Toolkit
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SECURE ACCESS IN VOLATILE ENVIRONMENTS
SAVE

Technologies for monitoring in insecure environments

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Introduction

In some of the most insecure humanitarian contexts, monitoring aid programmes is particularly important to humanitarian organisations. Did assistance get to the right people? Have aid trucks safely reached their intended location? How do affected populations assess the services provided? Amidst access constraints, attacks and the risk of aid diversion, those questions remain difficult to answer. M&E practitioners are therefore optimistic about the use of technology tools like mobile phones or GPS trackers when working in insecure environments.

While many pilot projects use technology for M&E in insecure environments, humanitarians consulted for the SAVE research programme noted a lack of clearly documented and user-friendly guidance on the different options.

Early research in close collaboration with aid agencies in Afghanistan, Somalia, South Sudan and Syria showed that organisations are interested in exploring technologies for monitoring, but are unsure about advantages and downsides of existing tools. To help address these concerns, this toolkit provides an overview of different technological tools for monitoring in insecure settings based on lessons from existing experience and pilot projects.[1]

[1] Parts of this research were summarised in an article with the Humanitarian Practice Network (HPN): Dette, R. & Steets, J. (2016). Innovating for access: the role of technology in monitoring aid in highly insecure environments, http://odihpn.org/wp-content/uploads/2016/04/HE-66-Web-Final.pdf

How to use this toolkit

This toolkit focuses on six technologies that practitioners deemed useful in insecure environments because they can function without constant electricity supply, across large distances and without advanced computing skills. Each chapter looks at benefits of a specific technology; discusses practical and ethical challenges as well as mitigation measures; runs through the concrete steps for implementation; and provides insights from applications in Afghanistan, Somalia, South Sudan and Syria. At the end of each chapter, we offer a collection of resources to learn more. The research team collected all information through a literature review and interviews with practitioners in both the four focus countries and globally. The following table provides a quick overview of the six chapters:

Task	1. Using mobile phones for monitoring and gathering feedback Page 7–25	2. Digital data entry with tablets or smartphones Page 26–43	3. Remote sensing and aerial imagery with satellites, radars or UAVs Page 44–65	4. Location tracking Page 66–80	5. Complementing feedback mechanisms with radio programmes Page 81–98	6. Communications with online platforms Page 99–116
Tool						
Description	Widespread usage of mobile phones offers reliable channels to reach communities through calls, text messages or voice recordings.	Digital data entry fed into electronic databases can replace paper-based surveys for faster and more reliable data transmission and analysis.	Areal imagery can elucidate context conditions (eg. population movements) or project outcomes (e.g., construction projects).	A range of tools makes it possible to visualise information on maps or identify and track the location of deliveries.	Broadcast radio is a reliable tool to spread humanitarian information or receive feedback through interactive radio shows.	Where social media like WhatsApp or Facebook are widely used, aid agencies can employ them for monitoring and feedback.
Applications	• Complaints/ information hotlines • Household surveys • Verification calls • Focal point reports	• Surveys and questionnaires • Registration and distribution reporting • GPS- and time-stamps in surveys	• Observation and analysis with satellite • UAV imagery for close-up analysis • Radar and sensor data	• GPS/barcode tracking • Delivery mapping and recognition of roadblocks • Sending accurate location reports	• Outreach, advocacy and engagement • Publicising feedback channels • Community radio to stream local voices	• Reporting back and accountability • Complaints and suggestions channels • Internal staff communications

Some general points before delving into the toolkit

Most of the lessons identified during the research are specific to each tool and therefore reflected in the individual chapters. However, when using or considering using technological applications for monitoring, the following larger points should be taken into account:

Take your time. Practitioners are well advised not to rush implementation. Consulting with partners who already use the technology, and developing a thorough understanding of who influences and spreads information in the specific context, is critical for success. Also, factor in time to win the support and trust from colleagues and affected populations for the solution, and work with users when inventing, designing and testing tools. Challenges can stem from inherent biases of some technologies – for example, men are more likely to own the household phone, making it difficult for women to use phones anonymously. Concerns can also arise from technical problems or be linked to resistance to change among staff. It is important to proactively address such concerns before they develop into general mistrust and rejection of a particular technology.

Do a proper risk-benefit analysis. There are contexts or situations where certain technologies can do more harm than good. It takes some stamina to resist the urge to be innovative. But experimenting with untested technology on the back of affected populations should not be an option. Do not use technology when data collected cannot be adequately protected and is so sensitive that it could put people at risk; when acceptance of a certain tool is very low and using it can create security risks; when the lack of infrastructure makes a project too costly; or when your organisation cannot guarantee long-term implementation. Hopefully this toolkit can help you to assess risks and learn about mitigation measures for each specific group of technologies.

Watch out for digital risks and privacy concerns. Risks related to digital security are insufficiently understood and addressed, and not just in the humanitarian sector. Even though aid practitioners are becoming more aware that digital data may be intercepted, or that mobile communication can be tracked, many organizations still opt against using encryption to secure their data. Increasing digitisation means increasing dependence on tools, which makes a potential attack on digital systems more harmful. At the same time, intrusion becomes more rewarding when attackers get their hands on greater amounts of information. Furthermore, technology-enabled aid often depends on for-profit actors, including businesses like Google, Dropbox or Facebook. It is important to keep in mind that aid organisations forfeit some control of their data by using third party tools. For a brief overview, see this toolbox for online privacy: http://www.privacytoolbox.gppi.net/obscure-me/

Contribute to improving practice. Because of potential dilemmas and risks, it is important that humanitarian practitioners continue to aggregate experience with the use of technology in insecure environments. Some practical challenges have practical solutions, many of which are explained in the following chapters. Nevertheless, some questions touch the very core of humanitarian action.[2] It is important to develop precedence before new actors create technology practice uninformed by humanitarian experience and principles.

[2] See also: Dette, R. (2016). Do No Digital Harm: Mitigating Technology Risks in Humanitarian Contexts, http://cooperation.epfl.ch/files/content/sites/cooperation/files/Tech4Dev%202016/1282-Dette-SE01-HUM_FullPaper.pdf

1. Using mobile phones for monitoring and gathering feedback

The rising usage of basic mobile phones and smartphones in volatile environments can make communicating with communities easier. Many organisations are expanding their outreach and feedback systems into accepting messages via SMS, calls or interactive voice response, in which pre-recorded messages are used to provide or gather information.

Aid organisations have developed several approaches to collect data remotely with mobile phones sometimes in combination with specialised software. This includes, for example, the use of hotlines, outgoing verification calls, phone-based surveys and other reporting channels.

NOTE: FOR MORE INFORMATION ON THE USE OF SMARTPHONES AND TABLETS FOR DATA COLLECTION, ALSO SEE CHAPTER 2: DIGITAL DATA ENTRY.

In this chapter:

1.1 Overview

Mobile phones offer channels for reaching difficult-to-access populations in insecure settings and can enable efficient information processing. In principle, they can be used for all monitoring tasks that would otherwise involve direct conversations between affected communities and aid staff, as well as additional monitoring applications.

Two recent developments helped further the interest and uptake of phone-based systems:

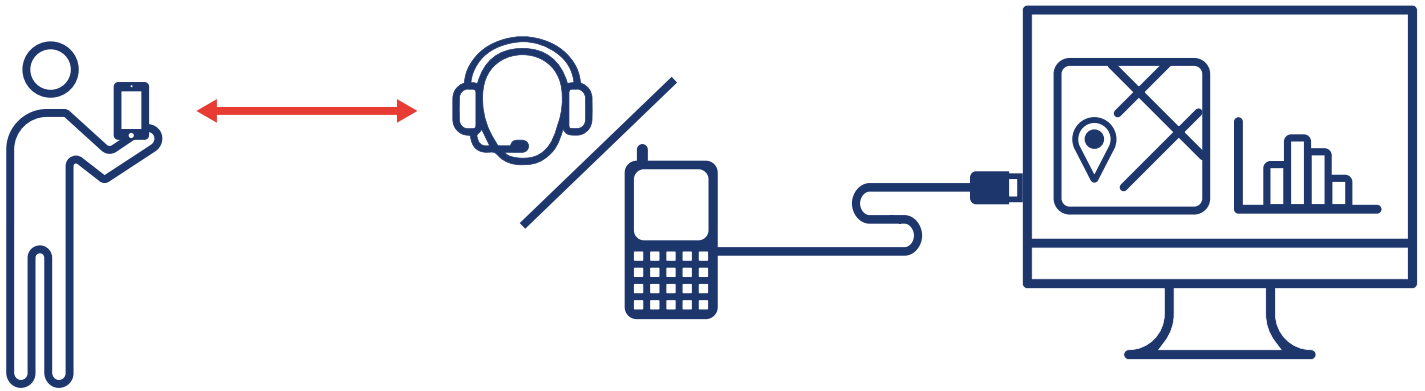
1. **Rising usage of mobile phones:** More people in crisis situations either own or have access to mobile phones. The devices are becoming cheaper and network connectivity is expanding.[1]
2. **New software:** A number of easy-to-use tools and services allows for organisations to receive large amounts of data via SMS, call or interactive voice response. This includes applications for managing and receiving calls or messages as well as processing and analysing information.

Three specific applications for monitoring aid efforts and assuring accountability stand out:

- **Feedback or complaints mechanisms:** Affected people send SMS messages or call hotlines to ask questions, comment or complain about service delivery.
- **Targeted data collection:** Aid staff call, send SMS or use interactive voice response (IVR) surveys to selected groups of people to collect specific data, sometimes in set intervals.
- **Link to community phone-focal points and/or staff:** Aid organisations communicate by phone with focal points and/or staff in communities that are difficult to access.

However, phone-based systems also entail limitations and introduce new challenges. Risk of bias toward those who are able and willing to use mobile phones, confusion amongst communities with navigating parallel hotlines and the threat of wire-tapping are not trivial. In some areas, (smart)phones can still put people at risk due to the perception of 'spying' or mistrust towards communication technology.

[1] Find updated statistics on mobile access at: http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx



Aid organisations or communities send and receive messages via modile phone networks.

Call centre staff or automated text message or voice recording systems send or receive messages and calls.

Incoming messages are transferred to and processed on a computer, sometimes with specialised software.

Benefits	Problems	Recommendations
Direct and regular contact with local communities	Bias to phone owners can skew perspective	Set up shared channels with other organisations to prevent fragmentation
Phones are widespread, easy and inexpensive to use	Privacy risks as messages can be read by others or intercepted	Plan and budget for long-term use
Versatile ways to communicate and collect data	Over-reliance on remote communication tools and tendency to accept reduced proximity	Do not set up a phone line if capacity to respond to and handle feedback is limited

MONITORING APPLICATIONS

Aid organisations can use phone lines to reach out to local communities, or call in or send text messages to hotline numbers. The exchange can be in direct conversation, or via text messages or voice recordings. Increasingly, data gathered through mobile phones is compiled in or linked to digital maps. Three distinct systems offer different advantages for feedback and data collection:

Call centres

Operators reach out to or pick up when beneficiaries call in. Staffed call centres tend to return high quality data quickly. They are suitable for collecting qualitative information.

On the downside, call centres can be expensive. Under-staffing can result in blocked lines or no response when somebody calls, which can increase distrust and lower usage.

SMS

Software is used to manage, send and receive text messages. Incoming data can thus be processed quickly. It is possible to send mass texts and receive messages 24/7. It is also possible to send SMS in a structured way to regularly communicate with local staff or focal points.

However, SMS requires literacy, which can exclude some vulnerable groups.

Interactive voice recording

Pre-recorded messages can offer a strong and cost-effective option. A voice talks respondents through the data collection process. Messages can be personalised and entered directly into databases.

Unfortunately, when aid recipients are not used to this type of robotised conversation, low retention and alienation can occur.

WHEN NOT TO USE PHONE-BASED MONITORING APPLICATIONS

In some instances, the risks and limitations of relying on mobile phones for monitoring and feedback can outweigh the benefits. Before setting up a channel, it is important to check against the following conditions:

- **Do not use phone-based systems to collect sensitive data that could put beneficiaries at risk.** Information related to gender-based violence, the location of persecuted people or financial and health information that could cause stigmatisation cannot be reliably secured when transferred through phone networks.
- **Do not use it for short-term projects or without continuity.** The set-up and familiarisation costs only pay off if phone-based systems are used longer than a few months and ideally for several projects.
- **Do not create a new mechanism where other, similar mechanisms already exist or are planned.** With too many systems in place, aid recipients can be confused and are less likely to use any of them.
- **Do not use it if you do not have the capacity to process feedback and follow up.** Beneficiaries will expect follow-up when using phone systems. Lack of response can harm trust and reputation.
- **Do not use it to replace all other monitoring or feedback channels.** Phone systems are not sufficient in themselves as phone ownership is biased and network coverage is uneven.

1.2 Benefits and challenges

If planned and coordinated carefully, the benefits of phone-based channels for monitoring mechanisms typically outweigh the disadvantages.

Nonetheless, limitations around reach, quality and trust compared to face-to-face communication must be kept in mind when planning the use of mobile phones for monitoring. New challenges with mobile phone usage, especially digital security, also need to be addressed.

BENEFITS

Affected communities demand direct interaction with aid organisations. The following benefits have been observed and documented when using phone-based mechanisms for feedback/ communications:

Direct interaction and wide reach

Phones enable direct interaction with affected populations where agencies' access is restricted. Even if face-to-face interaction cannot be completely replaced, phone-based communication is especially valuable where intermediaries might otherwise bias information.

Data triangulation

Phone-based data can be used for triangulation. Even when incoming comments are not fully representative, they can add depth or context to other indicators.

Improved accountability

Widely available feedback channels based on phone lines can help ensure a minimum of accountability to affected populations in inaccessible or hard to reach areas.

Efficient and systematic processing

Calls and text messages arriving at a centralised office can be processed systematically and much more easily than paper-based or in-person feedback data. Machine-readable processing enables trend and pattern detection and can guide decision-making.

Specificity and detail of information

SMS messages or calls can be used to ask beneficiaries for specific information to assess impact of programmes (e.g., food prices or conflict incidents). Asking specific questions is efficient for both staff and respondents. The direct nature of SMS and voice communication can help rule out entry or translation errors which can occur when feedback comes via intermediaries or paper forms.

Two-way communication

Mobile phone technology in combination with processing software is not only well suited for receiving large amounts of information but also for following up with individual messages.

CHALLENGES AND MITIGATION MEASURES

A number of challenges need to be understood when considering or operating phone-based monitoring mechanisms. The severity of each challenge depends on the contexts where phone-based systems are being considered. Similarly, mitigation measures will vary depending on the exact project and region, and need to take into account infrastructure and cultural factors.

