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Responsible Deployment of New Technologies in Humanitarian Crises

An analysis of frameworks for the use of new technologies, based on case studies from Nepal and Ecuador

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Abstract

Since the earthquake in Haiti in 2010 a surge of new technologies has been observed in humanitarian action. This phenomenon has been described as ‘digital humanitarianism’. While in the early years many information technologists and humanitarians expressed great enthusiasm about the possibilities these tools and methods offer, more recently scholars and practitioners have voiced a number of concerns. These include operational challenges as well as ethical reservations. A call for frameworks has been made by several experts in the field. In response, a number of the larger stakeholders in the humanitarian ecosystem, such as the UN, the ICRC, Médecins Sans Frontières and Harvard Humanitarian Initiative have commenced discussions and started working on standards. This dissertation reviews the challenges associated with the new technologies, assesses the main guidelines which have been drafted to date and identifies a number of gaps for further reflection. Two case studies, the earthquakes in Nepal 2015 and in Ecuador 2016, are being reviewed.

Keywords

Digital humanitarianism, technologies, disaster, crisis, conflict, innovation, Nepal, Ecuador, framework, regulation, ethics, code of conduct.

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<td>BPH</td>
<td>Brussels Privacy Hub</td>
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<tr>
<td>CERAH</td>
<td>Centre for Education and Research in Humanitarian Action</td>
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<td>CHS</td>
<td>Core Humanitarian Standard</td>
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<td>DHN</td>
<td>Digital Humanitarian Network</td>
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<td>GIS</td>
<td>Geographic Information System</td>
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<td>GSMA</td>
<td>Global Association of Mobile Operators</td>
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<td>HHI</td>
<td>Harvard Humanitarian Initiative</td>
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<td>ICRC</td>
<td>International Committee of the Red Cross</td>
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<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>IOT</td>
<td>Internet of Things</td>
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<td>IT</td>
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<td>KLL</td>
<td>Kathmandu Living Labs</td>
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<td>MSF</td>
<td>Médecins Sans Frontières</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>OCHA</td>
<td>Office for the Coordination of Humanitarian Affairs</td>
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<td>UAV</td>
<td>Unmanned Aerial Vehicle</td>
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<td>UN</td>
<td>United Nations</td>
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<td>V&amp;TC</td>
<td>Volunteer and Technical Community</td>
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<td>VGI</td>
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I. Introduction

Data gathering and analysis has been part of humanitarian responses to disasters and conflicts since the origins of humanitarian action, as described in detail by the researchers and historians Read, Taithe and MacGinty (Read, Taithe, and Mac Ginty 2016). However, the hype around digital technology and big data in the humanitarian field in the past decade was unprecedented. The earthquake in Haiti in 2010 is typically considered the origin of ‘digital humanitarianism’ – a term coined by one of the international experts on humanitarian technology, Patrick Meier (Meier 2015). In the aftermath of this major disaster a multitude of new information and communication technologies (ICTs) was developed, and utilized by humanitarian organizations and the affected population (Sandvik et al. 2014), a trend that has continued until today and is unlikely to come to a halt in the near future. Humanitarian actors therefore have to evaluate how to improve the use of ICTs in the aid response one way or the other and have to acquire the skills to deal with many diverse technologies (Raymond and Harrity 2016), such as crowdsourcing, smartphone applications, geographic information systems (GIS), use of unmanned aerial vehicles (UAVs), geospatial technologies, biometric identification and even the Internet of Things (IOT) (Zambrano et al. 2016). Together with these technologies, a new category of actors has originated, the Volunteer and Technical Communities (V&TCs). These varied informal groups of volunteers use diverse techniques, mostly to analyze big data, in order to rapidly provide information for humanitarian action. The UN has recognized the value of these groups and, in order to facilitate collaboration between V&TCs and the more formal humanitarian sector, has established the Digital Humanitarian Network (DHN) (Qadir et al. 2016). Although the new technologies offer numerous opportunities such as rapid access to real-time information and detection of trends due to the size of the data (Whipkey and Verity 2015), they likewise create a number of risks, challenges and vulnerabilities: for beneficiaries, these may include breaches to their right to privacy or exclusions due to the digital divide between those who have access to technology and those who do not (Sandvik et al. 2014); for humanitarian actors there may be a risk of accumulating large amounts of data, but not having the capabilities to analyze them and thus wasting resources (Read, Taithe, and Mac Ginty 2016). In consequence, the Harvard Humanitarian Initiative, one of the most renowned academic and

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1 Defined as those which were developed during or after the Haiti earthquake 2010; as an exception, the platform ‘Ushahidi’ which was already developed in Kenya in 2008 to track human right violations, is also be included under this term.
research centers in humanitarian assistance, has emphasized the need for frameworks to be
developed by the digital humanitarian community (including traditional humanitarian actors,
technologists and volunteers) in order to mitigate risks caused by the use of data (Raymond and
Al Achkar 2016). This includes the need to agree on guidelines, policies, standards and codes
of ethics and conduct for responsible handling of these technologies. Further investigation on
this matter by IT scholars and practitioners urges for a much closer collaboration between actors
within the digital humanitarian ecosystem in order to avoid duplication of efforts and ‘siloded’
information and action (Qadir et al. 2016). Although there have been critical voices about
digital humanitarianism and frameworks have been called out for, limited research has been
done to date as to which guidelines exist, whether their content is appropriate and sufficient,
and whether they are applied by actors within the humanitarian ecosystem. Therefore, this
dissertation has a threefold objective: first, it aims to identify which challenges are reported in
the literature about the usage of the new digital technologies. Second, it shows which
frameworks for addressing these concerns have already been developed or are being compiled.
Third, it explores the technological challenges and the implementation of those framework
elements in two recent humanitarian crises – the earthquakes in Nepal in 2015 and in Ecuador
in 2016. In each of these points it aims to identify gaps. The structure of the paper follows these
three objectives.

II. Literature Review

The amount of literature on digital humanitarianism that has been published in recent years is
quite remarkable. It is also surprising to see the diversity of authors who have an interest in this
subject. It includes IT specialists, humanitarians, geographers, sociologists, lawyers,
researchers and ethicists. While a majority of those documents explain the different
technologies (see Annex I), this dissertation rather focusses on less-addressed aspects: benefits
and challenges.

A) Benefits

There are four types of overall benefits of new technologies and big data identified in the
literature. First, at the operational level these technologies include rapid access to current data,
faster assessments and modifications to planned activities, more in-depth comprehension due
to the size of the data and better planning and prediction (Whipkey and Verity 2015). Response
is also likely to be more directed and professional (Raymond and Al Achkar 2016).
Second, from the dialogue perspective between responders and communities, a two-directional flow of information is now facilitated. The communication is not only provided by the humanitarian actors towards the beneficiaries any more, but the latter can also pro-actively communicate their needs (Belliveau 2016).

Third, at the level of the affected communities, physical access to aid is also increased through some of the emerging technologies: cash can be transferred easily though mobile phone systems, modular construction of buildings facilitates set up of hospitals, shelters and storage rooms, 3D Printing allows onsite production of equipment which would otherwise take a long time to order or would even not be possible to have (Belliveau 2016). A typical example, reported in December 2016, is the first UAV delivery of medical supplies in the Amazon jungle. Delivery time was decreased from 6 hours to 35 min (Meier 2016).

