

Disaster Response: Guidelines for Establishing Effective Collaboration between Mobile Network Operators and Government Agencies.





Introduction

Robust and well-functioning mobile networks contribute significantly to effective disaster response. They are relied upon to provide a wide spectrum of services encompassing early warning messages, facilitating emergency response and logistical coordination and assessments, and supporting vital communication and information flows between and to affected populations. Operators are uniquely placed to support disaster preparedness and response, and effective involvement with national actors and platforms can be valuable for everyone involved. As recognition of the challenges and potentials of such collaboration increases, more regulation is likely to emerge. Including mobile operators in the planning stages could help shape how strategies are designed and improve their effectiveness in the longer term.

There are growing calls to recognise that access to information is a basic human rightⁱ. Resolution 59(1) as was accepted by the first session of the UN General Assembly in 1946, states that “Freedom of information is a fundamental human right and ... the touchstone of all the freedoms to which the United Nations is consecrated”. Access to information is particularly important during disaster situations, and operators are increasingly being called upon to engage with humanitarian organisations and national governments to harness the potential of mobile phone networks and data to support response and preparedness strategies. Additionally, there is a growing trend towards the management of disasters on a national level rather than relying on external, international bodies, and this ensures that the local private sector and local operators in particular, can play a valuable role. It is essential for mobile operators to establish effective rules, processes,

mechanisms, contacts and expectations vis-à-vis national governments prior to the onset of natural disasters to ensure that relations with these authorities are based on mutual respect and understanding, and contribute to saving the lives and livelihoods of users. These public-private partnerships can be extremely valuable when they are well-managed and effectively implemented. There is great potential for, and significant benefits to be drawn from enhancing these collaborations. These guidelines seek to support operators to establish effective relations with government agencies at the national and regional levels to support disaster response.

This landscape document will specifically examine relations between the operators and the public sector, including governments from both developing and developed nations, international bodies and regional authorities. These actors should leverage the expertise of the private sector effectively in order to integrate ICT tools into their response strategies. Some countries have a significant number of legal and regulatory tools and demonstrate the value of close collaboration between government and MNOs for facilitating effective disaster responseⁱⁱ, whilst others have yet to establish these mechanisms.



Why Collaborate?

Enhancing collaboration in advance of disasters with government agencies has a number of potential benefits: contributing to enhancing corporate social responsibility, supporting the continued functioning of the mobile network during critical periods and protecting the lives of customers. It has a number of added values, including:

Expectation Management:

Many disaster response actors may expect operators to take action to support their responses, including governments and NGOs. This support may range from providing priority channels for essential communications, no-cost communications for their staff, or sending informational messages to subscribers. Establishing what support operators can provide in advance of the crisis, including technical and legal capacities and constraints, can limit potential reputational risk and ensure expectations are realistic.

Leadership

Disaster response is primarily the responsibility of national governments. Governments must in turn understand the capacities and constraints of mobile operators, and collaborate effectively to ensure logistical needs are met and expectations are realistic. A recent UN studyⁱⁱⁱ identified strong political leadership as the key to reducing the threats and impacts of natural hazards and improving resilience. Establishing effective mechanisms, protocols and good communication structures prior to the outset of disasters can save valuable time and ensure that key government agencies and actors are empowered to lead effectively on disaster response strategies.

Access to Resources and Capacities

Many operators may have considered the technical requirements for enhancing the resilience and robustness of networks, but the movement of people and goods into and out of disaster-affected regions is often dependent on the support of national and local government officials' support. Furthermore, the ability to leverage armed forces personnel and equipment can be very valuable during emergency situations, and they will often have all-terrain vehicles and trained personnel to support the transportation of engineers into heavily affected regions.

Core Emergency Infrastructure

Practically speaking, good relations and solid partnerships can ensure that critical network infrastructure is officially recognised and prioritised during disaster situations, fuel remains available to ensure the continued functioning of base stations, and equipment and personnel can be transported smoothly in resource-poor situations.

