The effects of continual disruption: technological resources supporting resilience in regions of conflict

Introduction

Information and Communication Technologies (ICTs) are changing the way that citizens are responding to environmental disruptions. In conflict zones it can be dangerous for people to travel and maintain their normal activities. However, with ubiquitous technologies such as the mobile phone and Internet applications, people can coordinate and communicate to help restore activities through negotiating travel, increasing situational awareness, and conducting online social interaction.

Researchers have been studying the social effects of disasters for many years. Studies of disaster events have looked at how affected populations deal with being socially disrupted, and how individuals, groups, and organizations modify their behaviors in order to continue acting in this new context. This perspective is highly applicable to war situations – when people are living in a war zone, normal life is disrupted and people must modify their behaviors accordingly.

While the term *disaster* has received various definitions, disasters have generally been viewed as non-routine events causing social disruption and physical harm with the following key properties:

- length of forewarning,
- magnitude of impact,
- scope of impact, and
- duration of impact

Disruptions caused by violent conflict are also non-routine events that cause social disruption and physical harm. Civilians living in a conflict zone may need to halt routine activities, such as going to work, due to the constant exposure to bombs, militias, and other disruptive, life-threatening elements. However, there is one key defining characteristic that differentiates a violent conflict from a disaster. Disasters are generally single events in time and space that disrupt a society. Unlike disasters, when individuals live in a conflict zone they must deal with constant risk and uncertainty in their environment.

It is difficult to predict when or where a bomb will fall or a militia may strike. As such, civilians living in a war zone deal with random events on a daily basis for a prolonged period of time and must make themselves continuously aware of what is taking place around them in order to act.

By studying disruption as caused by war we can better understand how individuals maintain routine life on a daily basis during long-term disruption that may last for years. In a normal environment, we often engage in various practices for work, social life, education, travel, and obtaining information. By studying life in war environments, we can understand how people who are living through prolonged disruption maintain these practices in light of their situation.

Technologies to aid resilient behavior

During disruptive events, where the environment is unstable and activities are greatly unpredictable, civilians in the impacted area may be forced to change the way in which they live. Thus, when people face the unexpected on a daily basis, expectations for routine life may change. On the one hand, when people live through extreme situations they may no longer be able to travel to and from work or university. On the other hand, people may find ways to be resilient to maintain these routines.

Resilience has been defined in various ways, but the most common definition centers around people's reactive abilities – how people 'bounce back' and persevere despite the situation.

Researchers have identified various ways in which individuals, groups, and organizations are resilient in maintaining aspects of their daily lives during disaster, where one of the major sources of resilience is improvisation. When people are unable to act in traditional ways during disruption, they often engage in new behavior in order to cope.

During various types of disasters, ***people have improvised by altering their work locations or developing ad hoc facilities*** to maintain organizational function when workplaces were damaged or inaccessible. For example, Buenza and Stark (2003) reported how a Wall Street trading organization moved to a temporary site following the September 11th attacks on the World Trade Center and resumed operations six days after the event.

Additionally, ***people improvise by modifying their work hours in order to accommodate growing needs***. For example, it may be necessary for individuals to work for longer periods of time to maintain proper organizational functions.

Resilience has been observed according to people's ability ***to improvise by assuming various organizational roles, or developing new roles*** – where roles are defined as expected tasks associated with specific individual occupations. ***Role improvisation*** may ensure group and organizational stability during a disruptive event. A web developer assuming a clerical position when co-workers are unable to travel to work is an example of this type of resilience.

Other properties of resilience, in addition to the improvisational aspects covered thus far, enable an effective response to situations that are ambiguous with rapidly changing conditions. ***The properties identified are communication, creativity, wisdom, and respectful interaction***. Resilience has also been discussed as a series of properties for maintaining organizational function during disruptive events, namely, ***robustness, resourcefulness, redundancy, and rapidity***.

Resources also play a critical role in enabling resilient behavior. When disruption occurs, people often improvise the tools or equipment used to perform tasks. One theory of social practice, structuration theory, explores the relationship between human agency and social structure. In this view, Giddens realized that social structure and people's agency (their ability to act) form a recursive relationship – one where human agency can shape social structures, and where agency is mediated by social structures. Here, social structure is

composed of rules and resources, both of which are important elements in guiding people's actions. Resources have received special attention from researchers in psychology and the organizational sciences, as they enable people to act in various contexts. The use of resources (e.g. materials and information) is contextual: their meaning and use changes depending on the situation. This is important for the study of disasters, because when the environment in which people live is no longer normal, the meaning and use of resources can change accordingly.