Fourth, volunteers around the globe offer their services for free, pleased to be able to contribute to relief efforts, although not being on the ground. These V&TCs have been increasingly used by humanitarian actors in the past few years (Givoni 2017). Coordination frequently occurs through DHN (see overview in Annex II) Having the same work executed by paid staff would cost a fortune (Brown 2016) and may thus not be affordable to all humanitarian actors.

B) Challenges

While there are many benefits with the use of these new technologies, there are also a number of challenges, risks and vulnerabilities; a number of papers with a critical view on digital humanitarianism have been emerging since 2015. After several years of almost unlimited enthusiasm and emergency-minded deployment of these technologies, the field is now maturing and taking a step back to reflect about the potential drawbacks and ethical implications with the use of these technologies. Authors have seen several examples where the use of technologies has caused more harm than benefit, e.g. when organizations in Nepal act on a crowdsourced report which shows the majority of the needs in the capital and neglect the needs of those who had no access to internet (Mulder et al. 2016). Those critical papers were authored by a variety of experts, such as humanitarians, geographers, sociologists, lawyers, researchers, ethicists and IT specialists. The diversity of disciplines involved in these critical reviews of digital humanitarianism hence not only shows that both the scholarly community and humanitarian practitioners are concerned by the use of big data, but also that a certain skepticism is rising regarding the gathering, processing and analysis of such data, and the social, legal, ethical and
other challenges facing the digital future. The following section is a first attempt to synthesize the main issues raised both for humanitarian organizations and affected communities.

**What to do with Big Data?**

Many of the new technologies are concerned with collecting and analyzing Big Data, with the promise of comprehensive knowledge. However, few actors have the capabilities, experience, knowledge and/or means to analyze this data (Read, Taithe, and Mac Ginty 2016). Thus, the risk is that the large amount of information is rather useless for many actors as it cannot be evaluated. Only the tech-savvy who know how to extract the relevant information are the winners in this. The data collected may also have more value for advertising the catastrophe for fundraising purposes rather than for actual relief action: the imagery collected by drones in Nepal certainly had a shocking effect and raised pity in donors. However it is doubtful whether it added substantial facts for relief efforts (Read, Taithe, and Mac Ginty 2016). Furthermore, sources of data are highly varied (social media, aerial imagery, GPS data etc.) and unstructured (Qadir et al. 2016). This makes a structured analysis challenging. More optimistic digital humanitarians like Patrick Meier, though, explain how machine learning and automation may help to tame the overflow in data (Meier 2015). Another challenge is related to the unvalidated use of such data, as it may contain errors or may even have been purposely distorted, especially in conflict situations (Hunt et al. 2016). During the 2011 Russian elections, a woman inserted false reports into a crowdsourced system analyzed by the only independent organization. She then used the reports to ‘demonstrate’ that none of the information on the site could be trusted (ICRC 2013a). As a consequence, affected populations could potentially exaggerate the situation or the data may be biased (Qadir et al. 2016). Such incorrect information may lead to inappropriate response.

**Why should humanitarian actors be careful with digital enthusiasm?**

There are several reasons why humanitarian actors should exercise a certain caution and awareness when utilizing digital technologies. First, in a crisis many different data sets are being collected by a multitude of actors using diverse technologies. This may result in actors having an incomplete ‘silooed’ picture of the crisis if only viewing one or several of these data sets, but not everything that is relevant to understand the situation fully. It is thus important to assemble the various data sources into an overall solution which provides the big picture of the crisis. Second, several agencies may be collecting the same information, thus duplicating efforts
After the earthquake in Ecuador in 2016 there were two sites collecting requests from affected populations (AyudaEcuador 2017; TerremotoEcuador 2017). The same needs may have been posted in both sites, resulting potentially in two organizations responding to the same request. Third, keeping volunteers involved with crowdsourcing, microtasking and mapping motivated over an extended period of time is often a challenge, as mostly they will have other obligations in their lives, such as a job or taking care of their families, to whom they will have to get back to after some time (Qadir et al. 2016; Burns 2015). Fourth, the use of UAVs has a number of drawbacks. On the one hand, there is a negative perception of a connection of drones with military usage. Then, regulations on the use of drones vary widely between countries and are frequently unclear. Furthermore, it is not always clear how confidentiality and privacy of data collected by UAVs should be managed (Soesilo et al. 2016).

In summary, humanitarian actors should not rely exclusively on big data, should question whether they have communicated sufficiently with other actors, think about how to incentivize volunteers and keep public perception in mind.

**How does digital humanitarianism impact affected populations?**

However, there are also a number of risks for affected populations. One major risk is that parts of the population may be discriminated, especially those who do not have access to information technology – either physically or because of lack of skills - (Read, Taithe, and Mac Ginty 2016). They cannot raise their voice and, although their needs may be greater, others may be favored in relief efforts as they are heard by the actors. Moreover, they may not have access to information, such as alerts sent via SMS or through the internet, because they do not have phones. One of the core principles of humanitarianism, impartiality, may thus be compromised (Hunt et al. 2016). At the time of the earthquake, around 60% of Nepalis did not have access to internet, most of them living in rural areas (Pun 2017). Gender may be an additional reason for inequality, as in developing countries women frequently have less access to information technology than men (International Telecommunication Union 2016), as well as age (Haworth 2016). Another concern is that during the past few years, a shrinking of the so-called humanitarian space has been observed, resulting in less access to the affected populations and a more dangerous environment for humanitarian actors. Actors may turn to technical solutions for remote management of the crisis, but this creates a gap in the personal interaction between the humanitarian actors and the beneficiaries, as the humanitarian actor loses the direct touch. Furthermore, the selected technologies may not function in a crisis environment: some of them
were built for non-crisis situations and may not withstand the challenges of an emergency situation (Sandvik et al. 2014). Frequent power cuts, extreme temperatures or computer-illiteracy may be some of the challenges. If the biometrics system in a refugee camp does not function, the refugee’s identity may be questioned and result in exclusion from assistance or marginalization as it happened in 2013 in a camp in Mauretania (Hossein and Nyst 2013). Another challenge is to ensure privacy and confidentiality. If sensitive data gets into the hands of aggressors, affected populations may be at risk of being targeted. This may be particularly harmful if data contains geopositional details so that people’s location can be traced. An even higher risk bears spatiotemporal data which in addition includes a time stamp. The advantage of being aware of population movements through tracking phone calls and generating maps, may be offset against the danger caused by it. Patients with stigmatized communicable diseases, such as Ebola or tuberculosis, may be harmed if confidentiality of their data is not ensured. For this reason, it is imperative for the humanitarian ecosystem to develop guidelines and frameworks to deal with the risks for privacy and security caused by the use of information and communication technology (Hunt et al. 2016; Raymond and Al Achkar 2016). This also leads to the question on how to obtain the consent of affected individuals when collecting personal data and images. Not everybody may agree to have their photos published, stored or transferred - even if originally uploaded by oneself. It may be necessary to have discussions and agreements with communities on how data and maps generated during an emergency may be used during and after the crisis (Hunt et al. 2016). After the earthquake in Nepal, UAVs were flown over affected villages and their images taken and analyzed. The population was neither informed, nor asked for their consent nor did they receive any feedback (Raymond and Harrity 2016). Lastly, new technologies may raise hopes in affected populations that aid will arrive swiftly. Yet these hopes may not be fulfilled (ICRC 2013b). With new technologies, communication has become much more a two-way interaction, with the affected population being more able to communicate their needs, but also more likely to be disappointed, if no action is taken – either because nobody saw the request or the humanitarian actors do not have the means to act on every request (Hunt et al. 2016). In summary, there are a number of risks for the affected populations and in many cases the people may not even be aware of them. Humanitarian actors, both in devising relief operations and frameworks, need to be aware of these concerns and should consider how to inform affected populations, and more so, get their input into the design of their actions and policies.
C) Frameworks and guidelines