Frequent Challenges

Coordination and Identification of Points of Contact

Identifying the appropriate agencies and points of contact within them can be challenging prior to a disaster, but it is virtually impossible during the chaos of a disaster situation. Without appropriate coordination early warnings may not be received, accessing legal permissions and special temporary authorities (for the use of satellites, power, bandwidth etc.) may be delayed and mobile networks may not be prioritised as critical national infrastructures. Poor coordination with other operators and international humanitarian organisations can also result in wasted resources, reducing efficiency and increasing the likelihood of organisational overlap and missed opportunities^{iv}.

Technical and Operational

Logistical challenges associated with disasters can be more devastating to the continued functionality of mobile networks than the disasters themselves. Even if robust base stations and other hardware are not damaged, government collaboration can facilitate on-going prioritised access to fuel and the movement of replacement equipment and parts. It can also fast-track the movement of engineers and other technical staff into (and out of) the region and reduce red tape around visas and customs procedures.

Strategic

Poor strategic planning in advance of disasters can create significant problems for mobile operators and governments alike. Ensuring that national strategies include acknowledgement of the importance of communications and support for their continued operation can enhance efficiency and reduce response times. Advance provision of strategic information can also enhance expectation management and reduce reputational risks, and shared expectations about privacy rights and legal obligations can reduce the chances of misunderstandings from all stakeholders.

Case Study: Nepal

Nepal is particularly vulnerable to natural disasters including floods, landslides and earthquakes. Kathmandu is widely regarded as an at-risk location for a natural disaster to strike. National operator NCell has developed a range of technical solutions through their Disaster Preparedness Program^v in order to maximise the robustness of the infrastructure, protect employees and reduce network disruption. NCell also has the capacity and willingness to disseminate early warning messages to populations likely to be affected. Further coordination is needed with the NRRC and with national government structures to ensure that appropriate information can be sent in time to protect the population.

Case Study: Transporting Equipment and Expertise

In the aftermath of destructive natural disasters, several mobile operators have successfully supported operations across national borders by sharing technical staff and equipment to support telecommunications functionality in neighbouring countries. These responses have been highly effective in the short term and have contributed to national disaster recovery, robust mobile service provision and saving lives. However, problems have been experienced when attempting to recover the equipment once the intervention has concluded. Transporting this equipment back across national borders has in some country contexts, proved extremely challenging. This can potentially affect future operator decisions to support each other across national borders during times of need. Telecoms Sans Frontiers (TSF) have experienced similar challenges in recovering emergency telecoms equipment from disaster-affected regions. In theory, all countries which have ratified the Tampere Convention should ensure that these processes are facilitated, but it may also be advisable for governments to consider putting into place additional national regulations and special authorisations to minimise the disincentives of excessively bureaucratic procedures. Ensuring that donated or borrowed equipment can be rapidly and painlessly recovered is predicated on government support, which in turn relies on clear communications with operators.

Certain disaster situations may compromise the institutional capacity of the government itself, as was the case during the earthquake in Haiti when government offices were destroyed and many key decision-makers lost their lives. Such situations require advance contingency planning, and operators will need to establish collaboration with other international organisations and humanitarian communities to ensure that they are able to operate effectively in situations when government capacity is severely compromised. Indeed, institutional capacity in developing countries may be limited even without the added pressure of an emergency situation, and operators should be flexible and supportive in enhancing their capacities to respond to crises.

Aside from the logistical issues, good relations can also mitigate the risk of reputational damage which is exacerbated by poor relationships with governmental bodies, as mobile operators who fail to establish good relations may later fall victim to political blame if disaster management communications are not well managed. Establishing effective coordination and collaboration with national actors in preparation for disaster situations is a strategic choice which can have significant benefits for operators, at minimal cost.



Who are the Key Stakeholders?

Our analysis suggests that formerly state-owned mobile network operators may have an advantage in terms of government collaboration whilst other private operators may have to work harder to establish such effective channels of communication and collaboration. In some countries where government capacity is limited operators may even be better placed than the governments to facilitate the necessary collaborations, and in certain circumstances it may be advisable to take the lead to ensure that all parties are protected.

There are a range of key agencies at national and regional levels, and relations between operators and government stakeholders are highly variable across different regions and political structures. Relations are governed by frameworks of regulations, and operators should ensure that actions are in line with their licensing agreements when approaching these stakeholders. Furthermore, the remit of each agency will determine the range and scope of their authority and responsibilities, which will necessarily impact the ways in which they can collaborate with operators.