Rating	Challenges	Mitigation options
severe	**Bias** The uneven usage of mobile phones today implies limitations for reaching the most disadvantaged groups. Among the most vulnerable, literacy levels can be low and phone ownership tends to be concentrated among better-off groups and (predominantly male) heads of households.	**Equalise distribution** • Do not use phone-based systems as the only feedback channel; use in tandem with other systems, especially direct conversations or open offices where possible. • When necessary and feasible, distribute cell-phones, SIM cards or mobile phone credit to disadvantaged groups.
severe	**Distance** Phones cannot replace the quality of direct, face-to-face interactions with beneficiaries. In insecure environments, this is especially problematic given the importance of building trust.	**Complement with other tools** • Use phones as complementary channels for communication along with in-person feedback methods, for example, with local staff or partners. • Introduce phone usage carefully and incrementally, using individual, explanatory phone calls in the beginning to build trust.
severe	**Expectation management** Beneficiaries expect follow-up if they submit complaints or information. There is a risk that these expectations cannot be met due to a lack of adequate organisational processes or capacity. In the long run, this can severely weaken the trust between aid providers and recipients.	**Communicate** • Advertise platforms very carefully, choosing words that clarify the scope and purpose of feedback hotlines. • Set up automated response messages based on keyword recognition where feasible. • Ensure capacity for follow-up through proper planning. Be realistic: if it is not feasible to respond to feedback, it may be better not to offer the channel in the first place.

Rating	Challenges	Mitigation options
high	**Security risks for organisations** Publicising feedback numbers and calling large numbers of people increases the visibility of aid activities. At the same time, this can increase security risks in some contexts. In some cases, local contacts and beneficiaries could be seen as spies or as partial to a certain side of a conflict when associated with aid agencies using mobile technology.	**Use cautiously, with consent** • Explain phone mechanisms and only use with consent of relevant groups, authorities or non-state actors and where sensitivity levels permit. • Assess impact of introducing phones and other hardware for data collection during risk assessments.
high	**Volatility of mobile infrastructure** Mobile network coverage can be uneven and prone to environmental or intentional disruption. Connection problems between urban and rural areas can be quite common. Conflict parties can sabotage systems and cut off communities. This could bias assistance, shifting focus on high-reporting areas and missing those unable to send feedback.	**Develop back-up plans** • Complement mechanisms with low-tech complaints-systems such as local contacts that continue as emergency systems when mobile networks are interrupted. • Communicate with local groups as much as possible. Transparency may decrease hostility. • Select the timing of SMS/calls carefully. • Evaluate whether you can address infrastructure issues directly – for example, with mobile phone charging booths in refugee camps.
high	**Security threats to individuals** Using mobile feedback channels can put individuals at risk. Phone calls or data traffic can be intercepted. Messages can be read by others who gain physical access to the phone. Where sensitive or personal information is shared this can threaten lives or stigmatise individuals. Even holding on to people's phone numbers entails risks: If the wrong actors get hold of this kind of information, it could be used for identification and persecution, or to exploit vulnerable groups in other ways.	**Restrict usage** • Only use active calls if beneficiaries have given their prior consent and be sure to include opt-out options. • Only use where culturally appropriate. • Explain the risks entailed with transmitting information via phones to beneficiaries and staff. • Secure digital communication channels with encryption and security-conscious software. Typically, open-source software is best as security experts can review the code. • Refer to existing guidance on data security, e.g., 'Security in a Box'[2] or user instructions from FrontlineSMS.[3]

[2] **Find the guide 'Security in a Box' at: https://securityinabox.org/en/guide/mobile-phones**
[3] **See: http://www.frontlinesms.com/impact-of-frontline/guides-tools-and-case-studies/**

Rating	Challenges	Mitigation options
high	**Low uptake and quality** Especially in the beginning, the uptake and use of hotlines and call services may be low. Incoming calls or messages might not contain the type of feedback aid actors are hoping to register. For example, incoming calls often concern daily operational matters rather than sensitive issues such as corruption and diversion, for which they were often set up. Positive and frequent feedback does not always mean that delivery has been effective. Too many active calls or messages to aid recipients can lead to fatigue and undermine acceptance.	**Plan ahead and focus on outreach** • Provide and advertise simple, toll-free numbers (e.g., with aid deliveries, on billboards). In some settings, it makes sense to offer phone credit in return for calls. • Practice and demonstrate diligent follow-up to incoming complaints and suggestions. • Explain the mechanisms carefully to local communities using visuals to illustrate how it works and, if possible, plan in-person meetings and involve locals in systems and outreach design. • Rely on alternative mechanisms to validate the level of satisfaction with and reach of the goods and services you are providing.
medium	**Abuse** In rare cases, hotlines are abused – for example, by competing NGOs mobilising communities to submit complaints. In addition, spam and fraudulent messages can be a problem. (In the context of the Ebola response, hotline abuse was a significant problem.[4])	**Check and review data** • Create follow-up and verification procedures to detect abuse. • Triangulate data with other sources, e.g., active calls or in-person visits. • Use open-ended questions to judge plausibility.
medium	**Lack of standardisation** Different mobile phone providers may not be compatible – for example, when establishing a shortcode such as '4357' or 'HELP' that people can call or text for free. Furthermore, aid organisations themselves can undermine each other's efforts when offering numerous parallel and similar phone systems. Concerns over the sensitivity of incoming complaints and requests and competitive funding schemes can make it difficult to collaborate.	**Collaborate to increase compatibility** • Negotiate with all major network providers to advertise a single number that callers from any network can reach. Ensure multi-network compatibility. • Collaborate and coordinate with other providers to prevent an overflow of options/information. Consider good practice from inter-agency and joint feedback systems. • Agree on procedures and access controls with regard to sensitive information to ensure that aid organisations do not compromise their delivery.

[4] For more information on abuse of feedback hotlines in the Ebola response, see http://www.voanews.com/content/sierra-leone-emergency-call-center-faces-daily-challenges/2506215.html and http://www.ictworks.org/2014/10/31/7-key-insights-in-using-ict-to-improve-ebola-response/.

[5] For an overview see Ruppert, L., Sagmeister, E., Steets, J. (2016). Listening to Communities in Insecure Environments: Lessons From Community Feedback Mechanisms in Afghanistan, Somalia and Syria (report from the Secure Access in Volatile Environments (SAVE) research programme: SAVEresearch.net)

1.3 Implementation

SET-UP

The exact process for setting up a phone-based feedback or survey mechanism will depend on the country, context and project objectives. They key players to keep in mind typically are: mobile network companies, software and hardware providers, local communities and their mobile phone culture, other aid agencies present who might use or consider a similar system, and the staff that is expected to work with the tools in the end. It is good to bear in mind that uptake of a new system can be quite slow. Set aside extra time to explain the tool and allow staff and local communities to grow acquainted to it.
In general, the following steps are necessary to implement a phone-based system:

1. Assess suitability

- How many hotlines or phone systems are already in place elsewhere?
- Is phone network coverage reliable?
- Who within affected communities has access to phones?
- Are people able and willing to send and respond to SMS or calls?

2. Choose or develop platform

- Are organisations in your field or region using tools you could use?
- Is software available that you can use or purchase or do you have to build your own?
- Do you have an internet connection and can you send SMS via a web-based platform or do you need to do so through a local android phone or local server?

3. Fill infrastructure gaps

- Do people need to receive phones in order to participate?
- Do you need to supply energy and charging sources?
- Do you need to build your own call centre?

4. Publicize

- What is the best way to reach those intended to use the system?
- How will you brand and explain the service?

5. Receive messages

- Where and how will you store the messages?
- Who has access to which data?
- How will data be visualised and recorded to be analysed?

6. Follow-up

- Do you have the capacity to respond to individual requests?
- How do you handle potentially large amounts of input?
- How do you assess the effectiveness of the tool itself?

SELECTING SERVICE PROVIDERS

It can be difficult to choose the right service provider amidst the increasing range of systems for collecting, storing and processing information via mobile phones. A significant time investment is worthwhile to ensure suitability. When selecting a provider, the following criteria should be considered:

- **Purpose:** Some tools are better suited for broadcasting messages; others are better at visualising the information you want to collect. Make sure to test different solutions to find a provider that fits your needs.[6]
- **Communications security:** Free and open-source software (FOSS) is typically less likely to contain security holes than proprietary tools as the code can be reviewed for bugs and reliability.
- **Compatibility:** Software from which databases can be easily exported into common formats, including .csv, .xml and .xls files, makes it easier to transfer and share information.
- **Optional service support:** Some companies provide tools that customers can use and adjust as they wish and then pay for service or maintenance on a case-by-case basis.

The following software and platforms providers are among those frequently used by aid organisations, though there are dozens of other services that also might be relevant.[7]

Provider	URL	About
Echomobile	**https://www.echomobile.org/public/main**	Good platform for broadcast messages and surveys. Some weaknesses related to collecting unstructured feedback.
FrontlineSMS	**http://www.frontlinesms.com/**	Free, open-source technology for SMS tools. Very limited functionality. Mainly suited for sending broadcast messages and receiving unstructured responses.
TeleRivet	**https://telerivet.com**	Well-balanced SMS system that can handle broadcast messages, incoming messages, as well as surveys. TeleRivet has recently announced IVR support.
TextIt.in	**https://textit.in/**	SMS/voice notification and survey platform developed in Ghana used by UN/ NGOs. VOTO Mobile has a strong emphasis on IVR and audio messages, which can be useful in countries with low literacy rates.
VOTO Mobile	**https://www.votomobile.org/**	MS/voice notification and survey platform developed in Ghana used by UN/ NGOs. VOTO Mobile has a strong emphasis on IVR and audio messages, which can be useful in countries with low literacy rates.

[6] A recent comparison of different SMS platforms can be found at: http://impacttrackertech.kopernik.ngo/sms-communication-platforms.
[7] Notably, the GSMA provides a table listing many mobile for development projects sortable by country at: http://www.m4dimpact.com/data/organisations.

COSTS

The costs of phone-based feedback and survey mechanisms vary significantly depending on what system is used and what conditions can be negotiated with network and service providers.

Experience shows that phone-based feedback systems incur costs throughout the programming cycle and can increase over time. This cost needs to be reflected in budgets. If set-up expenses are covered, but capacity for follow-up cannot be guaranteed, it might be better not to implement a system at all.

RESOURCES NEEDED

BUDGET CALCULATION

The table below offers a 'worksheet' for estimating the costs involved in a phone-based project. Exact numbers depend on country rates and project needs.

Item	Details or staff time to be paid (insert costs depending on your context)	Total
Hardware	_____ × _____ cost of basic phone, $5-20 number of devices needed to distribute	=
Software	_____ + _____ + _____ cost of software service provider fees & charges staff time for training	=
Outreach	_____ × _____ cost of billboard ad/SMS/radio/... number of advertisements needed	=
SMS and call costs	_____ × _____ × _____ cost per SMS/call number of people to reach number of SMS/calls p.p. _____ × _____ costs per SMS/call amount of credit to respondents as incentive to report	=
Call centre	_____ × _____ costs for providing office space staff time to respond to calls	=
Training	_____ + _____ × _____ training charges number of staff to be trained cost per staff member	=
Staff for processing and follow-up	_____ + _____ × _____ time to analyse results time to share information staff costs + _____ costs and capacity associated with follow-up to messages and feedback	=
TOTAL (add all sums from right columns)		=

COUNTRY INFORMATION

Before considering phone-based mechanisms, a review of network coverage and phone ownership is imperative. While the usage of mobile phones worldwide has been increasing, many people, particularly those in rural areas, remain cut off from telecommunications infrastructure.

The table below provides information on the four focus countries of the SAVE research project, summarising the state of mobile phone subscriptions in 2014.[8] When considering the number of cell phone subscriptions per 100 inhabitants, discrepancies between groups who own multiple SIM cards or phones and those who do not have access to any must be kept in mind. It is also useful to consider the high percentage of prepaid contracts, as they indicate that people typically pay per minute, which can affect their willingness to make calls they have to pay for.

Country	Afghanistan	Somalia	South Sudan	Syria	worldwide
Mobile cellular telephone subscriptions per 100 inhabitants	**75** per 100 inhabitants Subscriptions: 23.423.741 Prepaid: 93%	**51** per 100 inhabitants Subscriptions: 5.500.00 Prepaid: 98%	**25** per 100 inhabitants Subscriptions: 2.876.097 Prepaid: 100%	**71** per 100 inhabitants Subscriptions: 15.598.936 Prepaid: 90%	Developed: **120** Developing: **91** Worldwide: **96**
Mobile phone network operators as listed by the GSMA	1. Afghan Wireless (TSI) 2. Etisalat 3. MTN 4. Roshan (TDCA) 5. Salaam (Afghan Telecom) 6. Wasel Telecom	1. Golis Telecom 2. Hormuud Telecom 3. NationLink Telecom 4. Somafone 5. Somtel, Somaliland 6. Telcom 7. Telesom, Somaliland	1. Gemtel Green Network 2. MTN 3. VivaCell (Network of the World) 4. Zain	1. MTN 2. Syriatel	Worldwide, there are nearly 800 operators.

Sources: ITU, GSMA (2015, 2014), Status: January 2016

[8] See updated data at ITU's http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx and GSMA's https://gsmaintelligence.com/.

1.4 Solution stories

ONE HOTLINE TO COVER ALL INFORMATION NEEDS: A PILOT PROJECT IN IRAQ

Country: Iraq
Technology: Call centre, online data platform
Task: Bridge the communication gaps between IDPs and aid agencies

Problem

IDPs in Iraq had limited access to reliable news from local media and information about available aid services. As one man in Dahuk noted: 'We don't know the organisations or their names; we have never spoken with them. We don't know anything about their work'. Individual aid agencies sometimes provided numbers to people, but this created confusion as the affected populations often did not know the agency responsible for each type of aid.

Solution

In July 2015, after a year of negotiations and logistical preparations, an inter-agency group of UN agencies and NGOs launched a nationwide toll-free hotline. The Erbil-based call centre is run by two coordinators and four Iraqi operators, three of whom are female. The operators collect information from cluster leads and agency heads every week in order to answer straightforward questions from callers. With more complex queries, the call centre's coordinators contact the relevant agency or cluster for an answer and get back to the caller within three days. When agencies themselves have a well-functioning hotline in place, the operators refer the caller directly to this number.

Adjustments

Unsurprisingly, the project faced some growing pains. For example, the online data platform for logging calls was not finished when the call centre opened, and operators initially made use of an Excel spreadsheet instead.