More and more actors within the humanitarian ecosystem, such as the UN, the ICRC and NGOs like MSF are using one or the other of these technologies. Nathaniel Raymond, director of Harvard Humanitarian Initiative’s innovative Signal Programme\(^2\), states that ICTs are almost mandatory for the humanitarian community nowadays, and that it is the actors’ obligation to familiarize themselves with these technologies and understand how to utilize them. He acknowledges, however, that there is a lack of guidance and standards in how to use the tools, as humanitarians often use them imprudently and only afterwards reflect on which issues they can solve with them (Raymond and Harrity 2016). In light of these challenges, several frameworks and guidelines have therefore been developed very recently, during 2015-2016, mostly by large humanitarian organizations which have pushed for the turn to new technologies. The main propositions are summarized here.

As outlined above, many actors in the field do realize the need for minimum ethical frameworks, but there are different ways and degrees on how to put this into practice. Since the Haiti earthquake some of the larger V&TCs have developed codes of conduct, similarly to the DHN which became the coordinating body between the humanitarian ecosystem and V&TCs. The quality and content of these codes of conduct however varies largely. Some (e.g. those of Standby Task Force or Humanity Road) refer to some of the humanitarian principles (e.g. neutrality and impartiality), and add their own principles (e.g. responsibility and professionalism). Others draw up entirely their own rules (e.g. Ushahidi), or (e.g. Standby Task Force) state that they will also abide to the rules of the organization which has ‘activated’ them. Although some of the rules and principles overlap, there does not appear to be any commonly agreed standard yet. However, within the past two years, several of the major humanitarian actors and research centers have taken initiatives to address concerns observed with the surge of ICT utilization in humanitarian action. The UN is leading with three initiatives: (1) the Global Pulse’s Data Privacy Group’s report\(^3\) (Global Pulse PAG 2015a), (2) the UN OCHA guideline (Raymond and Harrity 2016), which was developed together with HHI, and (3) the DHN / UN OCHA framework (Whipkey and Verity 2015). The ICRC, on its side, is working with Brussels Privacy Hub, an academic privacy research center, towards a framework.

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\(^2\) The Signal Program on Human Security and Technology (Signal Program) “was founded by the Harvard Humanitarian Initiative in 2012. The program works to advance the safe, ethical, and effective use of information technologies by communities of practice during humanitarian and human rights emergencies.” (Harvard Humanitarian Initiative 2017)

\(^3\) The checklist of the Global Pulse’s ‘Risks, Harms and Benefits Assessment’ tool which is referenced in the document is being assessed
addressing data protection issues related to the use of new technologies (Brussels Privacy Hub and ICRC 2016)\(^4\). Moreover, MSF has supported a group of humanitarian practitioners, ethicists and scholars to publish a framework to reduce harms caused through humanitarian innovation (Sheather et al. 2016). Finally, HHI’s Signal Code’s guideline is the latest one of the publications and addresses the concerns from a human rights based angle (Raymond and Al Achkar 2016).\(^5\) The above frameworks each have their own focus. The ten elements out of the various guidelines which address the most important challenges are reviewed hereafter and are discussed in the light of the humanitarian principles and standards.

1) **Identification of the purpose:** All guidelines state that the purpose of the ICT project should be defined before starting it. MSF states that the problem needs to be looked at from a high level and involving other disciplines in order to assess the issue from different angles. OCHA stresses that data should not be used just because they are there; there must be a clearly defined need. Global Pulse says that the purpose should be defined as narrowly as possible, while DHN adds that the gap in knowledge needs to be identified. A short reflection on the ‘Why?’ is therefore necessary, even if there is high pressure for immediate action after a disaster, as it may prevent wasting time in doing unnecessary work. This is also in line with the Core Humanitarian Standard (CHS)\(^6\)’s first criterion ‘Humanitarian response is appropriate and relevant’.

2) **Data Privacy and Confidentiality:** DHN checks whether identifying information has been removed from the data and whether confidentiality and privacy of the affected population can be ensured. Global Pulse takes it further asking if individuals could still be identified with the use of technology, even with identifiers removed from the data. It is important to ensure (re-)identification is not possible under any circumstances according to the ‘Do No Harm’ principle.

3) **Organization’s infrastructure and policies:** OCHA highlights the need of determining whether the organization has the infrastructure and the policies for the ICT project, and that this needs to be evaluated before starting the project. DHN adds that staff capacity, knowledge and skills need to be assessed, but also mentions that adequate software and hardware resources

\(^4\) Although they are currently internally circulating a draft handbook, it is not yet available to the public (personal email communication) and can therefore not be evaluated in this dissertation.

\(^5\) More details about these initiatives are available in Annex III. This is not intended to be a complete review of all current initiatives. There may be others, but for the purpose of this limited dissertation only the above have been selected. Furthermore, the HHI Signal Code’s is not being evaluated as its authors describe it to be a baseline, an underlying set of human rights principles, which has to be agreed upon before drafting guideline. It is thus not a guideline itself.

\(^6\) The Core Humanitarian Standard (CHS) is an important humanitarian standard comprised of nine commitments. The CHS was approved in October 2014 by the CHS Technical Advisory Group which included more than 60 members representing diverse humanitarian constituencies and technical expertise.
must be available. This point is again important in order to avoid waste of resources and doing harm. If during the course of the project it is discovered that it cannot be continued, then the initial work may have been done in vain. This would be in contradiction to CHS’s ninth criterion ‘Resources are managed and used responsibly for their intended purpose.’

4) **Inclusion of knowledge from end users and local organizations:** MSF is the only organization which states that the projects should be determined by the needs of the end user and that power dynamics between humanitarian organizations and affected populations must be taken into consideration. This is an omission in the other guidelines. Inclusion of local communities in the response has been essential in humanitarian discourse in recent years, and has again been emphasized during the World Humanitarian Summit\(^7\) in 2016.