Tool and equipment improvisations have been well documented. For example, wooden doors have been used as makeshift stretchers to transport injured civilians when normal stretchers were not available. More recently, the role technological resources play during emergency situations has emerged as an active research topic in the Computer Supported Coooperative Work (CSCW) and Human Computer Interaction (HCI) communities.

Here, however, we are interested in how technological resources can enable resilience during continual disruption as caused by war.

Research setting

The findings of our investigation into technology use during conflict need to be considered within the context of the conflicts themselves; here we present a description of each setting. We interviewed civilians living in two regions that were undergoing severe conflict.

We interviewed people living in ***Israel during the Israel–Lebanon war*** that took place in the North of Israel (Haifa) from July 12, 2005 to August 14, 2006. Although a war was taking place in the country for 34 days, the infrastructure remained robust. Citizens in the conflict zone continued to have uninterrupted access to landline telephone systems, cellular and broadband Internet networks, electricity, and clean water. Additionally, the majority of Israel's residents had adopted and integrated various technologies into their daily repertoire prior to the war. For example, 74 percent of all households have broadband Internet[11] (Internet World Stats) and there are currently more cellular phones in use than there are people.

Various disruptive elements, however, made it difficult for citizens of the country to maintain their routines.

First, bombs, i.e. Katyusha rockets, were exploding randomly, thus making it difficult to travel within the country. Our informants were unable to easily travel to work, or to visit friends and family, or even the grocery store.

Second, sirens notifying citizens of impending danger were also altering the way in which people were accustomed to managing their daily lives. When people heard a siren, they would often halt what they were doing and flee to the nearest bomb shelter.

Lastly, many fled the impact area and sought refuge in other countries or safe zones within the south of Israel.

In various cases, members of organizations were no longer working in collocated environments, as team members were traveling from place to place. As explained by our informants, the country had two completely different environments. For those not living in Northern Israel, it was as if a war was not taking place; people were conducting their daily lives as usual.

We also interviewed civilians who experienced conflict due to the ***Gulf War in Iraq***. The eight-year Iran–Iraq war (1980–88), the war with with Kuwait two years later, and the United Nations-imposed embargo lasting approximately 13 years, along with numerous attacks from the US throughout the years of embargo, all combined to weaken the infrastructure and limit the country's ability to recover from each of these conflicts. The UN embargo (1990–2003) meant that ***Iraq was cut off from all technological development during this time. Iraqis had very limited access to ICTs during these years and were almost completely isolated from the world outside as a result of the strong censorship and monitoring of information flow by the Ba'ath regime in power at that time.***

The most recent war in Iraq was initiated in 2003 and led to the current ongoing conflict within the Iraqi borders. This conflict has led to an almost complete breakdown of normalcy experienced by Iraqis. Unlike Israel, the infrastructure has deteriorated to the extent where there is often no running water and no electricity from traditional providers. This has meant that most households within Iraq rely on private, expensive, and unreliable electrical generators. In addition, they often rely on water drawn from wells for everyday use and bottled water for drinking.

Fuel to power the privately owned generators is also in short supply because many of the refineries have been targeted by militias. Iraqis are forced to stand in long queues to buy such fuel (the demand has driven the prices to record-level highs), while being subjected to constant risk of death due to random bombs exploding in public places, sniper fire, and militia attacks.

Civilians within Iraq are also exposed to random acts of violence both in the privacy of their own homes and in public places. These attacks are often persistent and impose a heavy toll on civilian lives; the Iraqi government often imposes curfews that last several days in an attempt to limit civilian casualties during major battles between government-led forces and militias. Iraqis often find themselves unable to leave their homes for several days, with no guarantee of safety once the curfew has been lifted.

Militia forces belonging to one faction or another maintained control of certain suburbs within the capital at the peak of the conflict. This led to concrete walls being erected to keep 'undesirable' civilians from entering a suburb. Road blocks, controlled by militia forces, were also erected at random, which stopped people traveling along that route. These circumstances made routine trips a dangerous undertaking and many could not be completed.