Especially in the beginning, raising awareness about the hotline proved difficult. In the first four months, the centre received an average of 16 calls per working day. Volume increased enormously after the major mobile phone operators in Iraq sent a message to every cell phone to explain how the call centre functions. In January 2016, the operators received about 150 calls a day, and this number is expected to rise further.[9]

Another issue was how to handle calls about sensitive matters, such as those related to gender-based violence. The team acknowledged that such calls might come in despite the fact that the call centre is advertised as an information (as opposed to a complaints) hotline. A neutral Complaints Review Committee was established to investigate sensitive communication and respond to the caller.

Lessons

1. **Avoid friction between participating agencies.** It is important to include all actors in decisions affecting the set-up of and communication about the call centre. Similarly, the collaborative aspect should be emphasised in public communication about the project.

2. **Guarantee long-term funding.** While three agencies committed to funding the project for 2015, the question of how to fund running costs remained unanswered for a long time. Donors were interested in covering the costs, but wanted to see results from the pilot first.[10]

[9] Reliefweb (January 2016) 'UNHCR Iraq Country Representative Visits the Iraq IDP Information Centre.'
[10] CDAC Learn (March 2015) 'The Art of Listening: Setting up a Two Way Communication Centre in Iraq.'

‘PRESS 1 IF YOU HAVE NOT EATEN TODAY’: FOOD SECURITY MONITORING WITH CALLS AND SMS

Country: Somalia
Technology: Mobile phones, SMS, call centre, interactive voice recording
Task: Collect household food security data in inaccessible areas

Problem

The World Food Programme (WFP) was seeking to improve its data on the impact of food deliveries in South Central Somalia. Insecurity severely limited staff access and significant capacity was required for outreach, interviews and processing the responses from thousands of individuals.

Solution

The new idea was born out of a coincidence. An M&E officer on vacation noticed interactive voice recording (IVR) in the US electoral campaign, which was user-friendly and effective.
The agency hesitated to invest in a potentially costly programme, but an external grant from the Humanitarian Innovation Fund filled the gap. The money was used to work with the technology company InSTEDD to customise existing software, strike a deal with the local mobile network operator and hire staff, who would reach out to beneficiaries via SMS or phone calls and later IVR. It was decided to implement automated calls only once in-person phone surveys were proven to work. The agency worked with the network operator to choose a random sample of registered phone numbers.
In short interviews, staff (later on via IVR) would ask about food consumption, stock prices and other details that were easy to provide but hard to access from afar. Responses were collected automatically in a central database. The information gathered in this way by far surpassed the level of data collection possible before.

Adjustments

Over time, the project team was able to refine and adjust technical details, though the basic set-up stayed the same. They started to develop forms and guidelines to help staff administer phone interviews, honing in on the exact information that the programme needed.
The system was also rolled out in Iraq, where the team found it to be effective to work with text messages. The NGO would send a first question via SMS which recipients would respond to and then receive additional questions. Due to high illiteracy rates and cultural factors in Somalia, such a system did not make sense: people would not always respond, while a brief conversation with a real person on the line offered better results.

Lessons

1. **Make the first contact a one-on-one conversation**. People in affected communities are much more likely to respond to automated phone surveys or via SMS when they expect and understand them. Replace in-person communication with automated processes only later on.

2. **Call or message the same respondents repeatedly.** It can take time for people to get used to the new tool. Once they learned how it works, however, they respond quickly, and it becomes easier to incorporate automated processes.

COLLECT, MAP, RESPOND: COMBINING SMS AND ONLINE TOOLS TO MANAGE FEEDBACK

Country: Somalia
Technology: SMS, call centre
Task: Aid recipient feedback mechanisms

Problem

In the wake of corruption and diversion scandals after the 2011 famine in Somalia, an international NGO was seeking out more effective channels for capturing feedback and satisfaction levels of the affected communities they tried to reach. The team was aware of the high usage of mobile phones in South Central Somalia and started exploring phone-based mechanisms as an option.

Solution

In 2011, the INGO started working with a local contractor and the four main telecom service providers in Somalia. They created a system for affected populations to provide feedback by sending SMS messages or voice calls to the NGO. All incoming messages receive a response to confirm that their feedback was received and responses are logged on a publicly accessible online platform.

Responses and follow-up to all complaints and inquiries are also logged on the public platform and communicated to those submitting them. Often, responses involve information for beneficiaries about processes or entitlements. They also include reactions to suggestions for activities and investigations of reported abuse and corruption by the organisation's M&E officer.

The development and piloting of the system received dedicated, external support and generated direct project costs of approximately GBP 140.000.

Adjustments

The system was piloted in relatively stable areas of Somaliland and subsequently expanded to Puntland and South Central Somalia. A number of changes were made:

- Following agreements with Somalia's main mobile telecom service providers, the hotline became free for beneficiaries, with costs charged to the NGO.
- The original phone number was replaced by a short code, which was easier to remember.
- Voice calling was added to the SMS option to encourage feedback from illiterate individuals.
- Initially, all feedback received was logged verbatim on a publicly accessible platform in both Somali and English. Today, the wording of sensitive messages that involve power or sexual abuse is restricted to an internal platform.
- Methods for raising awareness about the mechanism have grown to include sending SMS prompts to affected populations and distributing small business cards with instructions to the initial awareness campaigns and posters.

Lessons

1. **Uptake takes time.** The team experimented with different approaches to raise awareness for the hotline. Overall, a mix of activities was successful, but the process required many months.

2. **Feedback mostly concerns operative issues.** Contrary to initial expectations, people rarely report information on sensitive issues such as corruption or diversion. They prefer other channels such as one-on-one conversations to discuss sensitive issues.

3. **The shift to a toll-free number has increased feedback volume.** This was only possible due to agreements with Somalia's main mobile telecom service provider.

CAPTURING SCHOOL ATTENDANCE WITH PHONES: A PAPER- AND SMS-BASED REPORTING SYSTEM

Country: South Sudan
Technology: SMS, digital database
Task: School attendance tracking

Problem

An international organisation overseeing an educational project needed to know if and how often the targeted group of students attended or missed classes offered to them. No straightforward reporting and data management was in place and the team was in search of a flexible and intuitive mechanism that teachers could use without lengthy training.

Solution

The organisation designed a system based on multiple tools, including paper-based, digital data management and SMS reporting. At the beginning of the year each school gets a registration book and a unique ID code. Every student and teacher is registered with a unique code as well. Additionally, the organisation records basic information about network and radio coverage nearby.

On a daily basis, teachers take record of their pupils' attendance and report absences via text message. To do so, the teachers send both their own unique code to register with the system and then can send messages with the students' codes for free. Teachers also record attendance on paper as a back-up log. In areas where there is no network connectivity, data can be recorded manually and teachers can regularly move to an area with network or internet access to submit it.

To motivate schools to partake, they receive grants if they regularly submit attendance data using the phone system or paper alternatives.

Adjustments

Even after trainings, teachers would often forget how to use the SMS system. The organisation thus ensured a help desk that participating schools could call in case of challenges. In addition, a staff member monitored all the incoming messages for quality control and to spot any patterns that might suggest someone having problems.

One remaining concern evolved around data quality. Technically, it would be possible for teachers to submit false numbers, e.g., higher attendance rates than they should be reporting. Because these teachers could then also report false numbers in the written reports on paper, there is no easy way to verify the data. The organisation did consider implementing surprise visits to crosscheck attendance rates, but random checks could only be implemented in some of the locations.

Lessons

1. **Phone-based systems rely heavily on network coverage.** Requiring users to walk a long distance where their phone can connect and send messages can take a high toll on uptake and even endanger them.

2. **Language-barriers can be an issue.** If users only speak and write Arabic, text message systems must not use the Latin alphabet.

3. **Make the reporting as easy as possible for the transmitter to increase usage.** Asking for only simple codes, for example, is better than expecting lengthy messages.

1.5 Links and resources

Reid, K., Korenblum, J., & Meier, P. (2013). ***Towards a Code of Conduct: Guidelines for the use of SMS in Natural Disasters*** **(p. 11). Retrieved from: http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2013/02/Towards-a-Code-of-Conduct-SMS-Guidelines.pdf**

This document is a collaborative effort to codify a series of best practices for the use of SMS in disaster response. It draws on past experiences with SMS feedback and outreach mechanisms across numerous organisations and previous research and urges for establishing a formal public SMS code. The text focuses on natural disasters only and recognises that complex and conflict environments need further scrutiny.

Van der Windt, P. et al (2014). ***Crowdseeding Conflict Data.*** **Retrieved from: http://www.columbia.edu/~mh2245/papers1/20140213_VDK.pdf**

This paper summarises the main findings and lessons learned from a phone-based data-gathering system in Eastern Congo. The researchers worked with focal points in local communities, who submitted codified text messages to report conflict data. Though the paper recognises many remaining challenges with regards to security especially in conflict settings, it highlights the overwhelming advantages with real-time data collection through mobile phones.

Hussain, H. (2013). ***Dialing Down Risks: Mobile Privacy and Information Security in Global Development Projects*** **(pp. 1–22). Retrieved from: http://newamerica.net/publications/policy/dialing_down_risks_mobile_privacy_and_information_security_in_global_development**

Referencing the huge opportunities but also inherent risks with using mobile phones for development projects, this paper proposes guiding privacy and security principles and a framework for project planning and evaluation.

HIF. (2011). ***SMS Feedback and Accountability in Somalia: HIF Case Study.*** **Retrieved from http://www.alnap.org/resource/10559**

This case describes the Humanitarian Innovation Fund-sponsored pilot project using mobile phones and internet-based technologies to strengthen communication and feedback between beneficiaries, aid agencies, Somali communities, and the diaspora.

Beardon, H. (2009). ***Mobiles for Development: How mobile technologies can enhance Plan and partners work in Africa*** **(pp. 1–48). Retrieved from: http://resourcecentre.savethechildren.se/sites/default/files/documents/mobiles_for_development_.pdf**

Beyond discussing some relevant applications for mobile phones in development projects, this Plan International guide contributes a process with three stages to help development practitioners identify the key social, economic and technical factors and issues they need to consider when planning to use mobile technologies.

2.Digital data entry with tablets or smartphones

‘Handhelds’ such as smartphones, tablets or more basic digital devices are becoming cheaper and easier to use. Many aid organisations have found it convenient and cost-effective to use digital devices for data collection instead of traditional paper-based surveys. Aid actors can now tap into a substantial market for digital form-creation and data collection applications. Digital data entry linked to electronic databases also facilitates automatic data analysis and visualisation.

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In this chapter:

2. Digital data entry with tablets or smartphones

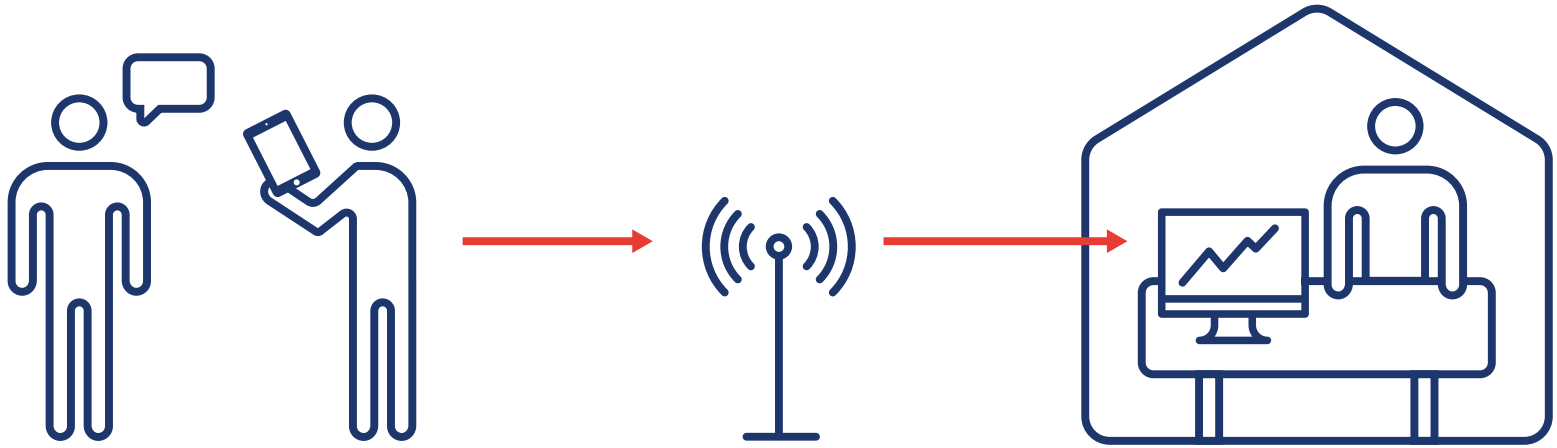
2.1 Overview

Smartphones and tablets, or 'handhelds,' can replace paper-based questionnaires to speed up field data collection and reduce data entry errors. Some organisations also digitise refugee and aid recipient registration, or track aid deliveries. As it is easy to download or custom-build software for many purposes, handhelds are used for various humanitarian programming tasks, such as needs assessments, coordination, mapping and reporting.

The devices are becoming cheaper and widespread in more countries, including volatile settings, so their use will likely expand further.

Aid organisations report positive experiences with digital data entry, but see risks that can make the tool unsuitable for some insecure settings. The greatest benefits include the versatility, ease of use, and efficiency of handheld computers. Electronic data transmission from device to database is automatic, which saves time and money. Additional control over the way information is captured improves the quality of data, which is especially valuable where aid actors face access constraints and there's a dependence on third parties to collect data. On the downside, the devices can put staff and local communities at risk in certain places as armed groups may be suspicious about digital devices and particularly their capacity to record geo-location data sensitive data.

Overall, it would be a missed opportunity not to consider digital data entry. Implementation should be incremental, though, and should happen only in carefully chosen locations.



Use a pre-programmed interactive form for surveys and enter data along with multi-media & time- and GPS-stamps. Receive real-time analysis.

Once in reach of an internet connection, upload data to server and receive updates.

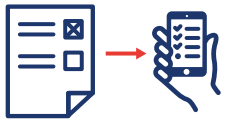
Aggregate and analyse information. Build and update forms.

Benefits	Problems	Recommendations
Can save money and time as it eliminates manual data entry	Security risks linked to the use of smartphones or other GPS-enabled tools	Build acceptance and plan and budget for incremental rollout
Enables additional control over local staff and partners	Proliferation of too many separate systems and data formats can create inefficiencies	Select software that offers digital privacy features
Can increase the quality of collected data as fewer data entry errors occur		Coordinate with other aid organisations in your region to work with similar systems or standardise practices
Offers discreet survey tool		

MONITORING USE CASES

For monitoring, two use cases have become particularly common in insecure environments. In both cases, data can normally either be uploaded to a server in real time or, where no connectivity exists, stored on the device and uploaded later.

