Use of Technology

in Emergency and Post-Crisis Situations

Global Education Cluster Working Group and IIEP-UNESCO

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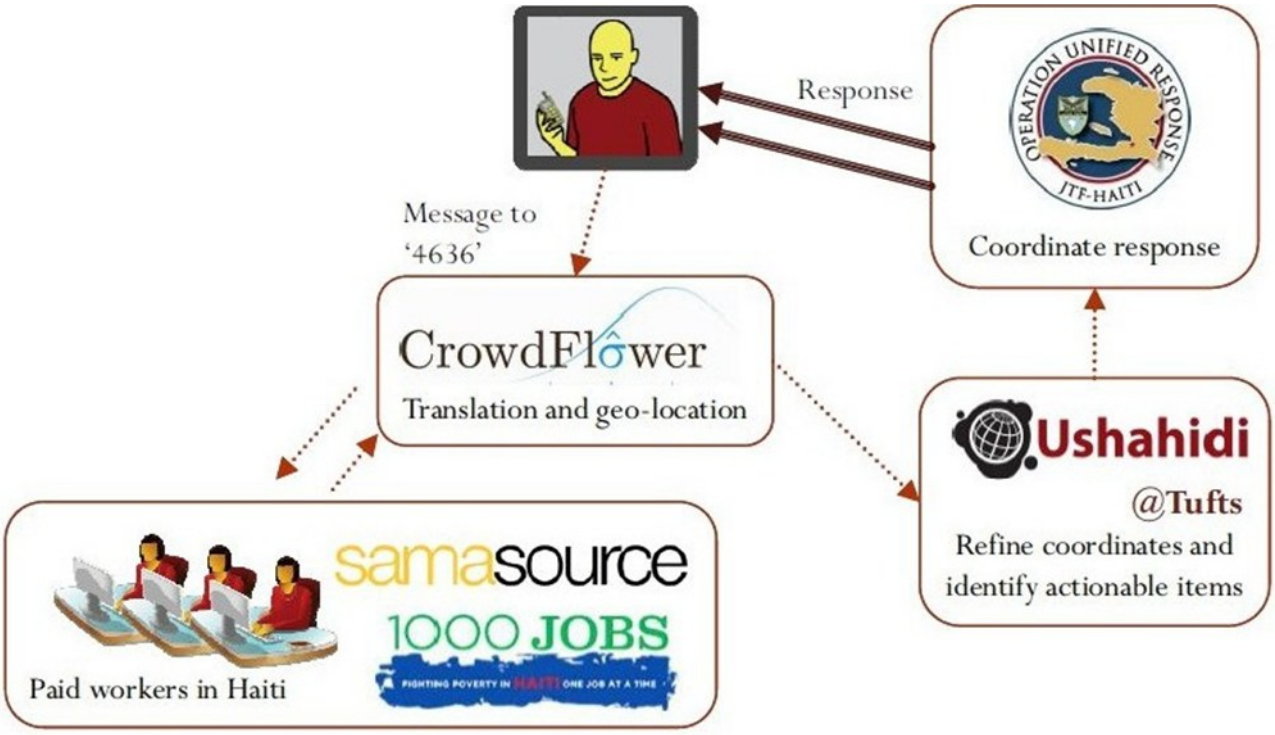

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Acronyms and Abbreviations

API	Application Programming Interface
ECWG	Education Cluster Working Group
EDC	Education Development Centre
ETC	Emergency Telecommunications Cluster
GIS	Geographic Information System
GPS	Global Positioning System
IAI	Interactive Audio Instruction
ICT	Information Communication Technology
IFRC	International Federation of Red Cross and Red Crescent Societies
IM	Information Management
IRI	Interactive Radio Instruction
ISP	Internet Service Provider
OCHA	Office for Communication and Humanitarian Assistance
OSM	Open Street Map
PDA	Personal Digital Assistant
PDF	Portable Document Format
SBTF	Stand By Task Force
SIM	Subscriber Identity Module
SMS	Short Message Service (mobile phone text message)
UNESCO	United Nations Educational Scientific and Cultural Organization
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations Children's Fund
WRC	Women's Refugee Commission
WFP	World Food Programme

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1. Introduction

Within recent years, information and communication technologies (ICTs) have been playing an increasingly important role within the field of education in emergencies. This can be seen not only in the use of ICTs by humanitarian workers for their information, coordination and communication needs during emergency preparedness, response and recovery, but also in the increasing potential for ICTs to be used for improving education provision and access during an emergency (IIEP-UNESCO, 2010). As new technologies continue to be developed and existing technologies continue to penetrate deeper into developing and crisis-affected communities, the question arises: What opportunities can new technologies offer as catalysts for overcoming certain obstacles facing education in emergencies and post-crisis situations and for improving agencies' various activities in these difficult contexts?[1] This report seeks to address and explore this question.

While ICT is certainly not a panacea or a de-facto solution to the challenges facing education in emergencies, it can, if implemented correctly, greatly enhance and improve education stakeholders' activities in these contexts. For example, technology could be used for:

- Providing SMS communication with warning alert systems for beneficiary communities;
- Enabling the rapid collection of educational data as well as the mapping of educational infrastructures and response activities;
- Delivering access to distance-learning education and capacity building trainings;
- Disseminating educational information and support collaborative, evolving, digital curriculum development;
- To establish collaborative collection, hosting, tracking on monitoring of group-based activities in a flexible, central location to coordinate education activities during an emergency.

Of course, there are a multitude of challenges which can make implementing technology within emergencies and post-crisis situations difficult. During emergencies, for example, existing electrical and ICT infrastructure, such as electricity, mobile reception and internet coverage can be damaged or disabled. Overcoming an existing lack of technology or technological capacity within a particular context can also prove to be expensive in terms of time and money. While these, and other, challenges certainly exist and must be considered carefully when planning activities and projects involving technology, ICT—if implemented correctly—can have an enormous impact on the work and effectiveness of education stakeholders, both in the field and at the regional and global levels. In addition from a collective 'cluster' perspective technology could serve to improve timely sharing, hosting, analyzing and understanding of education data quickly to fit strategic advocacy and response purposes.

Seeking a rote prescription for providing education in emergencies is accepted as unwise. As Sinclair urges, "Every crisis is different, and there are no sure formulae for successful response. The response must always be designed from the 'bottom up,' using some form of participatory appraisal, in order to achieve the best results in the least possible time" (2003). While this is no doubt more time-consuming in the short term, it is more cost-effective and sustainable in the long term. When considering technology within the field of education in emergencies, particularly in terms of preparedness for emergencies, Sinclair's principle still applies: technology provision, implementation and usage choices should be informed by actors within that crisis.

1. By this we infer developing capacities for implementing and utilizing technologies

Often, however, actors may lack awareness of, access to or technical capacity for these potentially useful technologies. This report, therefore, is not intended to provide prescriptive technology approaches for global education actors to universally apply at national or local levels; rather, it is intended to provide key examples of current and potential uses of technology that could realistically be implemented within education in emergencies and post-crisis situations.

2. Methodology, goals and rationale

Through reviewing existing literature, conducting open and semi-structured interviews with key informants and participating in conferences, various technologies and tech-based projects with potential relevance for education in emergency stakeholders were identified. Key informants included individuals working in the field of education in emergencies as well as individuals working from other humanitarian sectors;[2] the appropriateness of the identified technologies and projects for different emergency contexts was explored with key informants during the interviews. Technologies and projects were analyzed for relevancy based on criteria of feasibility, urgency/need, robustness, usability and utility and then logged into respective databases (see **Annex A**[3] and **Annex B**[4]). Finally, technologies and projects were grouped and prioritized according to various thematic activities of education stakeholders in emergencies and post-crisis situations (e.g. coordination, information management, etc.). It should be noted that during the data process, no provision was made for the collection of gender-based data; while this is certainly an important issue to consider when discussing the use of ICT within education; it has not been included in the scope of this study.

Rather than being a comprehensive log of all technologies and tech-related projects in the humanitarian community, **Section 3** is an initial mapping of what have been identified as the most relevant projects and technologies (both hardware and software) for actors in the education sector while simultaneously exploring how they could be most effectively utilized and implemented. To this end, a series of recommendations (based on the highlighted examples) are provided for education stakeholders throughout the study; **Section 4** is a compilation of all the recommendations and presented as an overall action plan.

The principal audience targeted by this report is education stakeholders involved in the field of education in emergencies. The broad terms ‘education stakeholders’ or ‘education actors’ are used intentionally in an attempt to include the many different individuals, organizations, agencies and ministries to which the findings of this report could be useful. However, while agencies certainly could benefit from these findings on an individual basis, since most actors and stakeholders involved with education in emergencies are (or should be) members of the Education Cluster, the findings and especially the recommendations are addressed especially to the Education Cluster, its members and its Task Teams/Working Groups (at the global and national level). They are particularly pertinent to the Knowledge Management and Capacity Development outcome groups. Although specific uses and activities involving a certain technology may vary depending on the phase of the emergency, many of the technologies and projects discussed are relevant/applicable before, during and after an emergency; the term ‘education in emergencies,’

2. A list of the informants is available by contacting the Education Cluster Working Group or IIEP-UNESCO

3. Annex A is a practical resource of a 77 project mapping, indexed by their sector, technologies, locations, and emergency contexts, which formed the basis for the in-depth review. It is intended to be the beginning of an ongoing case repository, which education actors can reference when planning for the integration of technology into emergency response.

4. Annex B is a list of commonly used technologies and links to further information and/or immediate download of software, if applicable

therefore, is also used quite broadly throughout the report and is intended to encompass the multiple stages of an emergency and humanitarian response.

3. Findings: Uses of technology in emergencies

This section presents the study's findings of examples of technology and projects which are relevant to education stakeholders in emergencies. The different examples are organized according to four major areas of activity and subdivided into several specific activities. The four major areas are:

- Information management;
- Coordination;
- Capacity building and knowledge sharing;
- Providing access to education in emergencies.

A fifth and final sub-section is also explored due to its applicability to the four areas of activity listed above:

- ICT provision and acquisition.

One general, cross-cutting finding that was discovered during interviews, literature reviews, and conferences is the importance of letting user needs and practices drive technology choice, use, and integration. In contrast, overly focusing on the promotion of certain devices or of certain software hinders integration and effectiveness and can result in user resistance. This is compounded by the frequent lack of capacity to utilize and implement technology, especially in the heightened situation of a crisis. In addition, pushing certain devices or software can lead to a mismatch of technologies with the existing infrastructure, the culture of use, and user needs while driving up costs, particularly those associated with capacity building. This general finding is essential to education stakeholders looking to implement various technologies; attempts have been made to incorporate it throughout the recommendations presented below.

3.1. Information management

Summary of main ideas and key technologies:

Information management (IM) activities are crucial for education sector emergency preparedness, response and recovery initiatives, and ICT can help improve the effectiveness of information management activities. Three specific areas are explored:

- SMS for collecting data from and communicating with beneficiaries: Due to the wide availability of mobile telephony, SMS texts can be an effective way for education stakeholders to deliver important messages and alerts to as well as collect data from beneficiary communities. AidLink and FrontlineSMS are two programs that can be used to do this.
- Smartphones for data collection: Another approach for data collection is to equip data collectors and education actors in the field with smartphone devices which can be used in conjunction with survey and data management software, such as FHI360's GATHER package, to collect and transmit data to a centralized database for real-time compilation. Camera and GPS functions in smartphones also allow for data collectors to record important GIS and image data

- Mapping and GIS software: A mapping gap currently exists within the education sector during emergencies, leaving many unmet mapping needs for education stakeholders. Print-based and interactive mapping capacities could be developed in the education sector using GIS software such as ArcGIS or QGIS as well as Google Earth, Google Map and Open Street Map.

Former Under-Secretary-General for Humanitarian Affairs, John Holmes, stated in a keynote address, "[G]ood information and good analysis—and the ability to communicate both effectively— are central to everything we do, and central above all to doing it better…Information is very directly about saving lives. If we take the wrong decisions, make the wrong choices about where we put our money and our effort because our knowledge is poor, we are condemning some of the most deserving to death or destitution" (2007). Information management activities are, therefore, key to humanitarian action—including within the education sector. Central to IM activities are issues of data collection, storage, analysis, visual representation and sharing—all of which can be greatly facilitated by the use of ICT. The sections below discuss how ICT can be used to collect, manage, communicate and map information.

3.1.1. SMS for collecting data and communicating with beneficiaries

Being able to communicate quickly and effectively with large beneficiary populations or specific key informants in affected areas—both in terms of providing as well as receiving information—can be incredibly important for education stakeholders. In the past, television and especially radio broadcasts have been—and continue to be—an effective mechanism for delivering important messages about the emergency, such as warnings and alerts, as well as messages for community awareness and back-to-school campaigns (Wattegama, 2007). While these technologies are great for reaching large groups of individuals and should certainly not be overlooked, they do not allow for two-way communication with targeted groups or individuals, such as key informants.

In addition to sending information to beneficiary populations, receiving information and data from them can also be extremely important for education stakeholders in emergencies. This task is often complicated in emergencies or post-crisis situations where travel can be limited by hazardous circumstances or poor road conditions. Conducting rapid needs assessments and program evaluations often involve physically travelling to the affected area with a data collection tool (typically a paper print-out with several questions or indicator fields), locating key informants and then either asking the informants the relevant questions or leaving the form with them to be picked up later, after they have completed the form with the required information. Once the forms are retrieved, data is then entered and stored in some type of database for future analysis. This type of data collection process is slow, laborious, costly and can—with the constant coming and going of multiple agencies and actors—create false hopes and expectations within beneficiary communities.

Given the increasing access of individuals within beneficiary communities to mobile telephony, SMS has the potential to be used as a means for both communicating important messages to targeted groups of individuals as well as receiving information from them. Souktel's AidLink is an initiative that can help education stakeholders do just that.

