobile phones and text messaging to prevent gang violence in the United States, or stop violence from being organized between ethnic and religious groups in India. The Everyday Peace Indicators project is another program that uses mobile phones and


\(^{12}\) Similar to crowdsourcing, but using a bounded group of trusted reporters to gather on-the-ground information instead of the general public.
SMS text messaging to gather locally relevant data on perceptions of peace (Firchow and MacGinty 2016).\textsuperscript{13} The idea is to encourage local actors to identify things that cause them to think that peace is durable, encouraging local ownership of the peace indicators instead of developing them from the outside.

This kind of research is cited by Letouze, Meier and Vinck (2013) as the next step in making big data analysis of conflict risk useful at the local level. By leveraging technology like mobile phones, entire communities can be surveyed on their perceptions of peace and this data can then be collated and shared within communities so that the data they produce becomes a tool they can use for their own conflict prevention efforts. In 2013 the journal Stability produced a special issue on technology for peacebuilding. This collection pulled together articles on using satellite imaging and digital mapping for atrocity prevention (Wang et al 2013), identifying and finding uses across the conflict resolution spectrum for different technologies (Larrauri and Kahl 2013), and understanding why different technologies work in different contexts (Martin-Shields 2013b; Muggah and Diniz 2013; Guttieri 2013). The work in this collection on Kenya was built upon by Martin-Shields and Stones (2014), and the data in they collected on information source trust helps inform this study.

What about the limitations of technology, both for violence prevention and disaster response? Meier and Munro (2011) took on this question after the Ushahidi crowdsourcing deployment in Haiti. Once of the problems was that there were no standards for data management and protection, so all information that was sent in via text message was made

\textsuperscript{13}http://everydaypeaceindicators.org/about/
public (Martin-Shields 2013a). Meier and Munro argued for the adoption of data protection and privacy standards in crisis crowdsourcing, pushing a ‘do no harm’ approach to data protection. It is also important to look at the way these technologies can be used to spur violence. There are many examples of SMS text messaging and social media being used to organize violence. Examples include organizing youth gangs in Kenya during the 2007 election violence (Ruvinsky 2014), and inter-religious violence between Muslim Rohingas and Buddhist nationalists in northern Myanmar (Kiersons 2014).

Pierskalla and Hollenbach (2013) attempt to quantify the relationship between mobile phones and violence risk in Africa, using geolocation data on events of violence and estimates of mobile phone access in those regions. They do manage to show a relationship, but their instrumental variable for mobile phone access, the World Bank’s quality of regulation indicator, is questionable. Setting aside problems with the models they still make an interesting point about mobile phones as organizational tools, but fail to show how phones uniquely lead to violence as opposed to other actions that require social organizing. Bailard (2015) also finds that ICTs make it easier to manage collective violence. Shapiro and Siegel (2015) note though that while ICTs can and do support the organization of violence, they can also be used by civilians to organize against insurgent violence. These studies indicate that ICTs are used as part of collective processes of organizing violence as well as resistance to violence, but focus specifically on mobile phones.

While there has been a great deal of writing done about ICTs in the peacebuilding and disaster management sectors, there is still significant room for grounding the
discussion in theories within the social sciences. Meier’s (2006, 2008) work focused primarily on theories of empowerment, and critiques of the neocolonialist nature of donor-supported violence prevention programs. Other theoretical articles focus on philosophical questions of communicative action or questions of ethics; some look at ICTs specifically through the lens of conflict theory (e.g. Martin-Shields and Stones 2014; Pierskalla and Hollenbach 2013; Bailard 2015) with varying degrees of success. One theme that repeatedly emerges though is the importance of information sharing, and the way that ICTs help facilitate the movement of data. To frame this in a social theory, what people are doing is trying to share enough information to support a collective process of stability and peace. The following chapter will build out a theoretical framework of how people use information to develop shared political and social goals focused on stability and peace, and then share information widely enough to keep the collective engaged in the active process of maintaining stability.
CHAPTER 3: BUILDING TOWARD A THEORY OF ICTS IN CRISIS RESPONSE

In Chapter 2 I laid out the relatively short, but rapidly evolving, narrative of using ICTs for crisis response. The narrative of empowerment through technology access is compelling, but it is also somewhat atheoretical from a social science perspective. To frame the available theory on ICT being used for crisis response, it is useful to start from the better understood phenomena of ICTs in political organizing. It is useful to look at the general role of technology in political organizing because there was a strong uptick in general interest in these technologies during the Arab Spring, causing development and governance organizations to expand their efforts to use ICTs in the conflict and stability programming.

ICTs facilitate the sharing of information and ideas. This is the most basic starting point when talking about technology being used for social or political development. They allow groups of people to share ideas faster and more efficiently than otherwise possible. This concept is critical to understanding not only digital political organizing, but also violence prevention and disaster response. Habermas (1987), in his book *The Theory of Communicative Action*, discusses how new ideas are formed within polities. He argued that more open forms of communication and reduction in barriers to information sharing were key to creating a more democratic system of social organizing and political movements.
By analyzing the role of ‘public spheres’, such as late 18th century salons and coffee shops, he developed a theory of social discourse and political organizing that would be a counter balance to the totalizing power of the state (Habermas 1991). When people entered the public sphere they left their class and economic status outside, and the qualifications for participating in debate were a shared interest in the ideas under discussion, and ability to add to the discussion (ibid). Habermas's idea of the coffee shop as public sphere gives us a social and historical way to think about the role of ICTs in politics and peacebuilding. ICTs play the role of coffee shop or salon, acting as a public sphere where debate and political ideation can take place outside of socially structured notions of who can participate in such a process. In 18th century salons and coffee shops though, there were inherent limits on who can really participate in a discussion; ICTs, due to their increasing ubiquity, get us closer to a public sphere where the barriers to participation are much lower and access is more democratic.

One of the best examples of meaning making and information sharing involving horizontally integrated digital media is the Arab Spring. McGarty et al (2014) approach the role of social technology during the Arab Spring using a social psychological lens to frame the protestors as an in-group and the Mubarak and Ben Ali regimes as the out group. They explain that citizens organizing against repressive regimes in this way is not new, but that technologies like Facebook and Twitter helped overcome barriers to organization and political meaning making that previously would have taken a decade or more (ibid). We
know that social media and technologies like mobile phones were important correlates in organizing the movements in Tunisia and Egypt (Howard et al 2011; Khondker 2011). Lotan et al (2011) performed analysis of the flow of Facebook, Twitter and YouTube data that flowed during the movements, seeing spikes in activity before major actions. But how did these tools fit into the overall process of creating a political movement? Howard and Hussein (2011) document the ways that social media and ICTs supported the networking and communication that was necessary for the uprisings against the Mubarak and Ben Ali regimes, discussing the technologies as a scaffolding that supported the more complex social aspects of the political organizing that took place over the course of years before the revolutions. The idea of ICTs providing a public sphere, where communicative action allows for political organizing and social change, was very much on display during the Arab Spring.

Egypt’s January 25 movement provides a superb case study of public sphere communicative action at work. While social media and the internet were important components of the information sharing regime of the movement, the back story of how a message was shaped and leadership emerged is remarkable. By the time the movement began, there were no apparent fissures within the protest groups. Information flowed effectively, even across changing mediums as the internet and mobile phone services were shut down. Most importantly, protestors across age, gender and class lines all shared a notion of what the protest was about, the aims of the movement, and the methods that would be employed in pursuit of those ends. At the root of the January 25 uprising was a group of young Egyptians who were computer savvy and could build common cause with
laborers who were striking in Mahalla al-Kobra (movements.org 2011). Starting in 2008
the group planned to organize a strike in solidarity with the textile workers, protesting the
economic inequality, lack of opportunity and high food prices. As part of their strategy
they started an April 6 Youth Movement page on Facebook, which garnered far more
attention than they were expecting. The group grew to 70,000 members, but when the
strikes were violently put down the April 6 movement split and the group went
underground. During this time, members of the group did find ways to attend trainings in
strategic non-violence and organizational management and organize further outside of
Egypt (Frontline 2011).

When the time came for the January 25 movement, what we witnessed from a
Habermassian perspective was the protestors putting the pragmatic meaning they had
created into action. Multiple groups acted in concert to organize, and there was
recognition of methods for protesting that were shared ubiquitously. While Facebook
was an organizing tool, and had been a primary conduit for large-scale information
sharing, what was really accomplished through it was the development of shared meaning
across socio-political and socio-economic groups. Those without Facebook had received
word of demonstrations from those with Facebook, and through public discourse over
three years the best ideas and methods for demonstrating and organizing had been well
established. What made the January 25 movement such a strong example of pragmatic
meaning was that even when the internet went down the core message and narrative of
the movement could be shared and understood across multiple channels (see Sutter 2011
for an interesting narrative of Facebook and Pragmatic Meaning at work).
Contrary to the often exuberant analysis of how social media such as Twitter and Facebook are changing political behavior and voice, the social media platforms are not a causal mechanism in uprisings like the one in Egypt in January 2011. There is a complex set of social factors that are foundational to effective social movements; before social media becomes part of the equation the recognition and understanding one-dimensionality, the failure of the parliamentary system, and the development of a shared meaning and narrative of change must take place. These things had been taking place in Egypt for years, and when the time was right, Facebook in particular provided a system for amplifying the message.

Much of this amplification though had little to do with message and more to do with community. Social media can act as a counter narrative to state media; in Egypt it provided a space for protestors to develop a sense of community. In this case, if we were to compare the impact of different social media systems, Facebook would have a powerful effect, since protest-related groups were reaching numbers in the hundreds of thousands. The increasing intensity of the protests since 2008 in combination with a system that allowed people to see that their feelings were shared with hundreds of thousands of other Egyptians could be posited as a driving factor in people coming out to the streets when the Mubarak regime turned off the internet. When the net went down, people knew there was a community outside and knew what that community believed in and was working for.

The theme that comes through in the analysis of how ICTs support political organizing is the importance of information sharing. The technologies themselves do not have agency; instead they provide added capacity to support and speed up the process of
coalition building, shared political goals, and the management of complexity. This speaks to the more specialized space of violence prevention and crisis management. Seeing the wider theoretical focus on the role of information sharing and meaning making, I will look at how these tools have been analyzed and theorized in the peacebuilding sector. Some of this is informed by the theories discussed above, but much of it is driven by anecdotal evidence derived from using ICTs in the field, and learning by doing.\(^\text{14}\)

### 3.1 General Theories of Communicative Action

One of the themes that emerges in both the literature on local level violence and disaster resilience and the research on ICTs in violence prevention and crisis response is the need for effective information sharing. This is where we start to see an opportunity for placing ICTs in our theoretical understanding of violence prevention. Instead of assuming that access to ICTs changes the fundamental ways that people adapt to pressure and prevent violence, I am highlighting a set of behaviors inherent to violence prevention and social resilience that are enhanced by having access to ICTs. In this section I will look specifically at communicative action, the literature on signaling and learning as part of collective action problem solving, and then making an argument that digital communication mediums enhance and support these preexisting behaviors that have been identified in the literature on violence prevention and social organizing.

\(^\text{14}\) I remember hearing a useful description of how practitioners felt in earlier efforts to use ICTs for violence prevention. Rob Baker, formerly a developer with Ushahidi, described the Ushahidi mapping efforts in Haiti after the 2010 earthquake as “…trying to build the airplane while you fly it, while making repairs to what you just finished working on.”
How do groups of people formulate and execute complex operations, especially when the group can have competing interests? How does a group determine a political or social agenda? In large part it is through a process of communicative action. The group identifies shared values and through the process of identifying values sets an agenda for achieving the goals that make the values a reality. This is important when communities are determining processes for preventing violence, particularly when faced with political or environmental pressures that can strain cooperative behavior across local groups. Reviewing the relevant theories of how groups formulate shared values and goals can help us understand the role of ICTs in the actualization of violence prevention.

Jürgen Habermas (1987) provides us with a comprehensive, though not inarguable, way of conceptualizing how communities, through communicative action, come to agreements on social and political issues. Habermas develops a rationalist system by which people come to consensus through communication that addresses both the practicalities of the world they live in with a reference to a rational Cartesian system of theoretical analysis. In this way he develops a process of meaning making that draws on both the life world and system paradigms, assuming the communication is embedded in a rational process where people integrate theoretical values and limitations inherent in the world around them to create a rational paradigm in which to make decisions. This paradigm is the rational basis for communication, which Habermas does not consider merely a linguistic exchange but instead views as a process by which people with differing individual rationalities share information in pursuit of reaching shared collective goals. Communication, based on rational outlooks within a group, is the process by which shared outcomes are coordinated.
While Habermas provides an overarching theory of how social groups develop theoretical reasoning, when looking at the role of ICTs in crisis response it is more important to analyze peoples’ practical reasoning. Practical reasoning is the process of modifying intentions and actions, the process by which individuals in a group attempt to make decisions about what to do as part of an ongoing collective process (Bratman 1987). Kim and Kim (2008) discuss this kind of reasoning process within the framework of deliberative democracy, noting the interplay between instrumental and dialogic deliberation. Dialogic deliberation is what the community uses to frame a sense of community norms and identity, while instrumental deliberation is the active negotiation process by which communities and community members make decisions (ibid).

In order to keep the discussion of using ICTs in crisis response and violence prevention from becoming one of ‘technology ex machina’ it is important to frame the use of technology within social processes. What governments, communities and individuals are doing during a violence prevention or disaster management exercise is inherently grounded in social and cultural norms. What I, for the purposes of this study am interested in, are the norms around meaning making, information sharing and decision making; from here we can then begin to analyze the ways that ICTs enhance or enable inherent communicative behaviors in a society.

When a society or community has defined a set of political and social norms the challenge becomes making sure that all people participate in collective processes. The collective action problem of violence prevention is particularly challenging; as an individual I have a variety of unique needs or perceptions, and after a disaster or during
interethnic tensions there strong motivations to focus on my own needs at the expense of the collective process. This is why communicative action described by Habermas (1987) is so important - it establishes the norms that guide groups to communal ends, while accounting for the fact that individuals within the group have different motivations for participating in the collective process. This sets the foundation for the signaling and negotiation process that people go through when trying to make decisions and take action, for example during a crisis like election violence or disaster response.

The discussion of social norms and collective meaning making gives a frame for looking at the ways that signaling and instrumental deliberation take place to manage collective action problems. Since this study views violence prevention as a collective action problem, I will transition from a discussion of social and political norms to how these become the foundation of the signaling and information sharing processes in high-risk collective action problems, such as violence prevention situations. From there I will tie the discussion back to digital and ICT supported communication during violence prevention processes, and formalize an argument for empirical demonstration.

3.2 Signaling and learning: Dealing with collective action problems

Once there is an agreed upon value for preventing violence in a community there is the challenge of how the group keeps all the community members involved in the violence prevention process. This stage in the violence prevention process represents a collective action problem, since the group needs to share information across its membership and those community members need to be able trust the information they
receive enough to set aside their own rational preferences to support the group’s shared goals. This means that information must flow efficiently and regularly, and when there is confusion within the group about events there is sufficient information sharing so that people regain trust in the collective violence prevention process. So how does signaling and learning occur within groups, and what are its implications for using horizontally integrated communication technologies to facilitate it?

Axelrod (2006) provides a jumping off point for discussing signaling and learning within groups and societies. His work on cooperation starts from the assumption that people are inherently stuck in a Prisoner’s Dilemma (PD), where the costs of not cooperating are lower the costs of taking the “sucker’s bet” and being taken advantage of while trying to cooperate. His work draws on the results of PD strategy tournaments he hosted, wherein political scientists and economists were invited to submit PD strategies that would play against each other for points. In a surprising turn of events the strategy ‘Tit for Tat’ won the tournament, and proved to be the most robust strategy when used in evolutionary games involving multiple players within a closed system. Tit for Tat uses a strategy that Axelrod categorizes as ‘nice’; it always starts by cooperating, and only defects when it is defected against first. In standard language, it always takes the option to cooperate first and only becomes aggressive in response to previous aggression.

What the computer tournaments showed was that when Tit for Tat played against all other strategies with a reasonably long future horizon, it won. It may have lost discrete games against aggressive strategies, but because there were enough strategies that were ‘nice’ it managed to win on aggregate score. Axelrod modified the games so that multiple
strategies could play simultaneously within an ecology. The game used probability to match strategies, and at the end of a round the winning strategy in each dyad would spawn more of itself based on its gross score. Essentially it modeled evolution; if two games ended with 10 points each (pure defection) they spawned 20 more of themselves. If two Tit for Tats played each other they both came away with 30 points, spawning 60 of themselves. What Axelrod found was that a relatively small number of Tit for Tats could come into an ecology of ‘mean’ games (those that always defected first), and given enough time would take over the environment, slowly at first then parabolically until all the mean games were gone.

To bring this back to signaling and learning, what Axelrod focused his argument on was the fact that Tit for Tat would win on aggregate against a variety of games by being ‘nice’ but also being prepared to punish an opponent for not cooperating. Over time Axelrod observed a pattern where other nice games ‘learned’ to cooperate; if they had a defection programmed in, Tit for Tat would punish them once by defecting, then return to cooperating. When he looked for qualitative examples of cooperative behavior in the real world, he observed a similar pattern of behavior. He used trench warfare as one example of evolving cooperation. It meets the criterion for long horizon of the future, and high risk if one side cooperates and the other defects. He explained that soldiers, without being able to communicate verbally would find ways over time to signal each other that it was safe to do things like the washing (snipers would fire into areas that appeared tactical, and those doing the washing knew to avoid those areas), certain visual cues were used to indicate when one side could come out to remove the fallen from No Man’s Land. Both sides had
heavy artillery, so either side could punish the other if cooperation was violated. Soldiers also knew that officers were required to force them to fight, so over time each side learned that going over the parapets was not a violation of the type of cooperation that developed to prevent violence between surges. Time, iterative interactions, and a credible threat of retaliation created a dynamic where, over time, two sides in a deadly PD found a way to cooperate in small but humane ways.

What Axelrod helps define in his work, along with a mode of developing and maintaining cooperative behavior in otherwise competitive dyad, is the idea that stability is a shared good. This ties into the concept of the collective action process/problem. In a collective action problem there is a shared public good, and there is an incentive to maintain it but limited capacity to prevent people from benefiting from the collective good if they choose not to participate in its maintenance (Olson 1965). Being able to rely on the benefit of a collective good, knowing that everyone in the community is maintaining it, and that there are mechanisms for sanctioning those who do not contribute to maintenance are key to maintaining a collective good. In a social setting, horizontally integrated communication systems can help people maintain a collective process by keeping the horizon of the future long, sanctioning people who do not participate and maintaining information symmetry across the group.

The problem of course is that in a large enough group, it can be difficult to enforce participation rules. In a large group a handful of people not doing their part at any given time means that they will benefit from the collective good for free; if only a few out of thousands do this the collective process is not at risk. The risk to the collective action
process starts if a few people see the free riders get the benefit without contributing to maintenance. They in turn stop participating, adding to the work load imposed on those who are still involved in the collective process. As the work burden increases more people stop participating, creating a cycle of people ceasing to maintain the public good until it stops providing for the collective benefit. In the end no one derives the benefit from the defunct public good because of the easy tendency to favor short term utility of getting a thing for free while others maintain it.

Olson and Axelrod both analyze situations in which learning and signaling create a non-equilibrium social dynamic. To win a multi-player PD or maintain a collective action process all the people involved need to be willing to take the risk associated with participating in the good long term outcome, instead of defecting and taking the best short term outcome. At this point it is worth noting that in the midst of natural disaster recovery or the unpredictability of political turmoil the decision to accept the best short term outcome is not necessarily a morally problematic choice. What it necessarily means though is that the decision maker is probably making a decision with limited information about the behaviors of the people around them and the behaviors of the authorities or government institutions.

Isaac et al (1994) discuss the temporal problems that face actors within large groups who are trying to make decisions for themselves as part of a collective management process. All collective processes have a horizon of the future; in a post disaster setting the future may be as long as you can survive without food and water, and in political turmoil it could be the outbreak of violence. Isaac et al (ibid) argue that the greatest benefit to
signaling information about your intentions to others is at the start of a collective action process, decreasing as the end of the process gets close. How much and how often I continue to signal will depend on how close I am to the end of the process. If I am about to die from dehydration in a post-disaster setting, clearly my signaling has failed to keep others involved in a collective process of water management and it is time to just meet my very immediate short term needs.

Thus it is critically important in a post-disaster or politically tense situation to make sure my signaling engenders the right kind of learning among my collective. Janssen and Ahn (2006) discuss the ways in which signaling relates to learning within heterogeneous groups, finding in experimental modeling that early and extensive signaling encourages reciprocal signaling and behavior modification by others in a collective. They also note that the credible threat of punishment for defectors early in a process keeps participants honest and rewards further cooperative signaling and learning (ibid). In order to maintain a collective process, particularly one with a short horizon of the future and dire consequences for failing to maintain the public good, the main tactic seems to be quickly and clearly signaling one’s intent to the group and making sure there is a reliable mechanism for punishing non-cooperation. This only addresses the interpersonal and community level of a collective action process. After a natural disaster or during political turmoil, it is important to also look at the role of elite organizations in supporting collective action processes. Elite organizations include government, international organizations such as the United Nations, and international non-governmental organizations (NGOs). These entities bring their own institutional behaviors and cultures with them when they provide
post-disaster humanitarian aid or monitor and enforce peaceful political processes. Thus is it worth enquiring into whether institutions have the capacity to learn.

Etheredge (1985) poses this question in his book on government learning, but reaches a blunt conclusion: Governments are not good at learning and when they do learn it is at a slow pace. Expanding on this, Stern (1997) argues that in large organizations crises present the kind of pressure and disruption for learning to take place; crises provide the opportunity for reflection, debate or trial-and-error learning that can lead to institutional adaptation or change (LaPorte and Consolini 1991). On the face of it, this argument hinges on the fact that an organization must make a mistake or find itself unable to cope with a situation before it starts adapting. For the victims of a natural disaster or those trying to prevent violence during political unrest this notion may be unsettling at best. But indeed in the liminal space of crisis and institutional openness to rapid adaptation to meet the mission mandate there is an opportunity for signaling to impact institutional adaptation for the better.

These analyses are grounded in an industrialized, Western context through. An alternative argument about technology and institutional learning comes from the previously discussed Arab uprisings. Heydemann and Leenders (2011) discuss how access to ICTs among Arab citizens created a new space for organizing and political meaning-making that governments were not adapted to monitoring. As the uprisings moved eastward, governments not only became aware of the tools protesters were using, but found that these technologies were easy to monitor and made a strategy of repression more efficient. What these examples may point to is the difficulty of institutional adaptation in democratic
systems of governance, where changes must be debated and follow bureaucratic processes; an autocratic government is not bound by these rules, and thus the changes needed to adapt to a new governance environment can be implemented by fiat.

This is where ICTs can begin to play a key role in the collective action process of crisis management. Between individuals and at the community level, signaling and learning must happen quickly, covering a large population and geographic area. If these community members intend to also make their signaling heard by large institutions that are ready to adapt as part of their intervention process, then volume and interoperability of the signal is key. ICTs are very good at funneling large volumes of information into mediums that are easily consumed by analysts in large organizations. So we should ask, is there evidence that signaling and learning occur across digital mediums?

3.3 Does signaling and learning occur in digital communication?

The way I am conceptualizing the collective process of violence prevention is a process through which communities recognize a stressor, place value on managing the stress without turning to violence, and then undertake a collective action process to maintain community stability in the face of the particular stressor. This means that the terms of the discussion of using ICTs for violence prevention and crisis management should be shifted. Instead of predicting certain events or outcomes, my focus is on the way people use information from different sources and mediums; my goal is to understand the processes by which people organize to prevent violence and how ICTs are used in those processes. To do this we have to avoid a ‘technology ex machina’ notion of violence
prevention and recognize that people participated in collective action processes before cellular phones, social media, and wide access to digital information. What is important is how and why people select information sources and mediums to guide their decision making in complex environments, and how political and social factors impact how people adapt to having an increasingly large suite of tools to make decisions with.

Lupia and Sin (2003) argue that modern ICTs have fundamentally changed the ways that communities deal with collective action problems. One of their main findings is that ICTs lessen the advantage that small groups have over large groups in managing collective action problems. The reason for this is because diffuse communication technologies make it easier to manage information sharing, learning and punishment across much larger populations and geographies (ibid). Consider for example the difference between organizing using leaflets versus using mobile phone text messages. The costs of managing a large group when each leaflet must be hand written and distributed are quite large; there is the cost of paper, the time it takes people to create the leaflets, and then distribute them. These costs all go up significantly as group size and territory increase. With a mobile phone, I could simply purchase the contact lists for an entire block of constituents and send one text message to all of them. The message goes at one time, and is delivered regardless of topography and distance as long as there is reasonable cellular tower density. But is there any evidence that people can learn efficient cooperative behavior from digital and crowdsourced information?

Letouze, Meier and Vinck (2013) note that while there is an increasing interest in using big data for conflict and violence prevention, there is still very little firm evidence
on how reliable big data is for predicting complex events like violence. Without a history of reliable data from a particular source or medium, people are unlikely to act on new data from that source or medium. One problem is that large-scale violence is actually quite rare in the grand scheme of things, so having enough observations to make firm predictions is difficult. When we talk about the reliability of data streams in places where violence breaks out, there are more independent variables (types of information sources) than there are events of large-scale violence so local actors have to make a decision about which of the many sources and mediums they will rely on. Big data does not solve this problem; the issue for an end user is not getting more information, it is getting better information to make decisions efficiently. If I already know I can trust the radio, then why would I take the risk of getting bad information from Twitter or an SMS text message when there I am trying to make a decision to act under pressure?

If we change from conflict outbreak to something more regular and predictable can we do any better? Elections are predictable events for which there are a decent number of observations. Most computer scientists that study prediction of social/political events with big data use Twitter as their platform of choice. Twitter, which allows users to post short messages and develop interest networks with other users, is particularly useful for this kind of analysis because access to its back end analytics is open source. Anyone with basic skills in web analytics can mine Twitter’s log data, making it possible to analyze millions of tweets and select those tweets that are relevant to an upcoming event like an election. Generally, Twitter users make this task easier by creating hashtags that are used to identify tweets about particular topics; an analyst can search that hashtag and see tweets that are
part of a particular discussion. Is data from Twitter predictable enough that people might use it to inform their voting strategy?