Surveys and questionnaires

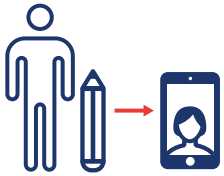


Handhelds are used instead of paper-based questionnaires and survey forms to collect and transmit field data.

Specialised software allows for efficient data entry and transfer to a computer's central database.

The devices can be used for multiple surveys and projects.

Registration and distribution reporting



Handhelds can simplify registration processes by creating digital entries for individuals, and synchronising these with other devices and a central system.

Individuals receive ID cards or, with the help of scanners or smartphone software, can be identified through biometric information. Similarly, aid deliveries can be tracked digitally through unique identifiers.

WHEN NOT TO USE THE TOOL

In some insecure settings, digital devices can either create risks or introduce new problems that make data collection unsafe or impossible. Agencies working in Afghanistan and parts of Syria, for example, have reported the risk to aid staff, who are either banned or targeted and killed when seen with smartphones or tablets. Thus, while the influx of cheap smart phones in recent years has enabled data collectors to utilise digital data collection more safely than before, serious risks can remain. Importantly, in many of these contexts, paper-based data collection can also be difficult, especially when large amounts or multiple pages are required.

Before implementing digital data entry in a complex environment, consider these questions:

- **Do not work with digital data entry where the necessary devices, Internet or phone networks are banned, compromised or culturally inappropriate in the targeted area.**
- **The tools themselves can create mistrust or suspicion.** This can create security risks for staff and aid recipients. Stigma can also hamper data collection. Make sure to understand the risks fully and compare with the risk for paper-based data collection.

2.2 Benefits, challenges and mitigation measures

BENEFITS

The benefits of digital data entry outweigh the downsides or at least make it suitable for most areas.

Time and costs saving

The most frequently cited advantage is the considerable time saved by doing away with manual data entry from questionnaires into central database. Instead, data is transferred electronically and automatically. Responsive design elements and skip logic, where questions are displayed based on previous answers, further reduce redundancies and make surveying faster and easier.

Quality control and supervision

Forms can be designed to only accept certain entries, such as multiple choice answers or numbers, and even numbers within set ranges (e.g., certain years, quantities or dates). This significantly limits the number of mistakes and errors in the data. Because entries are submitted from unique devices and, if desired, together with time- and GPS-stamps, managers can also ensure that enumerators are indeed collecting questionnaire answers at the reported time and place.

Data protection and discretion

As devices are small and light to carry, they can decrease the visibility of enumerators, thus increasing the security of staff and local communities. Compared to bulky paper questionnaires, handhelds can be discreetly stored and pulled out for the interview once in a secure, private space. Additional software features include automatically locking data on the devices to prevent unauthorised views.

CHALLENGES AND MITIGATION MEASURES

A number of conditions must be met to make best use of digital data collection. The following measures can help reduce risks:

Rating	Challenges or limitations	Mitigation options
severe ○○○○○	**Access restrictions** They do not offer a solution for remote or insecure areas where no access for field monitors is possible. Devices themselves may hamper humanitarian access in places where they are viewed with suspicion by local authorities or armed groups.	**Adjust to context** • Choose software that simultaneously allows for digital and paper-based data collection, switching between the two when necessary. • Invest significant time and effort in acceptance-building with local communities. Explain and demonstrate how devices work and what they are used for. Meet with local authorities and be sure to clarify any doubts or suspicions that they might have.

Rating	Challenges or limitations	Mitigation options
severe 	**Privacy and digital security risks** Digital data entry often entails collecting data points like GPS- and time-stamps that make it easy to identify respondents. Such detailed data sets needs to be carefully protected. Digital data transmission increases the risk of interception by third parties, including foreign and national intelligence, non-state actors, private companies and others. Agencies might not always know if they were 'hacked'.	**Restrict collection and ensure consent** • Define and implement ethics and privacy principles for data collection. 'Responsible data policies' can limit the type of data that is collected, set security and encryption levels and indicate where and how long information is stored. • Be cautious when recording sensitive data, such as the location of communities hiding from warrying parties or information on sexual and gender-based violence. In some instances, it may be safer not to record certain data-points, such as GPS coordinates, especially if encryption cannot be ensured. • Aggregate information where feasible to prevent retracing records to individuals. • Assess carefully when to send information via online channels. Unless adequately secured and encrypted, email messages and cloud storage can be at a higher risk for digital interception that goes unnoticed.
severe 	**Security risks to staff and locals** In some areas, local authorities are sceptical of devices that they know can record GPS and location information. This can present a security threat to enumerators.	**Use simple devices and be transparent** • Explain tools to conflict parties and only use GPS data when they do not object. • Use only standard smartphones with GPS and a camera that does not stand out.
high 	**Format restrictions** Digital surveys favour highly structured questions as they work better with pre-defined answer choices than entering text on small smartphone displays. Small screens only lend themselves to a limited number of answer options.	**Diversify and plan with backups** • Complement digital surveys with more qualitative and open-ended formats (e.g. oral debriefings with enumerators; focus groups; phone calls with beneficiaries). • Test digital questionnaires before roll-out.
medium 	**Capacity and skill** Staff or enumerators have limited experience with digital devices. Limited capacity to supervise enumerators actively and provide technical support.	**Train and engage local and national staff** • Interview key staff face-to-face when hiring and plan for adequate training time (between a few hours and 2-3 days). • Ensure capacity to supervise collection and also include automatic error detection in software.

Rating	Challenges or limitations	Mitigation options
medium 	**Staff disempowerment** Digital data entry tends to disempower field and operational staff, as the database is typically located centrally at country office, secretariat or donor level. Problems arise when access to the database for other staff members is formally restricted or technically difficult due to large data volumes and weak Internet connections.	**Assure adequate access to data and analysis** • Ensure appropriate data access rights for partners, operational and field staff. • Share data and analyses quickly and proactively (e.g., email) ensuring appropriate security processes (e.g., encryption). • Ensure that data can be easily exported to spread sheets or other easy-to-read formats. Include simple visualisation, analysis functions with the devices themselves.
medium 	**Data errors** Difficulties in translating key concepts for surveys and risk of clicking the wrong buttons on small smartphone displays can reduce data validity.	**Translate or train survey logics** • Design surveys in the local language, feeding into an international-language database. Check that the software can handle all necessary alphabets. • Discuss key concepts and their translation during trainings.
medium 	**Proliferation of multiple systems** Different tools for digital data entry and analysis have started to proliferate and are not always compatible, creating significant inefficiencies.	**Coordinate and collaborate** • Focus not only on adjusting software to meet your needs and also the needs of others. • Consider working with software or tools that others in your area are using.
low 	**Connectivity and infrastructure** Lack of connectivity or electricity in field locations can limit the usability and advantage of digital data entry tools.	**Alternate and back up** • Use software that is adapted to breaks, backs up data and has offline capacity so that data can be uploaded later. • Choose devices with long battery life and supplement with solar chargers. • Provide paper-based or other alternatives.
low 	**Digital divide and mistrust** Sometimes local communities feel envious or suspicious when staff visits with expensive tools. Elsewhere, local communities were said to be curious. Staff themselves might lack experience using touchscreen tools.	**Explain and introduce the tool carefully** • Plan with sufficient time to explain and demonstrate the tools to staff as well as local communities (not only authorities). • Invite local communities to enter survey responses themselves. This can increase familiarity and dispel suspicion. • When necessary, expect to teach staff the very basics of typing and 'swiping' on smartphones and touchpads.

2.3 Implementation

The following sections summarise some of the most important lessons and best practices that have emerged; the observations are particularly applicable to working with handheld devices in insecure settings.

SET-UP

Setting up digital data entry systems requires a number of typical steps, even if the exact set-up and design of each system depends on context, purpose and organisation.

1. Identify data collection needs and gaps

- Which type of monitoring data is needed?
- How sensitive is the data that will be collected?
- How many surveys are planned?
- How frequently are surveys taken?
- What is the weakness of current surveys (e.g., errors, reliability, number, delays)?

2. Assess unique digital data collection ecosystem

- Are other (aid) organisations using similar systems?
- What are the connectivity and infrastructure conditions?
- Are staff and local communities used to the type of device?
- Are there any hostile actors?

3. Purchase software and devices

- Has someone already built a software that can meet your needs and specifications?
- Does it make sense to invest in building your own unique tool?
- Will you use and adapt the software yourself or do you require service and support?

4. Design surveys on computer and synchronise devices

- Do you want to design the survey yourself or commission it?
- Should the survey be interactive where skip logic picks new questions based on answers?
- Is it helpful to restrict field (e.g., to numbers only)?

5. Train staff in use of the tool and survey logic

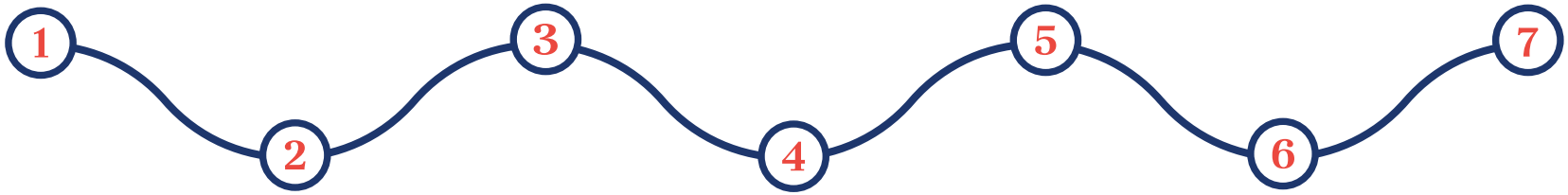
- Can you add an extra 2 days, or at least 2 to 3 hours to survey training to explain use of the tool?
- Are some staff in the area already trained in and used to the device?
- At what point can/should staff design surveys themselves?

6. Collect survey responses and transmit data

- Will staff share devices?
- Where do they collect and when do they return them?
- How are the devices charged?
- Who has access to the database?
- When and where can staff transmit data to the database?
- How will the data be protected?

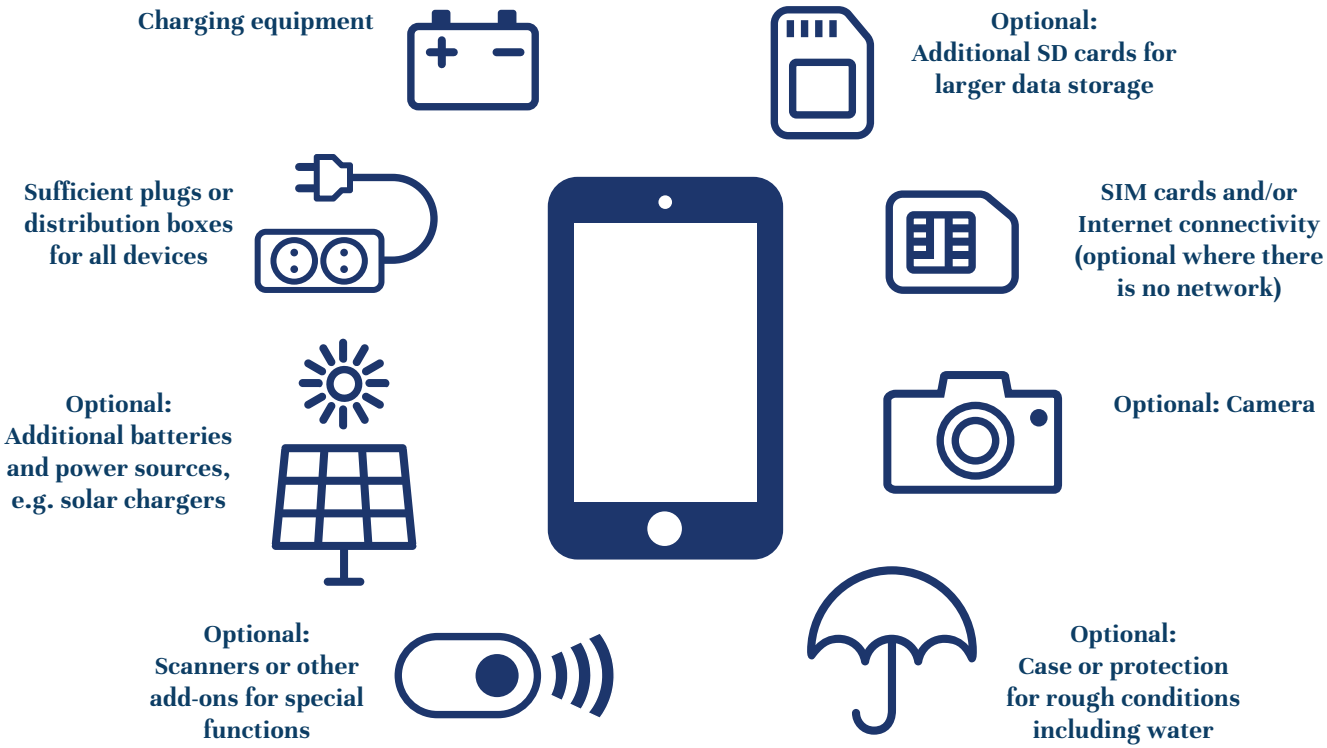
7. Review responses, use results and assess survey

- Was the survey design appropriate?
- Can the responses be verified?
- Can the survey be reused for slightly different contexts or times?
- Are any updates or adjustments necessary (if so, return to the design phase)?
- What type of analysis will be needed?
- Can the analysis be pre-programmed?
- Who needs to receive the analysis?
- How will they receive it?



HARDWARE

In most insecure settings, smartphones are a better option than tablet computers, as they are smaller, cheaper and more common, meaning they draw less unwanted attention.



SOFTWARE

A number of software features are important to bear in mind as they help mitigate security risks and address infrastructure issues that often occur in conflict settings.

- **Security and privacy:** Create passwords both for devices and data sets. Limit access rights to full primary datasets (while disseminating aggregate analysis widely). Include basic and end-to-end encryption by default.
- **Opt-out for GPS and time-stamps:** Ensure that GPS and timestamps can be turned off in cases where armed groups object and/or the GPS signal is poor, delaying survey completion.
- **Automatic data saving:** Ensure that no survey response is lost when the device is turned off or power runs out.
- **On- and off-line mode:** Ensure that the software can save without connectivity and transmit data later once the device is connected.
- **Interoperability:** Use software/programmes that require the least number of steps for processing and sharing information across devices and projects.
- **Languages:** Use software that can process surveys in different languages/alphabets.
- **Real-time visualisation of entered data:** Automatically displaying relevant information and trends in the survey on the device can help staff and local communities.

