

1 Introduction

On 13 June 2009, thousands of Iranians poured into the streets to protest what they believed to be a flawed national election. Emerald green banners, the color of opposition candidate Mir-Hossein Mousavi, lined roads clogged with people who held what became one of the most important tools for the grassroots movement: the mobile phone. With the Iranian regime restricting internet access and banning journalists' access to key demonstrations, communications via text messaging and social networks like Facebook and Twitter became a crucial tool for information sharing between the protesters and the outside world, and even a source for the news media. So critical was this source of information that the U.S. State Department asked Twitter to delay a scheduled network upgrade that would have shut down the site for some hours on June 15 and 16.¹

Yet both hoaxers and Iranian officials also are said to have used these same communications networks to post false information. Without a trusted process of vetting, misinformation gained currency simply by being constantly repeated or re-Tweeted. One such instance was the claim that the election monitoring committee had declared the result invalid. Another was the initial circulation of a photograph said to be of a young woman killed in one of the Tehran demonstrations; the well-known picture was of another woman with the same first name, Neda.²

The phenomenon dubbed 'Twitter in Tehran' demonstrates both the opportunities and the challenges new communications technologies present for information sharing during emergencies. Objective and accurate information is essential for organized communities—it is often referred to as a 'public good' for this reason. But particularly in times of crisis, vital information is often in short supply. New technologies and new uses of existing technology present an important opportunity for improving how people can prepare for, respond to, and recover from major disasters. At the same time, they present new risks and challenges. For assistance to be effective and

communities to gain in resilience, the right balance between faster access to and reliability of information must be found.

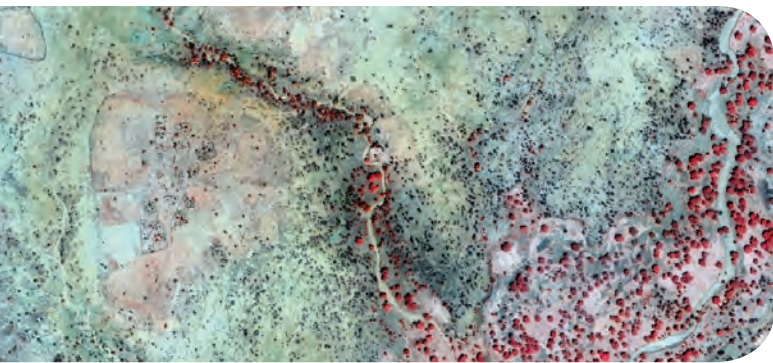
This report looks at the progress that has been made to date in setting policies that assist populations affected by disasters and conflicts, and considers some examples of both government-organized and grassroots uses of technologies that may help pave the way forward.

But first, some context.

Why consider the role of communications in emergencies?

There are two compelling reasons. First, there has been an increase in the prevalence of certain kinds of emergencies, whether natural disasters—including those resulting from climate change—or disasters resulting from human conflict.

“New technologies and new uses of existing technology present an important opportunity for improving how people can prepare for, respond to, and recover from major disasters.”



Credit: UNITAR/UNOSAT

And although the number of conflicts between countries has fallen markedly since the Cold War, there is a rising level of civil conflict, particularly in sub-Saharan Africa and the Middle East and North Africa.³

Second, the information and communications revolution of the past 20 years is continuing, meaning there is growing potential for people affected by emergencies to benefit from the flow of information. *If communities depend on information for their survival in times of crisis, then communication technologies are their lifelines.* More information is being gathered. More people have access to communications. The scope for effective relief is greater, especially if humanitarian agencies and policy makers as well as affected populations take advantage of the technological opportunities.

Growing number and intensity of emergencies

The number of disasters, both natural and technological, has been rising in recent years. According to the International Disaster Database, there has been a steady increase in the frequency of natural disasters during the past 35 years, with almost as many occurring during the past 5 years as in the whole of the previous decade. On average, there were 428 disasters per year between 1994 and 1998, but the annual average jumped to 707 between 1999 and 2003. This increasing trend in the total number of disasters is mirrored in most categories, including hurricanes, floods, and earthquakes.