Tamusjan et al (2010) matched Twitter mentions of specific candidates during the most recent German federal elections with the final party distribution in the Bundestag; they used this model to claim that indeed we can predict election results using Twitter. Upon replication though, their methodology for selecting tweets that would predict legislative distribution failed when Metaxas et al (2011) used it to predict the results of the 2010 Congressional midterm elections in the United States. They found that tweets were no better than random chance when determining if a seat would be Republican or Democrat (ibid). This presents a problem for arguing that people should use horizontally integrated information to guide their political or social behavior. So if tweets were so predictive in a multi-party parliamentary election, and so non-predictive in a system with only two parties, what happened?

Gayo-Avello (2012) wrote a humorous but well-founded critique of using big data such as tweets for predicting elections. He points out two obvious problems for those with basic training in sampling: not everyone uses Twitter, and relatively few Twitter users tweet about politics. This means there is going to a great deal of noise in any data set that culls tweets for references to a particular event. He then addresses something rather interesting about the difference between a computer’s logic when doing natural language processing, and the various ways that different languages represent information (ibid). Gayo-Avello (2012) and Metaxas et al (2011) found that in German, the language itself is very precise. There are very few words that overlap in meaning, and culturally German
political commentators are a fairly serious crowd. There is very little sarcasm or humor in news-grade political discourse. This made it easy for a computer with natural language processing software to identify tweets that were relevant to specific candidates in the last Bundestag elections. Gayo-Avello (ibid) notes that by comparison English is very complex, with double meanings to words and a tendency among political commentators to make jokes and be sarcastic when tweeting about the 2010 elections. Basically, this complexity led to huge numbers of incorrect tweets being selected to model the Congressional make up in the 2010 elections.

It would not be a stretch to assume that a person who is not accustomed to the intricacies of a language, and the cultural aspects of how it is used by a specific group, would have a very hard time picking the right data to predict the outcome of something like an election. So for something like violence prevention, why would someone trust social media feeds enough to act on them? There is a conundrum here. We are interested in knowing if people can use ICTs to increase their capacity to learn and adapt, supporting the propagation of collective processes such as crisis management and violence prevention. The conundrum is that to benefit from information, to learn and adapt, people need to feel they can rely on the data they are receiving, then take collective action based on that data.

Lupia and Sin (2003) hypothesize people could do this more efficiently with ICTs. The rub is that crises and violence are complex, hard to predict with structured data let alone messy crowdsourced data, and relatively rare. If computer scientists cannot predict regular events like elections in developed countries with big data derived from ICTs, then there is a problem with assuming that individuals in complex stressful crisis-affected
environments will find the large volume of potentially contradictory, messy data across horizontally integrated data streams useful for making informed decisions. If someone cannot create a viable idea of what the future benefits of participating in collective processes will be, then there is little utility in participating. This means that for crisis response and violence prevention, people will default to sources and mediums they trust for information as opposed to trying to innovate and create a more complex model of events unfolding around them.

3.4 ICTs as Collective Mediums: Do people trust and act on vertically or horizontally integrated information

Crises provide a variety of opportunities for cooperation to break down within a community or polity. Election violence after a disputed poll or conflict over the distribution of resources after a cyclone all represent the breakdown of collective organization. These types of problems are outcomes of information failures and/or scarcity and can escalate into crisis if there is not community-level information sharing and trust in institutions. There is an important micro-rational aspect to managing the collective action problem of maintaining social stability in the face of large scale crisis. The public good during a crisis is social stability and cohesion; depending on the context free riding can present itself in a number of ways. It’s rational during a crisis for an individual to act in a way that provides the best outcome for them at the lowest risk; there is risk inherent to setting aside one’s own needs to plan for the needs of the community. ICTs can decrease this risk by helping facilitate information sharing about a larger crisis response operation,
or information about when help/resources will be available. As credible information about an environment goes up, we expect perceptions of risk to go down.

For example, after a cyclone clean water might be limited. I can work with my community to develop a strategy for rationing water, but without knowledge of when water authorities will restore service, I have an immediate need to store water for my family while also participating on the community’s water resources. If someone else finds out I have a personal stock of water, they might also stock their own water, leading to a tragedy of the commons where no one participates in the common goal of water management. Without the social agreement that water resources will be managed collectively to meet minimum community needs in an emergency, it becomes micro-logical for me to acquire as much water as I can to meet my survival needs. I have ceased to be a community actor at this point, and instead am a competitor with other community members. This type of collective action problem could be alleviated by better information about when water authorities will restore service, and where to acquire extra supplies of water in the meantime. Information in this case helps ease the pressure of perceiving a survival risk.

Two areas from Mancur Olson’s (1965) work on collective action problems are key in a crisis situation. The first is group size; large groups are harder to manage and keep involved in a collective action. The second, related factor, is the cost of maintaining group cohesion. ICTs help alleviate both of these problems, because they can broadcast to a very large audience with little difference in cost (Lupia and Sin 2003). The transmission costs of an individual text message versus a text message sent to hundreds of recipients is negligible. In a social networking platform like Twitter, thousands of people can receive
and rebroadcast a message within minutes at no cost to the original sender except for the overhead of having an internet connection.

Along with group size and cost is the amount of information being shared among people or polities participating in a collective action. Axelrod (2006) demonstrated that the number of iterations of information sharing and a long shadow of the future has a significant effect on cooperative behavior in the immediate. Going back to the cyclone and water example, if I never hear from the water authority, live in a populous district, and would need to spend an entire day walking to all my neighbors to organize water sharing, it is more utilitarian to just hoard water. But if the water authority sends a text message every hour to my neighbors and me with updates, it can make it easier to organize water rationing since we all have regularly updated symmetric knowledge of our collective situation; as credible information increases, perceptions of risk go down. Indeed, knowing as a group that water will be back on before we run out could be the information that prevents an outbreak of violence over a suddenly limited resource; without ICTs this is difficult information to share widely and regularly.

What ICTs give us is low cost, wide information distribution that can be updated regularly. But this still does not indicate when and how people act on information, nor does it help us understand how people make decisions regarding information credibility. Fearon and Laitin (1996), in their work on interethnic cooperation, provide us with two models of how groups synthesize and act on information in high-risk environments to prevent the escalation of violence. The first is the inter-group policing model; leaders provide assurances to one another that they will both control their constituencies. The
second is the fear spiral; the citizens nearest the point where a crisis starts, fearing an escalation, quickly band together to prevent violence at the local level. These two models can be replicated in information sharing systems, since people get data from mobile phones, social media, TV, and radio among other sources. In a polity that follows an intergroup policing model, where leaders/elites act as proxies for their communities, people might receive information that comes via mobile phone or social media, but will likely not act until that information is verified over a mass medium like national radio or TV by their leadership. In a fear spiral model, people will immediately start acting locally when they learn about an emerging crisis, treating digital mediums equally as they learn new information. ICTs, because of their technical attributes, take care of the problems related to population size, cost, and regularity of information transmission. This leaves the socio-political question of what information mediums and sources people will trust enough take action on, versus merely acknowledge.
The last two chapters highlighted the arc of how new horizontally integrated technologies have been used in crisis response and violence prevention, then provided a theoretical frame for how they fit into collective action processes. This leads to two questions: Do people generally trust newer, horizontally integrated information systems as they become available enough to take action, and within a society who are the people who are more likely to favor different information sources and mediums? In order to empirically analyze this question I will use cases studies and survey data from Kenya and Samoa; in this chapter I will explain the case selection process and provide some basic introduction to the surveys. The surveys themselves, including sampling and collection methods, will be explained in greater depth in Chapters 5 and 6.

To address the empirical gap around information use and trust during stressful periods, and how people manage collective processes of stability maintenance, it is important to approach the question from the micro-level. Individuals may act in a collectively organized way, but in the end each individual makes decisions that are rational to them. To reach this point in the analysis I have discussed collective processes of learning, information sharing, and evolutionary behavior. The problem with directly applying these models to communities is that people are not a collective or a hive; there is some level of macro organization, but in the end individuals make decisions that, when
compared to optimal collective utility, are based on their unique understanding of the situation around them. Recognizing the individuality of each ICT user within a collective, how do people most commonly frame their decision making within a complex information ecology?

To analyze the ways that people use ICTs to make collective decisions I selected two case studies, and did surveys of information use, trust and action-taking in both. The case studies, Kenya and Samoa, are both developing countries that face unique social stressors that can lead to violence. They also have relatively high levels of ICT access across the whole population, active civil societies, and are not involved in major conflict. Instead of a traditional comparative approach to analyzing Kenya and Samoa, I will treat each country as a unique case that has particular social and political norms and different stressors. Both countries face the risk of violence when managing their stressors, and during these periods of social stress people must gather enough information to decide how to behave as part of a stability-maintaining collective. The unique characteristics of each country, their stressors, demographic and political features, are what I assume with impact peoples’ information choices.

My interest is in how individuals in these countries assess and act on information under duress, understanding the unique behaviors within a bounded set of circumstances as opposed finding a reproducible pattern of generalizable behaviors across cases. This does not mean that generalizable patterns will not exist, but that I am not assuming that generalizable patterns will emerge. Both countries face stressors that could lead to violence, in both places collective processes of stability maintenance are required to
prevent violence, and in the process of preventing violence people have to share information. In both places people have access to similar information ecologies and technologies. To get at the question of what information sources and mediums people trust enough to act on we have to start from the non-comparable individual, and then scale up looking at a collective of individuals who all have different motivations for participating in the collective process of stability maintenance.

4.1 Case Studies

I selected Kenya and Samoa as my two cases, combining historical and contextual analysis with survey data. The decision to use a combination of case studies and surveys was based on a desire to capture macro socio-political dynamics while being able to quantitatively evaluate how people behave within those systems. One major reason for selecting two very different cases is to attempt to control for endogeneity of peoples’ experiences. In Kenya what we are interested in observing is the way that people share and trust information during election periods, specifically to prevent the outbreak of violence in their communities. While it could be interesting to see how people in countries such as Ethiopia, Uganda or Tanzania make the same decisions, I am more interested in seeing how different types of stressors impact how people gather, assess and act on information. Samoa provides an interesting and completely different stressor: natural disasters. The reason I want to compare two different stressors is to identify whether the politics of responding to them effects the information collection and action choices people make. Does the highly charged nature of Kenyan elections lead people to rely on non-official
mediums and sources of information as a check against information from broadcast media? Comparatively, does the fact that disaster response has different political stakes affect the preferences people have for different mediums and sources of information?

I will use Kenya as my baseline case since it has a recent history of ICT investment and uses of ICTs for crisis management, election monitoring, and general socio-economic development. Using case study typology from Odell’s (2001) paper on case study methodology in political economy research, Kenya would be my ‘most likely’ case study. This means that Kenya should be the case that is most likely to be the place where people use and trust horizontally integrated communications systems. This is a theory infirming case; if we fail to see evidence that people favor, or at least equally trust, horizontally integrated communication systems we should not expect to see people favoring or equally trusting them elsewhere. This is because Kenya has been a hub in the technology for development sector for almost a decade, and global media coverage combined with international investment should have played a role in encouraging citizens to see horizontal communications tools as mechanisms for participation in governance. As noted previously Kenya was where the Ushahidi mapping software was developed as a rapid response to the election violence in 2007/8. There are also a variety of other ICT-related sectors that have boomed in Kenya during the last 5-10 years, and are used as models for other countries. Essentially, Kenya was an early market for technology for development programming, with the narrative bolstered by global media coverage and significant international investment in technology-for-governance programming; if we should expect to see a general
preference for preferring horizontally integrated information during crisis anywhere, Kenya is a strong case for it.

For comparison I will look at Samoa. While it is not a directly comparable case, the primary question I want to explore is whether or not people use ICTs differently when facing different stressors in varying socio-political contexts. In the case of Samoa the stressor is natural disasters, which can lead to resource shortages, political tension around the provision of emergency services, and community tensions around the distribution of financial resources for rebuilding. In comparison to Kenya, Samoa is an ethnically homogenous nation with no history of political violence since independence. In many ways the level of social capital at each level of society (local, district and national) is remarkably strong. This does not mean that there are not socio-political tensions, but that these tensions are managed through social and political mechanisms without turning to large scale violence. Using Odell’s (2001) typography of cases, Samoa is my ‘least likely’ case, where a preference for horizontally integrated information systems is not expected; should the data indicate otherwise then it is likely that in similar places there could be a preference for horizontally integrated information during crises.

The reason I am coding Samoa as my least-likely case is because of the comparative lack of technology for development initiatives versus Kenya. While Samoa has a functional telecommunications sector, with full mobile coverage and country-wide access to internet\textsuperscript{15}, there have been no significant pushes to develop an innovation sector in along

\textsuperscript{15} Access is not synonymous in this case with having it in every household. It is more a descriptor that mobile broadband is available everywhere, and that hotels and businesses across the country generally have high speed wired internet.
the lines of something like Kenya’s iHub\textsuperscript{16} or a constellation of NGOs with mandates to use horizontally integrated technologies to support conflict resolution or governance challenges. In effect, the kind of things that draw media coverage and push international organizations to be experimental with their in-country programming are not extant in Samoa. This also means that the average citizen is less likely to have heard about ‘tech for development’ and by extension is less likely to view their mobile phone for social media platform as a tool for managing or taking action as part of a crisis response.

My interest in comparing Samoa and Kenya is the micro level dynamics of how citizens use the consumer ICTs available to them. The primary piece of technology I am interested in is the mobile phone. Mobile phone ownership and access in Kenya and Samoa is very high, with upwards of 80\% of the population in both countries having access to a mobile device. The mobile phone is also a utilitarian choice from the perspective of being able to learn about how people use social media. In both Kenya and Samoa people are active social media users in spite of relatively low levels of internet access through computers. Instead they use their mobile phones to access Facebook, and have found ways to do this with and without smart phones.

In this research I reframe the discussion of collective action and ICTs away from using country-level event data (for example Pierskalla and Hollenbach 2013; Weidmann 2015; Warren 2015; Bailard 2015). To understand the aggregate systemic patterns of information sharing, I need to understand the micro-dynamics of ICT use at the individual

\textsuperscript{16} The iHub is an innovation and technology incubator in Nairobi that focuses on technology start-ups and innovation for social impact.
This means moving away from macro-level observational data, and using comparative case studies and survey methods to understand the relationship between individual behavior and the context in which these behaviors aggregate into different patterns of collective action. This also has implications for how development and crisis response institutions conceptualize the role of ICTs in their work. If the purpose of ICT-supported crisis response is to empower the individual and community by leveraging tools like mobile phones, then institutions need to develop interventions that start from the techno-behavioral level of the individual. By doing this, they are more likely to maximize participation and achieve larger aggregate impact at the macro level.

4.2 Methods

I use two case studies with surveys of individual ICT use to explain aggregate patterns of techno-social behavior from the individual level up. Political, geographic and social context are the broadly defined independent variables, allowing me to see whether context affects the micro-behavior of citizens using ICTs. This also gives us a starting point for designing future surveys, recognizing aspects of survey design including semantics and idiomatic differences in how respondents understand things like ‘government’ and social capital.

The motivation to ground the analysis in case studies stems from the relative newness of the ICT for crisis management phenomena, especially in developing countries. Eisenhardt (1989) provides a structured process for using case studies to support the development of theory. She explains that case studies can help frame and establish grounds
for developing empirical tests, with an emphasis on using multiple data collection methods and grounding the results in the extant literature to highlight new insights. The case study method also provides a space for deep analysis of variables that can be used to identify comparisons across multiple cases (Gerring 2004), and when combined with statistical methods can lead to compelling results where different methods fill one another’s gaps (Bennett and Elman 2007). Echoing Eisenhardt, Flyvberg (2006) defends the importance of case studies in social science, noting that disciplines are strengthened by having a well-developed collection of practical exemplars that speak to theoretical knowledge.

The inclusion of a survey addresses Bennett and Elman’s (2007) claim about the value of mixed method research, and is also informed by work done in management and information science on work flow and computing systems that combined case studies with longitudinal surveys. Kaplan and Duchon (1988) use a mixed case study and survey approach to better understand the impact of new information systems on the general operation of a company while also gathering data on how workers related to the new technology and integrated it into their work. Gable (1994:121) argues that a mixed method of case study and survey in management and information systems can help researchers identify patterns across cases and test propositions using quantitative data, while Modell (2005) discusses the value of mixed cases and surveys in management research as a method for identifying issues with validity in case selection and theory building. Recognizing that these examples are from the fields of information systems and management, and thus require some extension to be applicable to social science research, the approach of Kaplan and Duchon (1988) to use surveys to test the human technology interaction in the social
system of a workplace is informative for my purposes of understanding how people integrate new technology into their social and political processes.

I use surveys that are designed to elicit similar responses about information use and trust in Samoa and Kenya, focusing on questions of information and news gathering, preferences for sources and technical mediums for information sharing, and which sources and mediums a more important in making decisions about how to act during an emergency. Because Samoa is mono-ethnic small island state without a history of political violence since independence, we are able to see how or if micro-dynamics of information sharing and communicative behavior during crisis change as a function of socio-political context or differences in the type of stressor people experience. There are very different political and social factors at work when people are managing a political process like an election, versus managing a humanitarian process like post-disaster management. Fundamentally though, both require a basic level of information sharing and trust in different types of information.

The sampling method is different in each country, a reflection of both time and security concerns. In Kenya I was co-investigating ICT and crisis response issues with Dr. Elizabeth Stones at University College London. My questions were part of her larger survey, and for the sake of time and security our sample was limited to four neighborhoods in Nairobi. Dr. Stones trained a team of enumerators that came from the different neighborhoods, and these enumerators were instructed to interview every sixth person on the street, regardless of age, gender or ethnic group. The final sample size used in Chapter 5 is 202. Two of the neighborhoods experienced significant violence in the 2007/8
elections, and two did not. This approach provides some variance in the experience of violence across a randomized sample of Kenyans of different ethnicities. I was able to do a follow up survey in the rural Tana Delta region with the help of colleagues at the Sentinel Project, who are running a participatory violence prevention program in the region. I developed a survey that more closely mirrored the survey used in Samoa (the survey done by my Dr. Stones focused more on technology purchasing and use), which was delivered on tablets using Survey Monkey software. The sample size was smaller (n=80) owing to the lower population density, and the respondents had participated in Sentinel Project’s training programs so had some knowledge of how to use ICTs for violence prevention. This is an interesting subset of respondents to get data from, since their training may predispose them to preferring horizontally integrated information in a way that the general population may not be.

The security situation in Samoa is different, as is the geography, which makes it easy to do a national survey. I also had a ten-month window to complete the survey, as opposed to one month in Kenya. I managed a team of 10 enumerators with the help of the National University of Samoa, and these enumerators apportioned an even number of surveys in the urban area of the capital, and four regions of the two main islands. The islands were broken down into quadrants (NW, NE, SE, SW) so that there were be a geographically proportional distribution of respondents. There were a total of 400 respondents, and in the analysis in Chapter 6 I used 382 of the surveys (incomplete surveys were excluded). There is a more comprehensive explanation of the sampling methods in the case studies.
To set up the cases and the survey results I will introduce each case from a historical perspective, giving some history of the politics and society. I will then go into detail of the type of stressor that each country faces, the history of these stressors, and how the people and governments of both countries have dealt or not dealt with them. I will also discuss the information and communication technology environments, since I am focusing on how people use ICTs in the surveys. This analysis will include historical information about ICT investment, basic information about the regulatory and business environment, and the economics of ICT use in each country. From these historical comparative descriptions I will then explore the survey results in each country, discussing both the quantitative data as well we qualitative information that was gathered as part of the survey process. This will set up a larger comparative analysis of the survey results, and a discussion of micro-dynamics of ICT use across different contexts.

The first set of hypotheses responds to the overarching question: Do people prefer to make decisions using crowdsourced (horizontal) or broadcast (vertical) information? The survey addresses this question in two ways. The first is asking people to select as many options as they want from a list that covers a spectrum of crowdsourcing and broadcast mediums, asking which sources they trust during a crisis. The second part of this test involves a question that has only one answer: What is the single most important medium of information for you when you have to make a decision to act? The current popular narrative is that given the option people will opt for the horizontal model, favoring local information that can be gathered quickly over general broadcast
information that is not locally specific and may take time to be broadcast when making collective action decisions.

Within each of these there are different contextual reasons that these hypotheses would play out. In Kenya election violence has been a factor in elections since 1992. After the severe violence of 2008, crowdsourcing has been used by UNDP and civil society to manage and prevent violence. The crowdsourcing initiatives have been successful, but there has been little theoretical analysis of why. As mentioned at the end of Chapter 3, Fearon and Laitin (1996) provide two systems of information sharing to describe how interethnic cooperation is maintained, and these two models can be used to describe why crowdsourcing has worked to prevent violence in Kenya. The model that approximates horizontal information flow, the ‘fear spiral’, describes a process by which communities organize a local response to an event of violence to keep it from escalating. The alternative model is the ‘inter-group policing’ model, where group leaders provide credible commitments to each other that they will control their constituents, and enforce peaceful relations. The argument for crowdsourcing (H1), described by the fear spiral, is that over the last 30 years elites have organized election violence to maintain their voting blocs.

The broadcast media in Kenya is owned by members of the same elite political groups (Nyanjom 2012)¹⁷ so for civil society to actively organize to prevent election

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¹⁷ The evidence presented by Nyanjom shows a media landscape that is not as directly partisan as the U.S. media industry, for example comparing Fox News to MSNBC. The problems with ownership of media by political actors emerge in more organic ways; in the Tana Delta region for example, when competition over water sparks unrest between farmers and cattlemen the radio stations appear turn into cyclical echo chambers where the positions of each group are reiterated and focused until things become violent.
violence they would be motivated to trust information that comes from their local area over the information broadcast on traditional media, especially radio. Alternatively, people could be responsive to their ethnic or political leadership in which case the inter-group policing model is leveraged, pulling horizontally shared information onto vertically integrated media; people then act peaceably when they hear the information from their trusted leadership. Indeed, crowdsourcing combined with media broadcast has been used for violence prevention in the last two elections, so if H₂ is the result in Kenya then I will argue that Fearon and Laitin’s ‘intergroup policing model’, where elites provide each other assurances their respective groups will not be violent, is at work and that to maintain stability people listen to the broadcast media associated with their chosen leadership.

\[ H_0: \text{When people have a full suite of crowdsourcing versus broadcast information there will be no difference between trust across the mediums.} \]

\[ \text{Kenya } H_1: \text{Preferring locally sourced information, people trust crowdsourced information over broadcast media because over the last 30 years elite manipulation of political narratives has led to violence during elections} \]

\[ \text{Kenya } H_2: \text{People trust broadcast media over crowdsourced information because while they do not want to be manipulated into violence, there is also a salience with trusting the ethno-political leadership to protect and negotiate on behalf of the group} \]

In Samoa, because the crisis is a natural disaster, the politics are not as pronounced as during an election. It is more of a pure collective action process managing
post-disaster recovery. Theoretically Samoans would opt for $H_1$ if they favor gathering information from family and local governance networks. The family network systems in Samoa are very tightly knit, serving as de facto systems of local governance and land ownership. Indeed, the family leadership structure undergirds the entire political system; the Samoan political system is essentially a network of family titles called Matai titles. The family Matai title holder represents the entire family (nuclear and extended) at village and district governance functions, and can run for parliament. Since most of the function of governance emanates from local level Matai committees it may be more efficient for Samoans to tap into their local familial networks to manage the post-disaster setting before the government gets involved. Alternatively, the second hypothesis could be true if Samoans are willing to wait for the government to share information about the disaster response process. There is no history of political violence or ethnic cleavages in Samoa, and the government has proven reliable since independence, so the government broadcasting services may be sufficient for most people as an information source during crises.

$H_0$: When people have a full suite of crowdsourcing versus broadcast information there will be no difference between trust across the mediums.

Samoan $H_1$: Preferring locally sourced information, people trust crowdsourced information over broadcast media because their family and social networks are interwoven into village and district governance
Samoa $H_2$: People trust broadcast media over crowdsourced information because they have no reason to not trust the government, and single source information gathering is efficient

While country comparisons are useful, there is also scope within the data to look at information trust and use by age group, gender, income level, mobile phone type and geographic region. Age is a popular differentiator between who uses and does not use emerging technologies. Bennet et al (2008) and Herring (2008) argue that the idea of youth as ‘digital natives’ is more popular idea than theoretically grounded concept, arguing that more empirical research is required to fully understand how youth use and experience ICTs in daily life. While this deeper analysis is required the data still indicates that on the whole youth are major users of ICTs, especially mobile phones and social networking sites, and that this can be leveraged to engage them in policy and development (Blanchard et al 2008; Thackeray and Hunter 2010). Knowing that youth are major users of ICTs and that ICT use can be leveraged to engage youth in policy and social processes I hypothesize that younger survey respondents will be more likely to favor horizontally integrated information.

$H_3$: People who use horizontally integrated information are going to come from younger demographics

Just as youth are empowered by access to ICTs, the gender dimension of ICT access has been critically analyzed in international development. A UN-DESA (2005) report indicated that there was a distinct risk that unless women had access to ICTs at the
same rate as men, there could be a digital gender divide. Best and Maier (2007) analyze
the use of internet cafes and computer access points, noting that in rural India women
have unique patterns and uses for computers and internet access, particularly around
gender-based scheduling issues with accessing fixed internet points. While statistics on
gender and ICTs in development remain underdeveloped (Hafkin and Huyer 2007),
evidence from Muslim communities in India indicate that when male and female students
have access to computers and the internet, female students benefit from and take greater
advantage of the technology than boys do (Khan and Ghadially 2010). Thus in Kenya and
Samoa, I expect that women in the samples will be more likely to trust and use
horizontally integrated information.

\[ H_4: \text{Women will trust and use horizontally integrated information systems more than men.} \]

The role of income and geography in whether people have access to and adopt
ICTs into their daily lives are mixed. Tengtrakul and Peha (2011) find that income does
not have an effect on whether people in rural Thailand decide to access the internet from
home when those people already have computers and phone lines in the household.
Selwyn (2004) and Fuchs (2008) argue that in general there are a mix of social, economic
and cultural forms of capital that indicate how much access someone has to ICTs. Adding
to the complexity, Verdegem and Verhoest (2009) argue that the problem in many
countries is less about who has access to ICTs but about who the non-users are. As
countries hit larger numbers of ICT users, and indeed Kenya and Samoa have healthy
numbers in this regard, the problem is determining why the remainder are opting not to sign up. Given the ambiguity around whether income and geography impact trust and use of horizontally integrated information, I will simplify the argument based on what I saw during field work, and from my own experience with the cases. While there are intervening factors, the ability to afford access and be in a region that has the infrastructure to support connectivity are important. People with more money to spend are more likely to have access to a wider selection of information mediums, and those who are in more developed urban or higher density areas are more likely to have access to horizontally integrated information. The urban hypothesis is only tested in Samoa, since the sample in Kenya was purely rural.