AidLink: "Connecting aid agencies with people who need help"

Key actors: **Souktel**

Description: **An SMS service which allows aid agencies to send and receive alerts and surveys to targeted communities and each other via text messages**

Location: **Palestine, Iraq, South Sudan**

Tech needed: **Mobile phones, an 'Education' short code/phone number and provider, internet-connected computer in a main office, budget for Souktel collaboration and buying bulk SMS messages**

In 2007 Souktel, an organization that designs mobile phone services for aid agencies, created a tool called AidLink, an SMS service which allows aid agencies to send and receive SMS communications and alerts to and from targeted groups (i.e. text messages via a customized mailing list). Once an aid agency defines a target population or group of individuals they want to communicate with, Souktel sets up a web and mobile messaging service tailored for the agency and that population. Their services include managing the purchase of bulk SMS messages and establishing a short code[5] from a provider, ensuring compatibility with data formats of the agency, providing training for managing the system, setting up alerts, supporting survey creation and providing ongoing technical support (Souktel, 2011). There are three, simple steps for creating and sending an SMS alert using AidLink:[6]

1. Create an SMS mailing list by typing in the cell phone numbers of all recipient
2. Enter the text of the SMS message or select a pre-determined SMS message
3. Broadcast the SMS message to the list

Not only can these individuals receive messages, but they can also reply or use the short code to send a message (free-of-charge with reverse SMS billing) directly to the education stakeholders' account. In this way, AidLink can be used to create assessments and surveys which can be sent to key informants, filled out and texted back. Each person receiving or sending a message (and the message itself) is logged into a central system database for SMS management, which includes a spreadsheet of all user activity and messages. Designated administrators can log onto a secure website, view the data, and download the current data. In addition to the steps above, users can manage their lists by adding and subtracting list members as needed.

AidLink can also be used for communication within beneficiary communities; for example, an aid agency can send alert messages to all school principals in a specific geographic area and those principals can also be trained on how to send alert messages to the teachers, parents or students of the school. Such training could also be integrated into already existing training such as training on EMIS or for school inspectors. This does not require downloading lists or installing software into the users' phones; rather, they simply send a text to the central database specifying which contact list (e.g. teachers in a specific area) to which they want to send their message. When messages such as these sent by principals to teachers are sent, AidLink can also ensure that selected education stakeholders simultaneously receive an automatic copy of this same message via their mobile phones. This can be particularly valuable during alerts about attacks. Because alerts can be sent simultaneously to agencies that provide various services during attacks, there is no waste of time or risk of miscommunication inherent in a communication chain from one agency to the next. In seeing a message, an agency would know the nature of the alert by its text content and its location by the sender code that identifies the school of each message.

5. A short, easy to remember, free-to-call phone number that can feed messages from the designated provider back to the aid agency
6. A useful visualisation of this process can be found at http://souktel.org/aidlink.html

In a similar manner, AidLink can be used to communicate within and between sectors and education stakeholders. Cluster Coordinators, for example, could quickly and easily communicate with Cluster members, regardless of their access to email and the internet. AidLink's use in Gaza—spurred by the need for communication among the aid workers during the Gaza War—has been widespread there since late 2008. Impressively, the system was set up in less than 72 hours to provide support to CHF International in their work for the World Food Program. Through mobile phone providers AidLink enabled SMS to alert families about locations to pick up cooking supplies, and to poll and update food needs. The work in Gaza grew to include Red Cross/Red Crescent alerts for blood donations by blood type, recruiting over 500 donors across Gaza within two hours; and Mercy Corps, which used the system to help youth leaders communicate with one another and to receive course-listing alerts for post-conflict training and education.

The Souktel system has particular promise for schools near the buffer zone and border areas, which are more prone to incursions and bombings. During Israeli military attacks in 2008 and 2009, 280 schools were reported damaged and 18 destroyed (UNESCO, 2011a). In August 2011, Souktel collaborated with UNESCO and the Red Cross/Red Crescent on a Disaster Risk Reduction school alert system in Gaza. Given the success of Souktel in other programs in Gaza, the question was how to use the combination of SMS, the local community, and the various aid agencies to support protection of education.

Education stakeholders could benefit greatly from SMS communication through programs like AidLink. Ideally, it could be set up and tested as a preparedness or Disaster Risk Reduction activity within schools and with key education stakeholders prior to an emergency, but it could also be implemented during the response phase if needed. There are, however, some challenges facing implementation; for example, AidLink is still growing and may not be able to provide services in many of the countries where the Education Cluster has been activated. Furthermore, AidLink is not a free service and a budget will be required for its implementation. Education stakeholders should also be mindful and try to mitigate the potential danger that key informants could be in when providing information; in the 2011 war in Libya, for example, there were reports of women's cell phones being confiscated by soldiers to prevent the women's recording of sexual assault and alerts for help.

One open source alternative to AidLink is called FrontlineSMS, which operates with a similar process as AidLink but with a little different technology. A SIM card and phone number/short code will need to be purchased from a mobile phone provider as well as bulk text messages. The SIM card will then need to be plugged into a computer—via a USB cable or a GSM modem— containing the FrontlineSMS software. Messages can then be sent and received in a similar fashion as AidLink. The benefits to FrontlineSMS are that it is free, quick and easy to set-up and can operate offline through a GSM network. It is unclear what kind of survey/assessment functionality FrontlineSMS has and whether it would support communication within beneficiary communities. Moreover, open source technologies are often less robust and require programmers to debug and troubleshoot.[7] When using AidLink, Souktel ultimately takes responsibility for the success of the program, technology, content, and implementation with the objective of handing the project over to the local actors and lead agencies once all is in working order. Even then, Souktel stays on in an advisory role. Education stakeholders may want to explore and pilot both AidLink and FrontlineSMS.

7 Open source software often relies on a volunteer community or practice to develop code, debug problems and add features. Some advantages are innovative software development, low-cost solutions, broad participation and fast cycles of software development. Some disadvantages are distributed development can be buggy and lack documentation needed for fast recovery from system problems.

Regardless of the provider and software selection, one challenge will be collecting the contact details for individuals to be included in the databases. In some contexts, the Ministry of Education may already have contact names and numbers for head teachers, school directors, or school principals; however, this data may be lacking in other contexts and require a significant amount of time, energy and money collecting the amount of information required to make such a program useful. To benefit completely during an emergency, preparedness activities will need to take place in non-emergency situations.

Recommendations and key actions

- Ideally, to avoid the confusion that would come with having multiple agencies each with a different 'education phone number,' national-level stakeholders wishing to develop an SMS communication system should coordinate and implement a centralized database and system. This means setting up a single 'Education Sector' phone number or short code (purchased from a provider with reverse SMS billing enabled) and designating a focal point(s) for managing the information (e.g. Cluster IM specialist, or ministry officials dealing with EMIS).
- National and local stakeholders can then advertise and distribute the short code to designated groups (e.g. national and local authorities, school directors, teachers, etc.). They should simultaneously begin creating appropriate contact lists; they may want to try to liaise with government authorities and partner agencies who may already have contact information for key groups and individuals.
- National stakeholders should also coordinate and combine their SMS information needs for data collection and assessments.
- Since most national stakeholders will lack the resources and capacity to implement an SMS communication system, global education stakeholders should work closely with them to determine the best approach for providing support.
- To best determine this approach, in-country pilot tests should be conducted using different programs (e.g. AidLink and FrontlineSMS) in order to identify the best option.
- For the pilot tests, global education stakeholders should allocate budget and identify focal points to engage SMS specialists (e.g. Souktel staff, experienced FrontlineSMS users, etc.) to carry out the tests with specified national Education Clusters and Cluster members.
- Souktel could also be invited to demonstrate the AidLink technology and design process to global and/or national education stakeholders; the SMS focal point could observe a Souktel program and training workshop in the field.
- Pilot tests should be analyzed and lessons learned documented and shared with relevant stakeholders to inform future action.
- Should positive pilot test results encourage further implementation and roll-out, appropriate training modules for key education actors who will be using the SMS system—such as Education Cluster Coordinators and information managers, program managers, national/ regional officials, school teachers etc.
- Assessment and evaluation templates as well as a set of core school SMS alert messages could also be developed and shared with national education stakeholders using the system.[8]
- To mitigate the risks and potential danger to key informants, when possible, stakeholders should train them in best practices for sending information. For example, sending information in private spaces, using dedicated mobile SIM cards for reporting and deleting sent messages on their phones.

8. This is envisioned as joint activity of the Knowledge Management Group, Protection Thematic Group and Disaster Risk Reduction Thematic Group

3.1.2 Smartphones for data collection

Another approach for collecting data is for assessment teams to conduct field visits with more advanced technological devices, such as smartphones. Rather than using existing technology to collect information from key informants remotely, data collectors could be provided with smartphones to gather information from field sites themselves. While this would still require a travelling to an affected area, smartphones would allow data collectors more flexibility and usability in terms of functionality for more in-depth and rich data. Filling out electronic assessment forms using these devices would also enable immediate, real-time data entry as all responses could be fed into a central database. Furthermore, most smartphones can capture and communicate GPS coordinates crucial for mapping activities (see below) as well as photos and images of locations. FHI360 and the former AED have significant experience in this type of data collection.

Smartphones and FHI360's GATHERdata™ software for data collection

Key actors: **FHI360, South Sudan Ministry of Education's EMIS team, independent data collectors**

Description: **Smartphones and the GATHERdata software package were used for collecting and managing school data via surveys, assessments and GIS technology.**

Location: **South Sudan**

Tech needed: **Mobile computing device, such as a smartphone, central internet- connected computer, GATHERdata software**

FHI360's GATHERdata software is a package of applications for data collection and management used on mobile computing devices, such as laptops and smartphones, for collecting data from the field. The software can be used to create forms (such as surveys, assessments and questionnaires), communicate the forms to designated mobile devices for data collection, transmit data back to a centralized database, organize the data for analysis and share the results. Since the software is used on a smartphone, these activities can all be done via mobile network, wireless internet or 2/3 G.

In November, 2011, FHI360 completed a pilot test using smartphones and GATHERdata to collect GPS data to be used by South Sudan's EMIS unit for school mapping. 26 individuals were provided an LG-P500 smartphone with Google Android operating system and trained on how to use them. Data collectors were then sent throughout seven different states in South Sudan to collect school data and metadata for a total of 1,920 schools. At each school, team members not only collected GPS coordinates for each school (via the GIS functionality of the smartphone), they also collected specific information about each school and took photos of them. As data was collected, it was communicated in real time to a centralized database for analysis and mapping (for more on mapping, see **Section 3.2.3**).

Although smartphones and their multi-functionality have incredible potential for education stakeholders in emergencies, providing enough for a group of data collectors could be quite expensive—not only for the device itself but also for the phone/internet fees which will vary greatly from one context to another. This consideration also needs to account for the cost of developing the capacity to utilize and maintain a system using smartphones (replacement, periodic training etc.). Before investing in smartphones, national and global stakeholders should have a clear idea of their data collection needs and how the devices will help meet those needs as well as a solid understanding of the current smartphone market and implications/costs for local use.

Recommendations and key actions

- National education stakeholders conducting assessments and data gathering activities in the field should consider the potential of using smartphones (e.g. iPhone, Android, BlackBerry, Windows, etc.) or similar devices—preferably with GPS capabilities—to do so. They will need to weigh up the costs (in time as well as money for training in purchase and utilization of the equipment) versus the benefits.
- National education stakeholders wishing to try using smartphones for data collection (e.g. rapid needs assessments, detailed assessments, program evaluations, mapping exercises, etc.), but lacking resources and technical capacity should seek support from global education stakeholders.
- Global education stakeholders should work with willing and appropriate national stakeholders to conduct a series of smartphone pilot tests.
- Global stakeholders should engage an experienced representative or agency with expertise in data collection (including GPS data) using electronic devices to lead the piloting—which must include consultation on the most cost-effective devices, tech support, developing and delivering relevant training for assessment teams; given FHI360/AED's experience, they could be a potentially good partner for such pilots.
- A small number of devices, equipped with data management software, such as FHI360's GATHERdata package, should be acquired for the pilot tests (see **Section 3.5**). Pilot tests should attempt multiple types of data collection activities.
- Pilot tests should be analyzed and lessons learned documented and shared with relevant stakeholders to inform future action.
- If successful, global stakeholders should consider including smartphones in the Education in Emergencies ICT Pack (see **Section 3.5**).

3.1.3. Mapping and GIS software

During an emergency or post-crisis situation, maps become very important for education stakeholders. Maps showing schools, camp and key actor locations as well as capacity, needs and gaps can help plan, coordinate and carry out preparedness, response and recovery activities. They can be used for quickly displaying and sharing key information and are also powerful tools for advocacy issues. There is currently a large mapping gap in terms of availability and capacity within the education sector in emergencies. Due to this gap, education actors in an emergency must often rely on external agencies and other sectors to meet their mapping needs; however, due to large number of requests and limited time, resources and personnel, the education sector's mapping needs often go unmet. While the education sector and its stakeholders should certainly continue to establish and develop collaborative working relationships with agencies and organizations with strong mapping capabilities (e.g. OCHA, MapAction, UNHCR, UN-SPIDER, relevant governmental ministries/departments and militaries), it should move towards developing its own mapping capacity and become less dependent on these agencies.

There at least two different types of map mediums that could be used by education stakeholders in an emergency: 1) traditional, print-based maps and 2) interactive maps which are intended to be viewed on a digital device (e.g. computer, mobile phone, etc.). These are discussed further below.

GIS software for print-based map

Key actors: **ArcGIS, QGIS**
Description: **Using GIS mapping software to create traditional, print-based maps to be used by education stakeholders in the field**
Location: **Worldwide**
Tech needed: **Computer, GIS mapping software, baseline maps (.dbf, .shp, .shx country/region map files)**

During emergencies, traditional, print-based maps are typically created using GIS software and then converted and circulated in .pdf format (such as the maps from various sectors and agencies found on ReliefWeb). The education sector could use these types of maps for a variety of purposes, such as geographically showing where attacks on education have taken place, which schools are in located within the vicinity of an IDP or refugee camp, etc.