5) **Risks and Harms:** All guidelines include a section on risks and harms. Global Pulse document mentions data leakage and misuses as well as bias are some of the risks. MSF stresses that harms need to be weighed against benefits and that in particular it needs to be assessed whether those who are exposed to the harms are also the ones who receive the benefits. OCHA states that risks may be different according to context. DHN looks more at the risks for the organization rather than at the harms for the vulnerable population, probably because the network is working directly with the V&TCs and is more interested in improving the humanitarian digital response, without a real connection to the operations on the field.

6) **Collaboration with other actors to avoid duplication of efforts:** Only DHN asks to cross-check with other organizations in order to verify any duplication of efforts or any gaps. It is surprising not to find this element in all of the guidelines as it is also part of CHS (Criterion 6: Humanitarian response is coordinated and complementary).

7) **Mechanisms to identify false data:** Global Pulse and DHN are the only ones to mention that the validity of the data must be assessed, without providing real mechanisms to check.

8) **Laws, regulations and ethical guidelines:** OCHA stresses that national and international legislation as well as ethical guidelines must be adhered to, but admits that due to the diversity of the legal landscape this is currently a challenge. Global Pulse also has a section on regulation and legal compliance and adds that agreements and licenses should also be checked.

9) **Feedback loop with affected population and other stakeholders:** DHN and OCHA underline the need for a feedback loop on how the data has been used. This activity should be

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\(^7\) The UN’s World Humanitarian Summit (WHS), was held in Istanbul, Turkey, in May 2016. The Summit’s objective was to substantially reform the humanitarian sector in order to better respond to the challenges of today’s crises. The Summit had 9000 participants from over 170 countries, including 55 Heads of State and Government and representatives from the private sector, civil society and NGOs. The Summit resulted in more than 3000 commitments to action. (World Humanitarian Summit 2017) (WHS 2016)
defined before work on the project begins. Internal feedback loops should also be included in order to monitor data processes. This is an important point in order to confirm the effectiveness of the action. It is also in line with CHS criterion # 5, “Complaints are welcomed and addressed”.

10) Transparency: OCHA states that responsible use of data should include being transparent about how the data is used. Global Pulse agrees that making the results of the data project public is essential, but cautions that a risk assessment needs to be done beforehand. The other two guidelines do not include this point. Being transparent about data projects is already standard in other fields, e.g. in medical research where research projects are announced in international databases (FDA 2017). It is unclear why this is not part of all guidelines. Actors should proactively reflect on how they can make their data available to all in the field (including small, local organizations) for whom they may be useful. Transparency is also part of Standard 5 of the Sphere Project, another core standard of humanitarian action.

In summary, the existing guidelines address only some of the issues raised by scholars in the critical literature, thus showing a gap and a lack of collaboration between the academic reflection and the practitioners. Among the missing elements are mechanisms to avoid false expectations being raised, information silos, how to address the quantity and diversity of data, how to motivate volunteers and how to overcome the digital divide. The likely explanation for this incompleteness is that the process was started only very recently and that not all actors have worked together on drawing up a common framework. There appears to be a certain reluctance amongst the humanitarian actors. However, as most of the initiatives are still in process they will be further developed, extended and consolidated. Inclusion of all stakeholders in the humanitarian digital ecosystem is encouraged, especially national governments and affected populations, the diaspora, and of course the V&TCs to be involved. To establish frameworks for a responsible use, actors may find orientation in well-established humanitarian standards: in the four humanitarian principles – humanity, neutrality, impartiality and independence, or in the more recently established Core Humanitarian Standard.

III. Assessment in two case studies

To assess the implementation of the ten elements highlighted above two case studies are used: the earthquakes in Nepal 2015 and in Ecuador in 2016. Several reasons have guided their selection. First, they are very recent, therefore they can be assessed in terms of current state of the art of technologies and guidelines. Second, they happened a year apart from each other, so
that it can be evaluated how technologies evolved within this timeframe. Third, they are both earthquakes, therefore they are comparable. Fourth, they occurred on two different continents, so these are very different settings in terms of culture, language etc. Fifth, both of them took place in developing countries, which are likely to be not as prepared for emergency response as developed countries and thus can benefit most from new technologies. Sixth, they occurred in challenging, but very different landscapes – in Nepal in a high mountain area, i.e. the Himalayas, in Ecuador in a coastal area, with communities which were difficult to reach (for more details see Annex IV).

The Nepal earthquake was an important turning point in digital humanitarianism. For the first time, a local organization, Kathmandu Living Labs (KLL), took the initiative on the digital response, while in earlier disasters international groups had started the mapping and crowdsourcing. Knowing the languages, the culture, the different spellings of street names is the clear advantage of locals who have in-depth knowledge of the local situation. Furthermore, KLL had already been prepared for a major disaster. It was set up a couple of years before the event, as its founder had already reflected on how digital humanitarianism could be applied in a potential earthquake in Nepal (which had long been expected) (Wall 2016). Many citizens were already trained in how to use OpenStreetMap and could immediately update it (Gilmour 2016). Humanitarian organizations used the maps particularly in the earlier phases of the response, as later on they had their own systems. It also appears that UN OCHA has not sufficiently used the information provided (Mulder et al. 2016). Ecuador followed Nepal’s example, as also here a local applied what he had observed about the Haiti earthquake to a potential similar disaster in Ecuador. He had bought an internet domain and launched an Ushahidi\(^8\) platform long before the earthquake, so it was ready for immediate digital response (Brown 2016). However, the response in Ecuador was also characterized by another rather new development in digital humanitarianism, digital south-south\(^9\) solidarity from former to current affected populations: the digital volunteers in Nepal joined the response almost immediately and helped with mapping (Wall 2016). The maps produced by some of the V&TCs helped the Ecuadorian government in their response (Blitzer 2016). It should be noted that limited scientific literature is available on the responses to these recent disasters, in particular for Ecuador, and that thus other literature such as newspaper reports, PowerPoint slides, website content etc. has also been used as a reference. These were written by newspaper journalists, the

\(^8\) Ushahidi was developed to map reports of violence in Kenya after the post-election violence in 2008. Since then, the platform has been used in many different crises for crowdsourcing citizen reports (Ushahidi 2017).

\(^9\) South-south should not be taken too literally here, as both epicenters were north of the equator.
leaders of the V&TCs, or DHN representatives rather than by scientists. Possibly, the Ecuador earthquake is too recent for scientists and scholars to already have reflected on it. Also, this disaster generally received limited attention from the media, donors and actors, possibly as its damage was not as high as in other earthquakes. Although these documents reveal the extensive focus on new technologies, they also hint on some limits. Therefore, the digital response during these two earthquakes is used to assess to what extent the ten items for a responsible digital response identified above have been implemented in these examples.

Furthermore, too limited evidence was available to answer all questions in a scientific manner. A more detailed research project applying quantitative and qualitative research methodologies will be required. This dissertation however functions as a preliminary pilot study. Furthermore, only the most active local organizations’ response has been investigated.