\( H_5: \text{People with higher incomes will trust and use horizontally integrated information more so than poorer citizens.} \)

\( H_6 (\text{Samoa only}): \text{Urban areas are more likely to trust and use horizontally integrated information.} \)

One of the more straightforward hypotheses is based on smartphone ownership. Essentially, people who have a device that allows them to access the maximum number of mediums and sources through a single point should be more prone to trusting and using information that comes from horizontally integrated sources.

\( H_7: \text{Owners of smartphones are more likely to use crowdsourcing during a crisis or emergency.} \)
All seven hypotheses will be tested, providing some basic comparative data to speak to in an analysis of the case studies and surveys. Chapter 7 is a composite analysis looking especially at areas where the data show similarities. It will also provide a venue for discussing the different theoretical frames, setting up analysis of the results through the lens of institutional uses of technology for crisis management. The institutional and applications analysis in Chapter 8 will speak back to the survey data, and pose the question: Do the intervenors, such as USAID, the World Bank and UNDP, run programs that indicate an understanding of the information use decisions made by people affected by crisis? If we know that there are particular patterns of information integration that people use, do we see a reflexive understanding of these patterns in after-action reports from the donor community? Examples include UNDP’s Amani 108 program, which was used to monitor election violence during Kenya’s 2010 constitutional referendum. I will analyze the way the information system was developed, including the uses of vertically and horizontally integrated information streams, and frame the intervention against the patterns seen in the survey data.
CHAPTER 5: ICTS AND VIOLENCE PREVENTION: THE CASE OF KENYAN ELECTION VIOLENCE, AND VIOLENCE PREVENTION

This is the first chapter in the case study section of the dissertation. The case studies provide two interesting types of social stressors, allowing me to compare information management and action taking behavior driven by two politically and socially different phenomena. While the case studies are not designed to be comparative in a Millian sense, what they provide is a chance to look generally at two different contexts of information use. Having these two cases serves a few purposes. One is the macro question about whether groups of people facing a social stressor prefer vertically or horizontally integrated information. These results are comparable between the two cases since the surveys were designed to be reflexive; if these preferences are the same then perhaps we can explore the global question of why people prefer one direction of information flow over another, even in very different scenarios. The second question, why different people choose certain sources and mediums of information to act on, is deepened by having two different cases. In some cases there are patterns of action taking that are similar between the cases, while at other information preferences are guided by very specific geographic or social factors unique to each case. This, and the following, chapter I will treat each case uniquely then analyze their similarities and differences more deeply in Chapter 7.
Kenya, my ‘most-likely’ case, is the first to be analyzed. It is also the case that experiences a more ‘traditional’ type of violence we expect to see in peace and conflict studies. The results of two surveys, one administered in Nairobi and the other in Tana Delta, indicate that while people use horizontally integrated information systems they prefer and primarily act on information from vertically integrated systems. To frame these results in theory I will bring the theoretical structure of how collective meaning making turns into collective action, and how horizontally integrated communications systems can support such action, into discussion with the literature on interethnic violence.

In Kenya interethnic violence centered around election periods is the stressor that intervenors have attempted to use mobile phones and social media to combat in the last 7 years. A major component in achieving this kind of collective action is developing a shared understanding of stability across a polity, and then having the capacity to share information and maintain information symmetry as the collective increases in size. Thus, for horizontally integrated information sharing to matter in violence prevention we assume that interethnic and inter-group violence is the outcome of meaning-making processes and information sharing that undermines peoples’ willingness to participate in a collective process of stability maintenance. Section 5.1 focuses on the literature about interethnic violence, and analyzes evidence of political and social meaning making and the validity of information in interethnic conflict and cooperation. This literature review provides theoretical grounding about conflict and stability, providing a string between the
general theory of meaning-making and collective action discussed in Chapter 3 and the Kenyan case study about election violence.

From here I will move into the case study of Kenya, discussing the longer history behind current political-ethnic tensions as well as the modern dynamics that lead to the 2007-8 election violence. The key features of interethnic violence in Kenya include political meaning-making that focuses on inter group competition and activates peoples’ fear of other groups; the activation component is important because between elections Kenya does not experience high intensity interethnic violence. Indeed, people generally prefer to cooperate and have a strong identity as Kenyan. Thus, the way to maintain stability and prevent violence in Kenya is to maintain the meaning people have developed as Kenyan citizens, and to prevent the narrative of division along politico-ethnic lines that comes up during elections to diminish the collective process of maintaining stability. This can be achieved using mobile phones and other horizontally integrated communications systems, which help maintain information sharing and symmetry across large collectives.

Having established the theory and case, I then address the hypotheses about horizontal versus vertical information preferences and action-taking. Using the survey data, I take a descriptive and modelling-based approach to understanding information preferences in Kenya. I will describe the sampling and data collection processes used in both Nairobi and the Tana Delta region before moving into results. The results in the descriptive statistics indicate that in the whole sample, as well as in sub-categories of the sample defined in the hypotheses, people strongly prefer vertically integrated information sources and mediums. Regression analysis is used to develop models of which
demographic factors indicate whether a respondent is likely to act on specific mediums, such as mobile phones, internet, radio, TV or newspaper. Across the models age and levels of trust in authority are the only variables that have a significant relationship with acting on information from mobile phones, newspapers and radio.

The chapter will close with qualitative analysis of the findings in relation to the case study and history of Kenya, and provide an introduction to the second case study about Samoa and information sharing for disaster response.

5.1 Interethnic and community-level violence

‘Interethnic violence’ can be a fraught term; while many conflicts between groups in the post-Cold War period have been delineated by ethnic affiliation, it is critical to be careful not to assume that violence is an inherent feature of multi-ethnic societies. This study will focus on ethnic conflict as a phenomenon where two identify groups end up in conflict. That they are identifiable by their ethnicity, while perhaps salient, is not the key factor in why I assume they are fighting. Gurr (2000) provides a strong argument against these conflicts being ‘new’ and points out that ethno political conflicts span back into the 1960s. Fundamentally these conflicts are between groups vying for control of the state, and are most acute when the state is in a formational or reformational period. When we think about using horizontally integrated technologies for maintaining stability, one key way ICTs fit into a conflict or stability process is making it easier to share information about what a state should look like post-reformation.
Banton (1983) proposes a rational choice-influenced analysis of interethnic conflict, where groups act to maximize their advantage vis-a-vis other groups. His argument starts from the individual level, where a rational actor will work to organize a group along political lines in order to compete against other groups for maximum gain. McKay (1982) accepts the salience and power of ethnic identity, while also recognizing the ways that this identity can be activated by political actors in pursuit of rational outcomes. In both of these conceptualizations of ethnic conflict a key factor is information management – groups acting to maximize their power vis-à-vis other groups by activating their co-ethnics are going to need to control the information space, and prevent narratives that downplay risk from entering the discussion.

One of the main challenges is distinguishing types of ethnic conflicts, and how ethnic conflict fit into existing theoretical frames of conflict and violence. The field needed to develop analytic frames for empirically analyzing ethnic conflict and violence. Carment (1993) took an initial step of codifying ethnic conflicts by framing type against levels of violence. He looks at ethnic wars that were anti-colonial, secessionist and irredentist in nature, focusing on which types were the most violent. What he finds is that ethnic conflict affects conflicts outside the country hosting the ethnic conflict, and that both political and cultural aspects of ethnic identity are salient when analyzing ethnic conflict. In terms of this study, his work was an early analysis of how ethnic conflict affects different levels of society and politics, which sets up questions about how and where information is produced and validated before it is broadcast.
Stuart Kaufman (1996) takes this analysis a step further by using a levels of analysis approach inspired by international relations theory to explain how groups are organized to undertake violence. He discusses hyper-nationalism and militarism as key factors that lead to groups becoming violent. To take these tendencies from latent to active, he discusses how aggressive leaders create a security dilemma in which the only option is to fight. This dynamic leads to escalating hostility between groups, led by politicians who encourage the sense of a security dilemma among their respective groups. This dynamic of hostility escalation and manufacture of information shortages is of particular salience in my study; this kind of dynamic only works in a setting where elites can control information that their constituents receive about the competing group. Fearon and Laitin (2000) concur with this analysis, noting that the cultural concept of ethnicity is not itself inherently violence inducing; across cases group activation requires elite political motivation and the maintenance of perceived security dilemmas between ethnic populations.

We see in the above paragraph the importance of information control, and the development of divisions that cause groups to fight instead of cooperate. Thus, if the goal is inter-ethnic or intergroup peace, the best possible option is to not have violent conflict in the first place. Fortunately, as Fearon and Laitin discuss in their 1996 article on interethnic cooperation, violence between groups is exceptionally rare in comparison to how often groups cooperate or solve conflicts non-violently. They illustrate two models of interethnic cooperation that help frame the importance of information flow and access in violence prevention. The first is the intergroup policing model, where conflict between
members of two groups is reported to elites and the elites agree between each other to manage their constituents. The elites act as police, providing each other a credible commitment that they will each enforce peace within each of their groups. The second model is the fear-spiral; when there is a spark of conflict the local actors in the immediate vicinity, fearing escalation to violence, act to resolve the conflict locally. The spiral is the outward movement of information from the initial spark of conflict.

When discussing communication technology as a key factor in peacebuilding and violence prevention, the role of information sharing and control of the narrative are critical. This is where ICTs and information systems can play a key role in supporting collective action processes focused on stability. They help create information symmetries between leaders, as well as networks of local actors. These kinds of networks and information relationships can provide strong counter narratives to calls to violence. Fundamentally interethnic conflict is the outcome of groups who have a reason to fear each other, and lack the information to manage the stress of negotiating a peaceful solution. In Kenya the goal of using ICTs for peace has been to activate a shared meaning of peaceful governance across the population and leadership, so that people at all levels are involved in peacebuilding and violence prevention. What the case study and survey data will help us understand is whether people become involved in violence prevention and peacebuilding through horizontally or vertically integrated information systems.
5.2 Kenya: The baseline case

Kenya is noted as one of the hubs of innovation in development and peacebuilding. This stems from a variety of factors, including economic, political, and technological changes over the last ten years. This is the primary reason I am including it as a case study; many scholars and practitioners in the ICT and peacebuilding space consider Kenya to be the reference case. It also features a unique brand of violence, which is traditional in its typology while also being low intensity and sporadic enough to identify how civil society and political actors have reacted to it and prevented it from turning into a full-scale civil war.

From a theoretical perspective Kenya represents a case of interethnic localized violence. It is a unique case in that Kenya is not prone to full scale ethnic balkanization, and that there are recognizable patterns of when violence is likely to be organized. Elections are particularly fraught periods, but there are also examples of interethnic rumor mongering leading to violence in areas such as the Tana Delta region. The focus of my analysis is to understand how people assess, validate and act on information from different mediums and sources in a context where there is latent tension but enough social capital between groups for de-escalation to be a possibility.

I am also interested in how people assess and decide to trust information in a country that has a long history of dictatorial rule. The security state in Kenya remains powerful, and the police in particular have a reputation for criminal and extra-judicial violence. The role of surveillance in social and political life adds an interesting variable to how people use and share information; this was apparent in the lead up to the 2013
elections when the government issued a law requiring the registration of all SIM cards. The impetus behind this policy was to be able to monitor hate speech and rumor propagation, but the historical memory of the surveillance state ended up driving people off digital media completely. This will be analyzed later in juxtaposition to the Samoan case, where no such political history exists.

5.2.1 History and place

Prior to the colonial period, the territory that is now Kenya was a major shipping and trading hub. The coast hosted multiple ports that were used as jump-off points for trade between Europe, India and Southeast Asia. British and German colonial rule laid the ground for the political dynamics that would lead to ethnically divided, violently contested politics up through the 2010s. The transition from Omani coastal trading to agricultural investment by English and German commercial interests in the 1800s laid the groundwork for the kind of territory-based politics and ethnic affiliations that are part of modern Kenya’s election violence. In spite of these political pressures Kenya retains a level of development and national political identity that prevents the ethnic and political fissures to rupture into full-scale civil war; it is this capacity to prevent war during periods of violence that I will focus on in later sections of this case study. Understanding the land and political history of the British and Germany periods is important, since many of the socio-political dynamics that make political information valid to different groups are rooted in this history.
During the protectorate period the British built the Uganda railroad, linking the coast to British Uganda. This would have the effect of bringing both British administrators and new settlers into the Rift Valley region, where there was significant potential for commercial agriculture. The Maasai and Kikuyu were dispossessed of their land by the British administration, and it was given to white settlers from Great Britain and South Africa (Morgan 1963). While there was not significant military or insurgent action on the part of Maasai and Kikuyus toward white settlers and the British administration, there were grievances among the Kikuyu that they had been robbed of land that was theirs. As the railroad progressed the British administration used traditional leaders from the various ethnic groups to maintain control and manage the population. In 1920 the East Africa Protectorate became a Crown Colony, which afforded settlers more voice in administrative decisions but continued to exclude native Kenyans from public participation (Gatheru 2005).

During the World Wars Kenyan, as well as other Africans, were enlisted in the war effort. During World War I they supported British and Indian troops fighting German guerrillas in East Africa, and fought in World War II as part of the King’s African Rifles. These experiences helped organize and politicize Africans under British rule, and particularly after World War II there was a push by African soldiers to maintain the social and economic benefits they had earned fighting (ibid). These desires combined with the tensions over land use, modernization of farming, urbanization and an increased political voice for black Africans in the Crown Colony led to greater tensions, both between Kenyans and settlers and between Kenyan ethnic groups. After WWII Kenyans
started increasingly organizing politically, with the Kikuyu being one of the most active ethnic groups in the various movements. The movements became increasingly hardline, with the Mau Mau movement escalating to full-scale violence; the British government fought the Mau Mau militants aggressively, and the movement itself split the Kenyan political community due to its violence.

After the British suppressed the Mau Mau rebellion there were moves made to expand the governance of the Crown Colony to include the black population, as well as Asian, Indian and Arab constituents. Two parties were established by native Kenyans; the Kenyan African National Union (KANU) and the Kenyan African Democratic Union (KADU). The make up of these two parties continued to establish the dynamics that would lead to inter-ethnic rivalry in the 1990s and 2000s. KANU was dominated by Kikuyu and ethnic groups that supported the Kikuyu. KADU represented a wider swath of smaller tribes, and there was serious concern among KADU when the British, as part of granting independence to Kenya, supported an amendment to the constitution consolidating power with the central government. This amendment led to the consolidation of power by the KANU party, and later efforts to start a new party, the Kenya People’s Union (KPU) led by Luo ethnic elders was suppressed by KANU. Jomo Kenyatta’s government, the first post-independence, made it difficult for civil servants and local leaders to be part of the KPU. Internal tensions in KANU simmered and when Tom Mboya, a Luo member of the KANU party, was assassinated chaos broke out. Kenyatta used this opportunity to ban the KPU and to consolidate power with the KANU party, making Kenya a one-party state in 1969 (Kyle 1999).
After Kenyatta’s death in 1978 Daniel arap Moi, Kenyatta’s vice president, took power. His interim appointment became permanent, and he ruled as a dictator until 2002 when his party was defeated in the third round of multiparty elections initially implemented in 1991. Moi’s longevity was largely attributable to his backing of Western policy against Communism, but with the end of the Cold War his government was pushed by the U.S. to become more open and democratic. While he was able to organize the ethnic coalition that undergirded KANU to dominate elections in 1992 and 1998, and taking advantage of ethnic cleavages over land rights to prevent effective opposition (Klopp 2001), the strategy backfired in 2002 with KANU being defeated by Mwai Kibaki and his National Rainbow Coalition party (NaRC). The 2002 elections lacked much of the overt violence of the 1992 and 1998 elections, but there was still tension. This tension exploded in the 2007-8 elections, wherein the Orange Democratic Movement (ODM) led by Raila Odinga defeated Kibaki’s NaRC in parliamentary elections but the outcome of the presidential race between Odinga and Kibaki was marred by vote rigging and unclear results. Violence broke out between ethnic groups based on party affiliation and political outlook, with the Kikuyu-led NaRC ethnic coalition backing the KANU-derived central government model and the Luo-led ODM backing a local governance and land management program that would allow ethnic groups excluded from power by Kenyatta’s KANU party to move back to their traditional territory. The violence took Kenya to the brink of civil war, but in the end it was contained and political reconciliation took place.
This leads to the type of violence I will be analyzing in this section. There is a certain capacity for national identity in Kenya that supersedes ethnic affiliation. Because of the ways that party affiliation, land management and administrative power have shifted in Kenya over the last 80 years the relationship between ethnic groups and party affiliation has been driven more by land tenure and access to administrative power than by an a priori ethnic identity-to-party relationship. The state has always been strong, the economy grew through the 1990s and 2000s (even though the fruits of growth were unequally distributed) and Kenyans associated themselves with the state as much if not more so than with their ethnic identity (Hanson 2008). This combination of factors meant that when violence broke out there was enough binding all actors to their Kenyan identity that through dialogue and conflict resolution techniques and multiple track levels the stressors facing the country in the post-2002 environment could be managed with enough communication and transparency.

5.2.2 The type of stressor: elections and political transitions

The long history of intertwined land rights, political favoritism and ethnic activation by political leaders undergirded the violence that accompanied the 2007-8 elections. In many ways the 2007 elections were anomalous because they were both positive in terms of participation and citizen engagement, as well as being shocking in the way things descended into violence. Klopp and Kumangi (2008) noted that while there were irregularities in voting turn-out was large, and international observers did not see the large scale violence coming until it had broken out. Under the surface though, there
were many irregularities that led to a mass violent response to the results; the Electoral Commission of Kenya could not identify the winner of the election, and the secretiveness of the decision to declare Kibaki the winner and swear him in spurred violence among Odinga supporters (ibid).

The roots of this violence lay in the way that President Daniel arap Moi maintained his party’s control through the 1990s, when multiparty elections were held in 1992 and 1997. Kenya was ruled by Moi though the 1990s when the first multi-party elections were held. In 2002 his party was defeated, and Uhuru Kenyatta led the country while pushing Moi’s KANU party members to the opposition (Ndegwa 2003; Barkan 2004). During the time leading up to 2002 Kenya had a long history of political violence generally perpetrated along ethnic lines and managed by elites during election periods (Okumbo 2011). This history of land and ethnicity-based balkanization plays out in an open political space by making it difficult to form coalitions and form governments (Cheeseman 2008).

As noted in section 5.2.1, the issues of land rights under British colonial rule was a significant factor in the grievances between white settlers and black native populations. Kenyatta and Moi both used land ownership and access during their rule to reward or punish political actors. To understand the 2007/8 election violence, and the proper role of ethnicity in the violence, it is critical to understand how land access under a federal Kenyan government affected politics after multiparty elections started being held in 1991. In the first multiparty elections in Kenya, the Moi regime used the power of the state to allocate rural land to supporters and exclude competitors from access (Boone 2011).
These land allocations were designed, and contributed to, localized election violence in 1991 (ibid). This pattern of land access manipulation continued through subsequent elections, with recognizable patterns of violence, until it exploded in 2007/8. The violence was a legacy of white land holder policies that were continued under the KANU party’s rule from the 1960s to 1991 along with subsequent land use policies implemented by the Kenyan government that hardened the ethnic nature of land access; their lack of resolution was part of a mix of factors that led to the significant violence in 2007/8 (Kanyinga 2009; Rutten and Uwuor 2009).

The issue of land access that was part of the Majamboist federal-style management approach was the factor that led to ethnicized violence. What is interesting about the role of ethno-politics, at least starting in the early 1990s during the democratization wave in Africa, is that ethnicity correlated with political competition in Kenya but did not cause it (Hanson 2008). While pre-colonial Kenya had experienced inter-ethnic violence, it was exacerbated during colonial rule through the divide and conquer approach (Holmquist and Ford 1992). This continued under Jomo Kenyatta when the power of the KANU party was solidified with Kikuyu backing in 1963, and was allegedly utilized by Moi to mitigate the effects of open elections in 1992 and 1997 and protect Kalenjin political interests (ibid). In light of this, it is important that inter-group ethnic relations after the Cold War are generally stable, and many Kenyans identify as “Kenyan” as well as part of an ethnic group (Hanson 2008; Bratton and Kimenyi 2008). As noted in the previous paragraph there is a salience to ethnicity and connections to land, but these factors are also activated by targeted political behavior and party
organizing. What is important to note is that the violence is motivated by and for elites; there is no evidence that the population on the whole is particularly interested in or prone to be activated for violence. This is an example of ethnic activation and it takes place across different information streams, including radio, mobile phones and social media, the same mediums that people are using to try to intervene in calls to violence with calls for peace and stability.

Along with the clientalist nature of the way violent groups behave, there is limited evidence that any political party has a durably ethnic motive. Many political parties’ manifests in Kenya are politically indistinguishable, and ethnicity only becomes salient when considerations of voting districts become important (Mueller 2011). This can help understand why mobile phone-driven communication technology is having a significant impact on governance and peacebuilding in Kenya: all the indicators suggest that Kenyans are not generally interested in perpetrating or perpetuating violence and conflict. The “ancient ethnic hatred” notion finds little support in the case of Kenya, which has traditionally experienced the stable co-existence of tribes outside of the previously noted election periods (Hanson 2008). Violence in Kenya has historically been used as a political mechanism, peaking at election time when political actors need to shore up voting blocs (Holmquist and Ford 1992, 1994; Mueller 2008, 2011). Thus, maximizing information sharing between voting blocs should enhance peace and security, since it is a lack of information about each group’s intentions that creates dangerous security dilemmas during things like election periods (Lake and Rothchild 1996). The collective
action problem that has to be managed is the maintenance of stability during voting periods, when there are strong

5.2.3 The technology environment

Kenya’s technology sector has been one of the fastest growing in the world and has been a model for technology investment in developing countries, as well as being a model for other African countries. The technology sector has experienced significant growth in the last 10 years, driven heavily by investments and capacity in the mobile telephony sector. Like much of the developing world mobile telephony has meant countries have been able to leap over wired telecommunications infrastructure, with large swaths of access to mobile phones emerging quickly. For the purposes of development and peacebuilding, the Kenyan market had a unique moment during the 2007/2008 election violence. As has been discussed, the Ushahidi crowdsourcing platform was developed to track violence in real time and gather data from the public using SMS text messaging. I would posit that this event was the inflection point that took Kenya’s technology sector from being a reliable, growing market to being a hub of innovation that attracts start-up funding, international donors and governance agencies, and NGOs all trying to grow the commercial and social impact aspects the technology and telecom markets.

Kenya’s reputation as an innovation hub, at least within the international affairs and international development communities, emerged out of a confluence of factors. The election violence in 2007-8 drew the world’s attention, in large part because it threatened
to drag Kenya into a civil war. This was a serious issue since Kenya is a regional power that is allied with the West, and is also the host of a large number of international organizations’ regional offices. In this context the launch of Ushahidi provided journalists and international affairs professionals with an interest, and indeed potent narrative about local empowerment and the capacity for driving change using the existing human capital in a developing country. What makes Kenya such a key country within the narrative of technology and innovation is not necessarily the technology, since many countries have similar capacities, but the timing and activation of the human capital and civil society to use the technology to create a local solution to a problem that was attracting global interest.

The increased recognition of the way the technology sector was improving both commerce and civic participation led to the establishment of facilities and institutions to support innovation among Kenyan programmers, entrepreneurs and civil society leaders. The most recognizable of these is the iHub in Nairobi\(^\text{18}\). The iHub, while basic by Western standards, has been important in the Kenyan context because it provides a space for the human capital of the Kenyan technology and civil society to gather. Along with fostering cooperation it also provides a space for capturing lessons learned, and for the technology community to build on its successes. This has been formalized by the establishment the research entity iHub Research. They focus primarily on the data that comes out of commercial and civil society applications that are developed at the iHub, and have been involved in research on how hate speech propagates across digital media,

\(^{18}\) More on the iHub can be found here: [https://www.ihub.co.ke](https://www.ihub.co.ke)
the impact of mobile money on small-scale farmers and other civically oriented technology projects.

The Kenyan technology sector also has such a significant reputation because the international development community had gravitated to it. The UNDP in particular has invested significantly in crowdsourcing programs for violence prevention and good governance. During the 2010 constitutional referendum they worked with the government and civil society actors to set up the Amani 108 crowdsourcing and broadcasting program. It integrated SMS text messaging, mapping and radio broadcast in order to provide a centralized space for people to report voting irregularities and violence. Because the UNDP and Kenyan government were involved as stakeholders, police were able to respond to requests for help or intervention and citizens knew a third party was keeping an eye on how the police behaved. M-Pesa and the wider mobile money sector has also drawn a great deal of the donor community’s attention. While the product was built with commercial ends in mind, the development community and Kenyan civil society have been able to apply the technology to social and governance issues (Suri 2011; Garrity 2015).

Kenya’s technology sector, and its relationship to governance and civil society processes, is why Kenya is my ‘most-likely’ case. The technologies themselves are not particularly unique, or even the most advanced when compared to markets such as Nigeria and South Africa. What Kenya demonstrated in 2007/8 was that they had the political motivation to intervene on their own terms in the election violence, and the technical skills to use to the technology available to do so in an innovative way. When
the international community saw this, they helped scale the technology solutions and find
new ways to use commercial ICTs to address a range of development challenges. It is the
interplay between a well-developed technology sector and a highly engaged, technically
savvy population that has driven so many of the innovative responses to emerging
development and peacebuilding challenges in Kenya. The key question is whether or not
people use these technologies for governance and peacebuilding in their daily lives.

5.3 Survey results

Having established the fundamentals of the case, both from the theoretical
perspective of violence prevention and stability maintenance and the importance and
primacy of the technology sector in social and political development, I will now analyze
the data gathered on peoples’ information preferences over two rounds of surveys. The
surveys were administered in Nairobi in February 2013 and Tana Delta region in June
2015. The results will be analyzed at a macro level using descriptive statistics, and then at
a micro level using logistic regression.