The **Humanitarian Operations Mobile Acquisition of Data (NOMAD)** project provides more detailed assessments of different data collection tools, their uses and respective benefits. In an online selection assistant, it provides customised recommendations from more than 40 tools. It also sends regular updates on recent changes and new tools: http://humanitarian-nomad.org/

OVERVIEW OF FREELY AVAILABLE OPEN-SOURCE SOFTWARE

The table below summarises open-source software that is freely available and that several aid organisations have already used or taken as a base to build their own custom tools. 'Open-source' means that the source code with which programmers built the tool is publically available and can be downloaded, used and adjusted.

Software	URL	About
ODK	**https://opendatakit.org/**	This set of tools is the basis for many digital data collection applications used by humanitarian organisations. It provides out-of-the-box solutions for building data collection forms, collecting data with mobile devices, and aggregating and extracting it. Adjusting the openly available code requires some level of technical knowledge, but several initiatives offer ready-to-use tools based on ODK.
KoBoToolbox	**http://www.kobotoolbox.org/**	An ODK-based suite of tools for field data collection, KoBo is designed to be conveniently used even in challenging environments. Humanitarian organisations receive not only unlimited use of the tools but also professional user support provided by OCHA.
Martus	**https://www.martus.org/**	This information collection and management tool places special emphasis on data and operational security. It was designed by Benetech for human rights advocates operating within volatile contexts and can be adjusted for humanitarian applications. The tool works on desktops and Android phones.
Last Mile Mobile Solutions (LMMS)	**http://www.wvi.org/disaster-management/last-mile-mobile-solution-lmms**	Originally developed by World Vision to meet the need for more efficient data processing, LMMS is now being used by several aid organisations, including in conflict settings. The smartphone tool replaces paper-based aid recipient registrations, which saves significant time during recurrent aid deliveries.

OTHER SERVICE PROVIDERS

There are several companies and foundations that provide software and support on a subscription basis. In return, customers don't have to maintain their own servers and can access support. Many of these providers offer their services to humanitarian organisations at reduced costs (the below list is not comprehensive):

Software	URL	About
Captricity	**http://captricity.com/**	The online platform allows combining digital and paper-based information. The tool captures and extracts data from various sources and formats and translates it into a central database for analysis. Pricing is high, but the company provides a scheme for non-profit organisations to gain fast and easy access to data.
Enketo Smart Paper	**https://enketo.org/**	Enketo offers web form creation online and offline, which can be used to build surveys for any data collection device. The tool is open source, but a hosting and service solution is priced at around 50 USD per month.
Fulcrum	**http://www.fulcrumapp.com/industries/humanitarian/**	This digital data collection platform for deploying custom forms and mobile apps for surveys, inventories and inspections works online and as an app on smartphones. The company caters to various industries and offers custom features for humanitarian response efforts, including damage assessment, aid supply chain management and household surveys. The advertised price is at around 20 USD per person using it per month.
ONA	**http://company.ona.io/**	The online platform provides and supports several applications, and claims to aim for more efficient and cost-effective M&E. The data collection suite is built on ODK and available as an easy-to-use free version or with a subscription, for which the company provides hosting and services.

Software	URL	About
Magpi	**http://www.magpi.com**	Although Magpi's roots lie in the health sector, the software is also fairly widespread within the development sector and offers both free and paid premium versions. Forms can be built online and deployed on both smartphones and basic phones. Magpi can also double as a basic SMS platform.
mFieldwork	**http://mfieldwork.com/**	Created by a humanitarian practitioner in Somalia who was in search of an efficient M&E solution, mFieldWork is well-suited for monitoring in conflict settings. The tool supports form design, real-time observation of incoming data, aggregation and analysis. The company charges 30 US cents per upload.
Mobenzi	**https://www.mobenzi.com/**	Mobenzi is a data collection suite for fieldworkers. Forms can be created online and data can be collected with both smartphones as well as simple feature phones. On its website, several case studies explain development and humanitarian uses. Pay-as-you-go and subscription options are available.
PoiMapper	**http://www.poimapper.com/**	This mobile data collection tool is provided by Pajat Solutions Ltd., which is based in Finland, Kenya and India. It allows users to build forms, collect, share and visualize geo-tagged data, monitor and assess trends and create custom reports. The company provides the tool, data hosting and services though subscription plans costing about US $ 30 per month, per user, or the option to pay per upload.
SurveyCTO	**http://www.surveycto.com/**	The app is built for survey teams in remote locations to assure accurate and detailed data collection. The team places high priority on guaranteeing data security and privacy and offers encryption for all its services, which include collecting, transporting and processing data.
ViewWorld	**http://www.viewworld.net/**	The data collection platform is used and supported by several aid agencies. It was specifically designed for project monitoring, with functions to design surveys, deploy them to phones and manage data online with a web console. The company offers a limited *freemium* option for one user, as well as monthly or yearly subscriptions for which rates are agreed with the client.

COSTS

Introducing digital data collection tools requires significant up-front investment for smartphones, tablets, software purchases and adjustments, questionnaires development, training and testing. Over time, however, digital data entry often saves costs when compared to traditional, paper-based methods.

The table below helps to estimate the costs for the context and scale of a project.

Item	Details or staff time to be paid (insert costs depending on your context)	Total
Hardware	_____ × _____ cost of device, $40 number of devices needed for enumerators	=
Software	_____ + _____ cost of software, often $0 service fee charges, eg., support	=
Training	_____ × _____ training costs per person number of staff trained	=
Internet access	_____ × _____ cost for data subscription number of devices to connect	=
Planning, Analysis & Processing	_____ × _____ staff-time for planning, analysis, processing staff costs	=
Survey implementation	_____ × _____ cost of enumerator number of enumerators required	=
TOTAL (add all sums from right columns)		=

2.4 Solution stories

SAVING TIME AND MONEY WITH DIGITAL DATA COLLECTION

Country: Afghanistan
Task: Surveys with aid recipients
Technology: Tablets with specialised software for digital data entry

Problem

An international NGO runs a large, long-standing operation throughout Afghanistan, which involves multiple and time-intensive surveys every month. Transporting paper questionnaires from remote areas to local hubs often took days as they could be delayed at airports and different points. Moreover, entering the responses from the paper questionnaire into the database, aggregation and analysis would take hours.

Solution

In 2013, the NGO bought 20 Samsung tablets for about 300 USD a piece. It set up these tablets with open source software that was initially offered free of charge by a small technology company based in Kenya. In its Kabul offices, the INGO head of programming worked with the software to build the surveys she would normally print out on paper and installed them on the tablets.

The NGO sent these tablets, along with chargers and distribution boxes to field offices. Explaining to staff how to use and work with the tablet and digital questionnaires took an extra two or three hours.

Adjustments

With experience, the organisation adjusted the phrasing of certain questions, the order of questions etc. They also activated the tablets' 'child lock' option , restricting use to only the app needed for data collection.

Once the pilot project proved successful in saving time and money, the approach was expanded to almost all of the organisation's surveys. It now has around 15 tablets in each field office, which are used throughout the month to implement surveys for different programmes. As an early adopter, the NGO started helping other organisations adopt the tool.

Lessons

1. **Cost savings.** According to this NGO's experience, the investment necessary to roll-out digital data collection paid for itself after just one survey. 'It used to cost me $15.000 to print 11,000 surveys. In addition, the most efficient staff can transfer 100 paper surveys to a database in one day for $20. That still cost $2,200. These costs are gone now', as the head of the NGO explains.

2. **Don't doubt that staff can work with tablets.** Despite concerns that tablets would be too complicated to work with, the INGO staff quickly picked up their use.

FROM A REPORTING HEADACHE TO AUTOMATIC ANALYSIS: DIGITISED RECIPIENT REGISTRATION

Country: South Sudan
Technologies: Tablets, Last Mile Mobile Solutions (LMMS)
Task: Digitise aid recipient registration processes

Problem

'Reporting used to be big headache for us', says the programme quality manager of the INGO which has been working in South Sudan for over two decades. At each distribution, the paper work to enter and check records of 4,000 people took a high time toll.

Solution

The organisation introduced 'Last Mile Mobile Solutions', a tool designed to register aid recipients and track aid deliveries. After a one month set-up period the tool became the main solution for cash- and in-kind distributions:

1. At the first distribution, beneficiaries are registered for the programme and issued an ID card with a bar code and picture. This takes roughly as long as a paper-based registration.

2. The next time, the ID card can be scanned to record the receipt of aid. This speeds up the process significantly. A task that previously kept six people busy all day can now be completed by one or two staff, serving a couple-thousand beneficiaries per day. Moreover, double-counting was no longer an issue as duplicates would show up in the software immediately.

3. Reports are then updated immediately and added to a database. To assure information security, no data is kept on the device itself but rather at a centralised database, where everything is encrypted and password-protected.

Adjustments

With experience and time, the team was able to make the system more user-friendly to meet specific needs and demands from staff. They also expanded the tool and started using it for all of their aid distribution as well as commodity tracking.

Taking images of people can help settle disputes or verify that the person receiving a service is the rightful recipient. In some cases, however, obtaining consent to take photographs was not possible, especially where husbands had a say in their wives' decisions. When using this software it is possible to run the registration process without taking photographs, only using the barcode.

Lessons

1. **Training needs to start from the very beginning.** Some local enumerators did not have exposure to handheld computers and thus needed to learn the basics, such as how to turn on and 'swipe', before conducting more-complicated tasks.

2. **Sensitisation is required** to assure the data collection process works well and to obtain consent. It helps to explain and demonstrate the tool on site.

3. **Staff safety was not a problem.** Despite initial concerns that visibility of hardware could result in thefts or robbery, no such incidents were reported.

2.5 Links and resources

Belden, C., et al (2013). ***ICT for data collection and monitoring and evaluation: opportunities and guidance on mobile applications for forest and agricultural sectors (pp. 1–62).*** **Retrieved from:** www.unapcict.org/ecohub/ict-for-data-collection-and-monitoring-and-evaluation/at_download/attachment1

This World Bank report reviews the state-of-the-art information communications technologies (ICTs) used in the agricultural forestry for development work. Designed as a deep-dive, operational piece, the text introduces mobile data collection models and key ICT choices. Even though it does not address data collection in insecure settings, the insights and examples are relevant for any aid organisations considering ICT for M&E.

Pact. (2014). ***Mobile Technology Handbook (pp. 1–51).*** **Retrieved from:** http://pactworld.org/sites/default/files/Mobile Technology Handbook 2014.pdf

The Pact handbook is intended to give people involved in international development a framework for getting started with mobile technology. It can be paired with other resources and literature, country-specific information or training slides for more examples and context. The handbook provides instructions on developing and implementing strategies for using mobile, introduces different platforms that can be used and provides an overview of Pact's own work with technologies.

IFRC (2013). ***World Disasters Report 2013.*** **Retrieved from:** http://worlddisastersreport.org/en/download/index.html

In this comprehensive guidebook, the IFRC collects diverse experiences and case studies from multiple humanitarian contexts, including insecure settings. The volume includes a wealth of detailed resources, in addition to a general analysis of information technology in humanitarian assistance.

Tech Change (2016). ***Online Course: Mobile Data Collection.*** https://www.techchange.org/online-courses/mobile-data-solutions/

For practically minded people with little time on their hands, this free two-hour online course covers the basics of starting a mobile data collection project. Many more advanced courses are available on the same platform.

3. Remote sensing and aerial imagery with satellites, radars or UAVs

There are a number of aerial technologies to gather information about objects or areas without having a physical presence. This is also referred to as ‘remote sensing’. This chapter focuses mostly on imagery taken with satellites, planes or unmanned vehicles. These methods, which are relatively new to humanitarian programming, can reveal context conditions and other observable changes such as construction, agricultural developments or population movement. Additional remote sensing tools, like radars and infrared, can further augment this.

In this chapter:

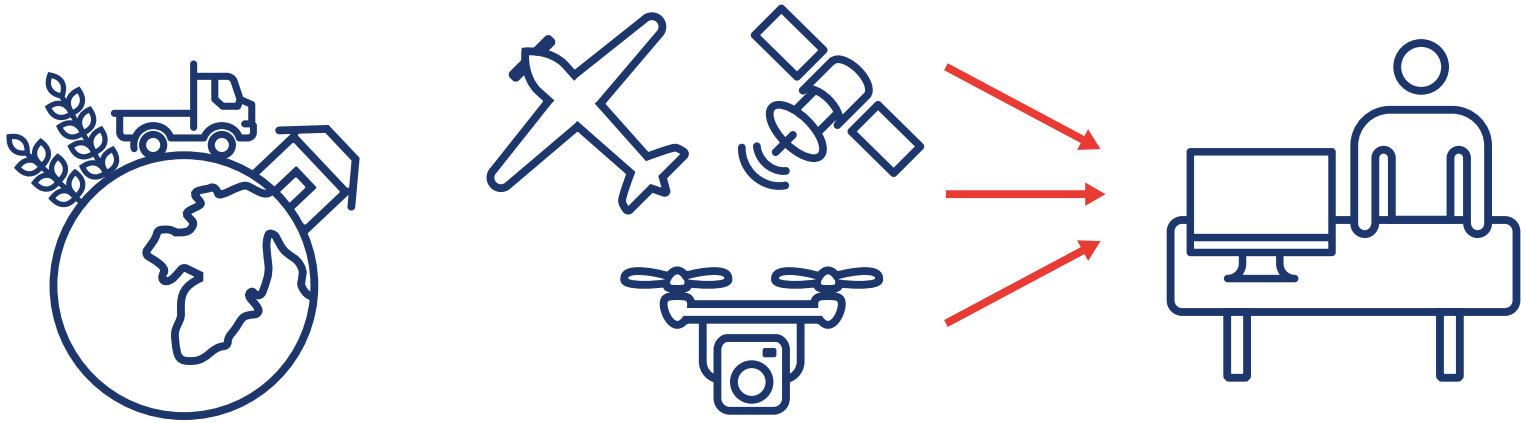
3. Remote sensing and aerial imagery with satellites, radars or UAVs

3.1 Overview

Aerial imagery and geospatial analysis can capture independent and objective information from areas that are too remote or insecure to reach. Where access is restricted, remote sensing data can provide insights on infrastructure and shelter, or the effects of disasters including flooding, drought or landslides. Taken repeatedly over time, imagery can help assess project outcomes and, in some contexts, impact. Remote sensing information is often visualised on maps or triangulated with other data sets.

Although these technologies are ready to use, they can be very costly and require specialised expertise. So far, most of the humanitarian applications have occurred within natural disaster contexts.

Their use in highly insecure environments, however, is less established. Geospatial data can reveal sensitive information and, in the wrong hands, it could bring harm to vulnerable populations.



Projects, their outputs or impact need to be visible from above.

Satellites, planes, radar or UAVs capture image, GPS signal or other data points from the sky.

Experts analyse data and imagery to assess results or make decisions.