National Level:

National governments have the primary responsibility for the management and coordination of disaster risk reduction and disaster management within their borders. In many cases, national platforms and authorities are tasked with mitigating risks and coordinating responses, and operators should seek to collaborate with such organisations as well as national regulatory authorities to ensure that mobile telecommunications networks are effectively utilised prior to, during and after natural disasters. It is also important to engage with the Ministry of Communication and with those officials responsible for granting emergency powers and special temporary authorisations, as well as national meteorological bureaus.

The **National Telecommunications Authorities**, such as the Federal Communications Commission (FCC) in the USA, are an essential partner for operators to engage with in order to ensure that disaster management legislation is in place in advance of a disaster. The **National Disaster Management Authority/Agency (NDMA)** is also a key ally for mobile network operators. Following the Hyogo Framework^{vi}, the United Nations has supported governments to establish national-level platforms defined as “national mechanisms for coordination and policy guidance on disaster risk reduction that are multi-sectoral and interdisciplinary

in nature, with public, private and civil society participation involving all concerned entities within a country.” Whilst mobile network operators may not be directly involved in these platforms, keeping abreast of their publications and recommendations is essential. The **Ministry of Communication** functions as the central policy making and administrative authority on communications within a country, and will usually be represented in the NDMA. In addition to dealing with licensing arrangements, they are also engaged in national disaster response so operators may wish to take the opportunity to discover if they have contingency plans in place, and coordinate to ensure that mobile communications are prioritised during disasters. In some circumstances, it may also be advisable to establish collaboration with the **National Meteorological Service** responsible for forecasting severe weather conditions, as they may prove valuable allies for operators in protecting both network infrastructure and network users. Effective communication with these agencies can enable the rapid dissemination of early warning messages and critical information to users.

Case Study: USA

Mobile operator AT&T have invested approximately \$600 million in disaster response and have received (the first) disaster preparedness certification from the Department of Homeland Security under the Voluntary Private Sector Preparedness Accreditation and Certification Program (PS Prep^{vii}). In addition to coordinating responses to national disasters, they have supported international relief efforts in Haiti, donating mobile phones to disaster affected communities and providing financial support to TSF to re-establish emergency telecoms networks, as well as waiving wireless usage charges for customers in Haiti. Furthermore, AT&T offer comprehensive disaster recovery services to help government agencies plan for and recover from a range of natural and man-made disasters. In the USA mobile telecommunications networks are recognised as a critical infrastructures for protecting national security. Working closely with US government structures has supported AT&T to coordinate responses rapidly and effectively.

Regional Level:

While in many circumstances it may be sufficient to coordinate with national authorities such as national disaster management agencies and communications ministries, it may also be advantageous to establish good relations with regional authorities. In most countries, however, local capacity is likely to be limited and coordination with national structures will be the most effective approach to pursue. If there are recurring

disasters frequently affecting a specific region, it might be particularly helpful to develop relationships with local authorities and this should be assessed from a needs-based perspective.

Case Study: China

Tropical storm Vicente struck China in August 2012. The central government was criticised for its failure to disseminate warning messages to the population despite having information about the impending disaster. The Director of the Beijing Meteorological Bureau announced that the warnings were not sent due to technical constraints which made it impossible to convey them in a timely manner to users. The three major telecoms providers (China Mobile, China Telecom and China Unicom) publically announced that they did possess the technical capacity to send the messages, denying government claims regarding the technical obstacles to sending messages to the entire network of users in affected areas^{viii}. A case in point; the effective coordination between provincial governments and Guangdong Mobile (a subsidiary of China Mobile) enabled 30 million warning messages to be disseminated to users in the cities of Shenzhen, Zhongshan, Zhuhai, Jiangmen and Yunfu^{ix}, while users in Beijing and elsewhere in China received no advance warnings. The lack of effective coordination between national government structures and mobile operators, rather than any technical challenges, contributed to the failure to warn the wider population about the deadly disaster.