I start with an explanation of the collection methods employed for gathering the
data. The surveys themselves are not perfectly matched since the Nairobi survey was part
of a larger study that addressed a larger spectrum of questions, while the Tana Delta
sample was exclusively focused on information trust and action taking. The Nairobi
survey also employed a different collection strategy, interviewing respondents on the
street, while the Tana Delta surveys were administered with the help of staff from the
Sentinel Project who integrated them into village training programs.
From here I move into analysis of the descriptive data to test the macro level hypotheses about how many people exclusively prefer horizontal sources and mediums of information versus vertical sources and mediums. The results show that at a macro level people strongly prefer vertically integrated sources and mediums of information during elections. This finding problematizes the hypotheses, and indicates that commercial behavior around the use of ICTs is not necessarily a good proxy for how people gather information during politically and socially grounded processes such as elections.

To analyze micro level trends in the data I performed a set of logistic regression analyses, looking at how the demographic factors in the hypotheses perform in models where mediums people take action on are the dependent variables. The results show a similar trend to the descriptive statistics; people on the whole do not act on horizontally integrated mediums during elections. The models do show some significant effects of age on whether people act on data from mobile phones, and a significant relationship between trust in local and national government and taking action on information from newspapers. The section will close with a review of the results, some basic qualitative analysis and explanation of the second case study, Samoa.

5.3.1 Survey methods and data collection

There are two sets of survey results featured in this section. The first are from an initial scoping study by Stones and Martin-Shields (2014), which featured a set of questions in a larger survey on ICTs and social processes that Dr. Stones used in her dissertation. The questions in the 2013 survey focused on where and from whom people got their news, information about elections, who and what sources of information they
trusted, and what they found most important when gathering information during elections. This survey used a man-on-the-street randomization method and due to security issues was limited to the Nairobi area. What it provides is an urban sample, and this sample can be compared with a later survey that was done in mid-2015 with the help of the Sentinel Project in the Tana Delta region. The Tana Delta region is a rural area in the southeast of Kenya, and has a history of inter-ethnic and inter-community violence often spurred by rumor mongering. This survey only included questions on information sources and trust, along with basic meta data.

The first survey was administered in Nairobi form February 1-17, 2013 by Dr. Stones and a team of 10 enumerators with a range of ethnic backgrounds. The survey used a convenience sample of face-to-face interviews done on the street, with a randomization strategy of interviewing every sixth passer-by over the age of 18 regardless of gender or ethnicity. Surveys were done on paper and filled out by the enumerators by hand. The geographic structure of the survey focused on four economically underserved areas of Nairobi, two that had experienced election violence in 2007-8 and two that did not. The response rate was 87%, relatively high and likely aided by the face-to-face survey approach. The areas affected by violence were Kibera and Eastleigh, while the areas lightly effected by violence were Kawangware and Mathare. The total number of respondents to this survey was 202 completed responses.

The second round of data collection took place in the Tana Delta region of Kenya, and was done to gather a sample of responses from a rural region. This particular survey’s questions were modeled on the Samoa survey, and thus was shorter and more
focused on questions of trust and action than the survey in Nairobi. Due to time constraints the survey was done face to face using tablets and Survey Monkey software, and administered by staff from the Canadian NGO the Sentinel Project. The sample of 80 respondents was selected based on participation in training programs Sentinel Project had done as part of their *Una Hakika* crowdsourcing and violence prevention project. The respondents came from the villages of Idsowe, Matomba, Malakoteni, Kajisten and Garsen, and represented a mix of gender, age, income and social rank; because these surveys were part of a formal project so the sample is not random, but does have a mixed demographic of respondents. The results indicate that a properly designed household survey would be useful in the region, especially since it has hosted the *Una Hakika* project and should be primed for using horizontal sources of information for violence prevention. It is important to note that I found a problem with time stamps on the surveys, which indicated that all had been completed within very short time periods on June 6 and 12, 2015. This was because the Sentinel Project staff had printed the surveys and then entered them into the software manually due to electricity limitations at the training sites. I checked the descriptive statistics against the Nairobi survey and am confident in the data gathered by the Sentinel Project team since it generally tracks with those results.

### 5.3.2 Descriptive statistics and macro-level hypothesis tests

The fundamental question that is posed in the theoretical argument is whether ICTs increase the ability for people to manage the collective action problems of violence prevention by promoting horizontally integrated information networks, using tools like mobile phones and social media, or whether collective action processes begin in earnest
when people get their trusted information from broadcast mediums such as radio and TV. This was the question explored by Martin-Shields and Stones (ibid), and the results of the urban surveys indicated that people trusted broadcast mediums and religious leaders. In this case the survey questions only covered trust in general terms:

Table 1: Sources and mediums trusted during elections in Nairobi

<table>
<thead>
<tr>
<th>Medium</th>
<th>Trust</th>
<th>Source</th>
<th>Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face to Face</td>
<td>%Yes</td>
<td>Political</td>
<td>%Yes</td>
</tr>
<tr>
<td>Radio</td>
<td>59</td>
<td>Religious</td>
<td>46</td>
</tr>
<tr>
<td>Calls</td>
<td>44</td>
<td>Youth</td>
<td>2</td>
</tr>
<tr>
<td>SMS</td>
<td>21</td>
<td>Elder</td>
<td>9</td>
</tr>
<tr>
<td>TV</td>
<td>49</td>
<td>Community leader</td>
<td>2</td>
</tr>
<tr>
<td>Paper</td>
<td>23</td>
<td>Teacher</td>
<td>1</td>
</tr>
<tr>
<td>Internet</td>
<td>24</td>
<td>Family</td>
<td>20</td>
</tr>
<tr>
<td>Events</td>
<td>3</td>
<td>Media</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>Friends</td>
<td>4</td>
</tr>
<tr>
<td>Don't know</td>
<td>5</td>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>

What we found most surprising in our survey results was the sheer lack of trust within the sample. We began the research assuming that people would not trust elite actors and centralized systems of information sharing like radio or TV. Because the narrative of crowdsourcing was so embedded, starting from the success of Ushahidi and through the successful Amani 108 election monitoring program during the 2010 constitutional referendum (UNDP 2011), we expected to see people generally trusting mediums like mobile phones and social media. The history of manipulation of public
sentiment by political elites also factored into our assumptions, leading us to surmise that when given an alternative people would prefer to get information from friends and neighbors. When just focusing on trust this was not the case; to extend this survey and tailor it more to a question of collective action, and the trust needed to take action on information during elections, I tailored the second survey to address trust in information and preferences for information leading to action. This survey was also used in Samoa for comparability in the questions. I will do comparative analysis of the results and deeper analysis using the respondents’ meta data in the synthesis chapter that follows the Samoa case study and survey results.

The rural sample, from the Tana Delta region of Kenya, is unique in that they are 80 villagers from a set of communities that participate in the Sentinel Project’s Una Hakkika program. Una Hakkika means “Are You Sure?” in Swahili, and the Sentinel Project set up the program to empower local leaders and citizens to check the veracity of inflammatory rumors through trusted networks of inter-community text messaging. Thus, this sample is different from the urban sample in that people from across the surveyed villages have been through a level of training on how to crowdsource and validate information horizontally using mobile phones. Being more cautious with my assumptions after the urban survey, I still assumed there would be a greater likelihood that this population would be prone to trusting and acting on information gathered using horizontal communication systems.

In the null and alternate hypotheses Kenyans will prefer horizontally integrated information because of the history with elites organizing and motivating violence (H1) or
they will prefer vertically integrated information because broadcast services are often owned or operated by ethnic or religious leaders whose information is considered more reliable (H2).

![Horizontal information sources most important](image)

**Figure 5: Horizontal information sources most important?**

We see that H2 is the hypothesis most supported by the results. Respondents show a higher level of trust and value for horizontally integrated *sources*, but even in that case the rate of preference for vertically integrated sources still stands at over 68%. The preference for vertically integrated *mediums* is even higher, standing at over 91%. This results is somewhat surprising, since the sample of respondents in this survey were from
communities that were participating in the *Una Hakika* project that leveraged networks of people using mobile phones to prevent rumours from turning violent. Youth and young users are the next group within the wider population that I expect to be more likely to use horizontally integrated communications. Hypothesis 3 states that younger users will be more likely to rely on horizontally integrated information sources and mediums.

![Figure 6: Horizontal source and medium most important by age group](image)

The results show that the mid-range age group has the highest percentage of respondents who find horizontal sources and mediums most important. These results call
into question the idea that youth are particularly likely to use new technologies during political crises than other age cohorts, and could speak to different factors such as gender and economic station as drivers of horizontal information use. Hypothesis 4 states that women are more likely than men to prefer horizontally integrated information systems.

**Figure 7: Horizontal source and medium is most important by gender**

Over a third of female respondents prefer horizontally integrated sources of information, 7% more than male respondents. In the case of horizontal mediums neither men nor women prefer horizontally integrated systems at practical levels. The other social factor that could lead to people preferring is income. For this survey we asked about
household expenses as a proxy for income, with Hypothesis 5 stating that people with higher incomes are more likely to be able to afford the data-linked services inherent to horizontally integrated communication systems.

The results are difficult to interpret. In terms of medium, the poorest quartile in the sample claim to prefer horizontal mediums at a higher rate than upper-middle and upper quartiles. Preferences for horizontal source are mixed. This could be because some horizontal sources do not require technology access, such as networks of community leaders. Further analysis of disaggregated sources could help indicate how different

Figure 8: Horizontal source and medium is most important by income
incomes groups gather horizontal information. To gather digital, horizontally integrated information a smartphone is a practical necessity. Thus we expect that people with smartphones are more likely to rely on horizontally integrated information than those without smartphones (Hypothesis 6).

![Figure 9: Horizontal source and medium is most important by smartphone ownership](image)

These results add to the question about the transmission nature of different horizontal sources. Significantly more people who do not own smartphones rely on horizontal *sources* of communication. This could be indicative of the importance of non-digital horizontal sources of information such as local leadership networks. The results for
preferring horizontal mediums falls into a more expected pattern, with smartphone owners preferring horizontally integrated information at over double the rate of non-smartphone owners.

What we see in the descriptive statistics is a generally strong indication that people prefer vertical sources and mediums. Radio, TV and official systems of information sharing are preferred across the whole sample as well as the different tranches defined in the hypotheses. While this addresses the universal question about whether people’s information gathering and action-taking preferences change with technology availability, with the answer being generally not, the descriptive statistics also indicate some interesting details about how sources and mediums are trusted and acted on differently depending on the gender, economic status and age of respondents. The key issue in this sample is that horizontal sources and mediums do not necessarily correlate with each other; for example poor and upper middle class respondents both prefer horizontal sources more than lower middle class and wealthy respondents. This could be a function of gathering data from horizontal sources face to face instead of having to use a digital medium to communicate; this is difficult to affirm though since the poor prefer horizontal mediums at a higher rate than other economic groups. To unpack the data further, and to explore interactive effects of different sources, mediums and specific technologies, the next section develops a series of logistic regression models with the aim of isolating which demographic factors among respondents are significantly related to preferences for different mediums and sources of information.
5.3.3 Regression analysis of respondent data

The descriptive statistics and analysis in the previous section indicated that at the level of the overall sample people prefer vertically integrated sources and mediums of information. This problematizes the narrative around the degree to which ICTs are changing political and social behavior, but there are interesting variations within the data that deserve a finer-grained analysis using regression techniques. This section uses logistic regression to model the significant relationships between different demographic variables and specific mediums on which respondents are willing to take action. I will explain the variables, address some artifacts in the model that emerged from the relatively small sample size and non-random sample, and analyze the significant results. Age and levels of trust in local and national government returned significant results, and will be analyzed within the framework of both the case study and descriptive statistics.
I produced seven logistic regression models that used the original binary variable for horizontal medium and source used in the descriptive statistics, as well as binary variables indicating whether people act on information from: mobile phones, internet sources, newspaper, radio and TV. The explanatory variables are the same ones from the hypotheses in Chapter 4, with the addition of two new ones; ‘Trust: ElecAuth’ and ‘Trust: Baraza’ are binary variables that indicate a respondent’s trust in information from central government (proxied by the election authority) and local government (the Baraza). Because of the small sample size (n=80) and the non-random survey process there are a set of coefficients that are omitted in the models. These variables ‘perfectly’ predicted the binary values.

**Table 2: Kenya regression analysis**

<table>
<thead>
<tr>
<th>Model</th>
<th>Horizontal Medium</th>
<th>Horizontal Source</th>
<th>Act: Mobile Phone</th>
<th>Act: Internet</th>
<th>Act: Newspaper</th>
<th>Act: Radio</th>
<th>Act: TV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. Variables</td>
<td>-0.03</td>
<td>0.007</td>
<td>-0.112</td>
<td>-0.031</td>
<td>0.008</td>
<td>-0.311</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>(0.473)</td>
<td>(0.738)</td>
<td>(0.000***))</td>
<td>(0.388)</td>
<td>(0.733)</td>
<td>(0.019**)</td>
<td>(0.447)</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.475</td>
<td>0.367</td>
<td>0.397</td>
<td>-1.181</td>
<td>-0.266</td>
<td>0.639</td>
<td>-0.921</td>
</tr>
<tr>
<td></td>
<td>(0.593)</td>
<td>(0.483)</td>
<td>(0.505)</td>
<td>(0.201)</td>
<td>(0.636)</td>
<td>(0.596)</td>
<td>(0.084)</td>
</tr>
<tr>
<td>Smartphone</td>
<td>1.045</td>
<td>-0.816</td>
<td>0.029</td>
<td>1.309</td>
<td>0.531</td>
<td>omitted</td>
<td>1.327</td>
</tr>
<tr>
<td></td>
<td>(0.253)</td>
<td>(0.287)</td>
<td>(0.97)</td>
<td>(0.203)</td>
<td>(0.478)</td>
<td></td>
<td>(0.079)</td>
</tr>
<tr>
<td>Income</td>
<td>0.00003</td>
<td>-0.00003</td>
<td>0</td>
<td>-0.0001</td>
<td>-0.00009</td>
<td>0.00003</td>
<td>-0.00005</td>
</tr>
<tr>
<td></td>
<td>(0.798)</td>
<td>(0.607)</td>
<td>(0.958)</td>
<td>(0.286)</td>
<td>(0.234)</td>
<td>(0.754)</td>
<td>(0.443)</td>
</tr>
<tr>
<td>Trust:ElecAuth</td>
<td>omitted</td>
<td>-1.134</td>
<td>omitted</td>
<td>omitted</td>
<td>3.587</td>
<td>omitted</td>
<td>2.565</td>
</tr>
<tr>
<td></td>
<td>(0.37)</td>
<td>(0.958)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.077)</td>
</tr>
<tr>
<td>Trust:Baraza</td>
<td>omitted</td>
<td>0.577</td>
<td>0.905</td>
<td>1.198</td>
<td>-3.731</td>
<td>1.152</td>
<td>-1.948</td>
</tr>
<tr>
<td></td>
<td>(0.508)</td>
<td>(0.703)</td>
<td>(0.262)</td>
<td>(0.002**)</td>
<td>(0.425)</td>
<td>(0.083)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.667</td>
<td>-0.726</td>
<td>1.694</td>
<td>1.992</td>
<td>-0.585</td>
<td>16.702</td>
<td>0.493</td>
</tr>
<tr>
<td></td>
<td>(0.774)</td>
<td>(0.674)</td>
<td>(0.024**)</td>
<td>(0.288)</td>
<td>(0.761)</td>
<td>(0.039)</td>
<td>(0.778)</td>
</tr>
<tr>
<td>Pseudo-R2</td>
<td>0.063</td>
<td>0.035</td>
<td>0.274</td>
<td>0.152</td>
<td>0.186</td>
<td>0.434</td>
<td>0.112</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001
dependent variable, which is an artifact of doing the surveys as part of Sentinel Project’s training program. To correct this a follow up survey would need to employ a proper randomization strategy and expand the sample.

The models for acting on mobile phone, newspaper and radio returned significant results. The variable for age in the mobile phone model is both significant and returns a negative coefficient, which is in line with the assumption in Hypothesis 3 that states that younger respondents are more likely to prefer horizontally integrated mediums of information. In this case the medium is mobile phones, which can be used to share text messages and web-based content. I found the lack of significant relationship between smartphone ownership and acting on mobile phone information surprising, though this could be a function of the small sample size. An alternative to the sample size explanation is a political-economic one; people who can afford smartphones will tend to be wealthier and could have affinities with national political parties, making horizontally sourced information less important them.

This potential argument finds grounding in the model for acting on newspaper information. We see the two significant variables in that model are trust in election authority, the proxy for national government, and trust in Baraza, the local governance entity. The direction of the coefficients is what is important in this case; people who trust the Baraza are far less likely to act on information in the newspaper than those who trust the election authority/government. This could be a function of people with higher economic and political status trusting the sources of information from their respective political parties, since Kenyan media ownership tracks with party affiliation (Nyanjom 2012). If
people who trust government also own smartphones this could help explain why smartphone ownership does not predict acting on mobile phone information: Smartphone owners have different political reasons for trusting vertically integrated sources and mediums of information. This assertion, while potentially interesting, requires further exploration requiring a larger sample.

The mode for acting on radio returns an interesting result, with younger respondents being significantly more likely to act on information from the radio. This was not what I expected to find in this model, though there is a history of local vernacular radio stations broadcasting inflammatory messages during election periods since 2002 (Somerville 2011) which coincides with the rise in youth wings of parties that have been involved in election violence over the same period (Kagwanja 2006). In the descriptive statistics people noted a distinct preference for vertically integrated information, and radio represented the highest percentage of vertical sources people would choose as the most important source of information. It is possible that activation of ethnically defined party youth wings takes place through vernacular radio; further qualitative research would help clarify the relationship between age and taking action on radio.

The models reinforce the findings in the descriptive statistics – while horizontally integrated technologies are readily available in Kenya, and indeed are being used in various types of public and administration and development initiatives, the necessary step of people being willing to act on information them during periods of political instability as part of a collective process of maintaining stability are not borne out in the data. The descriptive results are the most compelling indicator since they come from two different samples of
respondents; in Nairobi a random sample did not report trusting information from any source at a rate of higher than 50%, while a smaller sample of respondents who had been involved in an ongoing crowdsourcing training program reported horizontal information preferences at a rate of well below 50% that they would not act on information from a mobile phone. The regression analysis helps identify some micro-trends in the responses, indicating that youth is a significant indicator of acting on mobile phone information, but this is confounded by the much larger effect of youths preferring radio (the Age $\beta$ for acting on mobile phones was -.112 versus the $\beta$ for acting on radio at -.311).

To provide some comparative data, an alternative case to look at is Samoa. Samoa deals with a different stressor, natural disasters, and is vastly different in terms of social and political stability. Unlike Kenya, Samoa is monoethnic and has a long and relatively peaceful history since independence. In Kenya we see that availability of new technologies does not mean that people use them for social and political purposes. This could be due to the nature of the social stressor though; election violence is a politically traumatic phenomena and the nature of political violence could be leading people not to share or trust information that comes from anything other than a well-established source such as radio or newspaper. Natural disasters, especially in a place that does not have the same political and social schisms that exist in Kenya, are far less politically charged and the likelihood that people will find ways to cooperate to maintain stability is much higher. This might motivate people to trust a wider variety of mediums and sources during disaster response.

Samoa also provides a ‘least likely’ case for information sharing and trust during periods of social duress, with a significantly less developed ICT sector than Kenya’s and
no particular recent history ICT for development programming. Because there has not been a push to use innovative technologies for governance in Samoa at anywhere near the rate that there has been in Kenya, I expect that people will rely more on radio and traditional mechanisms of information sharing even through Samoa’s telecommunications market is accessible across both islands. As I did with this case study of Kenya, I will provide some historical and political background relevant to information sharing behavior and social stressors in Samoa then provide descriptive and regression analysis of the survey data that I gathered in May 2014. The aim of the case analysis is to identify whether differences in social stressor, in this case natural disaster, make a difference in how people trust and act on horizontally and vertically integrated information.
CHAPTER 6: ICTS FOR DISASTER RESPONSE AND STABILITY MAINTENANCE IN SAMOA

For comparative analysis and to better understand how information flows and preferences affect crisis response, I will analyze the same information dynamics from the Kenya case through the lens of natural disasters in Samoa. The results from the Samoan surveys are interesting because they track with the Kenyan results, with respondents showing a strong preference for vertically integrated information across the sample. Regression modeling returns interesting results that support some of the hypotheses about age and gender, and also highlight some interesting socio-political dynamics in people’s action taking behavior.

The results from Kenya, the ‘most-likely’ case are challenging to a narrative that technology access leads to changes in organizational behavior. Across the board people prefer vertically integrated communication systems by wide margins, and this is reinforced by the fact that the sample was taken from a set of communities who have been involved in ongoing training about how to use horizontally integrated communication technologies for crisis prevention. Samoa, my ‘least likely’ case, experiences a different kind of stressor: natural disasters. These can lead to violence and conflict, as people have to manage limited resources in the post-disaster recovery phase. In many ways this is a purer collective action process than what is described in Kenya; the political and social dynamics in a post-disaster setting are not as purposefully difficult
to navigate as a contested election in a country with a history of political violence. With this in mind, how do people manage contentious collective processes in a country that is highly collective to begin with and do they have different preferences for vertically or horizontally integrated information?

This chapter starts with a review of the literature on natural disasters, resilience and violence risk. This section is intended to tie the case study of Samoa theoretically back to the core theoretical argument in Chapter 3. Essentially, what is the collective action problem people face in disasters and how does information sharing fit into that context? I will then introduce the case study, providing relevant history and social context as it relates to governance and social behavior as well as some background on the technology sector in Samoa. I will use the same approach to analyze the results of the surveys as in the Kenya case study. Descriptive statistics will be used to test the macro-level hypotheses follow by logistic regression modelling of micro-level trends in the data. To close the chapter I will discuss how I will do further synthesis and comparison in Chapter 7.

6.1 Community resilience after natural disasters

I look at natural disasters in this study for two reasons. One reason is to expand the way that we think about violence; traditionally we have analyzed phenomena like elections, land grabs, secessions, and coups among other things. Political shocks are what tend to get the most analysis. But violence can occur at the inter-village level or intergroup level when there are resource shortages after a disaster. Disasters lead to conflictual situations, which
means there is an opportunity for violence prevention. The second reason is to better understand how people share and trust information during different types of shocks. Information is political, and people might treat it differently in a fraught political environment like a contested election than they would after a less politicized shock such as a natural disaster.

In this chapter a key theme will be ‘resilience’, often used when talking about disaster response. To avoid an extensive debate about semantics, I will use the definition developed by Norris et al (2008). They describe resilience as a combination of economic development, social capital, information sharing, and competence. If local response organizations lack financial or human resources, their impact is diminished. This concept will play a key role in this chapter, since ICTs enhance the capacity to communicate among and between local groups. One interesting aspect of operational resilience that Norris et al (ibid) discuss is preparing to respond in a situation that cannot be planned for. This is where information sharing and trust become important; communities need to adapt to the initial pressures of a disaster, and this requires that people not only be able to communicate, but that they trust the information they are receiving.

Coastal communities and small island developing states face a unique set of challenges in terms of natural disaster resilience, requiring increased communication and planning capacity. Orencio and Fujii (2013) developed an index of resilience for coastal communities in the Philippines, which showed the importance of environmental sustainability for mitigating damage and social cohesion and planning for effective disaster response. While the Philippines faces high risk in its coastal areas it is even more important,
given this study’s analysis of Samoa, to look at the risks faced by small island developing states (SIDS). This group of countries is particularly vulnerable due to their small size, exposure to environmental risks that are enhanced by climate change, and relative lack of economic and political clout. I will explore this particular theme later in this study when I analyze communication and collective action issues in Samoa during disaster response.

Since the key theme of this study is how stressors lead to violence, it is worth looking at the extant, though limited, literature on disaster management and violence. This is an issue that policy organizations have developed an awareness of and are working to address. The first question: Is there a relationship between disasters and conflict? Nel and Righarts (2008) find that indeed there is a robust relationship between natural disasters and conflict events, particularly in the case of rapid onset, large impact natural disasters in countries that have weak institutions. But beyond this there is surprisingly limited academic research on natural disasters and violent conflict. The policy community is active regarding this question though. Peters, Keen and Mitchell (2013) write about the complexity of disaster resilience in weak states, noting that grounding analysis in specific contexts is key. They use the examples of different levels of risk reduction in Afghanistan, the Sahel region, Karamoja and Nepal to explore the ways that different conflictual environments affect disaster management and resilience (ibid). The United Nations Development Program (2011a) uses a similar approach to the case study method employed by Peters et al to analyze how their conflict prevention programming has worked in countries that are simultaneously affected by natural disasters. They found that there were two types of conflict dynamics that emerged depending on the size and scope of the disaster. In cases
where the disaster was small and had a rapid onset, there was limited risk of national level conflict, but the risk of local violence went up; larger scale, longer onset disasters like droughts tended to exacerbate national tensions leading to onsets of national levels of violence (ibid). The United Nations Environment Program also deals with conflict risk in their work, focusing on integrating environmental management strategies and resource use policies into wider peacebuilding processes in countries where they work.

By analyzing the relationship between post-disaster resilience and violence, I intend to look at a different set of collective action issues and how these can break down into violence, focusing on localized resilience in Samoa. What is particularly important is the role that information sharing and social networks play in resilience, which I will analyze in the case studies and survey data.

6.2 Samoa: High social capital, good government

Kenya experiences a type of violence that is driven by mistrust and a history of political elite manipulation of resources and identity. Contrast this with Samoa, a small, stable island state in the South Pacific region that is ethnically homogenous and has high social capital across society. Land and land use are governed by traditional land tenure rules that date back to the first habitation of the island. While the politics of Kenya have evolved as a winner-take-all process that rely on exclusivity, Samoa’s political and social systems are highly inclusive and collective. This is not to say that there are not problems with Samoan political culture, but what is important is that the type of intergroup violence
likely to manifest in Samoa will be driven by exogenous shocks such as natural disasters, that place strain on collective resources necessary for survival.

I want to know whether patterns of information sharing and trust during crisis are different in Samoa, and to explore these variations using a very unlike case to Kenya. I will follow the same rubric from the Kenya case, providing history of Samoa to paint a picture of the place and the history that has shaped its socio-politics. From there I will explore the specifics of modern natural disasters and the impact that they have on social cohesion, stress management and the political economy of the Matai traditional governance system. The technology space in Samoa is interesting, quite different from Kenya’s. While the technical capacity is similar (the infrastructure and transmission capacity are similar), the activation of the technology community and the ‘innovation’ space is limited.