One of the most difficult aspects of creating these maps is knowing how to use GIS software. ArcGIS (by Esri) is the preferred product amongst mappers, but it is expensive. QGIS is the free, open source GIS mapping software; while it does not have all of the same functionality and support as ArcGIS, it can be used in place of ArcGIS where budget is limited. Both software allow for the importing of GIS specific baseline maps of countries and or regions as well as layers of information or data (already existing or created/inputted), such as roads, cities/villages, water sources, etc. After collecting GPS coordinates for schools, offices or camps, these too can be integrated, thus creating any map needed by education stakeholders. Both programs function offline, so maps can still be created if internet is down. Although Google Earth, Google Maps and Open Street Map are great resources for interactive mapping and can be integrated to some extent into ArcGIS or QGIS maps, these tools are difficult to customize to the extent that is sometimes needed for effective education maps.

Interactive mapping

Key actors: **Google Maps, Google Earth and Open Street Map**
Description: **Using mapping applications and software to create interactive maps**
Location: **Worldwide**
Tech needed: **Internet-connected computer, GPS device (optional)**

While print-based maps are effective tools, they are limited in terms of the amount of information they can display. In addition to print-based maps, therefore, it may be necessary to create interactive maps using such software as Google Earth, Google Maps and Open Street Map. One of the difficulties with displaying a 3/4 W, for example, is the sheer amount of information to cram into a small space. However, by inputting data and metadata into an interactive map, users can zoom in, zoom out and click on tags in order to see increasing amounts of detail. Users can also filter data on the image to only display the information they are interested in seeing. The drawback, however, is that its potential to be distributed and shared to a wide audience would be limited as many individuals may not be familiar or comfortable navigating such a map. Moreover, to view the map, one would need a computer with either an internet connection or the downloaded software.

Within recent years, a new movement of crisis mapping using crowd sourcing methods has begun to develop, with specific examples from the crises in Haiti and Libya.[9] The relevancy of crisis mapping to the education sector, however seems to be somewhat limited. Using SMS texts (where geographical points can be read from an SMS sent to a specific number) and short codes to collect and map information (as already discussed above)—as crisis and crowd sourced mapping methodologies do—certainly applies to education. However, when considering data collection only within the education sector, the amount of data received will most likely be manageable by the education sector itself (e.g. through an Education Cluster IM specialist), therefore crowd sourcing education data to volunteers for remote mapping will probably not be necessary in most instances. That said, when crisis/crowd source mapping is being conducted by the humanitarian community (e.g. inter-sectoral data collection and mapping led by OCHA), the education sector should ensure it is included and notified of education-related incidents. Additionally, although education stakeholders may not need to engage in crowd mapping, they may still want to explore Ushahidi—an online platform for crowd mapping—which appears to have good potential as a user -friendly platform for creating interactive maps (See **Annex C** for more detail on this)

Recommendations and key actions

- Global education stakeholders should immediately begin working towards building the education sector's capacity for creating effective and professional maps that meet the needs and desires of national and local education actors.
- A global education mapping task team, group or focal point (perhaps positioned within the existing Knowledge Management Outcome Group framework) should be established to determine and carry out a strategy for building this capacity; including deciding the hardware and software needs (e.g. ArcGIS vs. QGIS; GPS units vs. smartphones, etc.).
- A mapping specialist/expert should be engaged to collaborate with the mapping team and to create and conduct trainings for relevant education actors (e.g. Education Cluster IM specialists) on both print-based as well as interactive mapping. Having one or two well-trained mappers within a national Education Cluster would most likely serve all the mapping needs for the members of that Cluster and associated education actors.
- The global mapping team and specialist should also compile 'country-specific mapping packages' which include necessary software downloads and important baseline/shapefile maps to be provided to education IM/mapping experts upon deployment. They should also ensure that these individuals have access to and know how to use a GPS device (whether a specific GPS unit or a smartphone which has been included in the Education in Emergencies ICT Pack).
- Good examples of print-based and interactive maps should be compiled and shared with relevant stakeholders.

9 For further discussion on crisis mapping and these examples, please refer to Annex C

3.2. Coordination

Summary of main ideas and key technologies:

ICT can assist in improving the coordination of education actors and stakeholders in emergencies; two specific areas of this are explored:

- Contact lists and humanitarian profiles: OCHA's Humanitarian ID project may be a potential means to create automatically updating, real-time contact lists; this idea could be expanded to establish profiles and create a database including information for all education actors and responders in emergencies. An automatically updating database containing the location, availability and skillset of these actors could serve as an important education roster as well as capacity mapping tool.
- Improving meetings and trainings: Using basic and relatively inexpensive and easy-to-obtain technologies such as laptops, internet, LCD projectors, video cameras and printers, technology can greatly improve education coordination meetings and trainings.

Strong coordination amongst various education stakeholders at global, national and field levels is extremely important for effective planning and implementation of preparedness, response and recovery initiatives. Effective coordination is facilitated through strong communication and information sharing, which may occur distantly (through technologies like: e-mail, phone calls, SMS, Skype video-calls, etc.) and/or during face-to-face meetings. This section explores two specific areas wherein technology has the potential to improve coordination and communication: 1) contact lists and humanitarian profiles and 2) improving the effectiveness of meetings and trainings.

3.2.1. Contact lists and humanitarian profiles

In order for effective communication to take place, an accurate and up-to-date contact list containing education actors' contact information should be readily available to the Education Cluster and key education stakeholders. Although keeping such a list up-to-date appears straightforward at first glance, it can be quite complicated, time consuming and difficult to manage due to large influxes of humanitarian actors from many different agencies combined with extremely rapid turnover rates. Using software such as Microsoft Word or Excel to create contact tables and databases can help to simplify this process, but these lists and databases still need to be created, stored and updated manually—which can be quite taxing on an already overloaded cluster or agency. Discussion has begun, however, on using technology to develop humanitarian contact lists which update automatically. The example below discusses an idea OCHA is currently exploring:

Humanitarian ID[10]

Key actors:	**OCHA**
Description:	**System for tracking humanitarian personnel and automatically updating contact lists**
Location:	**Worldwide**
Tech needed:	**Internet-enabled device (laptop, mobile phone, etc.) and internet connection for checking in and out via the established online platform**

10. http://crisismappers.net/video/iccm-2011-humanitarian-id-a-check-in-system-for-un-ocha

To help with the issue of creating updated contact lists, OCHA has suggested developing a self- updating humanitarian contact list called, "Humanitarian ID." Humanitarian ID is the idea that upon arrival in an emergency—or even prior to arrival—humanitarian actors could 'check-in' to a centralized database.
Each actor would have a humanitarian profile that could be connected for ease of reference to one of his or her existing social networking profiles (e.g. Facebook, Twitter, Google +, etc.), so that when he or she checks in using their laptop or mobile phone, their information is fed directly into the relevant contact lists (e.g. a cluster, specific organization or a team). Moreover, the individual checking in can then immediately download and use the up-to-date contact lists pertinent to them and their work. Similarly, when leaving an emergency, a humanitarian actor will then 'check-out' and all contact lists containing that individual will be updated automatically. This is an idea in process, but the principles of maintain such a database could be one that Education Cluster can consider to maintain its contact lists, and other support information.

By providing humanitarian actors with an ID and a profile, the possibility then arises for having real-time contact lists. While Humanitarian ID has not yet been developed and is currently in the idea phase, education actors could greatly benefit from such a system as it could potentially save considerable time and energy involved with perpetually creating and updating contact lists as well as increase the accuracy and accessibility of these lists. However, many questions and challenges pertaining to the functionality of the Humanitarian ID initiative must be addressed. For example, will OCHA be responsible for maintaining the centralized database and will organizations trust this task to an external agency? Will organizations have flexibility in using the centralized database to create new contact lists for sub-groups, committees or task teams, or will they be required to go through complicated and slow procedures of submitting formal requests to the initiative's governing agency (e.g. OCHA)? Perhaps the most important and difficult question is: How will the humanitarian community ensure that individuals actually check-in and check-out? Since this is a self-reporting system, its entire functionality rests on the shoulders of each individual to accept the responsibility for updating their personal status. Since most local and national staff and partners are present before and after a crisis, there will also be a need to emphasize that they sign in and out at appropriate times—which may not be as obvious as international staff who physically arrive at and leave emergencies. While these questions and challenges are certainly real and must be addressed before implementation, the potential benefit of such a program to the humanitarian community in general and education actors in particular is worth exploring.

In addition to being used merely for maintaining contact lists, an initiative like Humanitarian ID which implements a system of IDs and profiles, has the potential to be used for response rosters and capacity mapping within the education sector. If, for example, additional metadata is able to be captured for a particular individual within his or her humanitarian profile (more than just ID, name, contact and check-in/check-out, such as: location, current employer, deployability status, thematic and geographic areas of expertise, training received, etc.) then it would be possible to have a constant map of its current capacity as well as response rosters which could be easily filtered according to specific needs. Of course, the main problem of encouraging and ensuring that individuals keep their profiles and statuses continually updated still remains. One way this could be overcome or minimized, however, is by making the profiles not only useful to organizations and clusters, but also by making them a valuable tool for the individuals themselves. User-friendly and visually pleasing profiles located within a centralized website, could enable the formation of important social networks or communities of practice via online discussions, document repositories, technical support, forums and trainings; this idea will be discussed further in **Section 3.3.2**.

It should be noted that INEE currently has a profile page function and a large, searchable database containing valuable metadata for all of its members. However, profiles are reported to be rarely updated and the membership database—while potentially a very valuable tool—is underutilized. Despite these issues, collaborating with INEE on the development or improvement of an EiE/Education Cluster database or involvement with the Humanitarian ID project might be worth exploring as an option.

Recommendations and key actions

- Since an initiative like Humanitarian ID would have to be done at an international level, the Global Education Cluster, key member agencies, INEE and other relevant education stakeholders should convene a group or team (perhaps using an existing group such as the Knowledge Management Outcome Group) to discuss the potential of Humanitarian ID or another profile/database project within the education in emergencies community (this conversation should also take into consideration the recommendations made pertaining to the community of practice in **Section 3.3.2**.). This discussion should also include key national- level representatives (such as designated Education Cluster Coordinators).
- Practical and specific needs and desires of education stakeholders (at global and national level) to be met by such a project should be identified (e.g. How and how much would this database or profile-based online communities of practice benefit the Education Cluster and its members?).
- The utility of the database should also be considered for different types of emergencies as there may be a need for different databases depending on the skill sets required (for example a complex emergency compared to a rapid onset natural disaster).
- Designate an individual or agency to act as the 'Humanitarian ID education sector focal point' to liaise with OCHA; they should find out more information regarding the project, its current state of development and how the education sector could support and benefit from it.
- The focal point, as directed by the group of relevant education stakeholders should explore ways of expanding the current Humanitarian ID project that would increase its usefulness to the education in emergencies community, especially in terms of the functionality of the humanitarian profile and the type of metadata to be collected. Specifically, determine how Humanitarian ID could be used to create not only real-time contact lists, but also rosters and capacity mapping.
- If Humanitarian ID is unlikely to happen/succeed, consider ways in which a profile-driven education in emergencies database could be developed, perhaps using Microsoft access or Excel; stakeholders may want to consider the possibility of whether the existing INEE database could be improved or merged into a more fully functioning and useful tool. Also determine if a revised INEE database could be used as the basis for the education in emergencies online community of practice (see **Section 3.3.2**.), which would avoid making individuals create multiple humanitarian profiles.

3.2.2. Improving coordination meetings

Technology also has the potential to improve the effectiveness of and access to education coordination meetings. Emails and SMS messages can quickly and easily remind participants of upcoming meetings as well as provide them with agendas for these meetings (for more on bulk SMS communication and management, see **Section 3.2.1**). There may be a small number of people working for local NGOs who do not possess a mobile phone, so such members should be catered for separately. A single laptop and an LCD projector can also go a long way in improving a meeting as they allow documents, images, videos, maps, data, report findings and other information to be shared visually, quickly and easily to an assembled group. Many of these technologies are already available within organization country offices or can be easily brought to the field by response personnel; LCD projectors, however, may be rarer and may be worth including within an 'Education in Emergencies ICT Pack,' described further in **Section 3.5.1**.

In addition to showing or displaying information, documents and videos, an LCD which is linked to an internet-connected laptop also has the potential to help provide online/distant access to coordination meetings and trainings. Clearly training needs to be offered to personnel who would take on such the task of setting up the technology in the first place. Often, travel during and following an emergency can be limited due to security reasons and destroyed or damaged infrastructure. Using inexpensive videoconferencing tools—like an internet- and LCD-connected laptop running Skype—can sometimes bypass these geographical barriers and allow important meetings and collaborations to still take place.

One final example for how technology could easily improve coordination meetings, is to ensure that in addition to having one laptop available for presenting information via the LCD projector, a second laptop with word processing software should also be available for that meeting's scribe or secretary to record the minutes, attendance and action points. By using a meeting template, this information can be recorded in real-time and emailed to all participants immediately following the meeting. Sometimes, important meeting minutes are not sent until just prior to the following coordination meeting, thus diminishing the minutes from being an important document guiding and directing cluster members' future actions to a mere historical record of what was said. If possible, it can also be very effective to connect the note-taker's laptop to a printer so that attendees are all provided with a hard-copy of the minutes as they leave the meeting.

Recommendations and key actions

- Education in emergency stakeholders should ensure key actors in the field, especially Education Cluster Coordinators/IM specialists, have access to a laptop and LCD projector by including them in an Education in Emergencies ICT Pack (See **Section 3.5.1**).
- Global stakeholders could gather accounts of good practices from the field regarding how coordination meetings are using technology, especially in terms of distant participation (via Skype, conference calls, etc.). These examples could then be shared with national stakeholders.