International Level:

A number of international bodies and organisations (both public and private sector) can offer critical support in responding to natural disasters. There are several UN agencies actively engaged in the use of ICT for disaster response. The key international agreement; the **Tampere Convention**^x presently ratified by 46 states, “calls on States to facilitate the provision of prompt telecommunication assistance to mitigate the impact of a disaster, and covers both the installation and operation of reliable, flexible telecommunication services”. It acknowledges that regulatory barriers can impede effective disaster relief and offers guidelines to support the importation of necessary equipment

and personnel, recognising the rights of States to direct, control and coordinate assistance. It also requires States to both develop an inventory of available material and human resources for disaster mitigation and relief, and also to develop a telecommunication action plan to identify the necessary procedures for the deployment of these resources.

Other UN agencies actively involved in disaster response include the **Office for the Coordination of Humanitarian Affairs** (OCHA)^{xi}, **The UN Office for Disaster Risk Reduction** (UNISDR)^{xii}, the **World Meteorological Organization** (WMO)^{xiii}, the **International Telecommunication Union** (ITU)^{xiv} and the **World Food Programme** (WFP)^{xv} which leads the Emergency Telecommunications Cluster. Operators and service providers wishing to collaborate with UN agencies to support disaster response can access information and submit proposals at www.business.un.org/en. They can also partner with the **Emergency Telecoms Cluster**^{xvi} and offer financial, in-kind or stand-by support to humanitarian organisations on the ground.

A number of international humanitarian organisations are also actively involved in using ICT for crisis management and response, including the **International Red Cross and Red Crescent** (ICRC)^{xvii}. International public and private sector organisations have also developed teams and task forces for rapid deployment to re-establish communications systems in disasters, including **Télécoms Sans Frontières** (TSF)^{xviii}, **Ericsson Response Team**^{xix}, **Vodafone Foundation's Red Alert and Instant Network**^{xx}, **Cisco's Tactical Operations** (TacOps)^{xxi} teams and **Microsoft Disaster Response**^{xxii}. While these are not governmental bodies, securing cooperation with them can enhance support for broader collaboration with national government structures and secure access to wider experience and resources. There are a number of vendors who also provide solutions for operators in disasters; please refer to the Disaster Response Vendor Directory for links to many of the key solutions providers.

Case Study: Vodafone Instant Network

The Vodafone Instant Network has been successfully deployed in Kenya to provide free calls to a community in a region without coverage, and the Instant Network with satellite backhaul was recently trialled in a simulation with 350 national government responders in Barcelona, Spain during November 2011^{xxiii}. The trial was considered a great success, and provides potential opportunities for national responders to communicate even during severe disruptions to normal mobile services.

Case Study: The Philippines

The Philippines is situated in a disaster hotspot. The archipelago is surrounded by active volcanos and fault lines, and is frequently affected by typhoons, floods, earthquakes, tidal waves and volcanic eruptions. Accordingly the private sector, civil society and state actors are experienced in disaster management and response, and are working together to develop collaboration for reducing the impact of disasters. ICT4D has been enshrined in the Philippine Digital Strategy 2011-2016^{xxiv}, which supports this collaboration across a range of fields, from education, governance, livelihoods and disaster response. This strategy recognises ICT as “an essential component of national development” and identifies “Mobilising the Private Sector” as a core foundation for the implementation and success of the strategy. The Government has been very responsive in producing legislation, for example the Natural Disaster Management Law which established a portion of budgets to be set aside for responding to calamities.

The Philippines is characterised by very high rates of ICT penetration; despite its relatively low per capita income, mobile phone subscriptions and use rates are high. The government embraces Twitter and Facebook as mediums through which to communicate with the population, and official government updates are also spread by agencies and organisations to affected populations. Mobile phone operators are responsive to the needs of affected populations and of government actors, and are leading the field in effective cooperation to save lives in disasters. SMART Communications^{xxv}, the leading wireless service provider in the Philippines, is well integrated with both governmental and non-governmental disaster relief services, including the National Disaster Risk Reduction and Management Council and the Philippine Red Cross. SMART have launched a range of services including free disaster updates, links to which are even available on official government websites. Furthermore, they have developed good relations with national meteorological institutes who have co-located weather monitoring equipment on their base stations, ensuring that they always have timely access to severe weather warnings.



How can Mobile Operators Help? What and When?

Operators may be cautious about collaborating with governments, but developing effective public-private partnerships can provide access to life-saving information, communication and services for users in disaster-affected communities. Many of the potential risks can be mitigated by strong advance planning and establishing clear guidelines for use in a range of disaster scenarios.