In this chapter I am particularly interested in understanding how a country that is small, homogenous and only faces natural crises has adapted to the digital technology environment. Does the lack of political strife mean that civil society is less inclined to be innovative with their organizing and political communication? Does the lack of a historical security state mean that people are more likely to trust information shared digitally? Perhaps we see a similar pattern of information trust in both places; if so, does this tell us something about the sociological and collective attributes of information mediums and sources? These are questions I will address after exploring the Samoa case, synthesizing findings and discussing patterns of behavior that show up in all the surveys.
6.2.1 History and place

Samoa is a Polynesian country of approximately 190,000 inhabitants, with a land mass of approximately 1,100 square miles. Like its two neighbors it was colonized or incorporated in British protectorate in the 19th century, and upon independence joined the Commonwealth system. The colonial history of Samoa began in earnest in 1830 when the London Missionary Society (LMS) landed on the western island of Savai’i and brought with them the Bible and written language (Meleisea 1987). Much of the colonial history of the South Pacific revolved around Christian missionaries and shipping routes, a theme that we will see in our other two case studies. Between the arrival of the LMS and the take over of Samoa by the Germans in the late 1800s, there was a considerable amount of unrest fueled by Western interests in the region (ibid).

Germany became the sole colonial power in Samoa in 1899, when the United States was granted control over the eastern most islands (now American Samoa), and Great Britain ceded control of Samoa in exchange for German renunciation to all claims on Tonga and parts of East Africa. The Germans were not particularly interested in intervening in local affairs and focused on exporting copra and coconut oil; during this time Chinese workers were brought into the country to work on the plantations, many of whom stayed in Samoa and integrated into the population after Germany lost control of the islands after World War I (Meleisea 1987a).

In 1914 New Zealand landed military forces on Savai’i and overthrew the German leadership, effectively taking control of Samoa under the mandate of the League of Nations until 1962. The latter part of New Zealand’s trusteeship saw the uprising of the
Samoan population under the leadership of a collective of chiefs called the *Mau*, in an effort to nonviolently gain independence from New Zealand (ibid). While these efforts were initially met with violent resistance from New Zealand’s local administration, the *Mau* movement was successful in 1962. Samoa was the first island state to gain independence and signed a Friendship Treaty with New Zealand that year. This is an important historical point in terms of governance, identity and by extension information trust; in Kenya the post-colonial era was marked by winner-take-all politics, while in Samoa there has always been a strong ethnic identity nation-wide. This detail is worth bearing in mind when analyzing the survey results since it could describe tendencies toward trusting vertically integrated government information more readily.

In the modern era there is a unicameral parliamentary system that operates in parallel with a traditional governance system called the *Matai* system. The *Matai* system is a title system in which each family is holds a title that acts as the signifier of family leadership within the village as well as the bond to the family’s land (Meleisea 1987a, Hills 1993). In order to be a parliamentarian the candidate must hold his or her family’s *Matai* title. The political system is dominated by one party, the Human Rights Protection Party (HRPP), and during the period of interest from 2005 to 2007 Samoa was considered a de-facto one party state which led to their membership in the Inter-Parliamentary Union being put at risk (Samoa Observer 2009).

Samoa is unique in that is has a traditional land management mechanism that is based on a proxy, the *Matai* title, and it has an egalitarian land tenure system based on family voting (Holmes 1980; Tcherkezoff 1998, 2000). In the *Matai* system, the family
can choose to bestow the title on any person they choose. This could be a biological family member, although it is not uncommon for a popular or respected foreigner to be given a title (ibid). Titles can also be taken away if the title holder does not meet the duties expected of them; this has ramifications not only for the family, but also at the government level, since one must be a Matai in order to run for and hold a seat as a MP.

Samoan information sharing and stability are rooted in the Matai system and the strong familial bonds people share. We see a vertical governance relationship that connects the family unit to the national government through the Matai title system, and a horizontal integration of governance through the land tenure system which is governed by a static bond between the Matai titles and land. This horizontal integration is critical, since families only have control over the land their title is associated with. These socio-political dynamics are important to any grounded analysis of vertical and horizontal information sharing in Samoa, since authority to share information and be trusted are key to whether people will take action. The type of stressor matters as well – in the next section I will explain Samoa’s history and experience with natural disasters, which create collective action challenges and stretch local resources in the recovery period.

6.2.2 The type of stressor: cyclones and natural disasters

Samoa, in spite of its social stability, faces a set of stressors that can lead to resource shortages and potentially interpersonal and village-level micro conflict. Cyclones are the main threat, with the island group dealing with annual storms; a secondary threat is tsunamis, since the bulk of the population lives along the coast. This
section will discuss the tsunami threat since it is covered in the surveys, but will focus more on the cyclone risk since environmental and climate change are making storms more frequent and intense. The damage they cause is also island-wide and far more systemic than the damage caused by tsunamis, the last of which only caused significant damage along the southeast coastline of the main island of Upolu\(^{19}\). In an interesting twist it was the response to the tsunami that was cited in the surveys as conflictual factor. The politics of disaster response are indeed salient in Samoa, and while it does not lead to intergroup violence there is a conflictual aspect to how different districts benefited, or did not benefit, from the government’s responses.

Cyclones are not the only hazards that can cause an emergency or disaster in Samoa. According to Meldau (2013), earthquakes, volcanic eruptions, large scale fire in the capital, and inland flooding all pose potential systemic risks to the country (see also Government of Samoa [GoS] 2013). Cyclones have posed the most consistent threat to safety and security in Samoa and to the wider Pacific Islands region. While there are multiple annual tropical depressions and category 1-2 cyclones, there have been a number of storms over the last 30 years that have caused severe damage and led to significant economic loss:

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\(^{19}\) While the damage was isolated to this stretch of coastline it is worth noting that this stretch of land accounts for a large portion of Samoa’s tourist revenue. So while the damage was geographically contained the impact on the economy and relatively high population along that stretch of coast was felt nation-wide.
To provide perspective on the size of Cyclone Evan, the most recent cyclone, the image below shows the radar imagery captured during the worst of the storm, which hit in December 2012:

Figure 10: Tropical Cyclone Evan: Source, ABC News

Samoa can be seen in the middle of the image; the diameter of the primary storm cell would be approximately 500 miles across. Most of the serious damage caused by the storm was due to massive rainfall leading to extensive flooding in the urban area of Apia, as well as in the primary crop producing regions on Upolu island (GoS 2013). In Apia, the Vaisigano river basin was backed up with trees that has lost root stability farther up the mountains, leading to large dams of full size trees downstream in the city center, causing the Vaisigano river to break its banks by over five meters (ibid). Loss of life was
limited by the fact that the storm hit during the day, making it easier for villages and neighborhoods to prepare and move to safe ground. The post-disaster recovery required extensive public infrastructure work, as electrical and water supply were badly damaged. The World Bank also reported that over 6,000 people were displaced and required emergency shelter, with many being poor rural residents (ibid). The lack of water and electricity combined with the stress of dislocation and overwhelming need for short term emergency shelter created the kinds of collective action challenges at the local level that require serious information sharing and resource management. It is interesting to note that of all the infrastructure that sustained the least damage and operational interruption, communication infrastructure was the least impacted by the storm (ibid).

The Government of Samoa (2013) did note that under duress after the storm there were cases of ‘antisocial’ behavior, though these were limited. From the perspective of violence management, it is these kind of resource allocation pressures that can lead to break downs in inter-community cooperation; while Samoa is a generally stable place, Samoans can be quite violent and aggressive and the Matai system can exacerbate intergroup competition and potential for violence (Freeman 1986). It is within this context of post-disaster resource management and social pressure that I framed the questions in the surveys that were done across both islands regarding information preferences and trust among Samoans.
6.2.3 The technology environment

Samoa does not have the same international development industry focus on its technology sector as Kenya does. I would not be considered an innovation hub, and by most metrics it is a standard-performing emerging market for telecommunications and internet services. There are two mobile phone operators, Digical and Bluesky, and the combine to cover 100% of the country with 124% SIM penetration\(^{20}\) (GSMA 2015). The Samoa Posts and Telecommunications Corporation was broken up as a monopoly over the course of 2006-2011, with the World Bank supporting the separation of postal services (still under government control) and the privatization of the mobile phone and telecommunications sector (World Bank 2011). The International Telecommunications Union (ITU) (2012) set forth a broadband strategy that focuses on the effective use of broadcast spectrum, working with the government of Samoa to maximize the efficient use and pricing of available spectrum so that new telecommunications and internet services can be integrated into the wider ICT market efficiently and cost-effectively. This strategy has worked well, particularly as Samoa has prepared to add new undersea cable connections and expand fiberoptic internet access between 2014 and 2017 (World Bank 2015).

As noted earlier the Samoan technology sector is not a ‘hub’ of development and governance innovation in the same way that the Kenyan sector is. As a Fulbright-Clinton Fellow during the 2013-14 academic year I was seconded to the Samoan Ministry of

\(^{20}\) SIM penetration is the indicator for the number of SIM cards, or unique phone numbers, per person. Thus, Samoa has 1.24 unique SIM cards (not necessarily phones), per person.
Communications and Information Technology [MCIT]. I was tasked with helping MCIT with their ongoing update to the Telecommunications Act 2005, which governs all telecommunications policy in Samoa. Specifically, I worked with them on sections of the Act that dealt with the role of the telecommunications sector during disaster and crises response. Overall, Samoa’s regulatory regime is good given its level of development, ranking in the 50th percentile globally according to the World Governance Indicators [WGI] (2016). What was lacking were regulations that were peace, or in this case disaster, aware. I will discuss the laws themselves, and indicate where there were disconnects between the government’s and ICT sector’s interpretations of the policies, and how the government and private sector found common ground in revising the regulations around government use of ICT infrastructure during natural disasters. In discussions with colleagues at MCIT and the Office of the Regulator [OOTR] I learned there were issues with coordinating the government’s needs for ICT access during the Cyclone Evan disaster in December 2012, and that the telecoms were not particularly helpful in the process. I reviewed the Telecommunications Act 2005 to see if there was any legal argument for the government being able to request or demand use of privately held ICT infrastructure. Indeed, the language can be found in Part XIII, subsections 69 and 70. They state:

69. National Security-(1) Despite any other law, a service provider shall comply with any written request, direction or other requirement of the Attorney General regarding access to any part of the service provider’s telecommunications network or telecommunications services or related information in connection with national security requirements or the prevention, detection or prosecution of any breach of the
laws of Samoa. (2) A service provider shall provide any facilities or capabilities, required for compliance with subsection (1) at the service provider’s expense, but may apply to the Regulator for an order dealing with the treatment of any substantial additional expense. The Regulator may consider such application in connection with any tariff approval application or recovery of the costs of universal access obligations, and make an order regarding the recovery of such additional expense. (3) For the purposes of subsection (1), the Attorney General may determine that any event or matter concerns national security or the prevention, detection or prosecution of any breach of the laws of Samoa.

70. Public Disaster and State of Emergency-(1) In case of a public disaster or state of emergency, service providers shall comply with any directions issued by the Commissioner of Police and/or the Chief Executive Officer of the Ministry responsible for disaster co-ordination to respond to or alleviate problems faced by the public or the Government related to such disaster or emergency. (2) Service providers may apply to the Regulator for compensation or other assistance with the demonstrated costs of complying with subsection (1), but not for loss of revenues during any period of service suspension. The Regulator shall consider any such application in accordance with this Act and other applicable laws of Samoa, and may make an order regarding the recovery of such costs. (3) For the purposes of subsection (1), the Commissioner of Police and/or the Chief Executive Officer of the Ministry responsible for disaster co-ordination may determine that any event or matter is a public disaster. (OOTP 2015, 146-7)

My initial assessment of these regulations was that they were quite broad, and when I had a chance to discuss them with colleagues from the Samoan telecommunications sector this lack of definition was what made them unlikely to comply with a government request to use their infrastructure and bandwidth. What I saw in the laws were two gaps. The first was what is the definition of a disaster or national security threat? Both sections leave this to the discretion of the Attorney General, Commissioner
of Police and CEO of the Ministry for Natural Resources and Environment [MNRE].

Reimbursement for lost revenue and expectations of what infrastructure and bandwidth would be used are also relatively vague. Because of this, the telecoms essentially refused to cooperate with government requests for access to infrastructure and bandwidth, donating what they deemed fair as part of their corporate social responsibility [CSR] policies. In private conversations with senior staff from the telecoms, they essentially told me they would take legal action against the Government of Samoa if it attempted to enforce the laws. All in all while the telecom sector was generally well regulated and functional, there was a lack of trust and shared process between the government and the telecoms when it came to national security and disaster management issues.

What I found as I became more acquainted with the institutional cultures of MCIT, OOTR and the telecom sector was that all three sectors recognized the need for coordinated response to disasters, but lacked a cohesive operational view of how to achieve it. MCIT was in charge of drafting policy and holding public fora for review. OOTR viewed itself purely as an enforcement arm, focusing primarily on business continuity and being as hands-off as possible. The telecoms viewed their CSR policies as sufficient, and saw too much financial risk in the government’s security and emergency laws. Critically, the Commissioner of Police and MNRE, the bodies empowered with

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21 MNRE is the ministry that houses the Disaster Management Office, and acts as the coordinating body for all natural disaster response operations.

22 No regulatory regime is perfect, and MCIT and the OOTR does indeed spend a great deal of energy enforcing competition laws, fixing monopoly issues, and addressing consumer complaints. One of the major challenges that continues to vex regulators in Samoa is the cost of broadband data, which as of 2014 was almost ten times more expensive than in Fiji per megabyte. Given the resources available though, Samoa’s government does a relatively good job of supporting competition and business continuity in the ICT sector.
using the ICT infrastructure for security and disaster management, expressed a lack of awareness that subsections 69 and 70 even existed in the Telecommunications Act 2005. Everyone wanted coordinated ICT use during disaster response, but there was no coordinated process for defining the rules that would guide the stakeholders to that end. Recognizing that the business side of the technology sector in Samoa has developed ahead of the social and governance support side, the survey results are interesting when compared with a more developed social and governance ICT sector in Kenya. These problems create a potentially ripe area for citizens to meet their communication needs through coordinated horizontal information sharing. To better understanding whether this is the case, I will analyze the descriptive statistics and run regression analysis of the survey data from Samoa in the same way that I did in the Kenya case study.

**6.3 Survey results**

This section of the chapter covers the survey approach, including sampling and data collection, descriptive statistics, regression analysis and qualitative analysis from the case. The survey results address the hypotheses enumerated in Chapter 4, analyzing them using descriptive statistics as well as regression models. The results show that in Samoa people rely and act on vertically integrated information when dealing with natural disasters at a much higher rate than they rely on horizontally integrated information. There are also qualitative social and political factors that respondents shared with the research team that help clarify how political and economic factors impact how people judge and validate information from different sources, particularly the government. These include experiences of how quickly government aid and insurance were delivered, which
is dependent on a district’s political representation and contribution to the tax base. This political-geographic dynamic will be explained after the quantitative analysis.

The first section of the results covers the data collection and sampling process. I will explain how the sample was developed, who comprised the research team I worked with, the sample size and unique factors that came up in the data collection process that are unique to cultural and geographic factors in Samoa. One of the interesting advantages to doing face-to-face surveys in Samoa is that Samoans are generally very friendly, hospitable and social, almost to a fault. In a number of cases, in order to maintain our sampling approach and control the geographic proportion of responses we had to decline peoples’ interest in doing a survey. I will discuss how I would modify my survey methodology in the future if I were to return to Samoa in order to take advantage of the unique ways that people socialize and share information about politics and policy issues.

From this section I will move into descriptive analysis of the full dataset. These initial hypothesis tests will be used to understand which communication and information gathering modes the whole population prefers. These basic tests look at whether the majority of the sample, and the majority of different groups, prefer horizontally or vertically integrated communication systems. After these tests I will build a set of logistic regression models to identify which factors have a significant relationship with different communications mediums. These sections help identify large trends in the data, as well as micro trends among different sub-categories of respondents.

To close the section, I will discuss the qualitative issues that came up in different regions when discussing whether people trust the government to provide information
during natural disasters. In two regions on Upolu (RU1 and RU2 in Figure 9), socio-economic factors and political representation were very salient in peoples’ perception of whether the government’s disaster information was relevant and trust worthy. I will discuss in detail how economic geography and cabinet-level representation differentiate how these two regions interact with the government after disasters, and how the quality of these interactions impact how people gather and act on information.

6.3.1 Survey methods and data collection

To understand the preferences that Samoans have for different information streams, I devised a survey that asked three key questions: where do you get your news, what information sources and mediums do you trust, and what information mediums and sources do you act on? There was also meta data and demographic information collected in each survey, so that patterns of information use and preferences could be compared with things like gender, employment status, age and other factors. The survey questions are listed in Appendix 2. There were also open response sections to the question about trust in government; the qualitative data is discussed after the statistical analysis of the survey results. With the help of the statistics and computer science departments at the National University of Samoa, I created a sampling strategy that gathered survey responses from both islands in Samoa.

The advantages to doing a survey in Samoa are the small population size, the homogeneity of the population, and the population distribution. There are two ring roads around both islands and over 90% of the population lives along these roads. We divided the islands and indicated in Figure 9 and enumerators surveyed every other household
along the road moving clockwise until they reached the predetermined number of responses for their sampling site. Once we had collected the prescribed number of responses, they were tallied and analyzed. There were of course some challenges in the collection process. The enumerators had to make a special effort to collect responses from men in some areas since we were doing the research during the work day. This was solved by having the second day of collection in each region occur on a Saturday, when all household members were home. The capital district (C) required making sure that people actually lived in the capital area; because the country is so small, it is common for people to commute to the capital from all the RU regions. People who resided at least four nights a week in the capital district were considered residents, and their responses were tallied in the C sample. In all the survey process took two weeks, with the help of ten enumerators and three faculty from the National University of Samoa.

Figure 11: Map of Samoan sampling regions
The total sample was 400, with 382 surveys being properly completed. The 18 omitted surveys were excluded due to missing responses. 100 surveys were administered in Savaii (S), 150 in Rural Upolu (RU) and 150 in the capital region (C). Surveys were administered face-to-face with enumerators filling out paper forms. Non-response was not a problem in the surveys due to the nature of household management and social norms around accommodating visitors. In rural areas (S and RU), there is always at least one adult at home since the most of daily routine focuses on managing the family land and compound. In the Capital surveys were administered after the evening Sa, a mandated period of rest and prayer; after Sa most people would be in the house or on the property. One distinct advantage to doing a face-to-face survey in Samoa are the cultural norms around hospitality. When we approached the houses, people were highly agreeable to participating both due to the expectations of being hospitable to visitors and the general preferences that Samoans have for socializing. On a number of occasions, I had to decline to let people participate; often passers-by would be curious and ask to be interviewed. It was common for respondents, after answering the quantitative questions, to spend upwards of 30-40 minutes discussing the open-ended questions about trust in government disaster response capacity. If I were to repeat this exercise I would structure the surveys so that upon completing the quantitative portion the open ended questions could be discussed as a *fono*, a Samoan style of open meeting to discuss local political or policy issues, and the discussions recorded.

The sample was both geographically diverse, and represented a reliable cross-section of the population. Like the Kenya case study, the following section provides
macro-level descriptive statistics that address the hypotheses as well as regression models that explore the statistical significance of different demographic factors in how people choose to action on information from different distribution methods and mediums.

6.3.2 Descriptive statistics and macro-level hypothesis tests

The results were interesting, and did not track with what I necessarily expected. I will discuss the survey results and how they fit into a collective action framework in this section, then address the qualitative data on political economy and geography in the following section. The results of the surveys showed that Hypothesis 2 most effectively describes the overall information environment, where people prefer both vertically integrated mediums and sources at rates of 84-85%.
Having addressed the null and first and second hypotheses, the comparative hypotheses from the Kenya case are tested in the Samoa data. Age is the second indicator that a respondent may prefer a horizontally integrated source or medium. It is important to note that in Samoa the 50+ age group is relatively small, so it is important to note that the results for that age group are easily skewed by a few positive responses.
Based on the third hypothesis we see an expected pattern of preference for horizontal sources, with younger respondents preferring them at a higher rate than their older peers. Again, the oldest age group’s responses should be read with the understanding that there were limited elderly respondents in the sample. The hypothesis is not as useful for understanding why older cohorts prefer horizontal mediums at a higher rate than their younger peers. It is likely that there is an economic component at work which will be analysed in Hypothesis 5. First though there is the possibility that gender is a driver of preferences for horizontally integrated sources and mediums of information (Hypothesis 4).
The results for gender make sense within the context of Samoan social and administrative structures. The results show that women are more likely than men to favour horizontal sources of information, while both genders trust horizontal mediums at about the same rate. The explanation I put forward for the difference in horizontal source preference between male and female respondents is the role of the women’s committees in village administration. In a village there is a Matai committee, which are the titled members of each family, which plays the role of maintaining order. The women’s committee plays more of a systems management role; they organize events and are the
contact entity when external actors such as the national government are running programs in the village. In effect they are the implementing body of village governance and link households horizontally, so the preference for horizontal sources among female respondents makes sense. Because the relationship between source and medium preference are closely matched (preferences for horizontal source and medium are nearly equal), the income variable should be a good predictor of horizontal information preference in Samoa.

Figure 15: Horizontal sources and mediums are most important by income type
Since the volume of money that comes into a household every month is not necessarily the best predictor of wealth in Samoa, I created a dummy variable for the type of income someone earns. Formal income is from a salaried job, while ‘non-income’ can include informal farm or household labor, or being a student. In both the source and medium categories we see that respondents for a formal income are more likely to prefer horizontally integrated communication systems than respondents who are in the non-income category. Interestingly when we switch the question to smartphone ownership the pattern of horizontal source being preferred by smartphone owners is much higher, but horizontal medium is equally preferred by owners and non-owners.
This differentiation speaks to a set of socio-familial patterns in Samoa that can also be seen in how horizontal information sharing is preferred geographically. It is likely that those with formal incomes also play leadership roles in the family, so along with a preferences for horizontally integrated sources, they are also the owners of tablets or laptops which are horizontal mediums. Smartphones though are common enough that one does not necessarily need formal income to have access to one. It is important to note though that in all these different comparisons, the key drivers of behaviour in Samoa are going to be familial and social; rank and role within the family unit and community are
determinate in how information is gathered, and who is likely to have access to different technology mediums, especially when discussion horizontal information sharing.

These familial and social roles aggregate in interesting ways when preferences for horizontal information sharing are looked at by urban/rural location. Part of the sampling strategy in Samoa was to divide the country into urban (Capital), rural Upolu, and rural Savaii samples, with quotas for each unit. Because of the infrastructure in the capital Hypothesis 7 says that respondents in the Capital quota will prefer horizontally integrated information systems at a higher rate than their rural counterparts. The results indicate that it is actually the Rural Upolu quota that have the highest rate of preferring horizontally integrated information.
The reason for Rural Upolu having the highest rate of preference for horizontal information is most likely attributable to the structure of horizontal social networks in Samoa. Samoans who live in the Capital area maintain an affinity and social connection with their family networks in the wider Upolu (and Savaii) regions. When people engage in horizontal communications the networks are integrated through familial networks, which are based in rural villages instead of urban centers. Rural Upolu has the highest rate because it has the highest rural population, with close proximity to the capital; Savaii would likely have a similarly high rate if it had the same population and proximity to the capital. People who live in the capital, and have social networks based exclusively in the
capital, are more likely to rely on vertically integrated broadcast information since their horizontal social networks are going to be thin. While we see the general preference for vertically integrated information across all the hypotheses in the descriptive statistics, regression analysis can help identify acute trends across the sample and give more depth to some of the more complex social and geographic dynamics at work in Samoan communication networks during disasters.

6.3.3 Regression analysis of respondent data

The descriptive statistics paint a macro picture of a population that universally prefers vertically integrated information sources and mediums. To test these findings in a finer-grained way I built seven regression models looking at similar independent variables to the Kenya case. The regression analysis highlights some interesting findings that provide support to some of the underlying assumptions the field makes about technology use in collective crisis management, while also highlighting areas where qualitative data from the case study either contradict or problematize assumptions about social technology use during crises. The significant negative relationship between trust in central government and preference for horizontal information sources in model two is interesting from a political economy and representative perspective, and will be examined in greater qualitative detail. Age, gender and income are significant in the internet model, while the findings about the role of geography in whether people act on information from TV are possibly an artifact of the sampling approach.
In model two, where Horizontal Source is the dependent variable, the explanatory variable “Trust: Gov for Relief” is significant and negatively correlated. What this tells us is that as people trust the government they have a decreased preference for horizontally integrated sources of information. On its face this makes sense: As I increasingly trust the government’s ability to deliver relief after a disaster, I will also probably be content to rely on the official information that it shares through official channels and news media.
This result matches up with an interesting dynamic emerged up in the qualitative data collected in RU1 and RU2 though, and it adds a nice layer of complexity to how and why people would choose to trust and act on particular streams of information.

While many of the respondents generally trusted the government and radio, there was an interesting division in the results between the northeast since of Upolu (RU1) and the southeast side (RU2). There was a noticeable difference in qualitative levels of trust between respondents in RU1 and RU2, with respondents in RU1 describing a much lower of trust in government and domestic mass communication, while respondents in RU2 had a very high level of trust in all information sources in comparison to other regions. There are a few layers of explanation to this, which have implications for the relationship between technology and information use and political geography.

There were two disasters on each side of the island that affected peoples’ trust in information. In 2009 a tsunami destroyed much of the coast line in RU2, and in late 2012 a force 5 cyclone destroyed much of RU1. In RU2 reinsurance from the government was issued quickly, and high risk villages were moved uphill at government expense; people in RU2 experienced efficient, rapid support after the 2009 tsunami. In RU1 people affected by the cyclone noted in the surveys that the government had not provided reinsurance or promised rebuilding supplies. Many respondents in this region had very negative views of the government and a lack of trust in information shared by the government. On the surface the basic fact that government services were not delivered had the effect of leading people to not trust information from the government delivered.

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23 See Figure 11 for the map of the sampling areas.
over broadcast platforms. But there are two more aspects of the political economy and geography worth noting in these two cases.