3.3. Capacity building and knowledge sharing

Summary of main ideas and key technologies:

Technology can be used to build capacity of and share knowledge between education actors; two specific issues are addressed:

- Online training courses: Online trainings can be used to overcome limitations of time and space and provide greater access to trainings. The open source software Moodle is one potential technology that to help provide these online trainings.
- Online communities of practice: a centralized education in emergencies website with social networking capabilities could become a space for collaboration, capacity building and knowledge amongst stakeholders.
- In addition to improving coordination and information management, ICT can also be used to help build capacity and share important knowledge and experiences. This section specifically looks at using online training courses as well as developing online communities practice focused on education in emergencies.

3.3.1. Online training courses

Conducting education in emergency trainings and capacity development activities can be extremely difficult as trainers and trainees at the global and national levels can be so geographically dispersed, lack travel funding and can be too busy with ongoing projects to leave for any extended period of time. E-learning with its 'anytime, anywhere' ability has the potential to overcome many of these limitations of space and time (Holmes and Gardner, 2006). The example below shows how IASC recently conducted an online IM training.

IASC-UNITAR distance learning course on Information Management

Key actors: **IASC, UNITAR**

Description: **This was an online distance training course for Information Managers working in emergencies; it was held by IASC's Task Force on Information Management and hosted by the United Nations Institute for Training and Research (UNITAR).**

Location: **Worldwide**

Tech needed: **For participation: an internet-connected device, such as PC or mobile phone**

For development: internet connection, web-server, Learning Management Software (LMS) or Virtual Learning Environment (VLE) software enabling uploading/downloading of documents and class discussion/forums. From April—June 2011, IASC in collaboration with UNITAR held its first ever distance learning course on IM. Its aim was to build IM capacity and competency and mainstream IM practices during humanitarian response. IASC had previously developed the IM course content which had been divided into several chapters. These chapters were then presented as weekly readings (downloadable pdf) and discussion topics by the course members. Each week/chapter had a different discussion moderator—a selected expert for that particular area—which helped facilitate discussion, sharing and learning. Participants were also required to take quizzes on the weekly content to check for understanding.

Education stakeholders could take this same idea and create online courses and training modules surrounding a myriad of education in emergency topics and issues. Although the IM course discussed above was kept very basic and relied on collaboration with UNITAR, open source software such as MOODLE can be used to easily create online courses.

Moodle: An open source LMS/VLE

Key actors: **Moodle**
Description: **This is an open source LMS/VLE that can be used to create online courses**
Location: **Worldwide**
Tech needed: **PC, internet connection, web server (Moodle needs to be installed on a web server to work)**

Moodle allows users to build their own customized e-learning environments and online courses by selecting from a variety of features to support distance learning such as: content posting and downloading, discussion forums, quizzes/grading, instant messaging/chat, online community news, wikis and more. It can also support multi-media content such as podcasts and videos. Moodle's robustness and scalability are demonstrated in the largest Moodle project to date – Open University,[11] a UK-based distance learning university with a student enrollment of 250,000 students across the globe. While Moodle can support large-scale implementations, it can also be utilized locally at a school or small group level.

Installation of Moodle from scratch is not simple but the process is outlined in step-by-step instructions written at a level suitable for those with basic computer literacy. Also, Microsoft has integrated a one-click Moodle installation, especially for teachers, into Microsoft Office. Since Moodle is an open community of software development, its development is highly influenced by educators. Current new features being developed in a feedback loop with Open University include integration of Google Apps, access via mobile phones, and increased personalization for individual learners. INEE is currently investigating and piloting the use of Moodle as a learning forum for quality education initiatives including the development of a Moodle site for NRC to interact with program managers to discuss INEE Guidance Notes on Teaching and Learning and NRC's Youth Education Pack. [12]

Recommendations and key actions

- Global education stakeholders should explore the possibility of offering online trainings; they should communicate with national stakeholders to determine who wants/needs training and on what content;
- Global stakeholders should then determine which courses should be developed and tested first; this may be based on need or perhaps based on what curriculum content and resources already exist;
- Specific agencies or combinations of agencies should be used as specific course focal points and content experts. Individuals should be enlisted as curriculum developers and training facilitators;

11. http://www.open.ac.uk/
12. Further information is available from Dean Brooks who is leading the initiative for INEE to utilize Moodle for capacity building.

- A tech expert or experts familiar with the chosen LMS/VLE (e.g. Moodle) should develop the structure of the course, train the experts on how to navigate and use the software and provide support throughout the training.

3.3.2. Online communities of practice

Another way for using technology to assist with capacity development and knowledge sharing is to create a centralized, online space to help establish important communities of practice. These can take a lot of human resources to maintain so there needs to be considerable commitment on the part of the communities of practice for ensuring continuity. Individuals within these communities of practice would be able to share lessons, practices and experiences with each other. Actors in the field would be able to turn to these communities for support. An easily searchable database and profile system containing important metadata would help individuals connect and communicate with each other. While there are currently many task teams and working groups in the field of education in emergencies, their online presence and accessibility are still very much limited which is, in turn, limiting their potential as true communities of practice.

One approach to this is to create a one-stop, centralized website for individuals and organizations involved in the field of education in emergencies. INEE and the Global Education Cluster are two entities that are particularly well situated—as interagency mechanisms—to act as hosts for these online communities of practice; although INEE may be somewhat better situated to do so, as it currently has an operational website while the Global Education Cluster does not. The INEE website is also well-known and highly visited (INEE itself is made up of over 6,000 members) and is in the process of being updated to be more interactive. It is also currently an essential source of information by acting as an online repository for important documents, tools and resources. It is not, however, meeting its huge potential as a social network. If education stakeholders were to prioritize the enhancement of the structure and functionality of INEE's website—including members' profile pages and member database—and website-based online activities (e.g. forums/ discussions, trainings/courses, etc.), a central hub for online collaboration, networking, capacity building and knowledge sharing could be created.

Creating such a resource will, of course, be faced with many challenges. If done properly, the sheer scope of such a project will require significant funding and personnel to develop and maintain. Web developers and designers will need to ensure the website has all of the needed functionality while remaining simultaneously 'light' in order to be accessible to those accessing it with low bandwidth. Coordination between stakeholders will have to be strong with clearly defined roles and responsibilities.

Recommendations and key actions

- Global education stakeholders should prioritize the establishment of a centralized website that could act as a one-stop location for education in emergencies actors. The website should serve as an information hub/online repository for key resources, documents, news and information pertaining to education in emergencies as well as a central space for networking and collaboration of individuals and communities of practice.

- Collaborative activities such as forums, discussions, wiki creation, resource development, webinars, etc. should be embedded within or linked from this website. Links to any relevant activities or events hosted on other websites should be included.
- All users should have a user-friendly and visually pleasing profile (which could act as a sort of humanitarian ID discussed in **Section 3.1.1**.). These profiles should feed into a database that can be easily searched/filtered to locate specific individuals, create contact lists and deployment rosters and do capacity mapping.
- INEE and the INEE website are already well situated to play this role and building on this existing structure and network may be most effective. However, education stakeholders will have to strongly support—in terms of financing and personnel—such an initiative.
- To implement these recommendations, global education stakeholders should coordinate together and pool funding to hire well-qualified expert website developers.

3.4. Providing access to quality education during emergencies

Summary of main ideas and key technologies:

Depending on specific contextual factors, ICT could be used in emergency and post-crisis situations to help provide individuals with access to quality education. This section looks specifically at three different areas:

- E-learning and online instruction: the internet has the capability to not only provide teachers with high-quality, customizable teaching resources and content, online courses also be used to increase access to education in areas where travel is limited. Online instruction, however, typically takes a level of ICT infrastructure and capacity that does not exist at primary and secondary schools in emergencies and post-crisis situations.
- Interactive Radio/Audio Instruction: Although IRI is often overlooked, it has a long history of providing low-cost and effective distance education to large groups of individuals.
- M-learning: Mobile learning is still a somewhat new field and area of focus; however, it is beginning to receive a lot of attention as a possible means for providing education. The Education Development Centre's (EDC) Interactive Audio Instruction (IAI) program uses many of the principles of Interactive Radio Instruction (IRI), but the added functionality of the mobile devices offers an increased amount of interactivity as well as the possibility for remote monitoring and evaluation.

The study thus far has focused on the use of technologies within the field of education in emergencies in terms of the coordination, information management and capacity building and knowledge sharing for individuals typically associated with NGO, UN or government agencies. Often, these individuals have a relatively high level of ICT capacity and access—even within an emergency. This section, however, focuses on how technology could be used to provide beneficiaries—particularly teachers and students—with increased access to quality education during emergencies and post- crisis situations. While this could be considered less relevant for the Education Cluster, the cluster as a coordinating body, needs to support and advise education agencies on good practices when it comes to the use of technology which is a rapidly changing field. Also a coordinating agency supporting education actors including ministry officials, the education cluster is in a good position to help ensure that the lessons related to the use of technology in various ways contribute towards better quality learning, both before, during and in emergency situations.

There is certainly great potential for ICT for educational provision in emergencies given the difficult or unsafe travel conditions that often accompany crises. However, while it cannot be denied that technology is penetrating deeper and deeper even within the most remote or crisis-affected communities (especially in terms of mobile telephony), there are still serious issues regarding the lack of ICT infrastructure, resources and technical capacity which can make ICT-enabled education provision extremely difficult (for more on ICT infrastructure, acquisition and provision see **Section 3.5**).

Although not much literature has been written about the use of technology for education during emergencies, much has been written and debated about the use of ICT in education within developing contexts (UNESCO, 2011b; Chen and Wellman, 2004; Hawkins, 2002). A wide spectrum of ideas and opinions on the matter currently exists among educationalists; at one end are tech-enthusiasts who see ICT as a viable way for increasing access and improving quality of education in these areas, and at the other end are the tech -critics who view ICT as a poor investment and prioritization of extremely limited resources. It is beyond the scope of this current study to engage with any degree of detail in this ongoing discussion and debate; rather, this section briefly presents some examples ICT-based education and their potential use within education in emergencies. Recommendations for stakeholders for all three sub-sections have been compiled and included at the end.

3.4.1. E-learning and online instruction

Through the internet teachers and trainers can access an online wealth of information, tools and resources to be customized and used within their teaching. The Khan Academy, Open Education Resource (OER) repositories (e.g. MERLOT, OER Commons, Connexions, TESSA) and CK12.org are just a few examples (for more on these and other tools, see **Annex B**). The internet can also be used to increase access to education through online instruction. As discussed in **Section 3.3.1** conducting online trainings can help education stakeholders bypass restrictions of space and time; this principle applies not only to response personnel, but also to teachers and students trying to access educational trainings and courses.

E-learning in Palestinian higher education

Key actors:	**Birzeit University; Al-Quds Open University (QOU)**
Description:	**Online learning has been used to varying degrees in Palestinian universities to bypass restrictions of the occupation and access education.**
Location:	**Occupied Palestinian Territory (OPT)**
Tech needed:	**For development of e-learning course: an internet-connected device, such as PC or mobile phone for users, internet connection, web-server, Learning Management Software (LMS) or Virtual Learning Environment (VLE) software enabling uploading/ downloading of documents and class discussion/forums**

During the first Palestinian Intifada, many Palestinian schools and universities we closed, including Birzeit University which was shut down from 1988-1992. In 2002, when Birzeit was facing another closure during the second Palestinian Intifada, two IT faculty members created an online portal whereby teachers and students could communicate with each other, participate in online discussion groups, take exams and upload lecture notes and homework. The finished product, which saved the academic year for thousands of students, was called Ritaj, meaning “The Great Portal” (Khoury-Machool, 2007).

In 2008, following the success of Ritaj and the recommendations from an evaluation conducted by the World Bank and the European Union, Al-Quds Open University (QOU)—which currently enrolls over 40% of Palestinian undergraduates—shifted from a print-based correspondence model to an e-enabled, blended learning approach (Matheos, Ragoza and Hamayil, 2009; Ghanem and Hamayil, 2011). These online courses are typically delivered using Moodle (see Section 3.3.1.) and include e-registration, electronic exams, video streaming, virtual labs and Web 2.0 tools like wikis, blogs and podcasts (Mikki and Jondi, 2010).

At least two conditions that must be considered when implementing online instruction are the teachers' and students': 1) access to ICT infrastructure and 2) ICT technical capacity. When one or the other of these requirements does not exist within a particular population, appropriate ICT infrastructure and training will need to be provided (which can cost valuable time and resources during an emergency). One reason why e-learning is a viable option in Palestine is because the general ICT infrastructure and usage is relatively higher than many other developing and crisis- affected countries; moreover, in institutions of higher education, ICT infrastructure and capacity is typically much higher than in primary of even secondary schools. Of course this does not mean that online courses cannot be effectively developed and delivered in other crisis-affected countries or for primary or secondary education, however, education stakeholders should be mindful of a context's 'e-learning readiness' and be prepared to provide needed technology, tech support and training which may be lacking.

3.4.2. Interactive Radio/Audio Instruction (IRI/IAI)

Another approach that is used when implementing technology for educational provision in emergencies is to capitalize on what technology and capacity already exists in a particular context. Traditional radio technology, for example, should not be overlooked when considering education in emergencies; educational radio programs have low operating costs as well as long histories and consistent evidence of impact and effectiveness. The United States Agency for International Development (USAID) as well as the Education Development Center (EDC) have been two of the biggest proponents and implementers of a pedagogical approach using radio technology called Interactive Radio Instruction (IRI); USAID's involvement with IRI goes as far back as the early 1970s in Nicaragua. The World Bank has also strongly supported the use of IRI and has produced an IRI toolkit entitled, Improving Educational Quality through Interactive Radio Instruction, which defines IRI as a combination of "broadcast radio or another audio medium with an emphasis on active learning to improve educational quality…[It guides] the teacher or facilitator and the students through activities, games, and exercises that teach specific subject matter and offer the teacher models of how to organize effective learning activities" (World Bank, 2005, p.2). Being centered on an active learning pedagogy, IRI programs require learner participation during pauses that have been built-in to the broadcast.