1) Was the purpose for the data collection pre-defined? In Nepal, KLL on their website states that they ask upfront questions about what is needed and where, and from where they will get the information. (Kathmandu Living Labs 2017). It is unknown whether the purpose of the mappings had indeed been clearly defined upfront. In general, the purpose of mapping an area hit by a disaster is obviously clear, i.e. it provides clearer information of infrastructure to those providing relief. However, this purpose could be refined – for example: Should it also contain information about camps that have been erected? Should it also assess the damage to buildings? Which is the area that should be mapped? Also in Ecuador, it is unknown whether the purpose of the mappings had been clearly defined upfront. It can be noted however that preference has been given to mapping the areas of Pedernales, Portoviejo and Manta (stated in a personal email). Here, the question could be asked why there was a focus on these areas. Was it because of highest needs or highest damage in these areas? Why were the populations in Muisne, San José de Chamanga and other places largely disregarded in this mapping effort? The report about Aerovision’s UAV deployment mentions that the purpose of the drone project was initially not clear to the government (FSD 2017b). Therefore, it appears that the purpose of the data collection had not originally been discussed with all stakeholders.

2) Were measures implemented to ensure data privacy and confidentiality? The documents reviewed did not provide information about data privacy and confidentiality measures. The organizations would need to be questioned as to where they are storing their data, whether they use encryption and VPN for safe transmission of data and what measures they take to prevent human errors.

3) Did the organizations have the infrastructure and policies to mitigate harm? In Nepal, KLL, according to their website, has a large team in place and, in its origins, was World Bank
supported. It is also one of the leading OSM organizations in Nepal (Mulder et al. 2016). It has a well designed website (Kathmandu Living Labs 2017). These are signs to assume that the organization has a good infrastructure. It is unknown whether it has policies and procedures as none are posted on their website. Local organization CloudFactory provided KLL with resources to host its mapping platform QuakeMap.org which adds to the assumption that sufficient manpower was available. Code for Nepal had a team in place on the ground and basic infrastructure. It is unknown whether it has policies and procedures as none are posted on their website (Code for Nepal 2017). In Ecuador, Ayuda Ecuador has a well designed website. Furthermore, a UN representative was part of their team. Also, it is launched as an Ushahidi platform, and Ushahid is a well known organization with international support. (Ushahidi 2017). These are signs that the organization is likely to have resources and support. Humanitarian OpenStreetMap also is a large organization, and as per its annual report 2015, has raised 1 million USD in 2015 and has more than 8,000 volunteers worldwide (HOT 2015).

Here, two questions arise: First, do all local organizations have sufficient access to funding to ensure an adequate infrastructure? Do funding mechanisms need to be developed? If the UN and other large organizations are using the material which local volunteers prepare, should they not pay for it? Also, do local organizations get sufficiently included in the dialogue around frameworks?

4) **Was there a mechanism for including knowledge from local organizations and end-users?** Both in Nepal and Ecuador, local organizations were spearheading the response in terms of mapping and crowdsourcing efforts. This was new in comparison to previous disasters. Even one of the drone projects in Ecuador was led by local volunteers (but supported by UAViators) (FSD 2017a). However, the international actors hardly took end-users and local organizations into consideration, as they largely focused on their internal needs for innovation (Ramalingam 2016).

5) **Was there a mechanism to avoid risks and harms to individuals or groups?** The Nepal Army used KLL’s QuakeMap as one of the primary data sources for its search and rescue operations. There is a risk of military misusing humanitarian data (for example regarding opposition groups). However, the potential risk in the case of Nepal would need to be further evaluated. In Ecuador, both in the AyudaEcuador and TerremotoEcuador platforms names and phone numbers of individuals are displayed and geotagged. This information could be misused. No information was available on formal risks and harms assessments being conducted in either of the disasters.
6) **Was there a mechanism for collaboration?** In Nepal, there was limited collaboration between international organizations which resulted in duplication of efforts and waste of resources (Ramalingam 2016). KLL, however, collaborated with local organizations, such as the Yellow House guesthouse and Professional Development and Research Centre. NepalMonitor.org and Himalayan Techies also assisted them. They were also in touch with Nepal Redcross through its GIS officer and with National Society of Earthquake Technology (NSET). Furthermore, international organizations were utilizing their output (DHN 2017a). Code for Nepal was working with the government (Code for Nepal 2017). In Ecuador, it appears that both AyudaEcuador.ec and terremotoEcuador were tracking requests for assistance, but that the datasets have been collected separately (AyudaEcuador 2017). It is therefore assumed that these organizations did not collaborate extensively. The drone projects in Ecuador collaborated with the government and the military (FSD 2017a; FSD 2017b).

7) **Was there a mechanism to identify false data?** In Nepal, KLL checks reports for accuracy and then approves them as per QuakeMap policy. The needs specified on the original report are verified to be still valid by QuakeMap’s verification team. The verifiers contact the original reporter on the contact number specified on the report (Mulder et al. 2016). AyudaEcuador has a ‘Verification’ tag on each report in their maps. It appears, though, that many reports have not been verified, although in the instruction document it says that reports will be verified within minutes. There is a verification process with the HOT system. No verification can be observed in the TerremotoEcuador website. Anybody can enter requests, without registering or leaving a name.

8) **Did the organizations adhere to laws and regulations as well as ethical guidelines?** For both drone projects in Ecuador it is mentioned that approval from the authorities was requested and granted. For the other projects and organizations, no information was found regarding this question. The organizations would need to be contacted and interviewed.

9) **Was there a feedback loop with the affected population and other stakeholders?** QuakeMap and KLL proactively followed up for every report on whether the people indeed received assistance (Mulder et al. 2016). Code for Nepal conducted a pilot survey in Nepal to investigate whether earthquake survivors received relief in the initial weeks and months following the earthquakes, and whether there still were unmet needs. Both Ecuador UAV reports mention that there was communication with local communities about the drone utilization and that there was neutral or positive feedback. For the Ecuador websites it does not appear that there was any feedback to the population.
10) Was there a mechanism to ensure that no false expectations are raised? KLL very actively followed up on every need that had been posted and inquired whether aid had been provided. Both with the AyudaEcuador and TerremotoEcuador platforms there would have been expectations of help by those who had entered requests. Especially with the TerremotoEcuador platform it is unclear whether anybody took responsibility to act on the requests. Although there is a response feedback button, for most requests no feedback has been entered.

In summary, in the assessment of the above questions, no full evidence-based research was possible. Instead, various hints have been used to obtain a notion on the answer. For scientific research a more detailed investigation needs to be performed. However, this review has demonstrated that there are still substantial gaps in a responsible digital humanitarianism, the following being the most important ones: 1) A lack of collaboration between international organizations and local initiatives, in particular in Nepal, 2) Missing verification processes to ensure validity of the data, in particular in Ecuador, 3) A lack of mechanisms to ensure requests by the affected population are addressed in Ecuador.

One of the challenges raised in Chapter II above, the digital divide, which, however, was not found to be addressed by the guidelines, is worth mentioning as well. In Nepal, crowdsourced data were largely accumulated around the Kathmandu valley, which is where a large proportion of the more educated population lives. However, several organizations (Code for Nepal, Mobile Citizen Helpdesks) realized this problem and made particular efforts to outreach to the populations in other areas, by using low-tech solutions (Mulder et al. 2016). In Ecuador, there were also more reports in the larger cities like Pedernales and Portoviejo, but this is also where most of the damage occurred, so it is unclear whether a digital divide caused any underreporting (see maps in Annex IV).