Prior to a Disaster: Emergency Preparedness

Spreading early warning messages and vital information to users is a crucial way in which mobile operators can help to support government agencies to enhance emergency preparedness and responses. Ensuring that these messages originate from a legitimate government agency and contain appropriate, valid and well-structured information is essential for protecting operators against reputational risk whilst protecting recipients from misinformation and confusion. It may be advisable to discuss the structure of such messages prior to a disaster situation, to ensure that government agencies understand the need to compress vital information into cell broadcast or SMS messages, and understand the capacities and limitations of operators and devices in supporting these technologies. For example, receiving a message via cell broadcast is contingent on the device supporting it, and it being enabled by the user. It is also important to note that mobile is not a standalone solution, and mobile operators and government partners should also consider how radio, television and other broadcast mediums can support the dissemination of critical information.

Case Study: Japan

There is a tight nexus of collaboration between MNOs and government bodies in Japan, resulting in prior planning to minimise impacts, and rapid resumption of services in the aftermath of disasters. This close collaboration may, in part, result from the history of the MNOs in the country, which were initially state owned. NTT Docomo have offered the Area Mail Disaster Information Service (using cell broadcast) free of charge to subscribers since 2008, broadcasting earthquake and tsunami early warning messages provided by the Japan Meteorological Agency and disaster and evacuation information issued by national and regional public institutions. It is now mandatory for all Japanese 3G cellular phones on the market since 2007 to receive this service. Additionally NHK, Japan's public broadcasting organisation, issues warnings through television and radio broadcasts, automatically activating all TV and radio devices tuned to NHK within the affected areas. This type of multi-channel early warning communication is likely to successfully reach many more users, and is the result of excellent collaboration between the public and private sector.

In the Aftermath of a Disaster: Disaster Response

Mobile phone operators and their networks can play a number of valuable roles in supporting national and regional authorities to coordinate and implement effective disaster response, including:

Facilitating communications: Enabling responders and affected populations to communicate coordinate actions and resources and keep abreast of emerging threats and opportunities.

Data collection: Updating responders on up-to-the-minute conditions on the ground, the condition of key infrastructure, medical supplies and key personnel.

Information provision: including early warning messages to affected populations and advice on health, sanitation, locations of emergency facilities etc.

Case Study: Effective use of Mobile Information

Digicell Haiti shared anonymised location information on users with a team of researchers from Flowminder, based at the Karolinska Institute in Sweden, whose analyses enabled the prediction of cholera outbreaks^{xxvi} and ensured that relief organisations were able to distribute medical supplies accordingly to minimise their impact. This data was anonymised at BTS resolution or lower to ensure that it was not possible to identify individuals. Additionally, Orange, in collaboration with Global Pulse Data for Development (D4D) Challenge, is planning to release anonymised data records of 5 million users in the Ivory Coast^{xxvii} to encourage researchers to develop applications which contribute to socio-economic development and well-being in the region. These types of public-private partnerships inevitably involve a degree of risk; but the benefits and the potential for protecting lives and livelihoods can be significant.

It is important for operators and regulators to work together to understand the ways in which mobile data can be used to support disaster and humanitarian response, whilst protecting the privacy and security of subscribers. There are several types of data which can potentially be shared with government and other stakeholders in order to support disaster response. Mobile data can be used to help determine the numbers and locations of survivors and track the movement of displaced populations.

Mobile operators are generally under a strict obligation to protect the security and privacy of customer communications and their data. Operators may also be under a general obligation to erase or anonymise

data on the termination of a communication, unless needed for limited purposes, such as managing networks, customer services, billing or to protect against fraud. There can be a mistrust of governments, particularly in countries with highly centralised or authoritarian regimes as well as concerns around the potential misuse of data. Sharing data for disaster response purposes may require changes to law, or the establishment of applicable laws and rules, in addition to establishing secure, privacy protective technologies and processes. This will include robust means to anonymise data to ensure that data is protected in such a way that it cannot be reverse engineered to identify individuals.

When Governments Intervene

Coordination between mobile network operators and governments in times of crisis — political or environmental — can be difficult, particularly in countries that have highly centralised or authoritarian regimes.