Countries of low human development (as defined by the United Nations) have suffered the biggest increase in the occurrence of natural disasters, partly due to changes

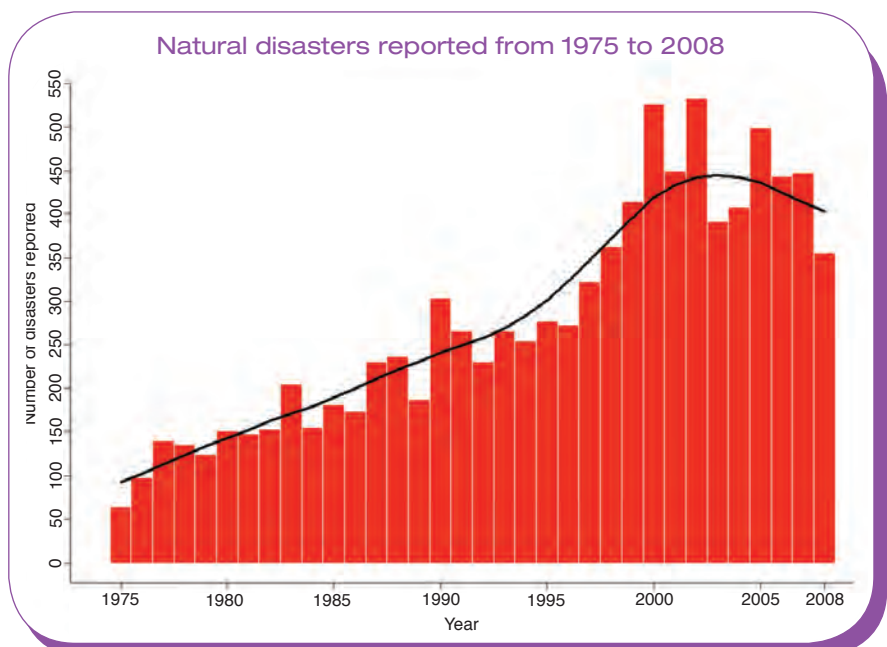
in weather systems affecting tropical latitudes. Moreover, people in the poorest countries are the worst affected by natural hazards, due to factors such as poor quality housing, inadequate levels of infrastructure, and weak emergency services.

This report also looks at the use of communications in crises such as civil conflict and terrorism. Like natural disasters, terrorist incidents have increased in recent years. Figures from the Terrorism Knowledge Base show that in the years 1998 to 2000, the number of terrorist incidents averaged about 1,100 per year. In the four years from 2001 to 2005, they averaged around 2,300 a year, reaching 3,000 in 2005 (the latest available data).⁴ The location of attacks has varied from year to year, with the cities targeted including London, Madrid, Mumbai, Jakarta, and Istanbul.

While the number of armed conflicts increased steadily throughout the Cold War, beginning in the early 1990s, conflict between nations began to decline. Clashes within states now account for 95% of all conflict-related casualties, and most of these civil conflicts occur in the world's poorest countries, according to the 2005 Human Security Report.

Growing access to new communications technologies

The potential for the use of communications before, during, and after natural disasters or conflict has been enhanced thanks to the advent of new technologies such as mobile phones and the internet.



Source: EM-DAT: The OFDA/CRED International Disaster Database – www.emdat.net – Université Catholique de Louvain – Brussels – Belgium

Landmark events in the role of information in emergencies

Some events have carried striking lessons about the impact of information and in each case have had a profound effect on the subsequent development and use of communications technologies.

The Kobe earthquake, 1995

The earthquake that hit the Japanese port of Kobe on 17 January 1995 was one of the first major disasters of the modern communications age. Official emergency communications were overwhelmed, but two computer networks set up free online bulletin boards. During its first week, one of these had 5,000 messages posted and was accessed 650,000 times by 140,000 people. *Decentralized and online communication and information initiatives were more effective than official efforts.*

Indian Ocean Tsunami, 2004

The 26 December 2004 Indian Ocean tsunami was one of the deadliest natural disasters in recorded history. There was no early warning system covering the Indian Ocean at that time and, as described in the next section, *the disaster gave great impetus to early warning efforts.* The confused aftermath led humanitarian agencies to start paying greater attention to information needs. The impact of the tsunami was *a lesson in the costs of inadequate information flows.*



Mobile Phones

The growth in the use of *mobile phones* has been one of the most remarkable features of the last decade. At the end of 2008, the number of subscriptions topped 4 billion, reaching 61 for every 100 people, according to the International Telecommunications Union (ITU)⁷. Mobile penetration is not even across the globe. In the developed world, there is



Credit: Meredith Byrne

Hurricane Katrina, 2005

When the Category 3 hurricane hit New Orleans on 29 August 2005, there was no lack of early warning. The shortfalls came in the slow response of the authorities and lack of support for the community. *Preparedness, which is broader than early warnings and includes education about potential disasters, is a vital part of the information landscape.* Absent effective official relief, *the online media proved a new way for those affected by the crisis to connect with sources of help.* According to one study, for many this was the first time they used a computer.⁵ *For many people, informal knowledge from trusted social contacts was the most important source of information.*⁶

Protests after 2009 Iranian elections

Social networks can amplify the spread of information enormously, as demonstrated by their use in Iran. Certainly, where mobiles and computers are widely used, people have the scope to supply information. *However, they have equal power to amplify inaccurate or deliberately misleading information.* Other illustrations of these issues arose with the November 2008 terrorist attacks in Mumbai and the post-election violence early in 2008 in Kenya.