Using a similar approach as IRI, Interactive Audio Instruction (IAI) uses audio recordings—rather than radio broadcasts—to deliver high quality course content and activities via MP3-enabled devices, such as a mobile phone. EDC's Shaqodoon initiative, highlighted in the next section, is an example of IAI.

3.4.3. M-learning

Mobile learning (or m-learning) is another example of how technology can be used in developing or emergency contexts. Again although not directly related to the work of the Education Cluster, it is essential that cluster coordinators have the capacity to advise education agencies on new educational methods appropriate for use in emergencies. This type of technology is beginning to be considered by many as a viable option for ICT in education; in December, 2011, UNESCO even held a Mobile Learning Week (MLW) for educationalists, government officials and experts to discuss how mobile technologies can help to achieve the Education for All objectives (UNESCO, 2011c). USAID also recently established the mEducation Alliance (also known as m4ed4dev), a consortium of key international institutions, UN agencies and governments, which aims to find ways of improving learning and access to formal and informal education through context- appropriate, low-cost mobile technologies.

Some of the arguments for m-learning are that mobile technologies are low-cost and are often already being used by beneficiary communities; moreover, as the mobile device usage continues to increase in developing contexts, broadband and 2 and 3 G internet networks are becoming increasingly available to these populations as well. While solid evidence of the effectiveness of m-learning in developing contexts has yet to be established, research, discussions and projects are currently being developed and are underway in an effort to learn more; for an overview of the different initiatives presented at the MLW, see their 'Walking Gallery'. EDC's Shaqodoon initiative described below gives one example of the potential in combining m-learning with IAI.

EDC's Shaqoodoon program

Key actors: **EDC, USAID, various implementing partners/NGOs**

Description: **A youth livelihoods financial literacy and entrepreneurship training program that implements an IAI pedagogy via the use of mobile phones.**

Location: **Somalia**

Tech needed: **1 MP3-enabled mobile phone per classroom, external speakers or speaker- dock, short code, quiz response data management software**

EDC's USAID-funded Shaqodoon project, which ran from February to December 2011, used MP3-enabled mobile phones to deliver IAI courses on financial literacy and entrepreneurship to Somali youth living in the most remote and hard-to-reach areas of their program. Curriculum developers, translators and programmers collaborated to create pre-recorded audio lesson segments for the courses and load each lesson segment into several mobile phones. Each course was made up of about 40 different 20-minute episodes. The phones, which each had external, portable speakers, along with training on how to use them were provided to instructors.

In addition to using the phones to broadcast course content, instructors could use them to call an EDC short code and take group quizzes at the end of each lesson to assess the students' learning. All quiz responses were uploaded to an EDC online database which could be viewed and analyzed by project staff.

Recommendations and key actions

- Using technology within the first three areas of activity discussed (coordination, information management and capacity building and knowledge sharing was applicable to all education stakeholders, but especially to the Education Cluster. Since the Education Cluster is a coordinating mechanism, however, rather than an implementing agency, using technology to provide access to education is beyond the scope of the Cluster and should most likely be done by education actors and agencies themselves. However, there is a need for cluster coordinators to be at least conversant with emerging mechanisms for providing rapid access to education in situations of emergency.
- While ICT does have potential to help these education stakeholders provide access to quality education during emergencies, implementing it successfully is can be quite complicated. To avoid wasting time and resources, stakeholders must be very mindful of the surrounding context in which they are implementing technological use.
- Stakeholders should consider: the needs and challenges facing the beneficiaries, how technology could be used to help meet those needs and overcome those challenges, which technologies and ICT infrastructure are required to do so and their cost effectiveness, and the 'ICT readiness' of the particular context.
- A context's readiness will vary according to the type of program and technologies being implemented; it will typically consist of the level of ICT infrastructure available and/or already in place and the technical capacity already in place. If there is not adequate/appropriate ICT infrastructure or technical capacity, stakeholders will need to somehow provide it or adjust their programs accordingly.
- Tailoring programs to use and build upon existing infrastructure, knowledge and capacity can go a long way in improving a program's likelihood for success.
- When implementing ICT within education programs, make sure to be mindful of gender gaps and ensure girls are not being left out.

3.5. ICT provision and acquisition

Summary of main ideas and key technologies:

- Although field offices at national and local levels do have some ICT and although actors may bring their own devices and technologies with them, it is important that global education stakeholders be prepared to quickly fill ICT gaps.
- One way they can be prepared is by stocking selected ICT technologies and creating customizable Education in Emergencies ICT Packs.
- In addition to traditional funding mechanisms, stakeholders should try establishing partnerships with relevant corporations (such as Microsoft, Google, Nokia) in an effort to receive ICT donations or subsidies.

One of the major challenges facing the use of technology for education in emergencies revolves around the issue of access to functional ICT. For coordinated and effective planning and response, it is essential that education actors in the field have access to a certain amount of information and communication technologies—although this amount may differ according to the responsibilities of each individual. The

problem is, however, that gaining access to these ICTs can be particularly difficult in crisis-affected situations where limited levels of pre-existing ICT are often further limited by the negative effects of the crisis itself. Despite these adverse conditions, global education stakeholders should work to ensure that key national stakeholders in the field have access to the ICT they need to do their jobs effectively.

While it is true that many individuals choose to bring personal ICTs with them (e.g. laptops) and that country and field offices often can provide access to some ICT (e.g. desktops, internet, etc.), there is a risk in assuming that individuals will have access to the necessary ICTs once in the field; moreover, unclear designation of responsibility for ICT provision combined with slow and bureaucratic ICT request procedures can increase ICT gaps and key actors in the field not being able to perform adequately. This section discusses the provision and acquisition of ICT by global education stakeholders to help ensure that ICT gaps are easily and quickly filled.

3.5.1. Education in Emergencies ICT Pack

Throughout this report, there have been several references to an 'Education in Emergencies ICT Pack.' The idea is that global education stakeholders can stockpile essential technologies and then use them to create customizable kits that can be sent with a newly deployed individual or sent to national education stakeholders who may be lacking needed equipment. Although there are surely countless devices that could be included in such a pack, the tables below provide an overview of those which have been presented in this study. The technologies listed below are not intended to be a comprehensive list, but rather a beginning of some of the most important (and feasible) options to include in an Education in Emergencies ICT Pack. In some field offices, such a pack may exist already but is often only utilized by the ICT designate rather than technical staff. Cluster coordinators should always check what ICT equipment is available before developing and ordering an EiE ICT Pack.

3.5.2. Acquiring ICT

As can be seen from the tables above, ICT provision can be expensive. In order to move forward with applying technology to education in emergencies, education stakeholders will have to have the budget to acquire and maintain the necessary ICT. Some of this budget may be able to be obtained through traditional, coordinated funding mechanisms. Another ICT acquisition strategy, however, is through establishing partnerships with the private sector. Many ICT and tech-based corporations and foundations are giving millions of dollars for financing technologically-related humanitarian and development projects in education. The Bill and Melinda Gates Foundation, the William and Flora Hewlett Foundation, Microsoft, Intel and Cisco are all examples of organizations which have been greatly involved with ICT in education and could be potential sources for funding ICT in education in emergencies.

Table 3.1 Key technologies for use in education in emergencies

Hardware

Technology	Price est. (US$)	Supply to	Comments
Laptop	500-1200	Those who need mobility of a laptop and/or have not been provided a desktop	Essential for field workers (word processing, emails, internet, etc.). Supply preloaded with appropriate software (e.g. MS Office, etc.)
Mobile phone (basic)	10-30 (device) Service fees vary	Every field worker	Essential for field workers (voice and SMS text functionality); most likely should be purchased at national/local level
GPS unit (basic)	80 –120	Appropriate individuals (data collectors, IMers, etc)	These are necessary for collecting GPS coordinates for plotting points and locations on maps
Smartphone	130-250 (device) Service/monthly fees vary	Appropriate individuals (e.g. Cluster Coordinators, IMers, data collectors, etc.)	Important for those needing constant email/ internet access (e.g. when field office connection goes down); also multi-functional and can be used as mobile phones (voice and SMS text), GPS units, cameras, video recorders, and electronic data collection tools
LCD projector	300-2000	1/group (e.g. national cluster, sub-cluster, agency program, etc.)	Important for meetings and trainings; prices vary greatly
Solar charger	65-300	Designated individuals	Since electricity is often unreliable, a solar charger for laptops and mobile phones would be very useful to include in the ICT pack

Software

Name	Company	Price est. (US$)	Comments
FrontlineSMS	FrontlineSMS	Free (open source)	SMS management software; could be used as an alternative to partnering with Souktel's AidLink
ArcGIS	ESRI	1500	High-end GIS software; ESRI has potentially reduced rates and offers for partners, education programs, etc.
QGIS	Quantum GIS	Free (open source)	Alternate GIS software; not as high-end, functional or robust as ArcGIS, but may meet needs of education stakeholders
Google Earth	Google	Free	Can be used by education stakeholders for creating interactive maps
Moodle	Moodle	Free (open source)	LMS/VLE software that can be hosted on education stakeholders' webservers and used for developing and delivering online courses and trainings
GATHERdata	FHI360	NA	This software, or one like it, can be used on mobile devices for data collection and management

NetHope: tracking ICT inventory

Key actors: **NetHope, private/corporate donors, Emergency Telecommunications Cluster (ETC)**

Description: **An organization that acts as a broker between tech companies willing to donate ICT and stakeholders who need those technologies during emergency response.**

Location: **Worldwide**

Tech needed: **NA**

NetHope is one of the members of the ETC and works to identify gaps in ICT provision and then connect stakeholders where technology infrastructure is limited in emergencies to hi-tech companies that can donate technologies to support new projects and basic IT infrastructure needs (NetHope, 2011). NetHope establishes relationships with key corporate partners (e.g. Cisco, Intel, Bill and Melinda Gates Foundation) and then tracks inventories of equipment and software that are available for donation by these partners. They then coordinate the supply chain for delivery of equipment during emergency response. NetHope also provides training for local recipients and support for new projects in humanitarian and development contexts, such as the donation of mobile phones for health assessments and recently, ICT for Education projects.

As social corporate responsibility programs continue to increase their equipment donations, there is an opportunity for the education sector to create private partnerships and acquire ICT through corporate donations or subsidies

Recommendations and key actions

- National and local stakeholders should decide which technologies would be most helpful in their work and which are most often lacking.
- Based on this information, global education stakeholders should then decide which technologies should be stockpiled for inclusion in the ICT packs.
- A technological expert should be requested to ensure the most appropriate makes, models, etc. Many agencies have an ICT designate within their teams already so this person could provide support.
- ICT packs should customizable as each individual and each context will have different ICT needs; this will avoid providing unneeded ICT.
- Education stakeholders should standardize ICT request and tracking procedures; they should create a form and a clear request mechanism for technology requests from the field that can be easily forwarded to NetHope or other donation supply chains.
- Enlist NetHope to advise on how technology requests by the education sector can be created in the field, tracked, and propagated effectively for the best chance of remittance and support for installation.
- Create a categorization for technologies that are temporarily distributed in the field to support emergency response and technologies that will persist as an integrated part of national ICT development plans.
- Explore, through NetHope as well as other means, establishing partnerships with tech- related private sector entities such as Microsoft, Cisco, Intel and Bill and Melinda Gates Foundation for creating alternative ICT acquisition methods.

4. Recommended plan of action

This plan of action is a compiled and condensed 'at-a-glance' version of the recommendations presented throughout this report. For more detailed recommendations, see the corresponding in-text boxes.

4.1 Information Management

a. SMS for collecting data and communicating with beneficiaries

i. National-level stakeholders coordinate and implement a centralized database and system. Set up 'Education Sector' short code and designate SMS focal point(s). The Cluster Coordinator at field level could approach mobile phone providers to support in setting up the code.
ii. Distribute short code to designated groups and create appropriate contact lists.
iii. Coordinate and combine their SMS information needs for data collection and assessments.
iv. Global education stakeholders work closely with national level to provide support – this could be through the Cluster Website with a designated help desk, or other mechanisms which work for the national offices, such as mobile phone, or email.
v. Conduct pilot tests using different programs (e.g. AidLink and FrontlineSMS, FHI360, OLPC).
vi. Global stakeholders allocate budget and identify focal points to engage SMS specialists (e.g. Souktel staff, experienced FrontlineSMS users, etc.).
vii. Create training modules for actors using the SMS system.
viii. Create assessment and evaluation templates and core school SMS alert messages after conversations with 'Info as Aid' who are conducting pilots on this.
ix. Train informants on best practices for sending information safely.

b. Smartphones for data collection

i . National stakeholders consider the potential of using smartphones for data collection.
ii. Global stakeholders provide resources and support to national level.
iii. Work with national level to conduct a series of smartphone pilot tests.
iv. Engage experienced representative/agency with expertise in data collection using electronic devices to lead the piloting (e.g. FHI360).
v. Smartphones and GATHERdata package acquired for the pilot tests.
vi. Pilot tests analyzed and lessons learned shared.
vii. Global stakeholders consider including smartphones in ICT pack.

c. Mapping and GIS software

i. Global stakeholders build education sector mapping capacity.
ii. Mapping task team established to determine and carry out strategy.
iii. Mapping specialist engaged to create and conduct trainings for relevant education actors.
iv. Mapping team and specialist compile 'country-specific mapping packages' including baseline maps and GPS devices.
v. Good examples of maps compiled and shared.