The first is that RU2’s political representation includes the Prime Minister [PM], who has served for two decades. This meant that when political capital needed to be spent to get reinsurance distributed and people moved uphill to new permanent residences, the region’s political representatives were supported by the PM. This is important in Samoa, where the Matai system plays an important role in politics. The familial and political connections are very important when activating emergency or government services. By comparison RU1 lacks the same political representation. Physical geography feeds the political economy of post disaster recovery assistance as well. RU2’s coastline is primarily beaches with a long lagoon. There are dozens of large resorts and many smaller village-owned restaurants, all of which provide tax revenue to the government. Indeed, tourism is a major part of Samoa’s economy. RU1 lacks beaches, farmland, and is particularly steep and rocky. There is limited tax revenue from this side of the island, and not much tourist infrastructure.

What is important about these details from an information sharing perspective is the role that political-economic and geographic factors play in affecting how people choose to trust and act on information. Putting this in the perspective of ICT in disaster, what it indicates is that social and political factors play a significant role in shaping how people interact with technology and information during emergencies and disasters. Thus, while people will use information and technology to try to manage collective action
problems during crises their experience of political and administrative processes have an effect on the values they place on different technologies and information streams.

In the third model, with ‘Act: Mobile’ as the dependent variable we see the ‘Trust: Matai for Relief’ variable return a positive, significant relationship. This dovetails with the relationship between trusting the central government and preferring vertically integrated sources of information; in a case where I trust the local Matai committee, with many of the members being part of my wider family network, I will be more likely to gather information through my mobile phone either through text messages or social media channels. This provides some support to the notion that organizing collective action at the local level, using familial or social networks, can actually be aided by having access to horizontally integrated communications systems.

The next model, where ‘Act: Internet’ is the dependent variable, matches up best with a number of the assumptions from the hypotheses. These include the assumption that younger respondents, women and wealthier respondents are more likely to prefer horizontally integrated systems of communication. In this case the horizontal medium is the ‘internet’, which in Samoa is predominantly going to mean Facebook and applications like SnapChat that require a mobile internet connection. Younger users tend to be more technology savvy, so this finding makes sense on that level. The theories around women’s voices having wider power through web based communications also gain some salience in this model. Finally, internet connectivity in Samoa remains expensive in comparison to neighboring countries, so it makes sense that respondents with formal incomes are more likely to act on web-based communication.
Women are most likely to act on information from the newspaper, which could be due to women having marginally higher literacy rates compared to men (UNICEF 2016). The last model, with ‘Act: TV’ as the dependent variable, is somewhat confounding. The first reason is that as respondents become increasingly rural, they become far more likely to act on information from TV during disaster recovery. The best explanation I can provide, which is an educated guess, is that this result is an artifact that occurs because of how televisions are distributed across rural households in Samoa. While the survey team had a randomization strategy for gathering respondent data based on the household, the distribution of TVs is not random in villages. For this reason there is a good chance we accidently over sampled households that had TVs in rural areas without knowing it and thus did not modify the question to account for this. The reason for gender’s significance in the model is also somewhat unclear, thought it could have to do with women in rural areas being proximal to TVs during larger windows of time during the day; again, this is informed conjecture. The significance of trusting the Matai for relief is also likely an artifact of TV distribution across households; I cannot offer an explanation beyond that for why this variable was significant in the model. If I ran this survey again, I would focus on TV ownership in the sample to try to account for what appears to be an artifact of the sampling strategy.

The results of the descriptive statistics and regression analysis point to macro-level preferences for vertically integrated information sources and mediums, and micro-level preferences for different mediums and sources based on age, gender and economic attribute. The other result we see in the regression analysis is the salience that trust in
government has in predicting peoples’ preferences for vertical and horizontal information. Those who trust the central government are more likely to favor vertically integrated information systems; this does not necessarily mean that they do not trust or observe information from horizontal sources, but that when it comes to taking action a vertically integrated source sufficiently meets their needs. These kinds of socio-political factors, as well as aspects of social geography and the authority of different sources, make comparative discussion of the results from Samoa and Kenya a valuable addition to this dissertation.

6.4 How do the cases relate?

Kenya and Samoa, despite vast differences in geography, demographics, political history and technology access, both returned results that were similar. In both cases the results show a strong preference for vertically integrated information. People have relied on radio and broadcast media so long, and it has worked reasonably well, that it is the source they trust by habit. While they gather information from multiple sources and mediums, the officialdom and reliability of radio is what leads people to trust and act on it. There is also an argument about scale. If I am trying to make a decision as a participant in a collective process then I need to know not only what is happening in my immediate vicinity or with my immediate friends and family, but also what is happening and what people in the next community over know.

Since radio covers a wide geographic space, what I hear on the radio is also probably what others are hearing in neighboring communities. This means that we are all
sharing the same information and if I act on it, others are probably acting on the same
information too. There is a symmetry of information that comes with broadcast, which
helps mitigate the possible negative effects of divergent, confusing, possibly
contradictory information being shared on thousands of phones and social media feeds.
Perhaps a way to think of the information eco system based on these results is that
personal ICTs such as mobile phones help people know what questions are being asked,
but when it is time to make a decision and act as a collective radio and TV broadcast are
what guide the group and represent the best aggregation of available information.

While in the aggregate vertically integrated platforms like radio are preferred and
acted on, there are also factors within the social and political contexts of both countries
that help us understand how and why different people prefer different technologies when
deciding how to take action during crises. These dynamics, which were highlighted in the
regression analyses and qualitative analysis of the cases, are useful in identifying
potentially systemic drivers of how people make choices about which information to act
on during a crisis. Chapter 7 discusses the results of the cases in a comparative light,
looking at the similarity of results from both and discussing why these similarities exist in
two places that are so fundamentally different. While it is outside the scope of this
dissertation to perform a more traditional Millian comparative analysis, the next chapter
aims to identify factors that could be used to ground future comparative case studies.
CHAPTER 7: ANALYSIS OF RESULTS AND REVISITATION OF THE ARGUMENT

This chapter goes into detail about the survey results and how they help us understand the theoretical issues around managing collective action problems during times of socio-political stress. While I will address the individual results of the surveys in the case studies, this chapter will provide deeper comparative analysis of the data with a particular focus on understanding why certain trends are reflected in both countries’ results. I will also use this chapter to go into greater depth about the qualitative details I saw during my field work as well as do analysis on sections of the survey data where people could select more than one option for sources and mediums.

To return to the argument, I am assuming in both cases that people in Samoa and Kenya are working to manage collective action problems driven by country-specific stressors. In Kenya this is elections, and the potential inter-ethnic violence that can occur in a politically charged environment, and in Samoa people have to manage the resource management issues associated with post-natural disaster recovery. They can do this in one of two broadly defined ways: they can act on broadcast media, which is vertically integrated and often requires the support of state infrastructure, or they can use horizontal ‘crowdsourcing’ methods, sharing information with social and local networks across mobile phones and internet-based social media. The data are particularly interesting because while the cases are quite different, the preferences shown by respondents in both
countries regarding horizontally integrated information showed similar patterns. There should be some expectation that differences in economic, political, social circumstances, or the nature of the unique stressors should lead to different preferences for information trust and action-taking. Indeed this was not the case and bears further analysis.

7.1 Comparing the results

By comparing two unlike cases with a focus on the type of stressor they face, it is possible to discuss patterns in the data in both countries in reference to managing collective action problems. The similarities are most evident in the data; respondents in both countries trust and act on information from broadcast media and professional reporters, even if they acknowledge and trust friends, family and local actors. While levels of trust in Samoa are generally higher, owing to obvious factors like cultural and political homogeneity, it is interesting that trends in information preferences follow similar patterns in both Samoa and Kenya. There are also interesting similarities that come up in comparing land use and access rules. Land tenure rules are very different in each country, but the ways that the political economy of land use affects trust is a factor that will be explored both as a similarity and a difference.

The overall comparison between those who find horizontal sources and mediums most important is quite similar in both countries. In both cases only 15-30% of respondents find horizontally integrated information to be the most important approach to information gathering during crisis. In Kenya the pronounced difference in horizontal source and medium as the single most important mechanism for information gathering
was interesting. While vertically integrated sources and mediums were by far the more trusted way to gather information, horizontal sources of information were favored by over 31.3% of respondents, while horizontal mediums were only favored by 8.7% of respondents. This indicates that horizontally integrated sources of information are often word of mouth, not necessarily requiring a digital medium to operate. When we compare this to Samoa, we see that both horizontal sources and mediums of information are preferred at similar rates, 15.3% and 14.7% respectively. This is attributable to the fact that Samoan social and familial networks are horizontally integrated, but are far more spread out. If one is to gather information from family about a cyclone or disaster in Samoa, the information could come from family in the village or from as far away as New Zealand and Australia. To tap into horizontally integrated sources it is inherently necessary for Samoans to use digital horizontal mediums given the wide geographic dispersion of Samoans across the Australasia region. If we look at the Kenyan sample and Samoan sample, the dynamic that emerges is that in the Kenyan case people could tap into horizontal sources of information without digital mediums due to the geographic dispersion of social networks, while Samoans require some digital medium access to tap into similar horizontal sources.

This difference in reliance on sources and mediums is interesting from a practical standpoint. For organizations doing peacebuilding or disaster response who want to leverage local networks, the dispersion of family and friend networks is a key indicator of how important the medium is for information sharing. While this might seem self-evident, the value in recognizing this comes into play when thinking about how people
will choose to take action collectively. In the Kenyan sample, using a digital medium to engage social and familial networks may be an extra unnecessary step when encouraging horizontally integrated information sharing. Indeed, it might actually make the horizontally integrated sources less efficacious if people lack access to digital mediums or are predisposed to not trusting information that is received through them. In Samoa though, it could make sense to support digitally mediated information from horizontal sources, since there is a cultural norm in Samoa for using SMS and social media to communicate with friends and family in New Zealand and Australia. The results indicate that it is important to differentiate how people assess and use horizontally integrated information since trust in a source could be impacted by the medium the source’s information is delivered on.

Age was an interesting variable in both cases, showing patterns in Samoa that supported the notion that horizontally integrated sources of information are favored by younger demographics, with the youngest demographic showing the highest rate of preference for horizontally integrated sources. When the question turned to horizontally integrated mediums though, it was older age groups that preferred them. This pattern was mirrored in Kenya as well, with the middle age cohort preferring horizontally integrated information at a higher rate than the youngest cohort. There are two explanations I will put forward for this. One is that younger respondents may use ICTs at a much higher rate than their older peers, but do not use them for news and political information. Conversely, older cohorts may not use ICTs in the same social ways that younger respondents do, focusing instead on gathering news and official information on them. The
second explanation is an economic one. Essentially, older cohorts can more easily afford things like smartphones, tablets and laptops which are the mediums associated with horizontally integrated communication systems.

The economic argument holds up in Samoa but is less descriptive in Kenya. Because Samoa’s horizontal communication systems are closely matched (source and medium are used in almost equal measure), the more able someone is to afford better cellular and computing technology the more likely they are to use it. Essentially, if I can afford a smartphone that supports video messaging I will buy one in order to stay in touch with horizontal sources of information such as family and friends who may be in different countries. In the Kenyan sample poor and upper middle economic groups are most likely to rely on horizontal sources of information, but this is explained more by the results in the Hypotheses 1 & 2 which indicated that horizontal sources are engaged face to face instead of through horizontal mediums. In direct opposition to the economic hypothesis the users who selected horizontal mediums more than any other were the poorest quartile in the sample. This result should be taken with a grain of salt since relatively few respondents from any economic group favored horizontal mediums, but it does indicate that there is relatively broad access to inexpensive horizontal mediums in the sample villages. Extending the economic argument, I posited that having a smartphone would make a respondent more likely to favor horizontally integrated information. In both cases the preference for horizontal sources were not especially effected by smartphone ownership, but, predictably, those with smartphones were more likely to favor horizontally integrated mediums.
Because the entire sample from Kenya was rural I could not compare a rural and urban sample there. For this reason the urban/rural comparison is only tested in Samoa. The sample is broken into three groups, urban, rural Upolu and rural Savaii. This test shows some of the more compelling qualitative aspects of how social geography and cultural norms affect information preferences. Savaii, the most rural and least densely populated island in Samoa show predictably low preferences for horizontally integrated sources and mediums of information. Given the low population density radio and TV are the most reliable and efficient means for gathering information. The preferences for horizontally integrated information become more salient and complex when looking at the results for Rural Upolu and the Urban Capital. The results show that Rural Upolu has the highest rate of preference for horizontal sources and mediums, marginally higher than the Urban respondents. This is most likely driven by the fact that relatively few Samoans maintain deep social and familial networks in the capital region. Many Samoans who work in the capital live in Rural Upolu, and their core social and familial networks are either based in their home villages or in New Zealand and Australia. Samoans who live exclusively in the capital are still likely to be primarily connected to social networks in Rural Upolu or Rural Savaii; people who live exclusively in the capital area and do not have deep socio-familial networks in the rural regions would likely have to rely on vertically integrated sources and mediums since social networks in Samoa are developed around family structures and Matai titles.
7.2 Other aspects of information use and trust

There is the possibility that when people have more than one option for information source and medium the results may be most varied than when people could only pick one direction of information integration. For example when people can select cellular phones and radio they may equally trust and be willing to act on both. While the hypotheses focused on the single most important direction of information gathering (vertical versus horizontal), there is scope within the survey data to analyze where people gathered news, which sources and mediums they trusted, and which ones they act on. The main difference with these questions in the survey was that people could select more than one answer. This set of options could help either solidify or problematize the main results, indicating whether there is a general trend that correlates with the rates of horizontal and vertical preferences in the primary results.

In Kenya there was also a set of questions that specifically addressed where people gather information during election periods, since there are multiple types of stressors in Kenya that can lead to violence. Analyzing the results of the multiple response questions adds depth to the case study results as well, allowing respondents to select a wider suite of information collection options that they would use during a crisis.
I included a question about mediums and sources that people trust. In the surveys there was a general question about the sources people trust. What is important about this question is that in reality people do not decide whether they will only use horizontal or vertical communication systems; they have a suite of options that can feed into one another, creating a larger picture of the world around them.

Table 4: Mediums and sources trusted in Samoa and Kenya

<table>
<thead>
<tr>
<th>Medium</th>
<th>% Trust</th>
<th>Medium</th>
<th>% Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>55</td>
<td>Mobile Phone</td>
<td>29</td>
</tr>
<tr>
<td>Internet</td>
<td>34</td>
<td>Internet</td>
<td>11</td>
</tr>
<tr>
<td>Newspaper</td>
<td>31</td>
<td>Newspaper</td>
<td>23</td>
</tr>
<tr>
<td>Radio</td>
<td>94</td>
<td>Radio</td>
<td>74</td>
</tr>
<tr>
<td>TV</td>
<td>80</td>
<td>TV</td>
<td>59</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>Other</td>
<td>1</td>
</tr>
</tbody>
</table>
As a collective action situation evolves, people have to trust the information they are seeing enough to take action. Again, like trust, people may use more than one medium to make a decision to act. Action can be driven by vertical sources coming through via horizontal mediums, or vertical mediums carrying general information. What I am most interested in is the volume of people who prefer horizontal sources when deciding to act. These results also show a distinct difference between the levels of trust across mediums and sources between Kenyans and Samoans. On the whole, Samoans tend to trust a wider variety of information mediums and sources more than Kenyans; this makes sense given the political and social contexts of the respondents. Kenya is a multi-ethnic, politically contested nation with a history of election violence and for many years a dictatorship. These variables do not lead to high levels of social capital and trust. Samoa, by contrast, has had none of these issues since independence – social capital and trust between people and families tends to be very high, even during periods of political or social conflict.
<table>
<thead>
<tr>
<th>Medium</th>
<th>% Act</th>
<th>Medium</th>
<th>% Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>49</td>
<td>Mobile Phone</td>
<td>35</td>
</tr>
<tr>
<td>Internet</td>
<td>24</td>
<td>Internet</td>
<td>8</td>
</tr>
<tr>
<td>Newspaper</td>
<td>19</td>
<td>Newspaper</td>
<td>26</td>
</tr>
<tr>
<td>Radio</td>
<td>94</td>
<td>Radio</td>
<td>72</td>
</tr>
<tr>
<td>TV</td>
<td>71</td>
<td>TV</td>
<td>51</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>Other</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>% Act</th>
<th>Source</th>
<th>% Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporters</td>
<td>73</td>
<td>Reporters</td>
<td>49</td>
</tr>
<tr>
<td>Friends</td>
<td>26</td>
<td>Friends</td>
<td>25</td>
</tr>
<tr>
<td>Mayor</td>
<td>41</td>
<td>Baraza</td>
<td>25</td>
</tr>
<tr>
<td>Government</td>
<td>44</td>
<td>Election Authority</td>
<td>46</td>
</tr>
<tr>
<td>Family/Matai</td>
<td>63</td>
<td>Family</td>
<td>22</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>
This makes the choices for sources and mediums people act on it both places interesting. The action choices are the most important set of variables in the survey after the horizontal versus vertical choice from the hypotheses. For practical reasons it does not especially matter what people trust, since merely trusting something may not be compelling enough to make a risky decision to stay in a collective action process. What people act on is key to a collective action process, and the more an organization knows about action preferences they more effectively they can determine with mediums and sources to reach out to a community through. I have an interesting personal experience to illustrate this.

When I returned from Samoa, I was invited to lead a panel discussion on technology and violence prevention at the Open Government Hub in downtown Washington, D.C. During my introductory remarks, every iPhone in the room chirped and about thirty of us saw an automated text message from the National Weather Service noting that there was a tornado warning for downtown D.C. Everyone then switched off their ringers and when I asked if we intended to move to the interior of the building, everyone agreed that we should wait until we hear the public emergency broadcast on the building’s PA system. No one would argue that the text message we all received was trustworthy; it came from the National Weather Service which is a very reliable vertically integrated source. But for a variety of reasons all of us in that room decided that it was advisable to wait until we had confirmation of the threat from a different, more traditional source.
The patterns that emerge in the survey data, where there is an obvious preference for vertically integrated information systems in both cases, indicates that there are factors at work beyond technology access that impact how people assess, trust and act on information coming from different sources and mediums. The results point to the need to analyze the qualitative factors that undergird social and political behavior in both Kenya and Samoa. At the most fundamental level the data from Kenya, the ‘most likely’ case, indicate that while horizontally integrated information has utility for people who need information during elections it is definitely not the most systemically important way that people gather and act on information.

This does not mean that people do not use horizontal systems for information gathering and sharing; an important factor that showed up in the data from both countries was the difference in how many people preferred horizontal sources versus horizontal mediums. As noted earlier horizontal sources come are endowed with social norms that predate access to horizontal mediums. These social norms track with qualitative factors like geography, political structures, and the political economy of access to actors within governance structures.²⁴ To understand these results more fully it is valuable to reference the qualitative data from the case studies about the social, political, and economic factors that guide information gathering and collective behavior.

²⁴ By this I mean that there is a political economy surrounding who within a community is granted access to members of local leadership; for example in Samoa the people who can interface with the Matai committees are often older and have some stature within their families. Men under the age of thirty are often considered too young to participate in significant governance and leadership processes.
7.3 Qualitative analysis: Geography, access and society

The evidence indicates that where there is horizontal information sharing, the driver is predominantly a social or contextual one, as opposed to access to technology. This is apparent in not only the hypotheses, but also in the other types of information gathering that people do. When people are gathering news, or have a wider selection of options for what they trust and act on, they have a notable draw to vertically integrated sources and mediums. So what helps explain the structure and space where horizontal networks operate? Geography, economy and social norms help map the nature of horizontally integrated information sharing networks. The history of land and geography in both case studies helps frame some of the horizontal versus vertical information preferences in ways that could be replicable. While financial factors were not especially indicative of whether people preferred horizontally or vertically integrated systems, access to sources and systems of communication remain indicative of how horizontally systems are integrated. These forms of access are driven by societal factors, structures of power and experiences of governance.

Social and physical geography play an important role in how systems of information sharing are integrated. I assumed at the start that local social networks would be indicative of a preference for horizontally integrated mediums such as social media and mobile phones. In the Kenyan sample the horizontally integrated networks people are part of are all local; this helps account for the fact that respondents preferred horizontally integrated sources at a higher rate. Horizontal information sharing happens face to face, so the value-added for using technology to mediate the process is lacking. This is not to
say that there is not some utility for having digitally mediated networks of people sharing information during periods of tension, but that this sort of network will actually be vertically integrated. The geographic issue at hand is making sure villages are connected digitally through their trusted leaders. The geography of digital crisis management in this case is based on Fearon and Laitin’s inter-group policing model; those with moral or leadership authority are the ones who are tasked with horizontally checking rumors among each other. They then provide assurances that they will make sure their communities are aware of the veracity of information, and this stage of horizontally integrated information sharing takes place within the village or community. The horizontal sources that affect individual-level behavior are accessible face-to-face, which is reflected in the data collected in Kenya. This was a very small sample though, so what it indicates is that at the very local level people will just speak to one another. I will admit that I had my own techno-social bias that led me to ignore this obvious outcome, and it makes the geographic analysis of Samoa helpful for identifying macro-geographic patterns.

The geographic dynamic in Samoa offers even more opportunities for analysis of network integration. With a sample spread over multiple different terrain types, and a social governance structure that is built around family networks that span multiple countries, horizontally integrated information systems can be impacted by physical, political and familial geography. Earlier the issue of government services being delivered in southeast Upolu and not delivered in northeast Upolu was noted as a reason that people did or did not trust government information. There are obvious political factors that drive
access to government resources in these two regions, a big one being the cabinet-level representation of southeast Upolu. The Prime Minister is from the region, and the interwoven politics of the Matai system and the parliamentary system can heighten differences in the delivery of services to different parliamentary districts. The economic question that was asked at the individual level, and returned negative results in the hypothesis tests, is more salient when looking at macroeconomic geography. Southeast Upolu is the country’s tourist and agricultural region, with some of the best beaches and terrain that supports large plantations. Northeast Upolu is steep, with generally rocky coastline and limited beach front. It is also on the windward side of the island, so it is constantly hit by line squalls during the dry season and is the side of the island that is more likely to be hit first by cyclones.25

Because of this southeast Upolu provides a deep tax base, so after a disaster it is the first place that gets government funding to rebuild and is more likely to have private insurance to back up the government support. This translates to two populations that have distinctly different experiences with the reliability of government information. The southeast knows they can count on the government doing what is says in an emergency; the northeast knows that the government has not delivered on its commitments so they rely on other sources of information during crises. Social geography matters for people in

25 In a twist of geographic fate, one of the most visually stunning beaches in Samoa is Tiavea Bay in northeast Upolu. It would be a perfect place for tourist infrastructure; the twist is that the beach is incredibly difficult to access, requiring a very capable four-wheel-drive vehicle. To get into the valley requires driving on tracks that either follow the coastline to the north or jackknife directly down the valley from the south. Both tracks, under the best circumstances, are steep and frightening to navigate. This problem occurs elsewhere in the northeast, where the access to certain bays that would otherwise be fantastic for economic development is nearly impossible because of the steep terrain.
the northeast, because they shift to relying on family members in New Zealand and Australia for information before and after disasters. Interestingly it is when information sharing becomes supra-local that horizontal mediums start to become key in efficient information sharing.

These qualitative results are challenged by the quantitative data in an interesting way. When I checked the who trusted the government versus Matai to provide relief, as well as whether people acted on government and Matai information, the results showed that people in RU1 marginally trusted the Matai more than the government to provide relief (93% trusted the Matai committee, while only 89% trusted the Government). This made sense – generally people had fairly high levels of trust across the whole sample, and it makes sense based on the qualitative data that people in RU1 would trust the Matai and family at a higher rate than the government. Respondents in RU2, who had subjectively better feelings about the government than those in RU1, trusted both the government (89%) and Matai (89%) to deliver post-disaster aid. Given the qualitative data I would have expected a higher rate of trust in government from respondents in RU2.

When the question turned to taking action, I checked the rates at which people in RU1 and RU2 took action on information from government and from their family Matai. The results were the opposite of what I expected. In RU1, only 46% of respondents would act on government information, while only 43% would act on family Matai information. This was in contrast with respondents from RU2, who subjectively favored government; only 31% would act on government information while 81% would act on family Matai information. The explanation I would use for this similar to the social
capital deficits in Kenya that lead to a general level of distrust in all sources and mediums; people in RU1 have not been well-supported by government and wider governance processes, and this has led to an overall decrease in their trust in sources when it comes to taking action. In RU2 the experience has been generally positive, so while government information is trusted, there is also the social capital in place to support a high enough level of trust in information from local Matai to act confidently. The main point I take away from these results is that a respondent’s previous experience with a source affects the social capital necessary to trust a source enough to take action later.

Access to information, and authority to share information, is another factor that can be determinate in the way that people engage with horizontal social networks. In the Kenyan sample, where the Sentinel Project had been training people in Tana Delta villages how to use technology to validate inflammatory information, it was the Baraza (local leadership) and the election authority that were the trusted sources. The first is horizontal in nature while the other is vertical, and access to them does not require horizontally integrated mediums since face to face communication is easiest with local leaders and the election authority will communicate via multiple mediums. Access and authority are even more identifiable as drivers of information sourcing and trust in Samoa, where relatively rigid rules governing who has authority in a village and between villages impacts how people gather and act on local information.

In hypothesis three I posited that youth are more likely to engage with horizontally integrated information streams, since younger citizens are ‘digital natives’.
In both cases this hypothesis was not supported by the data. The sample in Kenya is too small to make a general statement about why this is, though it would be reasonable to attribute it to economic factors; middle aged respondents are more like to have the resources to pay for things like smartphones. This is also reflected in the Samoan data regarding smartphones. But in Samoa age also plays a very specific, generalizable role in authority and the right to speak on behalf of a collective. It could very well be true that young Samoans use horizontally integrated mediums at a higher rate than older Samoans, but when placed in the context of decision making during a natural disaster the defined structures of information sharing and decision making are going to supersede any technosocial behavior. At the local level, the Matai committee is the executive authority and the women’s committee plays an implementing role. Both of these committees are going to be older, at least older than 30 and more likely older than 40, because authority is largely based on age in Samoan society. Young Samoans may play a rebroadcasting role, thought this is unlikely. Thus, in a village setting the most likely users of horizontally integrated mediums are unlikely to be the ones with the authority or rank to make decisions or rebroadcast information. This pattern holds up even in northeast Upolu, because a family member living in New Zealand can be a matai or have the social authority requisite to provide collective information through a horizontal medium.