Credit: UN/Evan Schneider

about one mobile subscription per person, but the equivalent figure for the developing world as a whole is 39%, with large variations between countries and between urban and rural areas.⁸ But the mobile divide is narrowing: for instance, Africa has the highest growth rate in new mobile subscriptions, with a compound annual rate of 47% from 2003 to 2008, according to the ITU.

Internet

The total global *internet* audience (people aged 15 and above with access to home or work computers) passed one billion in December 2008.⁹ China has the largest online audience in the world, with 180 million internet users, representing nearly 18% of the worldwide total, followed by the United States (16.2%), Japan (6.0%), Germany (3.7%), and the United Kingdom (3.6%). But while almost three-quarters of the North American population have access to the internet, in most poor and middle income countries just 1 in 50 people or fewer have internet access. Internet access is expected to continue to expand. For developing countries, this is likely to be via *mobile internet*.¹⁰ The advent of mobile internet in these countries is recent but already shows signs of extremely rapid growth. Given the absence of a fixed line infrastructure, it is mobile internet that offers the scope for wider access for people in the developing world.¹¹

Social Networks

On the back of the recent spread of broadband internet access, the popularity of *social networking sites* such as Facebook, Orkut, and Twitter has exploded. These are websites that allow users to communicate with other people as they choose, either sending messages (of fewer than 140 characters in the case of Twitter) or sharing photos.¹² The most popular social networking site globally is Facebook, which saw a 153% surge in unique visitors to 132.1 million from June 2007 to June 2008 and another 157% to reach 208 million visitors by June 2009.¹³ Although its largest base is in North America (70 million in mid-2009), Facebook's growth there was relatively modest. In every other region, Facebook's audience more than quadrupled in 2008. Even so, social networking is still small-scale in developing countries. In India (where Orkut is the most popular site), 19.4 million people were using these sites in December 2008, an annual rise of 51% but a tiny fraction of its more than 1 billion people.¹⁴

Twitter

Twitter, whose users are concentrated in the developed world, is also experiencing extraordinary growth. The number of visitors to Twitter.com increased by 67% in the month of April 2009 alone, from 19.1 million to 32 million. Rich nations predominate on Twitter. One report by independent analysts Sysomos that analyzed 115 million accounts found that almost two-thirds (62.2%) of users were based in the United States. The highest ranked developing country was Brazil at 2.0%, followed by India (0.87%), the Philippines (0.64%), and China (0.49%).¹⁵

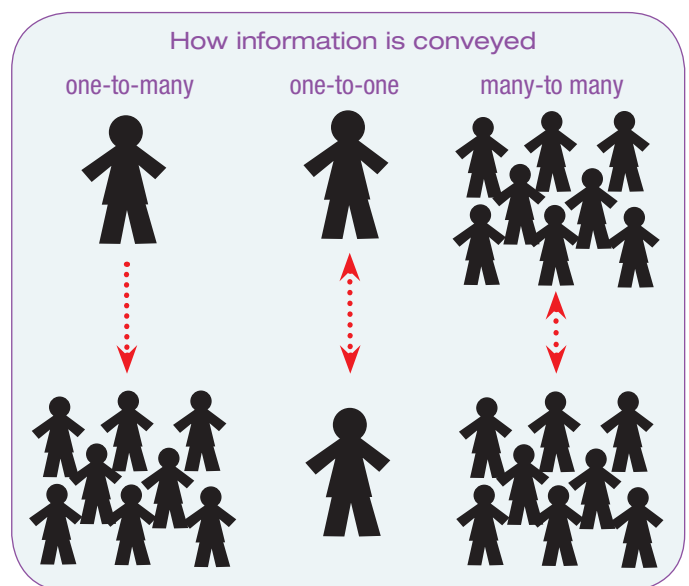
Themes of the report: what is the role of information in a crisis?

In this report, we give many examples of how different *technologies* are being used in different *contexts*, to illustrate the potential benefits and challenges. We offer some general lessons about the effective use of information in emergencies, and about the management of new risks. Two main themes that emerge are the importance of the *accuracy* of information and of the social context (either face-to-face or online) in which it is used.