4.2 Coordination

a. Contact lists and humanitarian profiles

i. Designate a focal person to liaise with OCHA regarding the utility or not of developing shred information systems, and discuss potential of Humanitarian ID or similar project.
ii. List needs and desires to be met by project.
iii. Explore ways of expanding the current project to increase usefulness to the education sector; determine how Humanitarian ID could also create rosters and capacity mapping.
iv. Consider ways in which a profile-driven education in emergencies database could be developed.

b. Improving coordination meeting

i. Include laptops and LCD projectors in Education in Emergencies ICT Pack.
ii. Gather good practice examples regarding technology in coordination meetings

4.3 Capacity building and knowledge sharing

a. Online training courses

i. Explore the possibility of online trainings; communicate with national stakeholders to determine who wants/needs training and on what content.
ii. For other agencies beyond the Education Cluster, determine which courses to develop and test. For the Education Cluster follow the course content of elearning that has been outlined in the strategic plan outcome priorities.
iii. Designate specific course focal points, content experts, curriculum developers and training facilitators.
iv. Tech expert develops structure of course, trains the subject experts on how to use.

b. Online communities of practice

i. Prioritize establishment of centralized, one-stop website.
ii. Web designers develop forums, discussions, etc.
iii. Web designers create user-friendly profiles and connected database.
iv. Discuss potential role of INEE website.
v. Coordinate together and pool funding to hire well-qualified expert website developers.

4.4 Providing access to quality education during emergencies

a. E-learning and online instruction; IRI/IAI; M-learning

i. Using technology to provide rapid access to education (cluster to advise education actors and agencies on good practice). Cluster can also use platforms to conduct Information Management Courses.
ii. As for all interventions the principles of 'Do No Harm' must be applied in all contexts, so stakeholders should be mindful of the surrounding context in which they are implementing the use of technology.
iii. Consider: needs/challenges, how technology could help, which ICT required, cost effectiveness, 'ICT readiness' of the particular context.

iv. Readiness will vary; typically consists of the level of ICT infrastructure available and/or already in place and the technical capacity already in place; must provide what is lacking.
v. Tailor programs build on existing infrastructure, knowledge and capacity.
vi. Be mindful of gender gaps and ensure girls are not being left out.

4.5 ICT provision and acquisition

a. Education in Emergencies ICT Pack; Acquiring ICT

i. National stakeholders decide which technologies would be most helpful (see **Annex B**).
ii. Global stakeholders decide which technologies should be stockpiled for ICT packs (see **Annex B**).
iii. Technological expert requested to assist in ensuring the most appropriate makes, models, etc.
iv. ICT packs customizable as each individual and each context will have different ICT needs.
v. Standardize ICT request and tracking procedures; create form and a clear request mechanism for technology requests from the field.
vi. Enlist NetHope to advise on how technology requests can be created in the field, tracked, and propagated effectively.
vii. Create categorization for technologies temporarily distributed in the field to support emergency response and technologies that will persist as an integrated part of national ICT development plans.
viii. Explore partnerships with tech-related private sector entities such as Microsoft, Cisco, Intel and Bill and Melinda Gates Foundation.

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Annexes

Annex A Project Mapping

Title	Quick description	Organisation	Locations	Emergency Context	Technology	Platform
Mapathon	Mapping South Sudan	World Bank	South Sudan	Conflict	Mobile/Web	SMS
Humanitarian Kiosk 2.0	A mobile application for live updating of dashboards and viral sharing of them	OCHA	Global	Various	Mobile	Smartphone App
Respect and Discipline Initiative	A school based program to promote attendance and curb bullying	UNRWA	Gaza	Conflict	Mobile	SMS
Humanitarian ID	Dynamic contact list and status up-dates for field personal during emergencies	OCHA	Various	Conflict/Natural Disasters	Mobile/Web	SMS, Web browser
Mission 4636	SMS short codes for aid requests (eg rescue) and partners	US State Department	Haiti	Earthquakes	Mobile	SMS
Hurricane Katrina Wiki	Wiki data used by remote actors and actors in the field as an information source of information	Crowdsourced	United States	Hurricane	Website	Wiki
2004 Indian Earthquake and Tsunami Wiki	Wiki data used by remote actors and actors in the field as an informal source of information	Crowdsourced	Indonesia	Tsunami	Website	Wiki
Haiti Wiki	Wiki data used by remote actors and actors in the field as an information source of information	ICT for Peace Foun-dation	Haiti	Earthquake	Website	Wiki
Mapping Hospitals	Mapping hospitals after the quake. Started with satellite images then used crowdsourcing to fill the gaps	Crisis Mappers	Haiti	Earthquake	Mobile/Webs	SMS
Aerial Mapping (2004 Tsunami)	Mapping bridge outages, thermal at night with infrared - fires to see where people had moved to	UN (not clearly defined)	Indonesia	Tsunami	Photography	Aerial imaging
Mapping with hi-resolution imagery (Haiti)	Collection of aerial images over Port-au-Prince for one week	Rochester Institute of Technology	Haiti	Earthquake	Photography	High res aerial imaging
Mapping IDP camps in Haiti	Mapping pathways and services and posting printed maps in kiosks	IOM and Haitian open street mappers	Haiti	Earthquake	Mobile/Web	SMS
Noula	Mapping local needs	Solutions incl. (Kurt, Jean Charles)	Haiti	Earthquake	Mobile	Voice, SMS
Radio One	Information broadcast (e.g. health info), testimony	Radio One and DJ Carel Pedre	Haiti	Earthquake	Radio (web facebook)	Voice, broadcast facebook postings
UN's One Response	Humanitarian Portal	Cluster System	Various/Global	Various	Website	Document, repository, coordination etc
IFRC SMS Messaging	SMS alert for refugees targeted to (eg water)	IFRC	Haiti	Earthquake	Mobile	SMS
IFRC Information Lines	Call centres providing advice on the cholera epidemic and response	IFRC	Haiti	Earthquake	Mobile/ Landlines	Voice

Annex A Project Mapping cont.

Functional area / sector	Notable Issues	Stage	Collaborators	url
Education, Health, Logistics	Local participation and training, mapping where schools were and where schools could be built	Implemented	Google	tinyurl.com/6d7xynt
Various	Push data and viral, nice idea to keep personnel updated, ready and to have a info channel that can go peer-to-peer (e.g. Bump app on the iPhone)	Proposal pre-pilot	None yet	tinyurl.com/7pd83lv
Education, Psycho-social support	Broad community participation. Respect and Discipline tightly defined in behavioral and attendance outcomes	Scaling up in 116 schools	None	
Communication and Coordination	In ideation and design stage but promising for implementation	Design	OCHA, ETC	www.mission4636.org
Rescue, nutrition, WASH	Collaboration worked well with different agencies, each did their part - translation, infrastructure, processing of messages	Implemented	Stanford (Rob Munro); FrontlineSMS, InSTEED, Energy for Opportunity, Thompson Reuters Foundation	www.mission4636.org
Various	View history to see development of information from response to the present	Implemented		en.wikipedia.org/wiki/Hurricane_Katrina
Various	View history to see development of information from response (characteristics / casualties) to the present view of its history	Implemented		en.wikipedia.org/ wiki/2004_Indian_Ocean_earthquake
Various	View history to see development of information from response to the present	Implemented		
Health	Key point, shared data in various formats (XML, KML, GeoRSS)	Implemented	Open Street Map, Sahana	tinyurl.com/7nqwluy
Assessment	Data never answered operational issues	Implemented	University of Texas	www.lib.utexas.edu/maps/tsunami_2004.html
Logistics	Very successful. Had high-resolution aerial map of 30km in one week	Implemented	Crisis Mappers, Disaster Risk Management Group, World Bank Funded	tinyurl.com/7kt2x7b
Logistics, shelter, camp coordination	Data synthesis was successful here but no details on updating etc	Implemented		www.iomhaiti.com/page.php?id=2
Various needs (shelter, rescue, education)	Had a difficult time getting support (competition with other projects perceived as similar - Ushahidi, UN One Response, connected with Ushahidi eventually. Schools were mapped.	Implemented		www.ictworks.org/tags/noula
Public information, community cohesion, health	Strong community participation and reach. Drafting of known personalities, communication channels and shifting gears to the emergency setting	implemented		www.facebook.com/carelhaiti
Coordination and training of emergency response actors	Design issues: site being redesigned by ECT	Implemented, next phase in process		tinyurl.com/6w6ub2l
Various (food health)	Developing key messages for SMS delivery was difficult for staff. Positive: incoming data from beneficiaries checked against IFRC data and team followed up on wrongly assessed situations.	Implemented		tinyurl.com/7az6wob
Health	Large call volume handled well	Implemented		tinyurl.com/6d7xynt

Annex A Project Mapping cont.

Title	Quick description	Organisation	Locations	Emergency Context	Technology	Platform
IFRC Shelter Helpline	Call centres to address acute shelter needs	IFRC	Haiti	Earthquake	Mobile/ Landlines	Voice
Caesar department Columbia	Information system to report on IHL (International Humanitarian Law) infractions	Department of Cesar Columbia	Columbia	Conflict	Mobile	SMS
Libya Crisis Map	Crisis Mapping of 3Ws (who does what, where) and IHL infractions	Stand by Task Force (SBTF)	Libya	Conflict	Mobile	SMS/Web tools
FabFi	Citizen chained Wi-Fi to expand coverage to rural areas	Fab Lab MIT	Afghanistan	Conflict	Internet Connectivity	Wi-Fi
Digital Radio	Replacing analogue with digital radio for linking sites, greater synchronised coverage, programming	UNICEF	Philippines		Digital Radios	Audio programming, SMS, GPS
Distance Learning for Refugees	Web-based programs to link US teachers with students in refugee camps for English and Liberal Arts Diploma	Jesuit Refugee Service and Jesuit Commons for Higher Education at the margins	Kenya, Malawi, Syria	Various (Refugee context)	Desktop computers	Website
WIDER	Wireless LAN for disaster relief, increasing bandwidth ease of joining for workers	Ericcson	Global	Various	Internet Connectivity	Wireless LAN
UWIANO Platform for Peace	Crisis mapping of violence during Kenyan referendum of 4/2010	NCIC	Kenya	Conflict	Mobile	SMS / Web tools
All in Diary	Information tool for humanitarian actors, print and electronic	All in Diary	Sri Lanka, Zimbabwe	Various	Various	PDF files
Mama: together for Safe Births in Crisis	Platform for identifying networking and supporting local maternal healthcare specialists	Women's Refugee Commission (WRC)	Various	Various (refugee context)	Computers, mobiles	Facebook, SMS
Luxembourg Skype	Program and software for UNHCR workers to stay connected to each other and home while in the field	UNHCR	Various	Various (focus on remote hardship postings)	Computers	Skype
Eyes on Darfur	Satellite tracking of destruction in villages	American Association for the Advancement of science	Darfur region	Conflict	Satellite imaging, computers	GIS image analysis
Project tracking databases	Project monitoring	UNHCR	Iraq	Various (refugee contexts)	Computers	Web-based application
IDP Tracking Databases	Monitoring structures, needs, assistance	UNHCR	Iraq	Various (refugee contexts	Computers	Web based application
Ushahidi DRC	Tracking displacement	CFMS at Northwestern University	DRC	Various (refugee contexts)	Mobile/Web	SMS/Web tools
Retaining ties and remittances	Connection to family enabling financial support	Local—Liberian Refugee entrepreneurs	Ghana	Various (refugee context)	Computers	Web—email, chat, Skype

Annex A Project Mapping cont.

Functional area / sector	Notable Issues	Stage	Collaborators	url
Shelter	Resources to meet need were not available	Pilot only	Noula	tinyurl.com/6wknqyx
Protection	Security measures were de-identification of messages by dedicated SIM cards (put in SIM, activate, send message, remove SIM) to mitigate risk for reporting informants. Laws about cell phone communication complicated matters	Implemented	UNDP, OCHA (their information system), and Ushahidi (aggregating data on server in Bolivia)	www.fmreview.org/technology/villaveces.html
Protection coordination capacity mapping	For the first months SBTF had to work from the borders. Classifying information went awry. Gaps	Implemented	OCHA Geneva, OCHA NYC, OCHA Libya, Information Management Group	libyacrisismap.net
Communication capacity development	Who sustains it after the initial phase, since it is not a disaster relief project but on-going. At first community ownership was strong	Pilot completed		fabfi.fablab.af
Education civic participation	Digital radios can also have GPS and can be tracked in web-based (or not) mapping software. Some have text messaging enabled	N/A		www.unicef.org/people/philippines_36130.html
Education	Very low enrolment (even for pilot); sites had different physical conditions and design was tailored to each (eg. In Kakuma WiMax, in Dzalek)	Pilot		tinyurl.com/77qo2dt
Communication	Sign-up is modelled after hotel internet sign-up	N/A	ETC	tinyurl.com7oafzjf
Protection	Multimedia on web—video, text messages, photos and geo located. UWIANO used tracking to notify police of violent break outs	Implemented	NSC, PeaceNEt Kenya	tinyurl.com8x9tzxc
Coordination, Capacity Development, Health	Simple electronic files (how automated is electronic file updating)	Implemented		www.allindiary.org
Health, Capacity Development	Skills profile, quizzes, information sharing, mentors, moderators, achievement badges, lives saved counter. 750 members	Implemented	Marketing for international Development (M4ID)	www.facebook.com/mama.wrc
Communication, Capacity Development, Health (well being)	Staff welfare project, now scaling up and looking at applicability for refugees and IDPs	Implemented first phase	Luxembourg Minister for Development and Cooperation and Humanitarian Affairs, Skype	tinyurl.com/7evm2s4
Protection, Human Rights	75% destruction or building over detected in selected villages	Implemented		www.eyesondarfur.org
Shelter	Shelter example, documentation of project, pictures, monitoring progress for accountability	Implemented first phase		www.unhcr.org.iq/04%20Assistance/PTD/ptd.html
Management	Locations of settlements etc	Implemented first phase		www.unhcr.org/pages/49e486426.html
Various needs (shelter, protection)	Location of settlements, etc	Implemented		http://46.137.77.92/
Financial support, diaspora connectivity	Internet cafes in Buduburam refugee settlement	Implemented		http://ijtj.oxfordjournals.org/content/3/3/341.full