Benefits	Problems	Recommendations
Independent data, including data from areas that are otherwise completely inaccessible	Ethical and security risks and lack of guidance on how to address these	Use only when risks are understood and addressed
Rapid technology developments are making implementation more affordable	High costs can be prohibitive for small and individual agencies	Engage industry and other humanitarians in developing funding and sharing models
	Reliance on technical communities or experts to interpret and use data	Use crowdsourcing or experts to assess data

TECHNOLOGY TYPES

Remote sensing can involve a number of different technologies. Each offers similar functions, even if the exact applications and ideal-use cases vary slightly.

Observation with satellites

Satellites in space take pictures from a distance, documenting a project location over time to observe the area or changes.

UAV imagery for close-up analysis

Photos, videos or radar assessments through drones can provide a cheap alternative for satellites and detailed follow-up.

Planes or helicopters for taking pictures or video

Images can also be taken manually from planes or helicopters, especially where vehicles are already roaming the area for logistics or transportation.

CROWDSOURCING

Crowdsourcing describes a process through which big tasks are broken into many smaller tasks, which are then shared with many contributors online. Frequently these contributors are volunteers. Common 'micro-tasks' include tagging images or identifying locations, such as:

- Converting aerial pictures into infrastructure maps by tracing outlines and shapes (e.g., roads and buildings);
- Rating damage levels on images from disaster and destruction areas;
- Mapping information shared on social media;
- Sorting and assessing images uploaded to social media.

MONITORING APPLICATIONS FOR REMOTE SENSING

In humanitarian action, remote sensing applications are typically used for logistics, natural disaster assessments, agriculture, infrastructure and, more recently, crisis mapping. Crisis mapping typically helps observe and understand evolving conflicts by combining and analysing remote data sets, including aerial imagery and geo-coded social media messages. The table below summarises the most relevant monitoring tasks remote sensing can help fulfil:

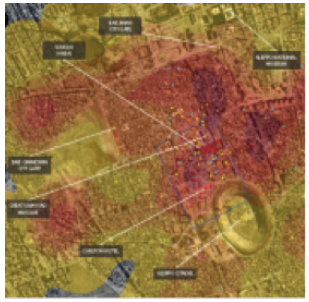
Mapping population movements and verifying deliveries	• Observe population movement based on settlements, agriculture, herds or lights • Document and monitor evacuation progress • Verify visually that large deliveries arrived (especially when they are not tracked)
Observing contextual conditions and changes over time	• Assess agricultural changes: e.g., how irrigation projects affect vegetation • Verify reported conditions: e.g., the extent of drought or flooding • Undertake environmental assessment of context to deduce population data such as movement and farming activities • Identify damage or destruction as result of attacks, war and conflict
Monitoring infrastructure, settlement growth or building projects	• See the dimensions and growth of refugee camps, burial sites and reconstruction efforts over time • Analyse the exact location of critical services, such as sanitation and health, in camp settings to assess their use and accessibility

EXAMPLES OF WORK WITH AND USES OF REMOTE SENSING DATA

Earth observation data can already be insightful in its pure form, but visualisation and processing can help highlight details or patterns. This requires some level of training with geospatial methods, though not always expert knowledge. The following uses are already well-tested by humanitarian actors:

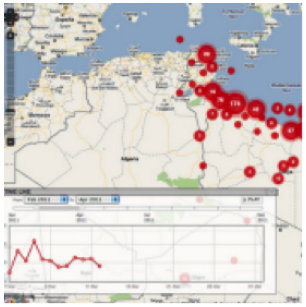
Visualise destruction levels

Source: UNITAR



Record incidents or messages

Source: Ushahidi

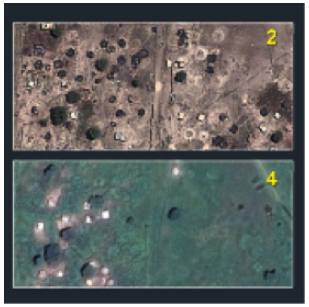


Detect and mark shelter

Source: UNOSAT

Compare changes over time

Source: UNITAR



Recognise or identify shapes

Source: Harvard Humanitarian Initiative

Observe and witness events

Source: Harvard Humanitarian Initiative

Create maps on top of images

Source: MapAction

Toggle image and map views

Source: UNITAR

WHAT RESOLUTION DO I NEED?

Currently, the highest commercially available resolution for satellite images covers 30cm per pixel. This allows identifying, for example, cattle. Humans would appear as one dark dot and would in most contexts be difficult to identify clearly. A medium resolution of 1m per pixel would still allow for clear recognition of vehicles, streets and buildings. A lower resolution of 40m per pixel is appropriate for identifying roads, city limits and agricultural usage patterns. Examples are available at http://beta.openaerialmap.org/.

WHEN NOT TO USE REMOTE SENSING

In some instances, geospatial information can cause greater harm than good. Sometimes remote sensing can seem promising at first, but the data it provides does not match aid actors' expectations or is not actionable for them. If the following conditions are in place, it might be better not to use remote sensing technologies:

- **Do not use satellite or aerial imagery if you cannot establish clear guidelines on use and access of the information and/or if the potential risk to local communities cannot be assessed and addressed.** Records of the location of highly vulnerable or persecuted populations, humanitarian goods and equipment, and critical infrastructure can endanger people and individuals if in the hands of their adversaries.
- **Do not work with UAVs or other remote sensing technologies if local stakeholders object to their use.** Remote sensing technologies can be associated with spying. Using them against the will of local authorities or communities can erode trust and put operations and staff at risk. Make sure to explain their use and be transparent about how you use gathered data.
- **Do not invest in technologies where weather or context conditions are prohibitive, and projects and their effects cannot be seen from the sky.** Satellites cannot see through clouds and in some instances regulation might inhibit use. Similarly, where projects can be seen, but there is no clear idea as to the kind of visually observable impact that could be expected, remote sensing may not be a worthwhile investment.

WHEN NOT TO PUBLISH COLLECTED DATA OR IMAGERY

When planning to acquire imagery or when deciding whether or not to publish or share the information, the following questions should be carefully considered.

- What information can be extrapolated from this imagery?
- Who else might be interested in this information and for what purposes? How can the material be accessed?
- What damage could occur when revealing sensitive data to adversaries?
- Would the use of imagery and sensitive information, the involvement of remote sensing companies or the challenges with ground verification in any way cause harm or compromise the perceived neutrality and independence of the operation?
- Whom should data be shared with and can this be done via secure and private channels?

3.2 Opportunities and risk with aerial imagery from satellites or UAVs

Remote sensing promises opportunities to enhance the detail and type of information for monitoring efforts. Because the tool is relatively new, the first steps must be taken very carefully to avoid and mitigate risks.

BENEFITS

As imagery and analysis are becoming cheaper, remote sensing will arguably become a more-relevant complement to monitoring activities in insecure environments. The benefits of this technology include:

Requires no access

Satellites, planes or UAVs hovering in the sky provide reliable data collection independent of access restrictions. Weather conditions permitting, photos or radar images can be taken repeatedly and at any time. Combined with local knowledge, this can create valuable datasets.

Visible impact can reliably be observed and compared over time and at scale

If taken repeatedly, aerial images can provide evidence on changes over time. When ground-level verification has already been done in at least one (accessible) area, visual keys can be applied to inaccessible areas and the analysis can be taken to scale. For example, once the appearance of certain object is confirmed by an image, large amounts of images can be scanned and mapped to look for the same objects.

Industry interest in collaboration

Several remote sensing and geospatial companies have signalled interest in working in or supporting disaster response efforts more actively. After some disasters, e.g., the Nepal earthquake in 2015, companies already provided data to respondents and local teams for free. There also is an expanding group of technical experts volunteering their time to geospatial analysis through crowdsourcing.

Decreasing costs

Overall, prices for aerial imagery keep decreasing. Developments and competition in UAV sales are lowering costs, making it fairly affordable to obtain aerial imagery.

CHALLENGES AND MITIGATION MEASURES

Some early experiences with remote sensing for humanitarian action in conflict settings have raised red flags about challenges and limitations regarding ethics, security and practical concerns. Today, awareness of challenges and knowledge gaps with satellite and UAV technologies in conflict settings is increasing. This opens an opportunity to help shape standards and norms in the emerging field.

The following challenges should be considered:

Rating	Challenges	Mitigation options
severe 	**Stigma (mostly for UAVs)** Affected populations and authorities are often very suspicious of drones, especially in areas where there are active military anti-terror operations.	**Engage commuities or refrain from using** • Engage with local communities in open dialogue when conducting drone operations to create community ownership and acceptance. • Reach out to the public with education campaigns through radio programmes or leaflets explaining why and when drones will be used.
severe 	**Lack of ethical guidance and standards** Regulation and data protection around satellite and UAV imagery largely protects people in developed country contexts, but does little for people in conflict settings. There is not sufficient experience yet in the sector to draw clear lines on when aerial imagery should be ruled out because it could incur harm.	**Restrict use and develop guidance** • Agree on clear principles that help guide decisions related to taking or publishing images well ahead of time. They should also be discussed on a case-by-case basis. • Apply existing guidelines for such decisions, including the humanitarian principles and organisational standards and code of conducts.
high 	**Limited information** Remote sensing cannot provide information on changes that are un-observable from above. It is not well-suited for qualitative data and does not enable interactions with communities. It also does not provide information on causality, i.e., whether observed changes are related to aid interventions or other factors. Sometimes, what is observed from the sky can be misleading or flawed, and misses out close-up context factors.	**Complement** • Contextualise information found on images with other data to detect patterns and meaning. • If possible, include in-person verification on the ground. Local staff or context can confirm if the observed patterns correspond to local conditions. • Compare images taken over time to set a hypothesis on the observed changes and test these against other data sources.
high 	**Lack of experience and evidence** Satellite and UAV usage in humanitarian context is fairly recent and there are few lessons to draw on. As a result, practice is shaped 'on the go' which can both delay projects and introduce ethical dilemmas.	**Build catalogue with ground-truthing** • Begin small, in one area where images can be verified or 'ground-truthed'. Based on this, create an identification catalogue and expand to areas without ground presence. • Cooperate with experienced agencies

Rating	Challenges	Mitigation options
high	**Costs** Despite decreasing costs and cheap innovations, high-resolution imagery and analysis can still be expensive (see Costs of acquiring and analysing remote sensing data). Cheap alternatives, including UAV images, low-resolution or outdated pictures exist, but they cannot meet expectations for detailed remote information.	**Explore common funding models** • Strengthen partnerships with providers to arrange good prices. • Explore collective purchase arrangements. Pooling funds with other aid organisations can be cost-effective. • Review low-cost and free service options for aid organisations (see Selecting partners and service providers).
medium	**Political rejection** In some instances, governments have prevented aid organisations from using aerial imagery out of fear that they might discover evidence that contradicts official claims. This included both UAV use (e.g., Somalia) and satellites (e.g., Afghanistan).	**Focus on outreach** • Engage authorities in discussions on what kind of information will be collected and how it will be used.
medium	**Multiplicity of actors can lead to confusion** Perhaps more so than with other technological tools, the work with satellites brings together many actors. The UN alone has dozens of organisations in some way involved in satellite operations, and in addition there are scores of satellite owners, software providers, analysts and other actors. Coordination can be confusing and can create many delays.	**Coordination** • Collaborate with other actors as closely as possible. • Work in consortia to make sure that imagery is conveniently accessible by all authorised stakeholders to avoid redundant efforts in establishing relationships and processes with the private sector.
medium	**Hard to meet high expectations** Remote sensing, and especially satellite technology, is sometimes seen as a silver bullet for obtaining missing data. But often even costly high-resolution aerial images are neither detailed nor immediate enough to provide precise census information or similar data.	**Investigate added value** • Study past applications to understand if the data needs can be realistically met with remote sensing tools.

3.3 Implementation

SET-UP

Accessing and using aerial images involves coordination and collaboration with external providers, typically from the private sector.

Generally, the following steps are necessary for using satellite imagery for humanitarian monitoring. Other remote sensing technologies require similar processes:

1. Determine relevance

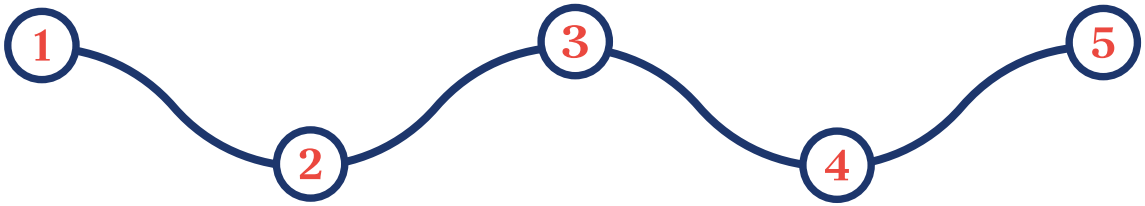
- Is the required information observable from the sky?
- Are the visible changes you would expect to observe clear?
- Do weather conditions allow for vision?

3. Seek partnerships

- Do aid actors in your country or sector have experiences with remote sensing?
- Are companies from the industry signaling interest in supporting disaster relief?
- Are readily available images, e.g. from UNOSAT, applicable?
- Do you have geo-spatial analysis expertise in-house or do you need to hire or work with experts?

5. Use and assess

- Does the information you are finding meet your expectations?
- Can the images or tools be used to inform other aspects of your work?
- Is the data relevant for other actors?
- Will you re-use the data in the future?



2. Set ethical standards

- Which type of information will you collect, when and why?
- Who will have access to the imagery?
- What risk could be incurred and to whom if working with remote sensing technologies?
- Which processes will you use to assure that no harm is caused?

4. Implement and analyse

- Does the data require verification on the ground or from other sources?
- What other information can experts obtain from images?
- Can you start capturing and analysing on a small area and later scale up?
- How will you visualise and make sense of the information you gather?

SELECTING PARTNERS AND SERVICE PROVIDERS

In most cases, humanitarian actors interested in utilising remote sensing information will work with experts from the geospatial and satellite industry. Generally satellite imagery is used in military and security, oil and gas management, and agricultural monitoring and planning.