In some such countries, operators may have a legal requirement to suspend services during periods of political upheaval as a requirement of their operating license^{xxviii}. Furthermore, they may be directed by the government to send messages on behalf of government agencies or provide officials with information about users' behaviour, location or personal communications. Even when there is no clear legal basis to shut down a network, in certain cases, regimes have forced operators to comply^{xxix}. During political crises and natural disasters, operators must be aware of these risks and challenges. Establishing protocols well in advance can minimise the risk of compromising the privacy and security of mobile users and reduce the risk of reputational damage to the operator.



Summary of Recommendations:

Coordination, Communication and Points of Contact:

- Nominate a primary point of contact for disaster response communications within senior management
- Identify the disaster preparedness team of the national regulator or national government and the key point(s) of contact within them
- Ensure regular dialogue, both formal and informal, with key government agencies
- If appropriate, identify a key point of contact within the army or other national force likely to be deployed in the event of a disaster situation and understand the extent of resources and support they may be able to provide
- In a multi-stakeholder forum including representatives from other mobile phone operators, discuss and establish responsibilities and guidelines for engagement in a range of disaster scenarios, at each stage (e.g. early warning messages prior to the disaster, advice in its immediate aftermath, information about service provision post-disaster etc)
- Share examples of best practice and effective collaboration from past experience
- Coordination amongst public institutions may also be weak; do not expect information shared with one agency to be shared with others, and ensure that coherent strategies with collaboration from multiple agencies are pursued whenever possible to prevent wasted time and resources or repetitive messages-The GSMA is developing a coordination database to help facilitate more efficient communication between the mobile industry and the wider disaster-response eco-system
- A searchable database of web-based solutions will shortly be available on the GSMA Disaster Response website
- Participation in the GSMA Disaster Response Group to share knowledge, best practice and lessons learned among the mobile industry, and between the industry and other stakeholders such as government

Technical and Operational Aspects

- Set out clear requirements for the maintenance of network services during disasters; coordinate with government to grant access and priority access and transportation of fuel, technicians and essential equipment during disasters
- Information communicated to affected populations should be proportionate, relevant, actionable and timely. Ensure that messages

sent contain no inappropriate, inaccurate, unclear or irrelevant content, and do not raise expectations unduly. For further guidelines, please see “Towards a Code of Conduct: SMS Guidelines for use in Natural Disasters”, developed by the GSMA Disaster Response Programme

- Ensure that the originator/sender of all messages sent to customers is clearly identified in the body of the message
- Understand the potential and appropriateness of cell broadcast for the simultaneous delivery of messages to users within the affected area in order to minimise the load on overburdened networks
- Encourage the use of SMS or interactive voice response (IVR) instead of calls, and encourage government websites and other communications channels (e.g. TV and radio broadcasting) to share this advice
- The GSMA Guide to Dealing with Disasters outlines technical challenges faced by operators during disaster situations and suggests a range of potential solutions

Strategic Planning

- Ensure that national strategies and standard operating procedures are developed and distributed to key stakeholders
- Provide guidelines and advice on the practical and logistical limits of the mobile network and infrastructure (e.g. capacity, speed, volume, even SMS message content) to key stakeholders to ensure expectations are well managed
- Ensure that key stakeholders understand the privacy and confidentiality rights of users and legal obligations of the operator
- If information is to be shared with government or non-governmental bodies (especially across national borders), ensure that standards, protocols and accountability measures are in place to protect against abuse and ensure the security of data transmission, storage and access.

Data Protection and Privacy:

- Identify the legal basis on which data may be shared.
- Establish clear and actionable internal guidelines
- Establish an anonymisation standard to ensure anonymised data cannot be reverse engineered
- Develop data exchange standards