Annex A Project Mapping

Title	Quick description	Organisation	Locations	Emergency Context	Technology	Platform
Dahadshiil	Financial services via mobile phone and debit cards	Dahabshiil (CSR)	Somali refugee community (Ethiopia, Kenya, Djibouti)	Conflict (refugee context)	Mobile	SMS
Interactive learning for all	Distribution of life player—AM/FM/ SW radio with MP3 capacity, pre-loaded with 32Gb of educational or informational content in any subject or language	Kristine Pearson	DRC, Haiti, Niger, Sudan, Zimbabwe	Various	Digital Radio, Internet capable	Audio
Map Kibera	Trained 15 youth to produce map of Kibera using Open Street Map	Erica Hagen	Kenya	Conflict	Mobile/Web	SMS/Web tools
Open source tool	Open source e-Platform for e-Governance and conflict resolution	KrisDev	India	Various	Computers	Website
"Promoting educational learning and innovation through technology in conflict-affected countries"	Mobile wireless learning centers to help educational planners collect and analyse a range of educational data to inform more effective planning	Geoff Calder	Afghanistan, Sudan	Conflict	Various	Unspecified
Accountability Now!	Radio for Peace-building	Search for Common Ground (SFCG)	Nepal	Conflict	Radio	Audio programming, SMS, GPS
Reducing Maternal Mortality with a PDA & GPS	Train community health workers on basic life-saving interventions & utilize the PDA with GPS in efforts to support the MDG5 goal	Various	Guinea-Bissau	Health Crisis	PDA	GPS, GIS, Voice, Text
Social Mapping for Multi-scalar development	Developing social mapping techniques to integrate with SMS and internet options	Digital Democracy (Dd)	Haiti	Various	Mobile	SMS/Web tools
SOPO	Communication for a Life Long Practice of Handwashing Media Campaign	SOPO Communication Initiative	Kenya	Various	Various	Film, TV, Print, Campaign
The African Elections Project	Social Networking Tools for Election/ Governance Monitoring for Sustainable Development	International Institute for Sustainable Development	24 Countries across Africa*	Various	Mobile, Computers, web	SMS, Facebook
Humanitarian Information Centers (HIC)	Common meeting points with ICT resources in the field for local actors, NGOs and humanitarian agencies	OCHA	Various	Conflict/ Emergencies	Various	Various
Inventorization Wiki	Wiki of ICT tools and mechanisms	ICT for Peace Foundation	Various	Various	Website	Web browser
Community Development Task Force	Empowering the Rural community with ICT, 600 Telecenters	Seuwandi Yapa	Sri Lanka	Conflict	Computers	Various

*Botswana, Burkina Faso, Burundi, Chad, Cameroon, Cape Verde, Central African Republic, Djibouti, Mali, Gambia, Niger, Ghana, Guinea-Bissau, Kenya, Liberia, Nigeria, Mauritania, Rwanda, Sierra Leone, Senegal, South Africa, Uganda, Zambia, Zimbabwe

Annex A Project Mapping cont.

Functional area / sector	Notable Issues	Stage	Collaborators	url
Financial support diaspora connectivity	Both tracking refugees and diaspora, communication and financial transactions	Implemented		tinyurl.com/7avidsu
Education Community	Solar or crank driven, updatable with USB key	215,000 Lifeline radios have been distributed reaching over 8 million listeners. Next pilot was scheduled for 2010 in DRC (follow up)		http://lifelineenergy.org/prime-radio.html
Mapping Capacity Building, Education	One of the densest maps ever created in the commons, highlighting the locations. Note schools mapped	Implemented		http://mapkibera.org
Governance, Community	Integrate the entire activities of the society/community, encompassing governments, communities and citizens, to bridge the divides to ensure transparency and accountability	Ideation		
Education, planning, capacity building	Technology is not well specified (in WB innovation document)	Implemented	CalderTowers, IIEP-UNESCO, Souktel, EDC, Laval University, Ryeson University	tinyurl.com/7sjnv80
Capacity building, community	Training local radio broadcasters, producing 17 radio shows that link citizens to government	Implemented		tinyurl.com/85cm92z
Health, Capacity Development Mapping	Community can communicate with practitioners before and after birthing, mapping location of the patient	Implemented		tinyurl.com7e5armn
Civic participation, Mapping	Goal to reveal and activate the often overlooked local social systems	Implemented		http://digital-democracy.org
Health	Steps for kids to follow, public awareness, low-tech solutions	Implemented		www.comminit.com/node/325329
Governance, Civic participation	“disseminate governance information to and from citizens using SMS on mobile phones”	Implemented		www.africanelections.org
Crosscutting	Cancelled project, in the process of bein revamped/ renamed by OCHA	Upcoming		www.humanitarianinfo.org/
Crosscutting	A useful on-going collection of ICT tools that can be tracked for new examples frequently			tinyurl.com/87zyowz
Education, Communication, Community	Combining access with capacity development	N/A		tinyurl.com/7y3nk7f

Annex A Project Mapping

Title	Quick description	Organisation	Locations	Emergency Context	Technology	Platform
"The use of ICT for effective delivery of Legal Service in the Ethiopian Federal Supreme Court"	Bringing information management to the legal system to expedite process		Ethiopia	Conflict	Computers	Information Management Software
The Village Development Program	Facilitating collective community visioning and project implementation	Institute for Rural Technologies	Zimbabwe	Conflict	N/A	N/A
ICT for LPG delivery	ICT tracking to stop black marketing of LPG cylinders		India	Various	Computers	Website
Armed conflict location and event data and crisis mapping	"Crisis mapping &Dataset that codes the location of all reported conflict events in 50 countries in developing world"		DRC	Conflict	Mobile/Web	SMS/Web tools, analysis & visualisation tools, spatial key integration
Common Ground News (CGNews)	"Electronic distribution of news articles to promote dialogue and constructive suggestions to facilitate peaceful resolution of conflict in the Middle East"	CG News Service	Egypt, Israel, Jordan, Lebanon, West Bank and Gaza	Conflict	Computers	Websites and email
Empowering censored journalists worldwide	A web-based publishing platform for journalists	Unfree Media	Afghanistan, Congo, Liberia, Myanmar, Niger, Somalia, Sudan, Yemen, Zimbabwe	Conflict	Computers	Website—blog
Generation Grands Lacs Radio Program	A broadcast and web streamed radio program to facilitate inter-country understanding	Generation Grands Lacs		Conflict	Computers, Radio	FM Radio broadcast, website (streaming of audio)
Hibr.me youth	Youth-run citizen mass media outlet (online in print, in person)	Hibr	Egypt, Lebanon, oPt, Sudan, Syria	Conflict	Online, print, mobile	Website, print, media, SMS
School alerts for protection Gaza	SMs alerts of violence from schools to community and aid agencies	Souktel, Red Cross/ Red Crescent, Mercy Corps	Palestine	Conflict	Mobile	SMS
East Africa Job Match	Using mobile phone for resume profiles, job matching and applications	Souktel, EDC	Somaliland	Conflict	Mobile	SMS
Citizen Journalism	Reporting and mapping of news during 2009 Gaza conflict "Cast Lead"	Souktel, Al-Jazeera TV	Gaza	Conflict	Mobile	SMS
Egyptian Election Support	Surveys, voter education messaging, election monitoring	Souktel, Elect-WY, Creative Associates	Egypt	Conflict	Mobile	SMS
EMIS School Mapping in South Sudan	Using PDA to gather baseline and updated education information	FHI360, UNESCO, UNICEF, MoGEI of South Sudan	South Sudan	Conflict	PDA, GPS	Custom software
Stopping Polio in Kenya	Mobile devices loaded with the EpiSurveyor health data collection software developed trace the path of the virus as it entered Kenya and record who came into contact with the infected refugees	UN Foundation and Vodaphone	Kenya	Various	Mobile	SMs / web tools

Annex A Project Mapping cont.

Functional area / sector	Notable Issues	Stage	Collaborators	url
Governance	Digitization and accountability themes	Implemented		tinyurl.com/7e5armn
Planning, civic participation	Training, visioning often included ICT integration	Implemented		
Civic Participation, Mitigating corruption	Registration, tracking, whistle-blowers	Implemented		www.dfscrewarilpg.com
Mapping, Protection	Scale expanding	Implemented next phase in process		www.acleddata.com
Civic participation	20,000 subscribers as of 2010 expanding format to blogs	Implemented,		www.common-groundnews.org
Freedom of Expression, Protection	Free from political interference and enables marginalised communicators to publish and have an Independent source of income	Implemented		www.unfreemedia.com
Civic dialogue, Youth	Objective of the program is to break down stereotypes and encourage dialogue between Congolese, Burundian and Rwandan University students	Implemented		tinyurl.com/6pakedk
Civic dialogue, Youth, Capacity building (Media Literacy)	"hybrid media model and encouraging open source content and open source tool development. Includes media café/laboratory is a physical café that serves as a 24 hour newsroom for citizen/youth journalists"	Implemented		tinyurl.com/7jrxhnf
Education, Protection	Training for school communities and participation in message construction. Streamlining alerts to multiple stakeholders simultaneously	Pilot testing		http://souktel.org
Youth, capacity development	For youth aged 17-30 as an extension of training and mentorship programs by EDC	Implemented		http://souktel.org
Civic participation	Thousands of citizens were advised via SMS "Do you approve of the ceasefire? Results fed into a dedicated Al -Jazeera website and TV ticker	Implemented		http://souktel.org
Civic participation	Encouraging 60,000 youth and women to participate in elections	Implemented		http://souktel.org
Education	Collection of data was across a broad range of variables including informal education sites, condition of facilities and learning resources	Implemented		www.fhi360.org/en/index.htm
Health	Tracing disease is helping workers in the field to treat individual cases quickly to curb outbreaks	Implemented		www.datadyne.org/node/332

Annex A Project Mapping

Title	Quick description	Organisation	Locations	Emergency Context	Technology	Platform
OLPC Palestine	Laptop distribution and capacity building for developing e-learning games	UNRWA, Palestinian MoE, OLPCF	Palestine	Conflict	Laptops	Sugar OS/Flash
PaleXO	Volunteer workshops for primary school students and major implementation support of OLPC program for the Palestinian MoE	Birzeit University	West Bank	Conflict	Laptops	Sugar OS/ Scratch
OLPC Haiti	OLPC Implementation focusing on orphanages in and around Port au Prince	International Center for Disaster Resilience, Haiti Street	Haiti	Emergency	Laptops	Sugar/OS Flash
UN Global Pulse	Innovation initiative for data collection and sharing	Project under the UN Secretary General's office	Global	Various	Various	Various
Rural Internet Kiosks Providing Ownership and Employment to Youth	Learning Kiosks for youth capacity building	Crystal Kigoni, Independent	Kenya, Uganda	Conflict	Computer Kiosk	Crosscutting
Sisi ni Amani	Crowdsourcing to connect disconnected peace initiatives in Kenya	Tufts University	Kenya	Conflict	Mobile phones	SMS
"Strengthening traditional/ social networks to bridge youth groups and prevent violence in West Africa"	To mitigate political divisiveness and prevent violence between youth networks in Burkina Faso, Ghana, Togo	John Atibila, Peace and Collaborative Development Networks	Burkina Faso, Ghana, Togo	Conflict	Mobile/Radio/ Web	SMS/Radio/ email
Tosalel'ango	A youth reality TV program for youth engagement and positive change	Michael Shipler, Practitioner	DRC	Conflict	TV	Reality programming
Establishing and Institutionalizing Disaster Loss Databases	Nationally owned disaster loss databases	UNDP and national governments	Indonesia; Tamul, India; Maldives; Sri Lanka; Thailand	Conflict/Natural Disasters	SMS/Web tools	SMS and KM systems (Sahana platform)
Disaster Management System in Haiti	Open source tools for disaster management in Haiti	Sahana	Haiti	Natural Disaster	SMS/Web tools	SMS and KM systems (Sahana platform)
Monitoring of Food Security through Media Analysis	Obtaining the big picture of trends in food security and correlations between food security and other events by data mining news articles	The Complex Systems Institute of Paris Île-de-France	Global	Conflict/Natural Disasters	Computers	Data mining tools
Global Snapshot of Wellbeing	Large scale polling of households including income, mood, health, and ICT habits	JANA	Global	Various	Mobile	Survey tools, Data analysis software
Data Without Borders	Volunteer data scientists	Data Without Borders	Global	Various	N/A	Data analysis software
FHI360 School Mapping in South Sudan	GIS data collection via smartphones	FHI360	South Sudan	Conflict	Smartphone	Google Android; GATHERdata
Shaqodoon	Interactive Audio Instruction for financial literacy	EDC	Somalia	Conflict/Natural Disasters	Mobile phones	IAI

Annex A Project Mapping cont.