This report examines the opportunities and challenges of using technology to promote information sharing in disasters, whether natural or manmade. The report is divided into four sections that look at the use of different technologies at the key stages on the crisis timeline: early warning, wider information preparedness, humanitarian relief and reconstruction, and long-term development.

The report also makes distinctions in terms of the *format* of the communications. While the underlying communications technology may be radio, mobile, or internet, it is useful to how the information is conveyed, whether:

- one-to-many (broadcast—radio, television, web, mobile applications (apps) and services, short message service (SMS) broadcast);
- one-to-one (mobile voice and SMS); or
- many-to-many, such as social networks (online or mobile internet, mapping, and crowdsourcing).



In evaluating the use of communications technologies in disaster relief, the report also considers the different *audiences* or users of information, whether a global or local mass audience; the aid and policy community, including their emergency relief efforts; or the affected population.

Reading this report

The below diagram provides a map of the major themes explored in this report, and identifies the communications formats, tools and applications, actors and examples identified in each section.

	Summary	Communications Formats	Tools & Applications	Actors	Examples
Section 1. Introduction	Growing access to technology and continuing innovation offer the potential for more effective response in emergencies, but also create new risks to be managed.			Facebook; Twitter	Kobe Earthquake, Japan, 1995; Indian Ocean tsunami, Dec 2004; Hurricane Katrina, New Orleans, 2005; Protests following disputed Iranian elections, June 2009
Section 2. Alerts: Early Warning	People need as much reliable information as possible to prepare for onset. Regulations and standards are vital but effective early warning systems must have people at their center.	Timely one-way communication to as many people as possible, as quickly as possible.	Meteorological warning systems; SMS messages; Cell broadcast	GIVAS	Indian Ocean tsunami Dec 2004, a turning point in understanding the importance of information; Ongoing pilot of cell broadcasts in flood-prone areas of Bangladesh
Section 3. Preparedness: Rebuilding Communities' Resilience	Preparedness depends on long-term education and planning in order to ensure people affected by an emergency or conflict can respond appropriately.	Interoperable and resilient communications infrastructure for emergencies; Public awareness and education; Two-way exchange of information	Broadcast media; Geospatial technologies; Crowdsourcing	EU Joint Research Centre's European Media Monitor & MOSAIC; GIVAS; Internews & BBC World Service Trust; Save the Children; Ushahidi & Swift River; World Food Programme's EPIC	Post-election violence in Kenya in early 2008; Cyclone Nargis in Burma in May 2008; Gaza conflict in Dec 2008-Jan 2009; Mozambique elections in October 2009; Ongoing conflict in DRC & Afghanistan
Section 4. Response: Coordination in Emergencies	The overwhelming need at the height of an emergency is rapid and high-quality information, delivered to those affected, and co-ordinated effectively between relief organizations. Information flows need to be two-way and validated for reliability.	Person-to-person contact for swift delivery of information; Emergency response communications for humanitarian workers and for affected families	Emergency telecoms/ satellite; Social networks; Satellite imagery; Unmanned Aerial Vehicles (UAV)	EU Joint Research Centre; GDACS; InSTEDD; Télécoms Sans Frontières; UNOSAT & AAAS for satellite images, UAVs; World Food Programme's ITHACA	Mumbai terror attacks in November 2008; Conflict in Sri Lanka 2009; Post-election protests in Iran, 2009; Niger community communications centers, ongoing
Section 5. Reconstruction: Post-Crisis Services and Development	Rebuilding after an emergency or conflict depends on the quality of the existing infrastructure. New technologies and applications mean information flows offer great potential for longer-term reconstruction.	Information exchange and co-ordination; Dispersed 2-way communications for as many people as possible; Access to communications tools	Mapping; SMS tools; Mobile transactions; Online job matching	EU Joint Research Centre; Kiwanja & FrontlineSMS; M-PESA and M-Paisa; SoukTel & LabourNet; UNDP's TRMA	Assistance in Kenya during post-election violence, 2008; Monitoring during March-June 2008 election campaigns in Zimbabwe; Post-conflict monitoring in Sudan; Money transactions in Afghanistan; Job creation in Gaza and Bangalore



Credit: UN/Evan Schneider

Key milestones in development of disaster early warning systems

1949

Hawaii-based Pacific Tsunami Warning Center established, following the 1946 Aleutian Island earthquake and tsunami

1989

December: United Nations declared 1990s International Decade for Natural Disaster Reduction

1994

World Conference on Natural Disaster Reduction, Yokohama, adopted *Yokohama Strategy and Plan of Action for a Safer World*

1995

January: Kobe earthquake

1998

Potsdam International Conference on Early Warning Systems

2000

UN International Strategy for Disaster Reduction launched