Further Resources

- ⁱ UN General Assembly (1948) Universal Declaration of Human Rights; International Rescue Committee (2005) World Disaster Report, etc
- ⁱⁱ National digital strategies include: UK: Digital Britain (2010), EU: Digital Agenda for Europe (2010), Australia: Australia's Digital Economy – Future Directions (2009), Norway: eNorway 2009 – The Digital Leap (2009), New Zealand: Digital Strategy 2.0 (2008), The Netherlands: ICT Agenda 2008-2011 (2008), Chile: Digital Development Strategy 2007-2012 (2007), South Korea: u-Korea Masterplan (2006), Philippine Digital Strategy: Transformation 2.0: Digitally Empowered Nation (Government of Philippines (2011-2016) Singapore: Intelligent Nation 2015 (2005). The ITU E-Government Implementation Toolkit (2009) may also be a useful document in this field
- ⁱⁱⁱ UNISDR Making Cities Resilience Report 2012: http://www.unisdr.org/files/28240_rcreport.pdf
- ^{iv} Imogen Wall and Lisa Robinson (2012) BBC Media Action Policy Briefing #6. Still Left in the Dark: How people in emergencies use communication to survive – and how humanitarian agencies can help: http://downloads.bbc.co.uk/mediaaction/policybriefing/bbc_media_action_still_left_in_the_dark_policy_briefing.pdf
- ^v NCell CEO's Blog: <http://blog.ncell.com.np/2012/08/disaster-preparedness.html>
- ^{vi} United Nations (2005) Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Accessed at: www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf
- ^{vii} US Department of Homeland Security <http://www.fema.gov/private-sector-preparedness-ps-prep>
- ^{viii} Available at: <http://tech.sina.com.cn/t/2012-07-24/01417419951.shtml>
- ^{ix} Tech in Asia: <http://www.techinasia.com/guangdong-mobile-sends-30-million-warning-texts-tropical-storm-beijing-bad/>
- ^x International Telecommunications Union (1998) Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations : www.itu.int/ITU-D/emergencytelecoms/Tampere_convention.pdf
- ^{xi} Office for the Coordination of Humanitarian Affairs: <http://www.unocha.org/>
- ^{xii} UN Office for Disaster Risk Reduction : www.unisdr.org/
- ^{xiii} World Meteorological Organisation: www.wmo.int/pages/index_en.html
- ^{xiv} International Telecommunications Union: www.itu.int/en
- ^{xv} World Food Programme: www.wfp.org/
- ^{xvi} UN Emergency Telecoms Cluster: <http://ictemergency.wfp.org/web/ictopr/emergency-telecommunications-cluster>
- ^{xvii} International Committee of the Red Cross: www.icrc.org/eng/index.jsp
- ^{xviii} Télécoms Sans Frontières: www.tsfi.org/en
- ^{xix} Ericsson Response: www.itu.int/ITU-D/emergencytelecoms/events/Alexandriaconference/presentations/Doc42-Ericsson.pdf
- ^{xx} Vodafone Foundation: <http://www.vodafone.com/content/index/about/foundation.html>
- ^{xxi} CISCO TacOps: http://www.cisco.com/web/about/doing_business/business_continuity/tacops.html
- ^{xxii} Microsoft Disaster Response: <http://www.microsoft.com/about/corporatecitizenship/en-us/serving-communities/disaster-and-humanitarian-response/>
- ^{xxiii} Vodafone Instant Network trial video report: <http://www.abc.es/videos-espana/20111117/simulacro-accidente-ferroviario-montmelo-1281376975001.html>
- ^{xxiv} Government of Philippines (2011-2016) Philippine Digital Strategy: Transformation 2.0: Digitally Empowered Nation, available at <http://ilearn.gov.ph/PhilippineDigitalStrategy2011-2016.pdf>
- ^{xxv} Accessed from: www.1.smart.com.ph/corporate
- ^{xxvi} Linus Bengtsson, Xin Lu, Anna Thorson, Richard Garfield, Johan von Schreeb (2011) "Improved Response to Disasters and Outbreaks by Tracking Population Movements with Mobile Phone Network Data: A Post-Earthquake Geospatial Study in Haiti" in PLoS Medicine: www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001083
- ^{xxvii} D4D Challenge: www.d4d.orange.com/home
- ^{xxviii} Vodafone Statement on Egypt: http://www.vodafone.com/content/index/media/press_statements/statement_on_egypt.html
- ^{xxix} Cellphone service suspension: SHC issues notice to PTA chairman, others: <http://dawn.com/2012/11/20/cellphone-service-suspension-shc-issues-notice-to-pta-chairman-others/>



Disaster Response

When you restore the mobile network,
you rebuild the human network

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