Despite the challenges that many within Iraq face daily, there has been a widespread uptake of ICTs, especially cellular phones, since these technologies became available early in 2003. While there are no reliable reports of technology penetration, major cities are reported to have relatively widespread access to the Internet and cell phones have been adopted by most demographics. Unlike Israel, however, the Internet and cellular networks are unreliable – our informants have reported that their communications networks do not work all the time.

Technological resources supporting resilience

In this chapter we report results based on 125 semi-structured interviews in both English and Arabic with informants who lived in Israel and Iraq.

Informants were found using a snowball sampling approach. Our informants were diverse with respect to their age and education levels as well as their educational backgrounds and work roles. We were unable to travel to either war zone to conduct observations and interviews.

We conducted interviews in two ways. First, we interviewed Israeli and Iraqi participants living in their respective war zones using several technologies (e.g. telephone, Skype, e-mail and Instant Messenger). Second, we conducted face-to-face interviews with recent Iraqi émigrés to San Diego and Los Angeles (both of which are cities in California).

In order to gain insight into how technology could be used to make people resilient in maintaining their routines during extreme disruption, we asked our informants how they conducted their daily lives before and during their respective conflict situations. The main topic we covered centered on whether or not technology played a major role in their ability to maintain their routines when living through war. Through comparison we were able to highlight the ways in which technology can facilitate people's ability to conduct their daily lives in extreme environments.

Our investigation revealed that civilians living in these war zones were highly innovative in their ability to maintain various aspects of their lives. We provide illustrations which show how technology can support resilient behavior, by enabling people to maintain practices for work, social life, education, travel, and obtaining relevant situational information.

TECHNOLOGY AND WORK COLLABORATIONS

During both the Israel–Lebanon war of 2006 and the Gulf War in Iraq, our informants have ***adopted and re-appropriated technologies***, e.g. Internet and cellular phones, to conduct virtual work from safe locations, eliminating the need to travel to and from work in a dangerous environment. In fact, those informants whose work was the least disrupted had conducted virtual work before the war. For example, one Israeli engineer, who worked for a large distributed multinational corporation in distributed teams, was able to take his laptop with him when he was called up as a reservist into the army. He continued to participate in his distributed international team, even while in intensive training.

MAINTAINING A SOCIAL LIFE AMID 'SOCIAL DESTRUCTION'

In both countries before the wars, people had the freedom to safely travel throughout the country to visit friends and family, attend sporting events, or go to clubs. When the war began, however, people were unable to travel as they did before. One informant characterizes this situation:

> *… when I get home I become a prisoner in my own home because of the security situation in Iraq. I cannot leave the house because it is not safe. I cannot go to plays, or clubs. No one drives and there is no public life, no café, no clubs, restaurants …*

Despite their inability to socialize in collocated settings, through the adoption and use of technological resources (e.g. the mobile phone, Instant Messenger and Facebook) our informants have reported that communication frequency has actually increased because it is now easier to connect with others. By using various technologies, Iraqi citizens now spend several hours a day perusing their Facebook network, reconnecting with people who had left the country, chatting with friends via Yahoo Messenger™, or talking to their friends and family via the mobile phone. Our informants reported ***relying on technological resources to communicate with friends and family who were outside of the country, as well as others who resided in areas that were difficult to access via conventional methods.***

Our informants also reported that ***societal trust has declined.*** The decline of interpersonal trust is the most devastating aspect of current-day Iraq that has emerged due to the war. Following the war, the Sunni–Shiite conflict forced people to move to Sunni- or Shiite-only neighborhoods within the country. Many people were constantly shifting to different neighborhoods, and people did not feel safe interacting with their neighbors. One of our informants describes this in greater detail:

> *The thing changed after the war … the greatest destruction was not the infrastructure … as much as the social destruction. This distrust which was created. I think this was the … like, the big knock that left people feeling uncomfortable with each other. Even at the market, or even in your workplace. You would feel like unsafe. Sometimes … I won't say most of the time if I'm talking about the college. But in the street. Even taxi drivers. The market. I can say this. You didn't know who is your friend and who is your enemy.*

Not only were people unable to visit friends and family with whom interpersonal trust existed, they also found it difficult to trust people living in close proximity. ***In order to continue socializing, a new practice emerged where several of our informants began using technology to meet people online. The new friends they made were located in various countries ranging from the United States and China to other Middle Eastern countries***. In the most extreme cases, four people in our sample initiated romantic relationships with people they met online, one of which led to marriage. This denotes a ***structural shift*** in Iraqi society, as traditionally people find suitable marriage partners through familial and friend-based connections.