What these analyses indicate is that when talking about horizontally versus vertically integrated information the question to ask is not necessarily ‘do people prefer horizontal or vertically integrated information’ but instead where in the social structure is the authority to collect and rebroadcast collective information vested, and how does this
map onto political, geographic and economic factors in the context people live in?

Through the case studies and survey data the results bear out that horizontally integrated communication takes place in both Kenya and Samoa, but how people decide to take action is much more dependent on vertically integrated communications. This has interesting implications for how organizations that are engaged in crisis management could engage with communities to support stabilizing collective action processes. To bring the theoretical and empirical implications back to the uses of technology for violence prevention the next chapter selects a set of technology-aided crisis interventions and analyzes them through the theoretical lens of collective action. Specific questions include: Did the intervention empower local actors or was it owned at the institutional level? Were communities networked together through the intervention, or was the data fed from the communities up to a central source? These kinds of dynamics can help clarify larger questions about where the agency for taking action rests when horizontally integrated communication systems are employed for crisis response.
CHAPTER 8: INSTITUTIONAL APPROACHES TO TECH AND VIOLENCE PREVENTION

To put the data and analysis into practical perspective and evaluate the overarching argument about whether people use horizontally integrated ICTs for taking collective action during crisis I will analyze examples of these tools being used in practice. While I will highlight examples from Samoa and Kenya, I will not limit the discussion just to these two countries, as there are interesting examples from other countries that are worth analyzing in relief of the data. My example selection is based on three factors:

1) There an active or potential crisis that could lead to violence in the locality/country;

2) The intervention designed with a specific application of ICTs in mind;

3) There was a third party organizing the process other than/along with the government or local actors.

The primary reason for limiting interventions to those that are in active or potential crisis/violent scenarios is to keep case selection in line with the scope of the survey questions. For example there are some excellent examples of mobile health projects that are used for extending health services into rural areas, and these rely on trust
and at times coordinated action. But the political and social dynamics around public health are different than a period of election violence or after a natural disaster. The concept of having to assess trust and action decisions with using ICTs for public health, rule of law and other aspects of public administration does have merit, and will be discussed in the concluding chapter. The second criteria is that the example has an explicit goal of using ICTs as part of its process. This stipulation speaks to the general theme, in which people will use these tools to solve their problems, and thus institutions should be designing interventions that take advantage of this behavior. The final criteria is whether a third party was involved. In most cases the push for increased use of ICTs in crisis management and violence prevention comes from the development community, including bilateral agencies, multilateral agencies, and large and small NGOs. Part of the analysis of these cases will analyze at how interventions run by various third parties were different.

The examples will be drawn from Kenya and Samoa, as well as a select number of well-known examples from other countries. In Kenya I will analyze the Amani 108 project, organized by the UNDP during the 2010 constitutional referendum, and the Sentinel Project’s Una Hakkika program that they have been running in the Tana Delta region aiming to prevent the spread of incendiary rumors. In Samoa I will look at the Humanity Road Ushahidi deployment, which crowdsourced information about damage after Cyclone Evan in 2012. The examples from other countries will include the now classic Ushahidi deployment in Haiti after the 2010 earthquake, the 2012 Ushahidi deployment in Liberia overseen by the peacekeeping mission to monitor the election, and
the Libya crowdmapping project set up by UNOCHA and the Standby Taskforce crowdsourcing volunteer group.

This section adds practical value to the discussion of ICTs in stability processes as well. One of the ongoing problems in the tech for social impact community, across a variety of sectors, is capturing data about what has worked and why. The last 5-7 years have seen a proliferation in high-quality blog content, which has been where many of the longest discussions around crowdsourcing in crisis settings have taken place. This is starting to change as longer term research projects begin to bear results that could not have been derived from the faster developments in the technology world (examples include Humphreys & van der Windt 2016 and Fichow & MacGinty 2016). One of the biggest problems that remains though is formal collection of lessons learned, evaluations of interventions, and overall descriptions of projects. It is difficult to theorize about the impact of technology on peacebuilding and violence prevention because information about these projects is often diffuse and was produced haphazardly. Even well-known events such as the Ushahidi project in Haiti after the 2010 earthquake have gaps and inconsistencies in the narrative of the technology intervention, in spite of two formal independent evaluations. These kinds of gaps will be addressed in each example; one goal of this chapter is to highlight the gaps and how they impact effective theorization of horizontally integrated communications systems in crisis management and violence prevention.
8.1 Kenyan and Samoan Examples of ICT-supported Crisis Response

Because the case studies and data come from Kenya and Samoa, the first three examples come from these countries. Knowing what is in the data and some context for the technology to fit into, the primary questions I will focus on include how the programs were designed from a horizontal versus vertical standpoint, who the key actors within the networks were, and how the systems mirror either an inter-group policing or fear spiral model. I will also discuss the effectiveness of the programs from a theoretical standpoint, recognizing that they were designed for different contexts and assessing them on their own terms.

8.1.1 Amani 108 and the Kenyan Constitutional Referendum

Amani 108 is the crowdsourcing program set up as part of the Uwiano Platform for Peace, a joint project of the UNDP and the Kenyan National Steering Committee on Peacebuilding and Conflict Management (NSC). Amani 108 was activated by the NSC and UNDP during the 2010 constitutional referendum in Kenya, and included crowdsourcing, crowdseeding (gathering data from trust actors in the crowd) and broadcast media approaches to managing the risk of election violence. The technology component is interesting and will be analyzed in depth, but this example will also focus on the actors involved in the Amani 108 implementation since they included government, civil society and the UNDP. The institutional make-up of the stakeholders plays as much a role in the success of the program as the effective implementation of the technology and communications set up.
The primary actors involved in the development and launch of the Amani 108 program include the Kenyan Government, multiple Kenyan civil society actors, and the UNDP. The organization of the entire project starts with the NSC, a Kenyan multi-stakeholder entity tasked with supporting peacebuilding and violence prevention in Kenya (NSC 2016). It was established in 2001 and housed within the Ministry of State for Provincial Administration & Internal Security (MoSPAIS). Part of the reason for its establishment was the recognized pattern of violence around elections, and the need to address the drivers of conflict that were leaving increasingly deep grievances between ethnic and political groups. The NSC counts Kenyan security and social ministries in its membership, Kenyan national civil society organizations, international rights organizations such as Oxfam and PACT, research organizations such as the Institute for Security Studies, UN agencies, bilateral aid agencies including USAID.26

The NSC was the body that established, with funding from multiple donors and the support of the UNDP, the Uwiano Platform for Peace. The Uwiano Platform for Peace is a coordinating project that focuses on local-level peace interventions, engaging with media partners to broadcast messages about peaceful conflict resolution, hosting village level events on peace and good governance, and establishing the ‘SMS 108’ system for reporting and sharing information at the local level via text message so it can be reported on radio and broadcast media. People could text information to the 108 short code, and it would be collected as part the Uwiano Platform’s civil society outreach process. SMS 108 was rebranded as Amani 108 during the 2010 referendum and the…

26 A full list of NSC members can be found at: http://www.nscpeace.go.ke/about-us/membership.html
broadcast communications were integrated with a mapping platform to geographically visualize the information being submitted to the 108 short code. This feature acted as a public archiving mechanism where text message reports could be available for later viewing, even as they were being broadcast through the Uwiano Platform’s media partners.

The actual Amani 108 project was run by the Uwiano Platform members with technical support from UNDP Kenya. As noted in the introduction of this chapter one of the major problems in the field has been documentation. The Amani 108 project was developed by a consultant, Zab Vilayil, on behalf of UNDP for the Uwiano Platform. While he did not implement the Amani 108 project, he designed the system of information collection, archiving and rebroadcasting that was used during the 2010 referendum. The Amani 108 project was designed primarily to provide ground truth information for government and civil society first and foremost, while providing a feedback loop to communities who were reporting their information on the 108 short code (personal communication 2012). While Mr. Vilayil was able to explain the process to me, he was the only member of the team that had deep knowledge of the process, and when his consultancy ended there was no embedded knowledge in the UNDP or NSC about how the project was set up.

Setting aside problems with documentation, the project was reasonably successful within the scope of the wider Uwiano Platform for Peace initiative. According the Mr. Vilayil the Amani 108 project provided an effective link between communities and police

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27 The map remains active and is available at: http://www.nscpeace.go.ke/108/
during the election, and was useful in engaging the government and international partners in monitoring hot spots and responding to incidents. As an intervention that drew on horizontally integrated communications systems Amani 108 was relatively successful. As a horizontally integrated system, did it support collective action at the local level though? I would say it partly did. Instead of a purely vertical or horizontally integrated system I would say Amani 108 was diagonally integrated. Local participants were using SMS text messages to reach out to the wider Uwiano Platform for Peace, which included local peace committees and civil society leaders as well as government and international actors. While it used vertically integrated information systems, the thrust of the narrative was based at the community level where horizontally integrated communication then took place. Referring back to Fearon and Laitin’s (1996) models of interethnic cooperation, the Amani 108 project engaged communities in an inter group policing process. It made horizontal communication between local leaders easier to manage, and in turn they could provide guarantees that they would make sure their communities would peacefully manage potential flare ups during the referendum period.

8.1.2 Una Hakika and rumor management

Una Hakika, which in Swahili means ‘are you sure?’, is a project organized by the Sentinel Project, a Canadian NGO, with funding provided by the Canadian government. The project is a community-level intervention in Kenya’s Tana Delta region in the southeast of the country, where long standing violence between agriculturalist Pokomo and pastoralist Orma tribes had been motivated by rumor mongering by both elites and
organic misinformation within communities. In comparison to Amani 108, the scope of
*Una Hakika* is far more local and takes the position that the best place to prevent violence
is within communities before it metastasizes into a larger scale event. The model focuses
on efficiently checking inflammatory rumors between communities, so that potentially
false but escalatory information does not have time to be disseminated and risk leading to
active violence. This example is especially interesting because the Sentinel Project helped
me gather the data for the Kenya case study. While analyzing the project design and
stakeholders I will also be placing the project context in relief with the survey data,
providing an opportunity to assess the relationship between the epistemology of the
project’s intervention and the behavior of the population they are working with.

The project was developed cooperatively between the Canadian NGO the Sentinel
Project and the Kenyan social enterprise iHub Research. The funding for the project was
provided by Canada’s International Development Research Centre (IDRC). *Una Hakika*
is remarkable among ICT for peace projects for its clarity of organization, process and
purpose. It is easy to find information about the project, including donors, implementing
entities, intended outcomes, and evaluation data. The project focuses on the Tana Delta
region, so unlike Amani 108 it is designed with a very specific use-case in mind. The
localized nature of the project makes it completely horizontally integrated, with the
reporting system built entirely around an SMS text messaging platform. Like Amani 108
*Una Hakika* uses a short code, 21512, that community members who have been through
an outreach program can send information about rumors to (Tuckwood 2014). The
message is processed and the *Una Hakika* team are alerted; from this point the message is
passed back to community leaders who have volunteered to be contact points so that they can assess the validity of the rumor. Once the rumor is validated or invalidated, the original sender is informed that action has been taken. Once the case has been closed there is follow up in terms of village outreach or conflict resolution between leaders or civil society actors to make sure that any negative effects from the original rumor are resolved.

Did the project work? Again, Sentinel Project and the Una Hakika team did an excellent job of transparently validating their data and the overall impact of the program in the Tana Delta region. In data releases the Sentinel Project team were able to model the flow of rumors, noting that proximity was less important than co-ethnicity in the process of a rumor spreading. Because of this a rumor could spread among an ethnic group, becoming increasingly volatile, while villages with a different ethnic make-up in the same area would be unaware that the rumor even existed. These kind of information asymmetries would lead to violence between ethnic groups, as one side had no idea what was going on while the other side had been exposed to a hyper-aggressive rumor for days. By setting up a system that allowed people to text in a rumor to a central source that would be validated by Una Hakika staff, and would then be broadcast back simultaneously to all village leaders, symmetry of information could be achieved quickly and rumor veracity checked (Silverman 2016). The Sentinel Project team’s data indicated that over the course of two years 1 in 15 citizens was using the system, and that these participants showed a pattern of sharing their information by word of mouth with an average of thirty people (ibid).
This is the best example of a horizontally integrated system I have found in my research. What is also compelling about this project from a violence prevention perspective is that people converted information shared digitally to face to face information sharing, keeping the horizontally integrated information sharing process going even in cases where other people were not participating in the text messaging. This is reflected in the data collected for the Kenyan case study, wherein people showed a preference for horizontally integrated sources of information at a higher rate than they do horizontally integrated mediums of information. The integrative approach to ICT for peacebuilding used in the *Una Hakika* project helped it overcome barriers such as low literacy rates, low levels of trust in information and fears of surveillance, and under representation of women by engaging with communities and using mobile phones as a mechanism for bolstering social processes of violence prevention and collective action (Tuckwood and Mutisya 2014).

### 8.2.3 Humanity Road and disaster mapping in Samoa

Humanity Road is an international non-profit staffed by volunteers who use their expertise to help close information gaps during disasters. They do this by leveraging internet-based communications systems to crowdsource data and package it for easier use by international organizations and first responders. After Cyclone Evan hit Samoa in December 2012 Humanity Road organized a mapping project called ‘Alerts!’ which use an Ushahidi Crowdmap to log publicly contributed data on post-disaster damage and needs. The map is well designed, with a variety of categories and well-defined
instructions for reporting local issues via Facebook, email, Twitter and through a web form. Unlike the two Kenyan cases this project was not implemented in obvious cooperation with a local partner, and I will speak to the issues that came up when the Samoan government became aware of the existence of the map and data that had been reported. It is an interesting case of a well-designed crowdsourcing exercise that failed to be as effective as possible due to a lack of coordination on the part of Humanity United with the relevant local stakeholders.

Humanity Road organized an activation of the Digital Humanitarian Network (DHN), a global organization of digital volunteer organizations that specialize in data management, digital mapping and social media analysis. Generally speaking, the DHN is only activated for a specific purpose and at the request of an international organization such as UNOCHA or a national government. The DHN essentially acts as short notice backstopping for organizations as they scale up in the immediate aftermath of a disaster. It is unclear to me in the reporting if UNOCHA or the Samoan Government activated the DHN, but based on conversations with my counterparts in the Samoan government I have serious doubts anyone in Samoa was responsible for the activation. Humanity Road claimed that UNOCHA cited/used the crowdsourced map in one of their situation reports (Wiggins 2012), but a cursory review of the UNOCHA Cyclone Evan Situation Report #2 gives no indication that UNOCHA or the Government of Samoa had used the map.  

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28 The situation report is available here, and contains no references to any crowdsourcing or digital mapping initiatives: https://phtpacific.org/sites/default/files/situation_report/101/files/TCEvan_SitRep2_14Dec.pdf
This example is a case study in how ineffective horizontally integrated information can be when the development of the project starts from the assumption that technology and remote volunteers can have an impact in a disaster response. The crowdsourced map itself is fairly well developed. If a response entity on the ground in Samoa were to use it as a data source they would find rich, useful data. The problem is that no one in Samoa knew about this map. No one in the surveys mentioned knowing about the map when asked, and during a meeting of government emergency management officials all were surprised when I pulled the map up during a briefing on crowdsourcing in emergencies. My counterpart, the head of policy in the Ministry for Communications and Information Technology, was unaware that telecommunications resources were being used to crowdsource information after the disaster. The head of the Disaster Management Office was equally surprised that this initiative had taken place.

This leads to an important question from a theoretical standpoint: Did any of the crowdsourcing and digital mapping support the collective action process of managing the post-cyclone recovery? The evidence from my time working with the Samoan government on this specific policy issue is no. Reflecting back on the data from the case study, as well as my time with the Samoan government, the Humanity Road Alerts map failed for a variety of reasons. The first is that information sharing in Samoan society does not happen in a vacuum; horizontally integrated information sharing is mediated through rigidly defined social networks such as Matai committees and women’s committees. For an outside entity like Humanity Road to set up a remote data management service and expect the information to be picked up broadly in Samoan civil
society shows a surprising lack of cultural awareness. The lack of obvious outreach to the Samoan government also shows a lack of awareness for how information spreads vertically; the government radio station, Radio 2AP, is the primary source of information for citizens during disasters.

Fundamentally the Alerts Map project by Humanity Road failed as a horizontally or vertically integrated system of information sharing system. Unlike Amani 108, they did not integrate into a governance network like the Uwiano Platform for Peace. Thus, they were not part of the wider government/civil society process for disaster response. Unlike *Una Hakika* the Humanity Road project did not display any understanding about the culture of information sharing and crisis response in Samoa. What the failure of this project helps demonstrate is that effective horizontally integrated information sharing during periods of collective action is less about technology and far more about understanding the social context of information sharing and action taking in a locality or society.

**8.2 Cases from Haiti, Liberia and Libya**

To supplement and generalize the cases from Kenya and Samoa, I am including three examples from other countries. While I will not make a direct comparison with the results of the surveys, since the data from these three countries could be different, I will do some general analysis of how the systems of information sharing were integrated and how the cases can help us understand the impact of these projects. The case from Haiti is considered a ‘classic’ at this point, though it is only from 2010. It received significant
media coverage and was something of a coming out party for the Ushahidi mapping software. The specific project, Mission 4636, was the volunteer-run crowdsourcing effort where students from Tufts university and Haitian expatriates worked to gather SMS and social media information and map it for first responders. In a year the technical volunteer community had been organized enough that UNOCHA was able to activate a group of volunteers to manage a crowdsourcing process for the evolving conflict situation in Libya. The final example comes from Liberia, where the UNMIL peacekeeping mission set up an Ushahidi instance to map the country’s 2012 referendum. The map and data collection was run from within the mission’s analysis cell with consultation from the Ushahidi team.

These three cases are important because they are all well designed crowdsourcing efforts, with third party intervenors using the technology to respond to a crisis (or potential crisis), but all also call into question the idea that in these kinds of situations the biggest value-added is an increase in local capacity. The primary question I look at in this dissertation is whether or not horizontally integrated information systems increase the capacity of local actors to manage collective action problems that arise during periods of crisis. All three of these cases, by their inherently closed nature, are excellent for operational awareness but also indirectly call into question whether the real value of horizontally integrated sources and mediums is at the local level.
8.2.1 Crowdsourcing with Ushahidi after the Haiti earthquake

Mission 4636 was the crowdsourcing program that drew on a base of Haitian volunteers to gather information through a toll free phone number, 4636 was the short code provided to callers/texters, with the information then being aggregated for the Ushahidi Haiti Project (UHP) map. This is an important distinction to make early; there is a difference between Mission 4636 and the Ushahidi Haiti Project, even though both are often conflated. The UHP was volunteers processing data submitted through different mediums, including the Mission 4636 group. Mission 4636 was a collection of local volunteers who were cleaning and translating data that was being submitted by local actors using the 4636 shortcode. The two projects had unique but overlapping aims, and because of this are often evaluated as related processes. They were also the first volunteer crisis mapping projects, and there was a significant amount learned from them that I will discuss since it speaks to how the Libyan and Liberian examples were developed.

The two main actors in Haiti for the crowdsourcing/mapping projects were Mission 4636 and the Ushahidi Haiti Project. Neither were affiliated with a major donor or multilateral mission, and required the services of volunteers and crowdsourcing technology companies to gather, validate and code data. For the sake of clarity this analysis will only draw on four sources to understand what happened with UHP and Mission 4636 in terms of crowdsourcing and horizontally integrated information gathering in Haiti. This is because, as with other projects that rely on crowdsourcing and volunteer data processing, much of the information is non-peer reviewed editorializing
and blog content which has led to significant confusion about the precise ways that crowdsourcing took place after the 2010 Haiti earthquake.

Munro (2013) and Shaw et al. (2010) provide an analysis of Mission 4636, which was the mobile phone supported crowdsourcing effort that drew on volunteers from Haiti and the Haitian diaspora to analyze and process text messages submitted immediately after the earthquake. The technical component of the process is described by Shaw et al. A toll-free short code, 4636, was set up with Digicel, the largest mobile network operator in Haiti. With the help of the U.S. State Department information about the 4636 short code was broadcast via radio so that people knew they could send requests to that number. CrowdFlower, a technology firm in San Francisco that specializes in data processing handled the throughput and categorization of text messages, provided the software system for volunteers to access the data and code it. Munro notes that during this process the participation of local and expatriate Haitians was key to cleaning, coding and preparing the data for use by international organizations.

As this process took off, the volume of data became overwhelming and the participation of the Ushahidi Haiti Project became important. The UHP worked with the Mission 4636 volunteers to take the data they cleaned and place it on an Ushahidi map. As data was processed and verified by the Haitian volunteers, teams of students at Tufts University were taking the verified data and mapping it. This is an important distinction; the Ushahidi Haiti Project was not actively crowdsourcing, they were taking data that had been crowdsourced and verified by local actors and were putting into a visual format that was more digestible for international organizations that were engaged in large-scale
search and rescue, aid delivery and public health tasks (Morrow et al 2011). Morrow et al are ambiguous about the actual impact of the UHP, noting that linkages between specific large scale outcomes and a crowdsourcing process like the Mission 4636 and UHP efforts are inherently difficult to confirm. This calls into question the idea that these technologies are have significant effects on local capacity to organize. Instead it indicates that the value added for horizontally integrated communications systems and crowdsourcing in crisis situations is that it increases the situational awareness and capacity of international organizations who must make large scale decisions quickly with limited data.

8.2.2 Cowdsourcing violence in Libya

The crowdsourcing project in Libya involving Ushahidi software and a team of Standby Taskforce volunteers was organized by UNOCHA when they realized there was going to be a significant humanitarian need after the fighting between pro and anti-Gaddafi forces ended. Because of the challenges of gathering information in a dynamic and evolving conflict environment UNOCHA decided to use crowdseeding to gather data digitally from within Libya and have the reports processed in a private Ushahidi deployment with the help of trained volunteers. In many ways this example is the best of the six explored in this chapter; there was organization at international organization level, clarity about what the volunteers were tasked with and able to do, and a product that was useful to UNOCHA after the initial data collection took place. Fundamentally though, this marked a distinct shift in what made a ‘horizontal’ approach work; it was not about providing information that local actors could use to overcome collective action problems,
it was about an international organization having ground-truth information so they could plan an intervention once the situation allowed it.

The Libya crisis map was set up after a request by UNOCHA for the Standby Taskforce, a volunteer organization set up to support crowdsourcing efforts after the Haiti response, for increased capacity to gather and geotag data contributed via cellular phone by trusted actors in Libya (Meier 2011b). This project, as well the Liberia example in the next section, are well designed but thin on detailed follow up analysis or evaluation. There was an effective activation or the volunteer community, the map was set up quickly, and teams of volunteers were quickly managing information flows that had been defined by UNOCHA. The project gathered on the ground data that would have been impossible to gather through traditional reporting mechanisms, using horizontally integrated technologies and innovative human resource management. The problem from a theoretical standpoint is that this project is so good because it specifically avoids making the data available to local communities, and does not use an open reporting process like Mission 4636. The reporters were predetermined, and the process was designed and managed at the international level.

This was the last time the Standby Taskforce was activated to gather and code data from a conflict setting. With this aspect waning, there was a move toward closed systems of information gathering and analysis, which we see in the next example. Fundamentally though, this evolution moved horizontally integrated communication systems away from local collective action and more toward international level data gathering and surveillance.
8.2.3 Mapping Liberia’s 2011 referendum

A year after the Libya deployment, and the decision by the Standby Taskforce to no longer provide volunteer support for crowdsourcing programs in conflict-affected settings, the UN peacekeeping mission in Liberia set up a crowdsourcing project that could be used as the primarily information gathering point for civil affairs and political data. Lt. Col. David Foster set up the UNMIL Situational Awareness Visualization Environment (USAVE) initiative, focusing on finding ways to visualize the data that was collected as part of civil affairs and security reporting. The initial USAVE deployment was during the 2011 referendum, when people could report information about the polling process. The goal of the project was to expand the idea of integrating all UN reporting into a mapped visualization, so that all UN entities operating in Liberia could have a centralized medium for capturing data and exploring relationships between processes across sectors.

Other than the map,29 there is only one significant piece written on the overall USAVE project and the horizontally integrated mapping component using Ushahidi’s software. It is co-authored by John Etherton and David Foster (2012) and provides an outline of the participants in the USAVE initiative. The initiative includes the UNMIL mission, the iLab in Monrovia, Ushahidi, and a variety of UN agencies working in Liberia. It is interesting that in this post the only actors involved in the USAVE process are involved with the UNMIL mission, other UN agencies, and the consultants from Ushahidi; at no stage does the post mention public data gathering, civil society

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29 Available here: http://liberia2011.ushahidi.com
engagement, or local level engagement. At this stage the project appears to be dead, with a Google search of “USAVER Liberia” providing only one hit (the original Etherton and Foster cited above) at the bottom of the first page after multiple listings for car rentals. A modification to “USAVER UNMIL” brings up three more relevant hits, but these are all references to talks by David Foster or one article from 2013 he wrote that mirrors what was said in the original blog post.\textsuperscript{30} Essentially the problem in this case is that there is a limited amount of information about the USAVER project, and what there is indicates that the project was centrally developed with no local or civil society input.

From the perspective of collective action the USAVER program is not developed in a way that would improve local collective action in any way. The structure of the project is entirely contained within the UNMIL mission; if the project is still gathering data it is not doing so publicly. What these examples indicate is that when technology becomes the driver of the data gathering process, which it did as these projects evolved from the local-actor oriented Haiti intervention through to UN-driven crowdsourcing, the entities that benefit the most from these technologies are large organizations engaged in data collection and surveillance.

\textbf{8.3 The Directionality of Information: Where does the power rest?}

The underlying argument of this dissertation was that horizontally integrated technologies may be changing the ways that people organize politically and socially, and

\textsuperscript{30} The entire search process turned up only 4-5 relevant hits, all of which were written by John Etherton and/or David Foster, and were all hosted on the Ushahidi blog.
that these new ways of organizing could have significant effects on how crises such as
election violence or natural disasters are managed. By managing the collective action
processes that are key to maintaining stability during periods of social and political
pressure, horizontally integrated technologies could help prevent violence at the local
level and significantly shift the agency for maintaining peace. The problem with this
argument is that it is problematized by the data from Kenya and Samoa, and when the
examples in this chapter are analyzed in greater depth the ‘best’ crowdsourcing
interventions are those that enable better information gathering by elite actors such as the
UN, not local actors such as village leaders or citizens. Is local agency in collective
action processes increasing at all if the most effective users of horizontally integrated
information systems are international actors?