IV. Conclusion and future perspectives

In this dissertation the drawbacks and challenges of technologies in humanitarian action were investigated, as well as initiatives to mitigate these concerns. The paper shows that besides numerous benefits of the new technologies there are also a number of risks and challenges associated with them. These include false data and the inability to analyze large amounts of data or data of varied structure, data sets providing only a ‘silooed’ picture of the crisis, duplication of efforts by several actors, risks to the population because of a digital divide, a distance between affected population and humanitarian actor due to remote management.
through technical solutions, breaches of privacy and confidentiality and a lack of consent of the population to use their data as well as raising expectations without fulfilling them. However, several guidelines and frameworks have been compiled, mostly by large humanitarian organizations, such as the UN, the ICRC, MSF and Harvard Humanitarian Initiative. There are working groups convinced about the use of ICTs who aim to further develop such guidelines. The various guidelines raise very interesting and valid points and several of them contain checklists for organizations to determine whether they use technologies in a responsible manner and to implement steps to ensure this. Ten important focal points were selected out of these guidelines and assessed in the responses to the earthquakes in Nepal (2015) and Ecuador (2016).

It has been found that while the guidelines are an important step forward to ensuring responsible digital humanitarian response, none of the guidelines is complete as yet. The main findings in the digital responses in the earthquakes were: first, international organizations and local initiatives were not sufficiently collaborating; second, verification processes to ensure validity of the data appeared to be missing in Ecuador, but were well managed in Nepal; third, mechanisms to ensure requests by the affected population are addressed were functioning well in Nepal, but appear to have been lacking in Ecuador; fourth, the observed digital divide in Nepal was at least partially addressed.

Substantial further research on this topic is encouraged. On the one hand, the response in Ecuador requires a more in-depth evaluation, possibly through interviews with relevant actors and affected populations. On the other hand, it needs to be evaluated how organizations within the digital humanitarian ecosystem (including international and local actors, traditional humanitarian and technical organizations as well as governments and affected populations) can better collaborate in order to agree on common frameworks and policies, to incorporate them into the organizations’ internal procedural frameworks and to develop training structures, practical tools (such as checklists) and quality control measures to ensure the frameworks are properly implemented. Further research may then investigate the impact of the frameworks on risk reduction and improved response. This needs to be an ongoing process as technologies develop at an exponential rate.
Bibliography


Annexes

Annex I - Technologies

With digital technologies being so extensively discussed in the past few years it is surprising to discover that apparently there is not one common understanding of what is meant by these technologies and data, and what they encompass. Reviewing the abounding recent literature on the topic reveals that almost every author uses their own taxonomy. While some terms, such as ‘big data’ or ‘crowdsourcing’ are being described by many, not everybody assigns the same meaning to a given term. Whipkey and Verity for example define big data as “large and/or complex datasets that go beyond the capabilities of people and traditional desktop software to capture, store manage and analyze in their entirety” (Whipkey and Verity 2015). Boyd & Crawford on the other hand define big data as “a cultural, technological and scholarly phenomenon that tests on the interplay of technology (…), analysis (…) and mythology (…)”(Boyd and Crawford 2012). Sometimes very different words are used for the same idea. For example, what Qadir calls ‘data exhaust” would be somewhere between ‘transactional’ and ‘captured’ data in the description of Whipkey (Qadir et al. 2016; Whipkey and Verity 2015). Some authors have a rather narrow view on new digital humanitarian technologies, others include even government records, biometric identification techniques or digital data collection (Whipkey and Verity 2015).

There is not even consensus on whether the classification should be based on the source of the data (e.g. online activity, governments records, etc.), on the ‘enabling technologies’ (such as phones, tablets, the internet, UAVs etc.), the type of data (e.g. images vs text vs geospatial data), the result obtained after transforming the data (e.g. maps obtained by evaluating twitter messages and putting them into a geospatial context). In consequence, there is an impressive variety between authors in the set of technologies they are describing.

For the purpose of this dissertation a distinction is being made between the primary data as collected in the first step and the transformative process applied to the data and its results, i.e. the output which is expected to be of value to humanitarian action.
Primary data

The primary data can be passively or actively collected. Passively collected data would include what Quadir et al describe as ‘data exhaust’: it comprises call details collected by telecom companies as well as so-called transactional data, i.e. banking details and usage data, and clicks on advertisements in the internet (Qadir et al. 2016). Cell phone data may be used to track population movement in times of crisis (Sandvik et al. 2014). Other data is more actively collected. Online activity for example includes emails, SMS messages, blogs, messaging (e.g. WhatsApp or Skype), social media use / Facebook, Twitter etc. Data collected by sensoring technologies is predicted to become more and more important in coming years (Qadir et al. 2016). It includes traffic, weather or environmental data collected by UAVs, GPS location data and other data measured by various new sensoring technologies built into smartphones, such as temperature imagery, rotation and acceleration data. MyData is a relatively new new concept referring to personal data which may for example lead to personalized medicine. Public records include birth, death and marriage certificates, police records etc. Whipkey and Verity add several more data classes: business systems under which they include such items as radio and TV transmissions, news articles and school records; and biometric data such as fingerprints, facial recognition and iris scans (Whipkey and Verity 2015). Hunt et al. add data collected on purpose via specific applications (e.g Kobo, DataKit) through devices such as smartphones or tablets (Hunt et al. 2016). This is increasingly being applied for health records collection, but also for household assessments after disasters. Point of care testing allows diagnosis with portable and easy to use devices (Hunt et al. 2016). Other examples could be added but this field constantly evolves, so this list will never be exhaustive.

Transformative Processes and their Results

Transformative processes include, but are not limited to the following: crowdsourcing, crowd computing, big data analytics, artificial intelligence and machine learning, crisis mapping. Many of these processes are being performed by so-called Volunteer & Technical Communities. These are non-traditional actors in the humanitarian arena who can collaborate with traditional humanitarian actors in searching social media, analyzing or mapping data, translating data from affected communities, etc. (Qadir et al. 2016). The most well-known of these groups are the Standby Task Force (SBTF), Humanitarian OpenStreetMap Team and
Crowdsourcing is described as “the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people and especially from the online community rather than from traditional employees or suppliers” (Merriam-Webster 2017). After the earthquake in Haiti, for example, volunteers analyzed social media for needs posted by affected people, had them translated (mostly by volunteers from the Haitian diaspora) and created maps out of this information. Humanitarian actors used the maps in order to find out where people needed help (Meier 2015). Crowd Computing or Micro Tasking on the other hand brings together the strengths of crowdsourcing, automation and machine learning (Qadir et al. 2016). Part of the tedious work of analyzing tens of thousands of text messages is being taken over by computers. Big data analytics include “the range of tools and methodologies that use advanced computing techniques to leverage largely passively generated data, for example those resulting from the use of mobile phones or social networks, and the active collection of observed data by satellites for example to gain insights for decision-making purposes” (Letouzé, Meier, and Vinck 2013)