Although the way in which finding life mates differed, people still followed traditional cultural practices. One of our informants, for example, met an American online who was working in the green zone in Baghdad (a safe area where most American operations take place). After eventually meeting in person, they decided they wanted to get married. In Iraq, traditionally the man's family must travel to the woman's family to engage in what is known as the 'promise' or 'word' – it is essentially an agreement between the families that their children will get married. After explaining to her boyfriend about this custom, our informant's father and her boyfriend's father (who could not travel to Iraq from America) scheduled to meet over the webcam, where the official promise was made between the families. ***Thus, technological resources enabled people to maintain relationships and develop new relationships in an untrustworthy physical environment, as well as develop romantic relationships online (which are not customary in Iraqi culture).***

CONTINUING EDUCATION WITH THE AID OF TECHNOLOGY

We also observed people's use of technological resources for maintaining education during the current Gulf War. We interviewed several students – the majority attending one of the universities in Iraq – who discussed how difficult it was to continue their educational routine in their unstable environment. When the war started, new obstacles emerged (e.g. curfews, bombs, and militias) which made it difficult for Iraqi citizens to consistently travel to the university or study with their peers face-to-face. It was especially difficult from 2004 to the beginning of 2008 for students to attend lectures on a daily basis.

In some cases, when students were unable to attend a lecture they would not receive the materials for the day. In other instances, students would use their mobile phone to call friends from the university to obtain lecture materials, as well as course updates. Unlike other student groups in our sample, our medical school informants described how they proactively developed robust technology-enabled practices to maintain education – these practices have now become embedded institutional praxis.

Using CDs, flash ROMs, and message boards, students began to archive course materials. First, students devised coordinated plans for note-taking; students who missed class could then go to copy centers to pick up what they missed. Additionally, lecture notes were distributed on CDs and students also shared notes via flash ROMs. If the Internet network was available, notes were also uploaded to a message board created by a medical student where students could provide updates on whether classes were to be held, as well as to discuss course material and share information.

When students could not attend anatomy or pathology laboratories, they could obtain pictures of slides or dissections taken by students with digital cameras. These pictures were available on CDs. ***In these cases, students were proactive in using technological resources to continue their education.***

RESTORING INFRASTRUCTURE FOR TRAVEL

Our informants adopted new ways in which to repair infrastructure and create new systems that enabled them to maintain the flow of essential services necessary for a normal life. We consider transportation, electricity, and emergency services, in addition to information and communication as essential services. We first highlight how people developed new practices to maintain their ability to travel.

In Israel, informants reported ***relying on cell phones to support their travel***. One informant described a 'cell phone battle plan', where she would call her friends about 30 seconds before arriving to pick them up so that they could race into the car. Another informant described how every day he phoned his family (who lived in Germany) before making the 45-minute drive to his workplace.

In Iraq, transportation modes changed from government-instituted public transportation and taxis to private means of transportation. ***The cell phone is central in helping to organize the transportation, as well as figuring out the route to take.*** There were several reasons why Iraqi civilians no longer felt safe using old transportation methods. Mainly, our informants reported that while government-instituted travel was no longer reliable, they could not trust bus and taxi drivers as it was difficult to determine whether they were militia members or insurgents. Many people also feared being kidnapped or even murdered due to their religious and political affiliations or their job roles (the educational elite were often targeted during the war), as well as their ethnic identities. In order to maintain routines for travel, our informants reported a new practice of using ***cell phones to organize car pools with others in their community,*** place of study, or workplace. ***They developed trust-based travel arrangements where they would call friends from before the war and family members to seek trustworthy drivers who would not harm them.***

One female informant, for example, who works in a bank, stated she organized a minibus to transport her and other employees to work. She was living in one of the unstable neighborhoods in Baghdad and did not feel safe driving herself, nor did she feel comfortable using random taxis with people whom she did not trust. In order to maintain her ability to travel to and from work, she ***used her cell phone to contact*** people she knew who could either act as a 'private bus' for herself and her colleagues from work, or recommend someone who would fulfill that role. After locating a trustworthy individual, she was able to continue traveling to and from work.