Functional area / sector	Notable Issues	Stage	Collaborators	url
Education	Large movement of teachers capacity building for ICT and for collaborating with engineers to design educational games.	Scaling up		www.laptop.org
Education	Student driven project for support of formal and informal education for primary school students.	Implemented		tinyurl.com/7srz86e
Education, Health, Logistics	Program cuts across sectors as an integrated program for psychosocial support, physical health, protection, DRR and education.	Pilot Implemented		www.laptop.org
Crosscutting	Vision is to develop tools and programs for massive data collection and analytics to give us a real-time (or close to real-time) picture of global human well-being	Implemented first phase		www.unglobalpulse.org
Education, Capacity Development, Health	Solar powered computer kiosks with wireless connectivity. Focus on ICT training, youth development, and entrepreneurship. Kiosks are manufactured in Kenya	Pilot of 20 kiosks	BOSCO Uganda, Voices for Africa	
Peace-building	Youth recruited to do mapping are also trained in violence prevention, conflict monitoring and peace promotion	Two pilot programs		www.sisiniamani.org
Violence prevention	Access is increased by using three different communication platforms: radio, sms, and email.	Ideation		
Youth, Capacity Development, Peace building	Each show presents a real life challenge, which participants work to overcome	Implemented	Search for Common Ground (SFCG)	www.youtube.com/watch?v=dlAP3Z2dfyI
Disaster Risk Reduction	Databases are backed up locally and remotely, data is for faster calculation of disaster impact, providing useful information to key stakeholders and informed decisions about prevention	Implemented	Sahana, UNDP	
Communication and coordination; assessment	Project and tools included: Missing persons registry, organization registry, request and inventory, volunteer management system, situation mapping, and displacement reporting. Note open source data was advocated.	Implemented		www.sahana.org
Assessment, Analysis	Very large data set to process for extracting trends in media. How will this translate into action is unspecified	Research project	UN Global Pulse	http://pulse-web.veilledynamique.com
Assessment	Two billion subscribers will answer survey questions in exchange for a small amount of airtime, focus on underrepresented households	Research project	UN Global Pulse	www.jana.com
Data analysis	A growing trend for volunteer organizations to take on data mining and analysis projects	Non-profit volunteers		www.datakind.org
Data collection	Great for data collection as it can do surveys, GIS, and pictures	Implemented	South Sudan EMIS	www.healthnet.org/gather
Education	Delivers content to remote areas	Implemented	USAID	http://shaqodoon.org/default.aspx

Annex B Tool Surveyor

Name	Organisation	url
Aidlink	Souktel	www.souktel.org
ArcGIS	ESRI	www.esri.com/
Blogger	Blogger	www.blogger.com
CK12	CK12	www.ck12.org/flexbook/
CrowdFlower	CrowdFlower	crowdflower.com/
CrowdMap	Ushahdi	ushahidi.com/products/crowdmap
Eden	Sahana	sahanafoundation.org/products/eden/
Epic	WFP	ictemergency.wfp.org/web/ictepr/epic
EpiSurveyor	Datadyne	www.datadyne.org/episurveyor
Facebook	Facebook	www.facebook.com
Frontline SMS	Frontline SMS	www.frontlinesms.com/
Google Circles	Google	plus.google.com/
Google Earth	Google	maps.google.com/
Google Maps	Google	www.google.com/earth/index.html
Job Match	Souktel	www.souktel.org
Khan Academy	Khan Academy	www.khanacademy.org/
Mayon	Sahana	sahanafoundation.org/products/mayon/
Mechanical Turk	Amazon	www.mturk.com/mturk/welcome
Mesh 4X	InSTEDD	instedd.org/technologies/mesh4x/
Moodle	Moodle	moodle.org/
Open Street Map	Open Street Map	www.openstreetmap.org/
OpenEMIS	UNESCO	openemis.codeplex.com/
Project Noah	Project Noah	www.projectnoah.org/
QGIS	Quantum GIS	www.qgis.org/
QR Code Generator	Various	qrcode.kaywa.com
OR Code Reader	Various	get.beetagg.com/en/qr-reader/download
Reporting Wheel	InSTEDD	instedd.org/technologies/reporting-wheel/
SamaHub	SamaSource	samasource.org/
Scratch	MIT	scratch.mit.edu/
Sugar	Sugar Labs	www.sugarlabs.org
Swiftriver	Ushahdi	ushahidi.com/products/swiftriver-platform
Tumblr	Tumblr	www.tumblr.com
Twitter	Twitter	www.twitter.com
Ushahidi (Tunis)	Ushahdi	tinyurl.com/6uxxgvl
Vesuvius	Sahana	sahanafoundation.org/products/vesuvius/
Wikipedia	Wikipedia	www.wikipedia.org
Wordpress	Word Press	wordpress.com/

Annex B Tool Surveyor cont.

Use	Platform
SMS Messaging for alerts	Mobile and Web
GIS mapping software	Various
Blogging tool and host	Mobile and Web
Online, customizable textbooks	Web
Task management and distribution	Web
Crowdsourced mapping	Web
Tracking inventory personnel etc	Various
Integrating communication	Various
Data collection	Mobile, Web, PDA
Social networking	Mobile and Web
Management of SMs data	Mobile and Web
Social networking	Mobile and Web
Mapping	Mobile and Web
Mapping	Mobile and Web
Job matching and outsourcing	Mobile and Web
Video curriculum and assessment	Web and Podcasts
Emergency management support	Mobile and Web
Crowdsourced outsourcing	Web
Data synchronisation	Mobile, Various
Open source course management	Mobile and Web
Mapping Wiki	Web
EMIS software	Various
Citizen science	Mobile and Web
Open source GIS mapping software	Various
Mobile barcoding	Various
Mobile barcoding reader	Various
SMS data collection (sans literacy)	Mobile, paper
Crowdsourced outsourcing	Web
Drag and drop multimedia programming	Web
Open source learning software	Various
Management of SMS data	Various
Blogging tool and host	Mobile and Web
Social networking	Mobile and Web
Crowdsourced mapping	Mobile and Web
People locator	Mobile and Web
Crowdsourced encyclopedia	Web
Blogging tool and host	Mobile and Web

Annex C Crisis Mapping

Crisis and crowd-sourced mapping

With the development of new technologies and social networking practices, the nature and process of creating maps during emergencies has begun to change dramatically. Crisis mapping and crowd-sourced mapping is the collection, visualization, and analysis of data produced by a large number of people in real-time. Participants clean the data, categorize it, and plot crisis- related events on a geographical map. Because they document each event as it happens, participants, together, provide information that can inform immediate response, as well as shed light on the progression of the crisis (Meier, P. and Leaning, J. 2009). Each piece of information submitted includes geographical coordinates and can be fed into a GIS platform or mapping environment.

The idea of utilizing volunteers to do crisis mapping, and the new technologies developed to enable mapping first came into use during the disaster mapping and humanitarian response to the earthquake that hit Haiti in 2010. Response was initially crippled when responders were faced with a severe lack of commonly available basic data sets, such as regional demographics, road locations, and information about existing projects on the ground. At the same time an influx of volunteers with new technologies for collecting and visualizing data arrived on the scene and began interacting with humanitarian response efforts. This unusual collaboration, which would grow over time, began with two projects in Haiti called Mission 4636 and Open Street Map Haiti. The collaboration grew into a process of mainstreaming the crisis mapping techniques into coordinated humanitarian response of the cluster system (Harvard Humanitarian Initiative, 2011; Norheim-Hagtun, I. and Meier, P., 2010).

Crisis mapping Haiti

Mission 4636[1] created short code–a short, easy to remember, free-to-call phone number: 4636, to which anyone in Haiti could text needs . A feed[2] of messages to that number was routed to a designated chat room and read by volunteers, sitting at their computers anywhere in the world. Volunteers translated messages from Kreyol and French and sorted them according to need. For example, a message with location coordinates from a person on the ground in Haiti stating, “Help! I’m trapped and bleeding a lot,” would be marked as urgent and sent to emergency response teams. In contrast, a message requesting, “Pray for us in Port au Prince,” while helpful for creating connectedness, and certainly an expression of one kind of human compassion as need, does not require a rescue action and would not be marked as urgent. Mission 4636 received 80,000 messages from Haitians in need of assistance and helped facilitate coordinates for rescue and, in the longer-term, food and water to those in need. The participation of Haitian residents and diasporas added essential local knowledge, not only in translating Kreyol but also in identifying geographic locations by their neighborhood nicknames.

When a text message came via the number 4636, it would be directed as input into an instance[3] of CrowdFlower, an enterprise crowdsourcing platform that can receive and organize incoming messages from social media platforms.[4] The version of CrowdFlower used was tailored to meet the needs of the project. The responsibility of the tailored version of CrowdFlower was to log all messages and annotate

1 http://www.mission4636.org

2 35% of Haiti residents owned a mobile phone in 2010. Only 10% had available Internet connectivity.

3 An instance is a single copy of a running program. They may be multiple instances running on different servers around the world, each serving different projects and purposes.

4 A system diagram of the path of information from sender, to the crowd, to mapping software, and finally to humanitarian response teams can be viewed at http://www.mission4636.org/the-process/

them with associated micro-tasks that needed to be performed on them. Tasks were services, such as translation, verification, and geo-location. Those micro- tasks were assigned to paid workers via SamaSource,[5] a non-profit service that connects people living in poverty with Internet-based work. The "crowd" was identified by SamaSource through a partnership with an NGO called 1000 Jobs for Haiti[6] and marshalled using the proprietary web-application called SamaHub[7] to read, translate, categorize, and map one report from 4636, on average, in under three minutes. Note that processing a single message was often accomplished by four people—one translator, one sorter, one categorizer and one mapper—collaborating remotely and asynchronously while connected via the Internet and the services of CrowdFlower and SamaSource. Messages were mapped by positioning a point on a shared map using Ushahidi.[8] Ushahidi is an open source, web-based platform that has the capability to accept, collate and plot data reports on an on-line map, which can be viewed publicly or by a designated group via login privileges. The resulting Mission 4636 map with dots representing needs for responses was updated regularly and used in rescue efforts by the Operation of Unified Response for Haiti.

The above process of crisis mapping–combining the crowd-sourcing methods of data collectors on the ground with technical innovators and web-based communities to produce and process data–was also used to create a much needed labelled aerial map of Port au Prince in the days just after the earthquake. Crisis-mappers came together to use Ushahidi and a resource called Open Street Map[9] to create a comprehensive map of earthquake damage and infrastructure that aided in understanding the extent of damage and efficacy of response efforts. Open Street Map is a wiki–a community built and maintained collection of knowledge on the web–specifically for maps. Anyone can contribute to building a geographical map by submitting aerial photos they have found on the web or inputting any image sources donated from a satellite mapping company. Other participants can stitch together images, edit maps, or use the OSM API to build new application features. OSM maps are viewable and printable via a web-browser on a computer but also are viewable on mobile devices such as Garmin GPS devices and GPSmid, a map display application that runs on Java-enabled mobile phones.[10] As word spread of this map resource on the ground, OSM maps were used during relief efforts of various humanitarian agency actors including UN- OCHA, UNICEF, IFRC and WFP for situation reporting and practical use in the field while navigating through the damage.

Crisis mapping Libya

Pre-planned collaboration between the crowd-sourcing crisis mapping community and humanitarian agencies that had their own well-established processes of mapping crisis data began with the Libya Crisis Mapping project. OCHA, seeing the value of the crowd-sourcing in Haiti for emergency response, approached the Crisis Mapping Stand-by Task Force (SBTF) to collaborate on mapping the 2011 Libya Crisis. The SBTF was created by a group of academic researchers in response to the earthquake in Haiti and provided much of the people-power behind the volunteer mapping of Haiti. A year later, the SBTF had developed into a well-organized and trained group who publish open source documents and guidelines for

5 http://www.samasource.org
6 http://www.1000jobshaiti.org
7 http://samasource.org/technology/
8 http://www.ushahidi.org
9 http://wiki.openstreetmap.org/wiki/Main_page
10 Different cell phone operating systems can run software written in certain programming languages. Andriod phones and Blackberries run software created in the Java programming language. Projects that use multiple cell phone platforms would require software be recreated in multiple language for each mobile phone platform. Alternatively, web-enable programs, which run within a browser on the mobile phone can be platform independent but have limitations specific to each platform. For a comprehensive view of the current mobile platform ecosystem visit http://www.visionmobile.com/blog/2011/11/new-report-mobile-platforms-the-clash-of-ecosystems/

crowd-sourced crisis mapping.[11] The SBTF agreed to and launched an instance of Ushahidi and recruited a set of dedicated volunteers to map Libya. The chart below shows the inputs of data from various channels, such as Twitter and Facebook, and their path through data verification, typically triangulation—meaning any report has two confirming sources—to mapping, and finally output to OCHA. OCHA was able to supply information to different task teams and feed requests for data to the SBTF, thereby directing data collection and output toward immediate needs. The resulting map provided locations and report details of violent attacks, needs assessments, displacement, and other effects of the political crisis. The resulting crisis map of Libya created by OCHA and SBTF, reports and information documenting the crisis are still viewable online.[12]

This project is widely cited as a successful incremental improvement for harnessing crowd- sourced crisis mapping in humanitarian response. Stakeholders and the volunteer community have identified next steps to further utilize their roles and develop technologies.

Key message

Crowd sourcing is gaining traction as a reliable method of fast, real-time data collection to inform humanitarian response.

Risks

While these projects generate a lot of data and can accomplish large tasks quickly, there are challenges related to data veracity, specifically: lack of breadth of data variety and noise can render collections of data useless. Although there are methods to help understand the veracity of data and detect sources, there are also risks inherent to the emergency context. For example, what if in a single neighborhood there is only one cell phone and six different families text the same need from a single location. A rudimentary system would read the communication as six repeat requests from a single person, skewing the actual representation of need. In any collective intelligence project there can be a struggle amongst groups for their voices to be heard and their outcomes to be ensured. While these might seem like extreme cases, it is worth considering points of failure. Data deluge and noise is a particular problem in crisis-mapping, the Mission4636 is currently pursing analysis of the 3,300 actionable messages of the 110,000 received to understand how to process messages more effectively. These data mining techniques can grow to include topic-spotting functions such as the automatic detection and classification of messages into categories such as life saving, health, or education related (Will, L. et al., 2011). Another risk is that it will disproportionately reflect needs of those with access to phones, further excluding the most vulnerable populations such as women, children and the very poor.

11 International Crisis Mapping Network founded by Jen Ziemke and Patrick Meier can be accessed at http:www.crisismappers.net. The site has the most historical and up-to-date information on crisis mapping tools, practices, events, data and projects.
12 http://libyacrisismap.net/main

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