Crisis Mapping “leverage mobile & web-based applications, participatory maps & crowdsourced event data, aerial & satellite imagery, geospatial platforms, advanced visualization, live simulation, and computational & statistical models to power effective early warning for rapid response to complex humanitarian emergencies. As information scientists we also attempt to extract meaning from mass volumes of real-time data exhaust.” (CrisisMappers 2017)
Annex II – Interaction between humanitarian actors, DHN and V&TCs

Interaction of formal humanitarian organizations an V&TCs

(DHN 2017b)
Annex III - Responsibility frameworks and guidelines

The Signal Code: A Human rights approach to information during crisis
(Greenwood et al. 2017)


The very recently (January 2017) published Signal Code acknowledges the fact that humanitarian response has been fundamentally changed during the past years through the use of ICTs and big data. It claims that a rights-based approach is an essential prerequisite for the development of responsibility frameworks for the use of information technology. The five fundamental rights which they name are:

- The right to information
- The right to protection
- The right to data privacy and security
- The right to data agency
- The right to redress and rectification

They request that the following steps be taken:

1. Human rights in regards to information need to be incorporated into international humanitarian and human rights law
2. Humanitarian actors must accept these rights and they must be laid down in a formal framework
3. Minimum standards for ICT usage based on these rights must be established and implemented by humanitarian actors
4. Actors within the humanitarian ecosystem must rapidly agree upon a set of norms for ICT usage.

The UN Global Pulse describes itself on its website as follows: “Global Pulse is a flagship innovation initiative of the United Nations Secretary-General on big data. Its vision is a future in which big data is harnessed safely and responsibly as a public good. Its mission is to accelerate discovery, development and scaled adoption of big data innovation for sustainable development and humanitarian action. The initiative was established based on a recognition that digital data offers the opportunity to gain a better understanding of changes in human well-being, and to get real-time feedback on how well policy responses are working.“ (UN Global Pulse 2017)

In 2015 the Global Pulse set up a data privacy programme in order to ensure responsible use of big data. This programme focuses both in development and humanitarian action. The Data Privacy Advisory Group (PAG), established by Global Pulse and comprising experts from the private and public sectors, academia and civil society, was aiming to open discussion of privacy issues in the use of big data and to provide guidance on this topic.

The group held a number of teleconferences and summarized its discussions in a face to face meeting in 2015. The report summarizes the outcomes of these discussions. It focuses on the following challenges and provides a set of recommendations for each:

1. Fragmentation of the regulatory landscape in terms of data protection and privacy
2. Risk assessment and management, balanced against advantages: a ‘Risks, Harms and Benefits Assessment Tool’ is proposed.
3. Risks of re-identification
4. Necessity of obtaining consent and what to do when it cannot be obtained
5. Data Security
6. Private-Public Data Collaborations

In summary, the report proposes a number of frameworks and guidelines, but highlights that these are work in progress and need to be continuously improved. It also stresses that collaboration between experts from the fields of development/humanitarian, data privacy,
research and technology is required. It does not mention inclusion of affected populations in the discussions.

**UN OCHA: Building data responsibility into humanitarian action, May 2015**  
(Raymond and Al Achkar 2016)

OCHA, as described on their website, is the part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. OCHA also ensures there is a framework within which each actor can contribute to the overall response effort.

The document cautions that affected populations may not only benefit from digital technologies, but that there is also a potential for harm. The authors claim that data responsibility does not only include data privacy and data protection, but that it also encompasses a number of values and methods to utilize data in a way that people’s lives are improved in a responsible way. They suggest that the following four rules be followed in order to ensure responsible use of data:

- Assessing the purpose for which the data are planned to be collected; data should never be collected just for the purpose of collecting,
- Ensuring that the capacities to safely handle and process the data are available,
- Pre-identifying the potential risks and harms to affected populations by the planned use of the data,
- Prepare a plan to mitigate those risks and ensure adherence to legal and ethical standards.

Furthermore, they postulate that processes be followed, that there are clear stopping rules defined before collecting the data, that organizations are transparent about their projects and that feedback systems are implemented.

They state that frameworks must be developed to mitigate the risks and already propose the basis of a framework.
Brussels Privacy Hub and ICRC: *Data Protection in Humanitarian Action*  
(Brussels Privacy Hub and ICRC 2016)

According to their website, the Brussels Privacy Hub (BPH) is an academic privacy research centre with a global focus. As an entity of the Vrije Universiteit Brussel (Free University of Brussels or VUB), it engages EU policymakers, data protection regulators, the private sector, and NGOs to produce innovative, cutting-edge research on important questions of data protection and privacy law and policy (Brussels Privacy Hub 2017).

The ICRC (International Committee of the Red Cross), according to its website is an independent, neutral organization ensuring humanitarian protection and assistance for victims of armed conflict and other situations of violence. It takes action in response to emergencies and at the same time promotes respect for international humanitarian law and its implementation in national law. (ICRC 2013c)

This joined project by the Brussels privacy Hub and the ICRC aims to explore the relationship between data protection law and humanitarian action, to assist humanitarian organizations with implementing data protection policies and to identify data protection concerns which may arise through the use of new technologies as well as ways to address them. Throughout 2016 a series of workshops has been scheduled which address the following topics: data analytics / big data, “humanitarian” UV/drones, biometrics, mobile cash assistance, cloud based data processing (including health data), Internet of Things/Connected devices. Stakeholders to be included in the project were to be experts in the area of data protection law, practitioners from major humanitarian organizations and stakeholders from the private sector. No mention is being made of the more informal sector of the humanitarian digital ecosystem, i.e. the digital volunteers, nor the affected populations. However, as these are key stakeholders in the digital humanitarian ecosystem it is concerning that they do not appear to be consulted.

At the time of writing this dissertation (January 2017) the Brussels Privacy Group was informing that the workshops had been conducted as planned, that the draft handbook and various papers were at that moment being circulated for review and that they were planned to be finalized in Spring 2017. No further information was provided neither as to the participants nor the content of the discussions.
(Whipkey and Verity 2015)
This guideline first explains Big Data, then outlines the advantages and disadvantages of big data and lastly gives guidance on how to incorporate big data into humanitarian response. It suggests consideration of personnel capacities, collaborations with other actors, needs-based data collection, a structured and responsible approach to data collection and analysis, feedback mechanisms, information sharing, documentation and planning for storage infrastructure. It furthermore advice on reviewing or creating policies, in particular in respect to privacy, confidentiality and ethics. It also refers to several other guidelines prepared by various organizations. The authors suggest combination of traditional and big data, and to build policies for big data based on those existing for traditional data. Part of the guideline are two comprehensive checklists on questions to ask when working with big data and on risks to take into consideration.

(ICRC 2013b)
The first version of this guideline was produced in 2009, in collaboration with many actors in the humanitarian ecosystem. The guidelines are intended as minimum standards for organizations to incorporate them into their own procedures. They aim to protect both the affected populations and the humanitarian actors.

The 2013 edition has added a section addressing issues related to new technologies. Eighteen recommendations (#36-53) are given in respect to handling sensitive information. Many of them would also apply to more traditionally collected information, but many of them are particularly applicable to new technologies.