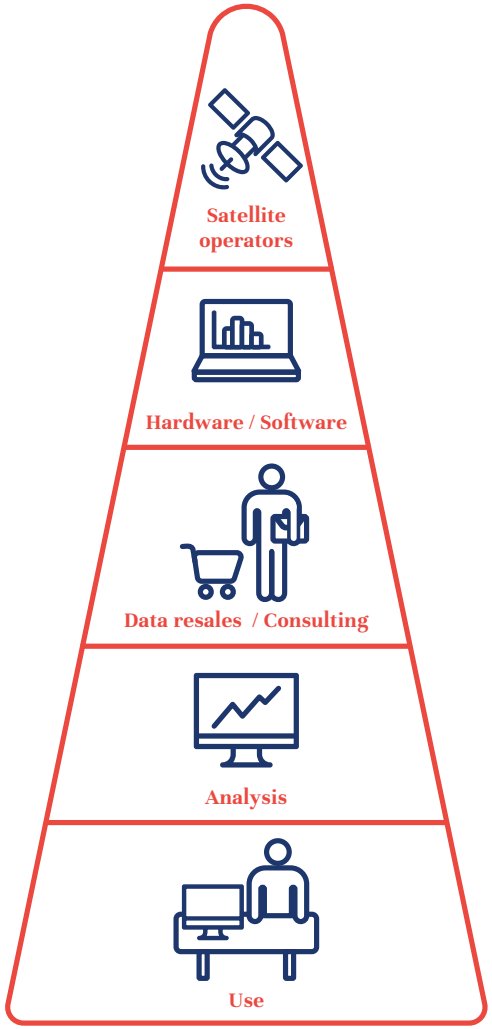
About 300 different companies operate satellites and sell their imagery commercially. A small number of them have clear market dominance: owning several satellites, they can provide more images and more quickly position one of them to hover over the area of interest to take images. Typically, images in a disaster situation can be taken within a few hours after the request, if there is no cloud cover. Recent low-cost Earth observation units enable near real-time images, but at relatively low resolution.

In addition, there are several hardware producers involved who supply tools and equipment for transmitting and processing the large data volumes of high-resolution imagery. Several companies also sell geospatial software to handle and assess the data.

Often imagery users will not purchase their data from satellite companies themselves, but rather third-party resellers. In addition, users may work with consultants who advise on the data to be purchased.

Lastly, there are many additional service providers. These agencies and experts will analyse, visualise and report on the pure imagery for end users.

To obtain imagery and data, humanitarian actors generally can collaborate with different types of actors, such as international (UN) agencies, government or private sector organisations.



OVERVIEW OF RELEVANT SERVICE OR IMAGERY PROVIDERS / PRIVATE SECTOR

Provider	URL	About
DigitalGlobe	**https://www.digitalglobe.com/**	DigitalGlobe is the largest commercial vendor of space imagery. It provides an array of data types and services that are relevant for humanitarian applications and has supported various disaster response efforts in the past. In 2014, the company created the first baseline map for the entire African continent, which will make it easier to capture and compare images over time. Its humanitarian operations have included free imagery provision for the 2015 Nepal earthquake response, relief efforts during hurricane Patricia in the US and the search for flight MH17.
Planet Labs	**https://www.planet.com/**	An ex-NASA team built inexpensive, small satellites that are only the size of a shoebox. Sent into the sky in hundreds, they enable full Earth coverage and can take pictures of the whole world every 24 hours. Although, at 5-6 m per pixel resolution, these images are not very detailed, the potential for humanitarian applications is significant. In the past, very few images were taken regularly in crisis-affected regions, which made it difficult to observe changes and impact over time. Moreover, the company positioned itself to actively support humanitarian operations.
EARSC	**http://earsc.org/**	The European Association of Remote Sensing Companies (EARSC) is made up of over 70 member companies providing Earth-observation services in Europe. Many of its members operate one, a few or several satellites or provide analysis software or services. They typically sell their imagery commercially or via third party vendors and may be interested in supporting humanitarian operations.
e-geos	**www.e-geos.it**	The partnership between the Italian Space Agency and Telespazio provides a full set of products and services including data acquisition and pre-processing for a variety of applications. It caters to various fields including emergency response, defence and security, as well as agriculture, forestry and environmental protection.

OVERVIEW OF RELEVANT SERVICE OR IMAGERY PROVIDERS / GOVERNMENT

Provider	URL	About
NASA	**https://www.nasa.gov/**	The US National Aeronautics and Space Administration (NASA) is one of the world's largest civilian space programmes. It has supported various aid agencies with data and analysis during disaster response – providing, for example, the World Food Programme (WFP) with precipitation and rainfall data to predict and respond to flooding and drought.
Copernicus	**http://www.copernicus.eu/**	The European Commission programme supports public authorities with data for emergency preparedness and prevention to help identify risk and coordinate disaster response. Copernicus was already used to support refugee camp monitoring, population estimates and environmental impact assessments during conflicts and natural disasters.

OVERVIEW OF RELEVANT SERVICE OR IMAGERY PROVIDERS / INTERNATIONAL INSTITUTIONS

Provider	URL	About
UNOSAT / UNITAR	**http://www.unitar.org/unosat/**	The UN's own space technology is hosted at UNITAR: the United Nations Institute for Training and Research. Created in 2000, UNITAR's Operational Satellite Applications Programme (UNOSAT) specifically provides imagery to humanitarian action and sustainable development efforts. The technology-intensive programme supports and works with aid organisations world-wide, providing mapping, training, crowdsourcing, reporting, among other services.
UN-SPIDER	**http://www.un-spider.org/**	The UN General Assembly established the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) to 'ensure that all countries and international and regional organisations [can] use all types of space-based information to support the full disaster management cycle'. Its services go beyond Earth observation and include weather forecasting, navigation and telecommunications. Cooperation with humanitarian agencies is typically done via UN OCHA.

Provider	URL	About
International Charter 'Space and Major Disasters'	**https://www.disasterscharter.org/**	The 'International Charter' brings together around 24 satellite image and service providers – mainly national space agencies - who will ensure that those affected by natural or man-made disaster have universal access to up-to-date space data for free. Authorised users can activate the Charter on their behalf, which then sets off a chain of activities including satellite positioning, image acquisition and data delivery. The bodies authorised to request the Charter's services include national civil protection, rescue, defence and security bodies. In recent years, the Charter was activated around 50 times per year, often for flood, hurricane or earthquake responses.

OVERVIEW OF RELEVANT SERVICE OR IMAGERY PROVIDERS / RESEARCH AND ACADEMIA

Provider	URL	About
Z_GIS	**http://www.zgis.at/index.php/en/**	The department of geoinformatics at the University of Salzburg in Austria has collaborated with many aid agencies, for example, Médecins Sans Frontières (MSF). The interdisciplinary team supported relief and monitoring efforts and the assessment of displacement of people in South Sudan.
Harvard Humanitarian Initiative: Signal Program	**http://hhi.harvard.edu/research/signal**	Founded in 2012, the Signal Program conducts independent satellite-based assessments in human rights and humanitarian emergencies with a strong focus on practicing and shaping the safe, ethical and effective use of such technologies. The team originally supported an atrocity prevention project in South Sudan.
UAViators	**http://uaviators.org/**	A grassroots initiative, UAViators bring together UAV experts and enthusiasts interested in supporting humanitarian efforts. They offer a forum for sharing experiences, documenting lessons and establishing ethical guidance.

COSTS OF ACQUIRING AND ANALYSING REMOTE SENSING DATA

While high costs are still a limiting factor for the use of satellite technology, prices vary greatly depending on the exact type of technology. With the technology continuing to spread, prices are decreasing quickly and a greater number of free options are becoming available.

FREE IMAGERY AND DATA

Google Earth	OpenAerialMaps	Humanitarian OpenStreetMap Team (HOT)	International Charter	UNOSAT
Reliable but with rough and sometimes outdated images.	Collection of all freely-available, recent Earth observation images at various resolution levels. A small but very detailed set of images is available so far.	Technical volunteers provide maps or create them in real-time as disasters evolve. The database of past mapping projects is openly accessible, and humanitarian actors can activate the team to step in during emergencies.	The Charter provides up-to-date satellite images in disaster settings. It can be activated by national civil protection, rescue, defence and security bodies.	The UN agency aims to provide satellite imagery and analysis to aid organisations and affected countries for humanitarian response and development efforts.

COMMERCIAL SATELLITES

Current approximate standard rates for images are given below.

1 km2 at 50cm high-resolution	1 km2 at 50cm high-resolution, from archive	10 km2 at 50cm (size of Juba)	100 km2 at 50cm (size of Jonglei)	100 km2 at 50cm (size of Jonglei)
~ $25	**~ $15**	**~ $2.500**	**~ $250.000**	**~ $250.000**

More price estimates are available at: http://www.landinfo.com/satellite-imagery-pricing.html

COST OF UNMANNED AERIAL VEHICLES

In some circumstances it may make sense for aid actors to purchase UAVs for regular usage –for example, to monitor infrastructure developments in refugee camps or to assess the agricultural impact of projects. Alternatively, aid organisations can draw on the help of technical volunteers and experts to assist during times of high information needs. Three broad types of UAVs or 'drones' are available: hobby, commercial and military UAVs.

Personal hobby UAVs

~ $100 to 1.500

Flight time and distance
Up to 25 min and 2 km

Availability
Technology stores; easy to operate

Humanitarian uses
Disaster mapping, damage assessments (e.g., in Nepal)

Commercial-use UAVs

~ $6.000 to 15.000

Flight time and distance
Up to 60 min and 60 km

Availability
From specialised companies; require training and skil

Humanitarian uses
Monitoring, observation of changes, video

Military surveillance UAVs

~ $5 million

Flight time and distance
Not disclosed, but longer

Availability
At special request and only with permit

Humanitarian uses
UN peacekeeping surveillance in the DRC

3.4 Solution stories

INSIGHTS FROM WHERE NO ONE GOES: SATELLITE IMAGERY AND SYRIA CONFLICT ASSESSMENT

Country: Syria
Technology: Satellite imagery
Task: Improve context awareness for international community

Problem

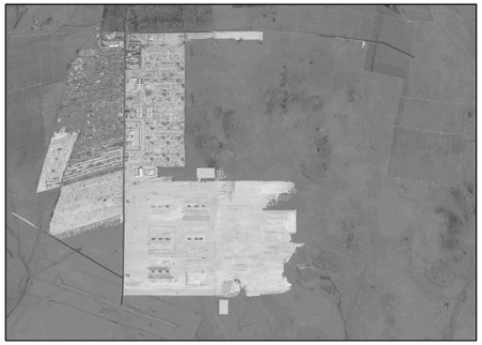
Strict access constraints to Syria and dynamic changes on the ground make it very difficult for humanitarian responders to have a clear picture of the situational needs. The UN body for space imagery, UNOSAT, thus aimed to contribute to context understanding using satellite technology.

Solution

Satellite imagery and analysis were used to assess conflict developments and their impact. The same tools could be used to monitor humanitarian programming in similarly inaccessible situations.

The project focused on situation awareness and damage assessment in Syria. To create the analysis and report, UNOSAT experts worked with images purchased from DigitalGlobe, then assessed individual pictures and compared these over time. The final report included a destruction rating scale that was used to draw actionable data out of the images. Many images were shown from the same location over time in order to visualise change. Razed neighbourhoods stand in stark contrast to views of the full city only two months earlier. It also was possible to identify new mass graves, and, with images taken at night, identify infrastructure damage based on light-out conditions in vast areas.

The images below show the growth of a refugee camp near the Jordan-Syrian border.



Adjustments

No major adjustments were necessary during this project. The expertise and methods used to create the analysis were built over time and can be refined in the future to help identify further humanitarian applications.

Lessons

It was clear that both aggregated information, as well as region- and city-specific data was important for users to understand the big picture and find details relevant to their operations.

More information: http://www.unitar.org/unosat/four-years-human-suffering-%E2%80%93-syria-conflict-observed-through-satellite-imagery

THE LIMITS OF REMOTE SATELLITE ASSESSMENTS: COMPARING FIELD LEVEL INFORMATION WITH CROWD-SOURCED MAPS

Country: Philippines
Technology: Satellite imagery, mapping
Task: Assess damage and improve situational awareness

Problem

In November 2013, Typhoon Haiyan brought severe damage across the central Philippines. Given the vast scale and geographic scope of destruction, accurate assessments and damage figures were needed to prioritise the response, but estimates varied greatly.

Solution

In the initial days of the response, the Humanitarian OpenStreetMap Team (HOT OSM) had mapped basic infrastructure. The American Red Cross (ARC) then asked HOT OSM and their volunteer network to crowd-source remote damage assessments based on satellite images.

As the REACH Initiative was conducting a rapid needs assessment for the Shelter Cluster at the same time, crowd-sourced remote damage assessments could be validated with assessments at field level. The accuracy was found to be very mixed, with only 36 per cent of buildings accurately tagged. Partially and majorly damaged buildings were underrepresented in the remote damage assessment, whereas the rate of destroyed buildings was clearly overrepresented.

Adjustments

While the exercise did not require major adjustments, it showed necessary changes for the future use of OSM and remote mapping. Images used by volunteers did not provide a high-enough resolution to accurately classify buildings. In some cases, there was also a lack of comprehensive pre-disaster building data. Where volunteers did not know how an area looked before the disaster, they could not accurately assess damage.

Lessons

1. The comparison of field data with remote assessments showed that in addition to technological advances, investments in guidance and training of OSM contributors are required. This includes investments in pre-disaster baseline data.

2. The exercise confirmed hypotheses from other studies that such assessments suffer from media bias, i.e. a focus on certain high impact areas covered in the media at the exclusion of others. Damage in highly publicised areas was overestimated while in remote areas it was underestimated.

3. The links between the OSM community and the humanitarian coordination system should be strengthened to make sure priority areas are assessed and to jointly develop guidance for assessment and classification.

More information: http://reliefweb.int/report/philippines/groundtruthing-openstreet-map-building-damage-assessment-haiyan-typhoon

WHEN BIG PLAYERS JOIN ONE TEAM: CROWDSOURCING IN THE NEPAL EARTHQUAKE RESPONSE

Country: Nepal
Technology: Satellite imagery, crowdsourcing
Task: Assess earthquake damage to inform response

Problem

The earthquake in Nepal in April 2015 destroyed close to 300,000 residential buildings and damaged many more.

The main tasks were information management and assessing the damage as quickly as possible to organise response efforts.

Solution

One technology provider eager to support in the recovery was DigitalGlobe (DG).

DigitalGlobe provided high-resolution images that would have normally come at a significant cost. Interested people worldwide could freely access images for humanitarian purposes.

The images were overlaid with maps to provide blueprints of the destruction levels. Volunteers helped look at images and rate the severity of the destruction that they saw. Within a month, more than 50.000 people helped identify and tag more than 20.000 damaged buildings via crowdsourcing.

Adjustments

After one month, DG started to wind down its support as imagery was not considered as urgent anymore.

It is worthwhile to note that many other actors worked on supporting aid response staff with information from the sky. The UAV community organised a sizable effort to help with images, rooting its work closely with the communities.

Lessons

1. **Seek out companies for in-kind support, but do not depend on it.** The Nepal response presents one of the first major satellite-imagery donations to humanitarian response actors. But support from commercial providers cannot be taken for granted, so where imagery is deemed helpful for crisis response, funding models are needed.