One of the driving narratives around ICTs for social change is the idea that having
a cellular phone or connectivity to social media is inherently empowering. The individual
can take some control of their local situation, can organize with other local actors or
leaders, and can then craft solutions with the available crowdsourced data that meet local
needs before a problem becomes large enough that a government or international actor
must intervene. An important component of this narrative is the Western idea of
individuality, and the agency of the individual to make their own decisions. This idea is
not entirely misplaced; in a well written blog post Daniel Solomon (2013) explains how
violence happens in fits and starts, that as local data on violence trickles up it is also
mixed with misinformation, false positives, and changes in the political environment such
that it takes hundreds of uncounted micro-events of violence add up to what the world
sees as a single mass atrocity. In such a situation there is no way for an observer outside the locality of the initial sparks of violence to intervene because the data about the event will never make it onto Twitter or the front pages of the World’s newspapers. The only intervention at this stage is local, and this is why the Sentinel Project’s Una Hakika program is so well designed from an ICT for stability standpoint. The project intervenes in the messy, confusing period where rumor can metastasize into action, creating enough unease to peel people away from the collective process of stability and into the ostensibly self-preserving process of mob violence. Fundamentally though Una Hakika involves itself with a social process, with the technology playing a supporting role. When there is a shift to big data and mass organizing, what happens when the social process takes a back seat to the technology?

When technology takes primacy in a process, collective action gives way to institutional hegemony. In the Libya and Liberia examples, the questions facing the intervenors where questions of institutional process. How can UNOCHA have the best data possible when it comes time to implement its mission? How can UNMIL have the best data possible to be able to respond to threats? Both of these organizations have mandates and institutional goals that supersede local processes; crowdsourcing ceases to be about supporting local processes and becomes a new means of surveillance. Is this necessarily a bad thing though? Citizens in Western countries benefit in myriad ways from surveillance, and from effective communication systems between police and citizens. A perfectly fair question to ask someone in Liberia might well be: Would you rather have Una Hakika and rely on texting with your neighbors when you sense a
security threat, or just be able to call or text the nearest UNMIL field office and request a police or military team investigate a threat in your locality?

Perhaps a different way to assess the value and validity of horizontally integrated communications systems within the context of crisis management and violence prevention is to turn the lens back on the developed world. Would American or European citizens trade in their 911, 112 or 999 systems in favor of locally organizing responses to crises by using group SMS text messaging? As empowering as the notion of self-determination is in theory, I doubt many citizens in the Global North would decline access to centralized sources of governance and security in order to use horizontally integrated systems to create ‘local solutions’ when crises hit. The troubling narrative to emerge out of the case studies and examples in this chapter may be that the development and peacebuilding community are showing excitement about the innovative use of horizontally integrated communication systems, when indeed the only reason these innovations proved necessary was because governance and capacity were so utterly lacking that people turned to ad hoc combinations of mobile phones, digital maps and far flung volunteer groups to meet their basic security needs.
CHAPTER 9: CONCLUSIONS

People in Kenya and Samoa largely prefer to get their information from traditional sources and mediums when deciding to act during crises. These findings provide some push back against what has often been a technology-driven discussion of ICTs being used in developing countries for crisis response and violence prevention. While the macro results indicate is that grounding ICT for crisis response programming in both social and technological theory is critical; the descriptive statistics have a far more nuanced voice when they are analyzed within the framework of how people create meaning and understanding their actions as part of a collective process. When we view the use of information sharing through these socio-political lenses non-technology variables such as economic and political access, the geographic distribution of social and familial networks, and who has the authority to share information become contingencies for how people decide to trust and act on information. Access to technology is only the first step in the process of how people and communities establish the information sharing norms used for collective action during crisis. The variables that predict who will use which sources and mediums though are embedded in the political and social factors unique a country, and indeed localities within a country.

The previous chapters set up a theoretical grounding for whether or not people prefer on horizontally integrated information systems. In both cases and across different
demographics, people firmly preferred vertically integrated communications systems when it came to making decisions during crises. Even when given the option to pick multiple mediums and sources of information, people preferred vertically integrated broadcast systems by a wide margin. These results were surprising to a certain degree, in the case of Kenya because the sample was from communities that had been participating in local crowdsourcing training and in the case of Samoa because the society is so collectively structured that it would make sense for people to gather and act on horizontally integrated information. The qualitative analysis, case comparisons, and examples of projects analyzed in theoretical relief helped draw out certain social and political factors that point to areas where horizontally integrated communication and collective action take place. These could be at specific social levels within a community, or be based on factors like geographic distribution of family units.

What came to light in the data, case studies, and field examples was the importance of understanding how people and institutions use these tools. As Winner (1980) points out, technologies have politics; the choice in a community or in an institution to favor one type of technology over another signals wider intentions and values. These values are elucidated at each level, from the individual to the community, all the way up to the international organization level. Because crisis management and violence prevention is an integrated practice, where people and institutions working together can achieve the best outcomes, the ways that communication technologies are integrated into different levels of management indicate both the intentions of the users
and the potential problems that will be posed for coordination between communities, national actors and international organizations.

Understanding these intersections more clearly is a major contribution of this dissertation. After almost ten years of crowdsourcing, technology and ‘innovation’ taking place in the crisis management and peacebuilding sector there is enough data, experience and interest to more thoroughly unpack the social and political aspects of mobile and internet-based technologies. This creates space for further research on the human side of technology use during crisis, as well as an opportunity to ask questions about how institutional uses of technology affect society. These could be indirect effects, such as slow moving changes in the economic foundations as a country rebuilds and integrates new technology into its market place, or direct effects like a more active and connected civil society. The topics explored in this paper represent a new opportunity for social scientists to engage with classic literature on technology in society at a time when global technology access is increasing rapidly, and the global community is preparing to deal with the emergent 21st century environmental, governance and peacebuilding challenges that are upon us.

One thing that is clear from the cases and data is that people have specific behaviors and needs when it comes to how they assess, trust and act on information. Many of these needs are borne out of habit; people know to trust the radio and TV because those are the mediums that have always been used. Developing trust in new technologies and systems of information gathering takes time, and there are cultural and political factors that come into play when information sharing is taking place at the
community level instead of the traditional broadcast media level. Just like people, institutions have their own built in issues with integrating new mediums of information collection into their tool boxes. Years of bureaucracy and standards for information collection, clearance and dissemination run up against the unstructured and often insecure nature of horizontally integrated information systems. Even in cases where there are mechanisms for integrating big data flows from telecommunications databases and social media streams, many organizations lack the agility to deliver services as quickly as they can identify needs within crisis affected communities. By understanding the human and institutional propensities highlighted in the cases and field examples, there is an opportunity for true innovation to happen that recognizes the value of large scale data collection and processing for rapid community level response to emergent crises.

9.2 Further Research

While recognizing the opportunities for merging human and institutional behavior in new ways, there is still a lot to learn about how technologies are impacting social networks and collective action processes, as well as the secondary effects of large institutions shifting their information collection processes to different technology platforms. The technological impacts on social and political economies in crisis affected countries, from the community up to the national level, will create new opportunities for administrative innovation and economic growth.

The field of social informatics has provided many examples of how social scientists can conceptualize the ways that people communicate and network to
management collective action processes. While social informatics often focuses on purely
digital engagement, such as how affinity groups emerge on platforms like Twitter, the
logic behind these models can help deepen the understanding of traditionally social
science models of social networking and organization. The study of human interactions
mediated through digital hardware and software is an emerging liminal space between
large-N statistical studies of conflict behavior and household level case and survey
research of resilience at the micro level.

At an institutional level Winner’s (1980) analysis of the politics of technologies
continues to be salient, especially as large institutions working in crisis-affected countries
make shifts toward decentralized technologies for their communications, information
gathering, and civil affairs operations. The decisions that come with these shifts impact
how entire countries will recover from crises, as spending is directed at different types of
infrastructure, new regulations must be devised that account for business continuity needs
in settings where legal and governance continuity is lacking, and business practices adapt
to meeting the needs of international organizations operating in post-crisis settings.
Without understanding these macro dynamics in relation to the micro dynamics at work
in communities, our understanding of how technology impacts crisis response and
community resilience will be bifurcated in a way that maintains a synthetic line between
the micro and macro dynamics of social organizing and collective action.
9.2.1 Further research into behavior and collective action

One area that has exciting avenues for social research is how technology affects and can help explain patterns in collective action processes and information sharing. While the field of informatics has explored networked relationships for years, social science can help frame how technology is impacting socio-political networks in communities affected by crises. The Sentinel Project provided an example of one such discovery, noting how rumors propagated through ethnic networks over significant distance while skipping villages that were physically more proximate to the source of the rumor. More field research, including surveys and field experiments, about how people integrate new technologies into their daily social and political lives will be necessary for fully understanding how communities and governments will be strengthened or challenged by crisis and conflict in an increasingly digitally connected world.

To extend the research done in this project, I believe it would be useful to run the surveys again, but to take a sampling approach that accounts for political and geographic variation. One thing that came up in the discussions with Samoans was how much the delivery of aid after disasters affected peoples’ narratives of whose information they trusted. When I cross referenced the general distribution against the qualitative feedback people gave us, there was an interesting different in how people perceived government information that track political and economic factors; areas that were large tax bases and were represented in the cabinet tended to have respondents that were happy with the information provided by the government. Areas that lacked economic or political power reported that they had not been given promised resources and thus did not trust
government. What was interesting about this was that the data indicated the opposite set of perceptions. People who trusted government tended to prefer locally sourced information while people who did not trust government tended to prefer government information.

I would change the sampling strategy to gather data from political constituencies, gathering randomized sample from each voting district so that along with respondent data I could also create dummy variables for the rank of the district’s parliamentarian, party affiliation, district revenue and economic indicators. Essentially the goal is to shift from assuming access to technology and variation in the type of stressor are indicators of which information sources and mediums people prefer, to explicitly exploring the social, political and economic factors that impact end users. This would also make country-to-country comparisons easier to do; doing surveys in countries which have parliamentary voting districts that double as administrative regions would allow me to compare how the distribution of administrative and economic access in a country impacts peoples’ information preferences vis-à-vis other countries.

One of the primary areas that this kind of research can provide significant value is bridging the gap between small-n and large-N studies of conflict, violence and governance. Research by Firchow and MacGinty (2016) and Humphries and Van der Windt (2016) demonstrates that locally sourced data that reflects local perceptions can be predictive of conflict behavior. This type of research and data collective can be used to deepen the kind of quantitative research done at places like PRIO and UCDP, speaking quantitatively to large-N statistical research that analyzes conflict processes at the
country level. For example, when we analyze a political process through the lens of
government type using data such as Polity IV, micro and household level data collected
through mobile phone polling can provide disaggregated information about how people
experience the government described in Polity IV. Crowdsourcing and technology
supported research can help close the gap between how social scientists understand
system-level and household-level behavior during crises.

9.2.1 Institutions Using Tech: Better economic outcomes?

Just as communities and offline social networks will be affected by new
technologies, institutional adaptation to the new information environment will have
effects on national systems of governance and economics. In the case of Liberia, a
peacekeeping mission used open source mapping and mobile phone technology to run a
large information collection program. There is no evidence that this project had a
significant impact on mission operations, certainly did not change the way that the UN
Department of Peacekeeping Operations manages data gathering, and likely did not
engage the general public more than traditional civil affairs would have. By many
standard tactical metrics it would not be unfair to say that the use of horizontally
integrated technologies in this case was a failure.

Instead of thinking about technology for crisis response in purely tactical terms, I
would argue that there is value in viewing the use of technology by large institutions as
something that supports systemic resilience in societies. Large institutional actors like
peacekeeping missions bring big budgets into post-crisis settings, spending money locally
as they go about their work. Part of this spending includes communications and information technology acquisition, and in cases like the Central African Republic the technology and communications budget of a peacekeeping mission can equivalent to 2% of GDP (UNDPKO 2016). Large organizations in post-crisis settings can potentially be the market that drives initial private investment in infrastructure, import and export capacity, and insurance.

Communications technology plays a unique role in this situation because it is not only mission critical for peacekeeping and humanitarian response, but is necessary for the re-establishment of government capacity and links businesses domestically and internationally. When a peacekeeping mission arrives in a country like the Central African Republic their demand for data and connectivity, and their ostensible role providing security in a tumultuous situation, can spur communications firms to make initial investments in durable infrastructure. This can include cellular towers, basic cable networks, and server hubs; while these may initially only serve the mission’s communications needs, as the country stabilizes the user base will increase as businesses, schools and civilians begin using the infrastructure for general communications and information gathering. The fact that peacekeeping missions and other large institutional actors have money to spend on multi-use infrastructure could be where they bring the greatest benefit for long term stability. After their investment it becomes possible for smaller-scale tech-supported peacebuilding and governance to take place, because infrastructure that otherwise would not be built is in place as stability becomes the norm.
There is also a question of policy diffusion. Since end-user behavior when it comes to different information sources and mediums appears to be highly contingent on national and regional factors, how do international organizations and institutions make decisions about which technologies and innovations to introduce into their programming? It is unlikely that international organizations are doing end-user surveys about sources and mediums and information people trust enough to act on during periods of crisis, so this opens up the question of which political economic factors impact an organization’s choice to develop something like an ‘innovation lab’ or to pursue crowdsourcing programming in the countries they work in. Work by Gilardi (2010) and Gilardi, Füglister and Luyet (2009) explores how institutions learn from each other, and how political environments effect institutional learning. While there is probably some level of learning-by-seeing going on with institutional choices to integrate innovative technology into their crisis response programming, I would also propose that variations in core funding and a pro-innovation media environment can also lead to an increased likelihood of institutional innovation and technology use. Identifying the underlying patterns of how institutions make decisions to use certain communication technologies, particularly when compared to the preferences of people in beneficiary countries, can tell us a great deal about the political economy of technology and innovation in crisis response and development.

9.3 Closing Observations

The increasing integration of technology into our lives will have profound effects on social and political processes. We have seen how mobile phones and social media
changed the power dynamics in the Middle East in 2011, and how quickly governments learned from those events and adapted to the new information environment. ICTs, social media and mobile phones are increasingly turning into the liminal medium where horizontally integrated networks of family, friends, and communities can share information with each other and shape local action while simultaneously being observed by institutional actors who will adapt political and governance practices in response to these local actions.

The politics of information sharing through digital media has a long theoretical history which modern technology availability is now making possible to observe. It is not just theoretically compelling to observe what happens when a local community and a national government can see what the other is doing and thinking in real time through digital platforms. What governments and governance institutions do with the massive amount of data available to them, and the ways that citizens decide to share data with each other knowing that governments can see those interactions as they unfold, are going to have profound effects on the openness of government and access to opportunity in an increasingly digital economy.

The biggest risk facing researchers and practitioners working in crisis response, peacebuilding, and development is to imagine that horizontally integrated technologies such as mobile phones and social media are values-free mediums for information sharing that will only lead to more openness and civic consciousness in countries and communities recovering from the trauma of a large-scale crisis. The mediums reflect the social and political processes that were inherent to making them available, connect
people through the preexisting social networks that developed around differentials in power and access, and are reflective of both the preexisting openness of a government to citizen organizing as well as the learned propensities of communities to organize. Without understanding the politics and processes of communication in a society, horizontally integrated technologies will have little effect on how countries, communities and households recover and rebuild after crises.
APPENDIX

Appendix 1: Kenya Survey Instrument

Leveraging Communication Technologies During Elections

Survey form

Instructions: Do not put your name anywhere on this form. For open ended questions, circle the letter that best reflects your opinion.

General information

Village:

Birth year (e.g. 1960):

Gender (Male/Female):

Are you a Village or local leader? (Y/N):

Occupation:

Do you have a mobile phone? (Y/N):

Do you have a smart phone [e.g. Blackberry, iPhone, Android] (Y/N):

Do you use your phone for internet access? (Y/N):

Do you have a Facebook and/or Twitter account? (Y/N):

Approximately how much do you spend per month on mobile credit? KSH____________

Approximately how much do you spend per month on internet? KSH____________

What are your approximate total monthly household expenses? KSH___________
Do you trust the national government to provide security during elections? (Y/N):

Do you trust the local leaders to help provide security during elections? (Y/N)

Questions about news and information

From whom do you get your news (select all that apply)?

a. Professional reporters
b. Friends
c. Matai-Baraza
d. Government leaders-Local Authority (e.g. D.C.C, D.O, Chief)
e. Family
f. Other (please elaborate):

What sources do you use to get news (select all that apply)?

a. Radio
b. TV
c. Mobile Phone (SMS or voice call)
d. Internet
e. Newspaper
f. Face to face
g. Other (please elaborate):

Emergency information (during an election)

Who do you trust to provide information during an election (select all that apply)?

a. Professional reporters
b. Matai-Baraza
c. Family
d. Friends
e. Government leaders-Local Authority
f. Other (please elaborate):

What sources do you trust for information during an election (select all that apply)?

a. TV
b. Radio
c. Mobile Phone (SMS or voice call)
d. Newspaper
e. Internet
f. Other (please elaborate):
Taking action during elections

Whose information would you act on during an election (select all that apply)?

a. Friends
b. Professional reporters
c. Family
d. Government leaders-Local Authority
e. Matai-Baraza
f. Other (please elaborate):

What sources of information would you act on during an election (select all that apply)?

a. TV
b. Mobile Phone (SMS or voice call)
c. Radio
d. Internet
e. Newspaper
f. Other (please elaborate):

Importance of information sources

Whose information do you most trust during an election (select ONE)?

a. Professional reporters
b. Matai-Baraza
c. Government leaders-Local Authority
d. Family
e. Friends
f. Other (please elaborate):

What source of information is most important to you during an election (select ONE)?

a. Mobile Phone (SMS or voice call)
b. Radio
c. TV
d. Internet
e. Newspaper
f. Other (please elaborate):

Whose information is the least important to you during an election (select ONE)?

d. Government leaders-Local Authority
e. Friends
f. Matai-Baraza
g. Family
h. Professional reporters
i. Other (please elaborate):

What source of information is *least important* to you during an election (select ONE)?
a. Internet
b. Radio
c. Mobile Phone (SMS or voice call)
a. TV
b. Newspaper
c. Other (please elaborate):

____________________________________________________________
Appendix 2: Samoa Survey Instrument (English and Samoan)

Leveraging Communication Technologies for Economic Development and Disaster Response

Survey form

Instructions: Do not put your name anywhere on this form. For open ended questions circle the letter that best reflects your opinion.

General information

Village:

Birth year (e.g. 1960):

Gender (Male/Female):

Do you have a mobile phone? (Y/N):

Do you have a smart phone [e.g. Blackberry, iPhone] (Y/N):

Do you use your phone for internet access? (Y/N):

Do you have a Facebook and/or Twitter account? (Y/N):

Do you trust the national government to provide emergency relief? (Y/N):

Do you trust the Matai council to organize emergency relief? (Y/N):

In an emergency (e.g. cyclone, tsunami), who do you turn to first for help? Why? (Open ended)

Questions about news and information

News
From whom do you get your news (select all that apply)?
a. Professional reporters
b. Friends
c. Matai
d. Government leaders
e. Family
What sources do you use to get news (select all that apply)?
- Radio
- TV
- Mobile Phone (SMS or voice call)
- Internet
- Newspaper

Emergency information (e.g. cyclone, earthquake, tsunami)
Whose information do you trust during an emergency (select all that apply)?
- Professional reporters
- Matai
- Family
- Friends
- Government leaders

What sources do you trust for information during an emergency (select all that apply)?
- TV
- Radio
- Mobile Phone (SMS or voice call)
- Newspaper
- Internet

Taking action during an emergency (e.g. cyclone, earthquake, tsunami)
Whose information would you act on during an emergency (select all that apply)?
- Friends
- Professional reporters
- Family
- Government leaders
- Matai

What sources of information would you act on during an emergency (select all that apply)?
- TV
- Mobile Phone (SMS or voice call)
- Radio
- Internet
- Newspaper

Importance of information sources
Whose information is the most important to you during an emergency (select ONE)?
- Professional reporters
- Matai
- Government leaders
d. Family
e. Friends

What source of information is *most important* to you during an emergency (select ONE)?
a. Mobile Phone (SMS or voice call)
b. Radio
a. TV
b. Internet
c. Newspaper

Whose information is the *least important* to you during an emergency (select ONE)?
a. Government leaders
b. Friends
c. Matai
d. Family
e. Professional reporters

What source of information is *least important* to you during an emergency (select ONE)?
a. Internet
b. Radio
c. Mobile Phone (SMS or voice call)
a. TV
b. Newspaper
Una’iga o Tekonolosi o Fesootaiga mo Atinae ole Tamaoaiga ma le Tali atu i Faalavelave Faanatura

Pepa o Suesuega

Faatonuga: Aua le tusiina lou suafa ile pepa o suesuega. Faailoa mai lau tali i fesili e ala ile l’ioina ole mata’itusi o loo iai le tali ua e filifilia. Mo fesili e manaomia ai se faamatalaga, ua iai le avanoa i le pepa e te tali mai ai.

Faamatalaga Lautele

Nuu:

Tausaga fanau:

Ituaiga (Tane/Fafine)

E iai sau telefoni feavea’I (Ioe/Leai)

E iai sau telefoni atamai/matapoto (ftg. Blackberry, iPhone) (I/L)

E te faaaoagaina lau telefoni mo le Initaneti (I/L)

E iai sou avanoa(account) i fesootaiga ile FB poo le Twitter (I/L)

E te faamoemoeina le malo e maua ai fesoasoani i mataupu tau faalavelave faanatura (I/L)

E te faamoemoeina le pulega a matai e fuafuaina fesoasoani mo faalavelave faanatura (I/L)

Fesili i Talafou ma Faamatalaga

Talafou
O ai e te maua mai ai talafou (filifili uma tali e talafeagai)
d. O e faia lipoti
e. Uo
f. Matai
d. Ta’ita’I o le malo
e. Aiga
O a auala e te maua ai talafou (filifili uma tali e talafeagai)
f. leitio
g. Televise
h. Telefoni feavea’i (feautusi(tx) poo le valaau)
i. Initaneti
j. Nusipepa

Faamatalaga i Faalavelave Faanatura (ftg. Afā, mafui’e, galulolo)

O ai e te faamoemoeina e maua ai faamatalaga i faalavelave faanatura (filifili tali e
talafeagai)
f. O e faia lipoti
g. Matai
h. Aiga
i. Uo
j. Ta’ita’I ole malo

O a auala e te faamoemoe iai e maua ai faamatalaga I faalavelave faanatura (filifili uma
tali e talafeagai)
f. Televise
g. Letio
h. Telefoni feavea’I (feautusi poo le valaau)
i. Nusipepa
j. Initaneti

Gaioiga I taimi o malosiaaga faanatura (ftg, afā, mafui’e, galulolo)

O ai e te faamoemoeina ma usita’i/gaioi ai i taimi o faalavelave faafuase’I(filifili tali e
talafeagai)
f. Uo
g. Vaega fai lipoti
h. Aiga
i. Taitai o le malo
j. Matai

O fea ala o faamatalaga e te usita’I iai I taimi ua tupu le faalavelave faafuasei((filifili tali
e talafeagai)
f. Televise
k. Telefoni feavea’i(feautioni poo le valaau)
g. Letio
h. Initaneti
i. Nusipepa
Tāua o auala o faamatalaga

O ai e ala mai ai faamatalaga aupito taua ia te oe I taimi o faalavelave (filifili le tali e tasi (1))

f. Vaega fai lipoti

g. Matai

h. Ta’ita’I o le malo

i. Aiga

j. Uo

O le a le auala o faamatalaga e aupito taua ia te oe I taimi o faalavelave faafuasei (filifili le tali e tasi)

c. Telefoni feavea’I (feautusi poo le valaau)

d. Letio

e. Televise

f. Initaneti

d. Nusipepa

O ai e sili ona le tāua ana faamatalaga ia te oe I taimi o faalavelave faanatura (filifili le tali e tasi)

f. Ta’ita’I ole malo

g. Uo

h. matai

i. Aiga

j. Vaega failipoti

O le a le auala o faamatalaga e laiti lona tāua ia te oe I taimi o faalavelave faafuasei (1 le tali)

d. Initaneti

e. Letio

f. telefoní feavea’I (feautusi poo le valaau)

c. Televise

d. Nusipepa

I taimi o faalavelave faafuase’I, (ftg’ afā, galuloloa) o ai e te sulu muamua iai mo se fesoasoani? Aisea?

________________________________________________________________________

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Appendix 3: STATA Commands for Regression Tables
All data is available at https://charlesmartinshields.com/data/ for download, and by email request:

*Table 2: Kenya regression analysis
logit kenmedium kenage kensex kensmrtphn kenincm kentrstgov kentrstlcleader

logit kensource kenage kensex kensmrtphn kenincm kentrstgov kentrstlcleader

logit kenactblb kenage kensex kensmrtphn kenincm kentrstgov kentrstlcleader

logit kenactlntrntn kenage kensex kensmrtphn kenincm kentrstgov kentrstlcleader

logit kenactnwsopr kenage kensex kensmrtphn kenincm kentrstgov kentrstlcleader

logit kenacttv kenage kensex kensmrtphn kenincm kentrstgov kentrstlcleader

*Table 3: Samoa regression analysis
logit sammedium ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief

logit samsource ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief

logit samactmob ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief

logit samactlntrntn ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief

logit samactnwsop pr ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief

logit samactrdio ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief

logit samacttv ib1.samgeo samage samsex samempstatus samsmrtphn samgovrelief sammatairelief
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BIOGRAPHY

Charles Patrick Martin-Shields, a North Carolina native, graduated from East Chapel Hill High School in 2001. He earned a bachelor of arts in German studies from American University in 2005, before serving two years in Samoa as a U.S. Peace Corps Volunteer. After Peace Corps he returned to American University’s School of International Service, earning a Masters of Arts in International Peace and Conflict Resolution in 2010. During his graduate studies he has worked on peace and conflict resolution policy issues at the U.S. Institute of Peace, World Bank, and was a fellow at the Institute for Economics and Peace in Sydney, Australia. He was a Fulbright Scholar during his doctoral studies, doing fieldwork in Samoa while serving as a policy advisor to the Samoan Government’s Ministry for Communication and Information Technology. Outside academia Dr. Martin-Shields was a director with TechChange Inc, a Washington, D.C.-based training and consulting firm focusing on technology applications for international development and peacebuilding.