Furthermore, a new practice also emerged where our informants reported that they also ***relied on their social networks to determine which routes to take when attempting to reach their destinations***. Parents relied on their social networks to find private drivers to transport their children when they could not. Females are particularly susceptible to attacks and parents of young girls went to great lengths to ensure their safety. The following experience is reported by a female informant who describes an instance in which communicating by cell phone helped them avoid the

dangers her daughter and her daughter's friend would have encountered if they had taken the usual route home with the driver:

> *… there was bombing and an exchange of fire, so she called me from just outside the blocked road, the bridge leading into the district, and told me that the driver suggested we have lunch with him in a safer place, and this was at 3:00 in the afternoon because they have long working hours. And I told her not to go out with the driver, but to tell the driver to take her to her grandparents' house with her friend. And so she had lunch there with them. And then the driver called them and told them that he had phoned friends and friends told him that the roads were still blocked. But the driver told them that he could take them to the bridge that takes them to Al Razalia, and he can drop them off there and they can walk from there. So my daughter called me and told me what was happening and what the driver had told her, and I said yes, that's a good idea. Let him drop you off and you can walk home. And when the driver dropped them off near the closed bridge, their father was waiting for them on the other side to pick them up, so they walked a short distance and my husband picked up our daughter and her friend and took them home.*

This example illustrates how people used communication technology extensively to support travel. Faced with a situation in which there were bombs exploding when her daughter was due home, the mother used her cell phone to notify her daughter of the danger ahead. ***Rather than relying on a public service or announcements through radio or TV, citizens became responsible for organizing their own travel routes.***

CROSS-CHECKING INFORMATION

We also investigated the ways in which technological resources can be used during war to seek reliable, trustworthy, accurate, and timely information. In Iraq, before the war, the majority of our informants were limited to television news networks, radio stations, and newspapers that were controlled by the Ba'athist regime. After the war, however, we found that Iraqis typically have access to a lot of information through a diverse set of information media such as numerous satellite channels, newspapers, radio stations, and websites.

While they often enjoyed the freedom these choices gave them, they also recognized the need to verify the accuracy of the information provided through these various media. We found that this verification process involved checking and cross-checking information deemed vital by individuals. ***Thus, news from one source would typically be checked against that reported by another source from the same medium, and often checked again against news reported by other sources and types of media. The number of checks and cross-checks performed by an individual usually depends on how important the information is and the impact it will have on the individual's everyday activities.***

Information is also cross-checked against personal accounts of events by individuals within their personal social network. ***Several informants reported they would typically contact a friend or relative by cell phone, e-mail or Instant Messaging to verify a popular media report of events that occurred within Iraq, e.g. the number of victims of an explosion.*** The following statement made by a male informant is typical of such practices:

> *… I rely on the news on the satellite, through the satellite TV. I don't trust all the news that's available, or that's broadcast on satellite. I don't trust every channel; it's different on every channel. The news is different. Some say there were that many killed, and others say there were this many killed, and neither of them match up … I rely on people. I rely on the people who were actually there, where the disturbance occurred. Like when a bomb goes off, I rely on people who were actually in the place, or on site when the bomb happened, when the bomb went off. I also rely on word of mouth, and the news that is transferred from one person to the other. I feel that's a reliable source. You just believe … you disbelieve the news from regular sources, or official sources, but you rely on people that you know, and the news that they're telling you.*

This individual statement is typical of many who did not trust news channels and predominantly relied on news relayed to them by people they trusted in their social network. Here too, 'word of mouth' is possible only through the use of communication technologies like e-mail, Instant Messenger, and cell phones.

Concluding remarks

This case presented how people living in regions of conflict have adopted and appropriated technologies to help them negotiate and navigate through their dangerous environments. People used ICTs to reconstruct, to modify, and in some cases to develop completely new patterns of actions. In some cases, deep structural changes occurred, such as when the Iraqi medical students became collaborative in their studies to share information with those who could not travel to class.

The people whose routines changed the least were those who were already using ICTs intensively for their work or social life. Communicating and coordinating through technology enables people to be independent of their environment. When people are restricted by living in a dangerous environment, ICTs can expand people's reach, serving as a way to augment their life in these settings.