Médecins sans Frontières Ethics Framework for Humanitarian Innovation

In 2016 biomedical ethicists and practitioners from the British Medical Association, MSF, and CERAH published a paper which describes MSF’s own pilot project on ethical frameworks for humanitarian innovation (Sheather et al. 2016). The reason for developing this framework was that MSF wanted to foster innovation, while at the same time avoiding creation of excessive new risks. Based on the humanitarian principles, it outlines key points to consider and applies
them on three case studies. The authors stress that this is a first draft and that they will be monitoring its usefulness within and outside of MSF projects.

**Codes of Conduct of various organizations**

The DHN defines a code of conduct as “A set of rules outlining the responsibilities of or proper practices for an individual, party or organization. A Code of Conduct formalizes a number of acting principles and “minimum” standards: a body publishing its own Code of conduct commits itself to conform to these standards and expects the same from the individuals composing it and representing it.” The DHN states that a number of its members already have a code of conduct and encourages all members to develop their own.

The content of the various codes of conducts varies widely and does not necessarily focus only on the responsible use of technologies. Furthermore, it is unclear how organizations want to enforce adherence to their code of conduct. Some, like the Standby Task Force, ask their members to sign their code of conduct and provide guidance on how to deal with violations of the code, including the mentioning of potential corrective measures.

Meier also mentions the Global Association of Mobile Operators’ (GSMA’s) ‘Guidelines for the use of SMS in Natural Disasters’ which was co-authored by him. This document provides guidelines to humanitarian actors and telecommunications companies who wish to use SMS messages as a tool for disaster response. It was issued in 2013 as a draft and it is stated in the document that it is to be considered as work in progress which eventually should result in an official code of conduct. It is unknown whether the document has been finalized to date.
Annex IV – Digital humanitarian responses in earthquakes in Nepal and Ecuador

A) Earthquake in Nepal 2015

On 25 April 2015 a 7.8 magnitude earthquake hit Nepal, with its epicenter at Barpak, Gorkha, north west of Kathmandu. Continuous aftershocks happened throughout the next day and another important aftershock occurred on 12 May 2015. In total, the earthquakes claimed about 9,000 people and injured almost 22,000. Hundreds of thousands of people became homeless and many ancient buildings were destroyed in Kathmandu Valley (Wikipedia, Reliefweb). Landslides, severe damages to many roads and avalanches caused isolation for a large part of Nepal.

The Nepal earthquake was the first large-scale disaster in the developing world where locals took the initiative of mapping (Wall 2016). Kathmandu Living Labs (KLL) had been founded by Nama Budhathoki in late 2013. He lived in the US when the Haiti earthquake occurred. The digital response to Haiti made him reflect on whether the same could be done in Nepal should an earthquake hit the country. For this reason he returned to his home country to start KLL. From then the organization started hiring Nepali volunteers and began mapping in OpenStreetMap the Kathmandu area, including schools and universities, hospitals and clinics, roads, temples and other geographic features of the Kathmandu Valley. They also gave mapping lectures to universities, the government, NGOs and youth groups (Kathmandu Living Labs 2017). In the very beginning Budhatoki was supported by World Bank funding. Nowadays KLL uses the crowdfunding platform Indiegogo to raise funds. The organization was thus well prepared when the earthquake struck. Almost immediately the team started mapping and quickly included a large number of volunteers from all over the world (Wall 2016). KLL was supported by local organizations Nepal Monitor and Himalayan Techies as well as DNH members Humanity Road and Ushahidi. Another initiative, Code for Nepal, an organization registered by a diaspora Nepali in the US, but acting on the ground in Nepal, runs projects to foster digital literacy and the use of open data. During the earthquake the organization used government data to build maps of deaths and injuries as well as damaged buildings (Kumar 2015). They also created a shared document for reporting needs and resources. French
organization CartONG was involved with bank location for OCHA and provided GIS support for MSF. UK based NGO MapAction provided maps with information about people affected, 4W mapping, details on the shake area, weather and logistics mapping, as well as district specific data. Standby TaskForce (SBTF) connected the Nepalese diaspora with KLL and online groups. Translators without Borders translated Twitter tweets and other messages, documents and media output into and from Nepali, Newari and Hindi.

Map of the Nepal Earthquake 2015, (Tackk 2017)
B) Earthquake in Ecuador 2016

On April 16, 2016 a 7.8 magnitude earthquake hit Ecuador, with its Epicenter in the north-western coastal area, near the town of Muisne. A total of 668 deaths were reported, eight missing people and 6,274 people with severe injuries. More than 230,000 people were wounded and more than one million people were directly or indirectly affected by the earthquake. Approximately 35,000 homes were destroyed or damaged (ReliefWeb 2017). Roads were also partially destroyed. Although Ecuador also has rather high mountains, the area affected by the earthquake was mainly in hilly or rather flat coastal areas. Some villages in the rainforest were difficult to reach, but most areas were more accessible than those in Nepal. The largest damages were in cities where many multi-story buildings collapsed. However, in smaller villages and towns many huts also disappeared into the sea or into rivers (personally observed).

Similar to what had happened in Nepal, the digital response to the earthquake in Ecuador was largely led locally in Ecuador rather than through international organizations. The website AyudaEcuador.ec was deployed very shortly after the earthquake as it had already been pre-prepared beforehand by Ricardo Arguello, a member of the ‘Association of Open Source Software of Ecuador’. This website is based on Ushahidi. In fact, Arguello had set up the site
long before the earthquake, just in case something happens. Ecuador is prone to disasters. Not just earthquakes, another impending one is the eruption of volcano Cotopaxi. Volunteers from Ecuador as well as other countries were contributing in mapping reports (Brown 2016). Anybody was able to enter information or needs via the website or a dedicated SMS service. The platform provides maps where these details are displayed. The team was working closely with the government and provided maps on request (Blitzer 2016).

Another mapping project in the Ecuador response was based on Humanitarian Open Street Maps (HOT). Spearheaded again locally, this project mobilized volunteers to map disaster affected areas based on satellite imagery (Brown 2016). Interestingly, volunteers from KLL Nepal were among the first to help mapping The project focused mostly on the regions of Pedernales, Puerto Viejo and Manta (Personal email Humberto Yances). Volunteers were instructed to map buildings as destroyed or damaged and roads could be labelled as impassable. Another feature were organized or spontaneous campsites. These maps were used by relief organisations (Owens 2016)

TerremotoEcuador.com is another site which mapped requests for assistance, based on an underlying Open Street Map. Request can be classified by type (water, clothes, medicine). There is an option to enter name, phone number and email address of the requester. There is also a reply option for a responder.

There were also several drone projects: local volunteers affiliated with UAViators flew drones to collect aerial images, and worked with the government to generate maps. AeroVisionCanada, partnering with GlobalMedic also collected damage images and developed maps (FSD 2017a; FSD 2017b).
The earthquake in Ecuador April 2016 (MOW 2017)
Screenshot of AyudaEcuador (run on the Ushahidi Platform using OSM) for the 2016 Ecuador Earthquakes (AyudaEcuador 2017)