2. **Coordinate with authorities and local government from the very beginning.** The leading role of local authorities should be respected and the potentially unintended aggregate effects of multiple initiatives need to be considered. More data sharing between humanitarian actors can prevent such unintended consequences. In Nepal, this chance was missed. With a surge of drones flying in the sky, both from humanitarians and journalists, the government eventually passed a ban on drones.

More information: https://www.google.org/crisismap/2015-nepal-earthquake

3.5 Links and resources

Uddin, K. et al (2013). ***Application of Remote Sensing and GIS for Flood Hazard Management: A Case Study from Sindh Province, Pakistan. American Journal of Geographic Information System 2013, 2(1), 1–5.*** **Retrieved from: http://www.alnap.org/resource/8290**

The paper describes application of Remote Sensing and Geographical Information Systems in identifying flood hazard zones and flood shelters. It describes an approach to delineate flood inundated areas, flood-hazard areas, and suitable areas for flood shelter to minimise flood impacts.

Shelter Cluster. (2013). ***Mapping and Information Management for Effective Humanitarian Programming in Somalia: Secondary Data Review (pp. 1–24).*** **Retrieved from: http://www.alnap.org/resource/8694**

This case study discusses many of the challenges related with data gathering and information management in insecure environments. It describes satellite imagery as a key complementary tool for assessing the situation, putting information into context and following programme updates.

Frost, J. (2014). ***Eyes in the Sky are Inevitable: UAVs and Humanitarian Response. PHAP.*** **Retrieved from: https://phap.org/thematic-notes/2014/october/eyes-sky-are-inevitable-uavs-and-humanitarian-response**

This brief article urges humanitarian practitioners to consider the futures uses and applications of drones more strongly.

UAViators (2015). ***Recommended Code of Conduct: Draft 2.4. Last updated July 1, 2015.*** **Available at: https://docs.google.com/document/d/1pliYVNek2RsiSQ8_9ATFdJBzYFVP88edfLHL8uFBhUA/edit?pref=2&pli=1**

This Code of Conduct, which is written for UAV pilots and humanitarian professionals, seeks to provide guidance and promote best practices in the use of UAVs in humanitarian settings to minimise mistakes.

UNOSAT (2015). ***Four Years of Human Suffering – the Syria Conflict as Observed through Satellite Imagery.*** **Retrieved from: http://www.unitar.org/unosat/four-years-human-suffering-%E2%80%93-syria-conflict-observed-through-satellite-imagery**

This report shows a wide range of satellite imagery used to assess and trace the impact of the Syrian conflict on affected communities and infrastructure throughout the country.

Lichtman, Amos and Nair, Mohit (2015), ***Humanitarian Uses of Drones and Satellite Imagery Analysis: The Promises and Perils, AMA Journal of Ethics. October 2015, Volume 17, Number 10: 931-937. doi: 10.1001/journalofethics.2015.17.10.stas1-1510.*** **Available at: http://journalofethics.ama-assn.org/2015/10/stas1-1510.html**

This article provides a brief overview of humanitarian uses of satellite and unmanned aerial vehicle (UAV) technologies for crisis mapping and disaster response logistics as well as human rights and advocacy efforts. It explains open ethical issues, including the lack of regulation and experience and legislative issues.

D'Onofrio, Alyoscia (2014), ***Drones 'R' Us? Reflections on the use of UAVs in humanitarian interventions.*** **Available at http://206.188.15.221/blog/drones-r-us-reflections-use-uavs-humanitarian-interventions**

In his blogpost, the IRC's Senior Director of Governance and Rights reflects on the controversial nature of unmanned aerial vehicles (UAVs) or drones and their uses in humanitarian action.

4. Location tracking

A range of tools make it possible to identify and trace the location of humanitarian deliveries or staff and to visualise information on maps. Location tracking requires transmitters, e.g., tags or GPS-enabled devices that can be attached to goods or carried by people. These link to 'navigation satellites' (rather than image-taking, observation satellites, as explained in the previous chapter), which either send signals to GPS devices or scan whole areas to identify and note transmitter signals. The use of these tools in humanitarian logistics is not new. Yet, recent innovations and creative approaches are making it ever more convenient and cheaper to implement.

In this chapter:

4. Mapping and location tracking

4.1 Overview

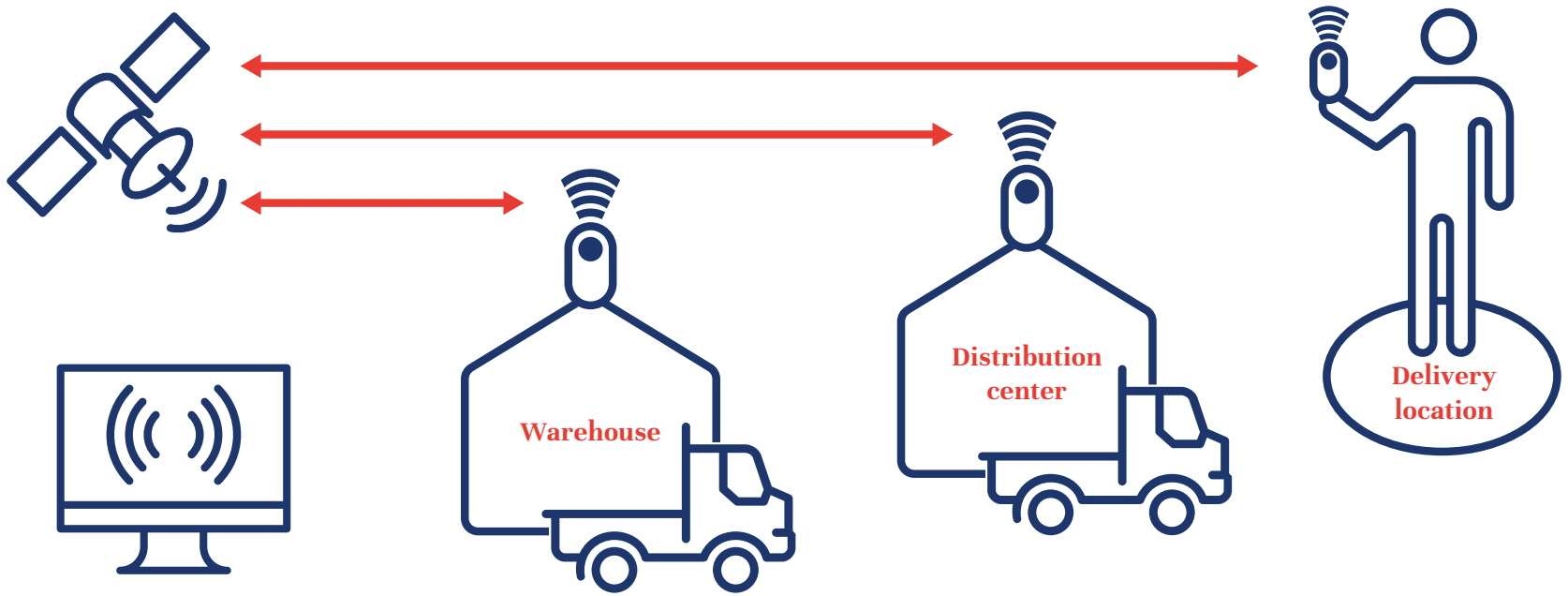
Location tracking often makes use of the Global Positioning System (GPS), a navigation system made up of more than two dozen satellites that were sent into orbit by the US Department of Defence. GPS devices, including smartphones, can send signals to these satellites to receive back the exact coordinates of their current location. This data makes it possible to track commodities, vehicles or people, even in areas in which humanitarians have no access.

For security reasons, GPS devices, including smartphones, sometimes cannot be used. Armed actors in Syria and in Somalia, for example, sometimes ban their use. For those contexts, other location tracking methods exist, such as SMS for logging and transmitting location names.

Location tracking includes:

- Attaching **GPS-trackers** to deliveries or vehicles and monitoring their movement;
- Using **digital forms** to record and send details about deliveries at various checkpoints;
- Sending information about items, people and their whereabouts via **SMS**;
- Installing **small sensors or tags** to capture data about specific devices or their use in specific locations.

Because location information can be sensitive, location tracking raises concerns similar to remote sensing with regards to data security and causing harm to vulnerable populations and humanitarian workers. Responsible use of the tool and a focus on digital security are essential.



Benefits	Problems	Recommendations
Provides accurate data to oversee deliveries and identify problems	Geolocation data is sensitive and can create security risks for staff/locals	Use open-source software, such as the commodity-tracking system (CTS) designed by the IRC
Recent innovations make tracking cheaper and easier to use for more actors	GPS devices are seen as spyware by some groups who may restrict access	Collect GPS coordinates in the background of an app, not as individual data point, to be less conspicuous
Data provides baseline for information management	Remote tracking is not as reliable as in-person supervision and technical failures are possible	Invest in data security

TECHNOLOGY TYPES

Technologies to record location information can either automatically receive signals from satellites, or users can enter indicators such as street names into databases directly. Other information, like recipient lists or survey responses can be recorded together with location data. This data is then referred to as 'geo-tagged'.

The following technologies are relevant for humanitarian actors:

GPS signals

GPS-enabled devices, e.g., smartphones, send signals to navigation satellites to receive their exact location coordinates. This can happen on a click or automatically.

Bar code or sticker scans

Machine-readable bar codes or QR codes can be printed or attached to packages and scanned with smartphones or special devices to track location over time.

RFID chips

The passive tags can be incorporated into the packaging of deliveries, making them discrete and durable. They emit radio waves that can be read and recorded by scanners or GPS devices in the area.

MONITORING APPLICATIONS FOR LOCATION TRACKING

In humanitarian programming, location and commodity tracking are mainly used in logistics. Tracking can also be implemented to support humanitarian action and information management, especially in areas with restricted access.

Track deliveries

- Track products, deliveries or other movements through GPS signals or barcode tags to provide accurate information to those waiting for items.
- Trace points of diversion, lost packages, and recognise bottlenecks or physical roadblocks.

Send accurate location reports and verify location of data collection

- Use the GPS function of smartphones to enter and send geo-tagged details about items or people. Mobile phones, email and even handwritten records work for this so long as location is known. When taking photos or other multimedia data, GPS coordinates can be automatically recorded.
- Location data can be used to verify the location of data collection – e.g., to ensure data was collected in the locality agreed upon with field monitors. This acts as an additional level of integrity for conducting field research.

Security-risk management

- Monitor and track the location of security incidents to create greater context and risk awareness and adjust planning accordingly.
- Track vehicles to know where staff last went in case of a security incident.

WHEN NOT TO USE LOCATION TRACKING

In some instances, location data should not be collected or made public. Not using location tracking might be better if the following conditions are in place:

- **Do not use GPS tracking if ill-intentioned parties could gain access to sensitive location data.** In the wrong hands, records of the whereabouts of vulnerable or persecuted populations, humanitarian staff, goods and equipment, as well as critical infrastructure can seriously endanger people and hamper project goals.
- **Restrict GPS-coordinate collection where locals object; ban or suspect people with GPS devices.** Using GPS devices, which are often associated with military or intelligence operations, against the will of local authorities or communities, can erode trust and put operations and staff at risk.

4.2 Benefits and challenges of location tracking

Reliable data that is easy to obtain

Location coordinates are accurate and are difficult to manipulate or interfere with.

Tracking is cheap and simple

All smartphones are enabled to identify geolocations and can communicate with GPS satellites at no extra cost (though transmitting the data later on may involve costs). It is easy and convenient to add location-tracking functions to software and apps. Low prices and easy handling mean that tracking can happen at box- rather than batch-level, e.g., by tagging each box with an RFID tag.

Real-time location monitoring is possible

Where the security situation and network connectivity permit this, location data can be transmitted immediately. This allows for real-time tracking.

Software advances allow for quick response to danger

Emergency buttons on devices can highlight users last known location and can call emergency and pre-programmed numbers. Apple and Facebook have integrated these safety-check functions into their software and hardware, even allowing for voice activation.

CHALLENGES AND MITIGATION MEASURES

Where, when, how often, and how long people are at a given location can be incredibly revealing. While there has not been a significant amount of research into location-data privacy concerns within humanitarian settings, it is clear that such data needs to be treated with care. The following challenges must be considered and planned for:

Rating	Challenges	Mitigation options
severe	**Security risks and e-identification** The exact location of people and items can threaten security if shared with, leaked to or intercepted by the wrong people. In addition, even anonymised datasets containing location data can be used to 're-identify' people and determine personal information.	**Establish privacy-conscious method** • Do not track people; track groups. As much as possible associate trackers with populations rather than singling out individuals. • Aggregate information before it is stored in database. Such information cannot be raced back as easily. • Use security-conscious software and encryption.
severe	**Can cause suspicion and access restriction** Location-tracking devices carry stigma and are often associated with military or intelligence operations. This can affect humanitarian access and put staff caught with GPS devices at severe risk.	**Discretion or full transparency** • Meet with local contacts to explain and model the use of GPS where possible. • Switch to inconspicuous tools, e.g., send location notes via SMS rather than a stand-alone GPS device; collect GPS as background data where considered safe.
high	**Weak signal can cause delays** Where GPS signals are weakened by factors such as terrain or indoor settings, in-built functions can cause severe delays: for example, a smartphone app might not be able to move to the next task while waiting for GPS data points.	**Design systems not dependent on GPS** • Make sure your system does not rely on GPS data and can function without a signal. If GPS tracking is part of an app, for instance, make sure it can run without or skip the GPS-collection function.
high	**Technical shortcomings** GPS signals are not accurate enough to measure elevation; sometimes this can cause incorrect reading and data flaws. Barcodes and RFID chips can be damaged during transport, which makes them illegible to scanners.	**Keep backups** • Always assure to have a backup system in place. Staff should be able to record and communicate receipt or shipment of deliveries manually when the technological system breaks.

Rating	Challenges	Mitigation options
high	**Infrastructure and capacity constraints** It may not be possible to install GPS trackers on all vehicles that are used for deliveries, especially when local fleets are used that do not belong to the aid organisation.	**Keep alternative systems in place** • Where possible, install trackers in local fleets that are likely to be used when larger-scale emergencies hit. • Use portable devices that drivers or staff at delivery points can carry.
medium	**Only complementary, never complete, information** Location data is extremely useful, but cannot show causality.	**Verify and look for patterns** • Compare tracking data with other, ideally field-level information. • Triangulate data and investigate issues that location tracking highlights before taking action.

4.3 Implementation

SET-UP FOR A COMMODITY TRACKING SYSTEM

The examples below detail the steps necessary to create a mechanism for tracking the location of aid deliveries.

1. Determine scope

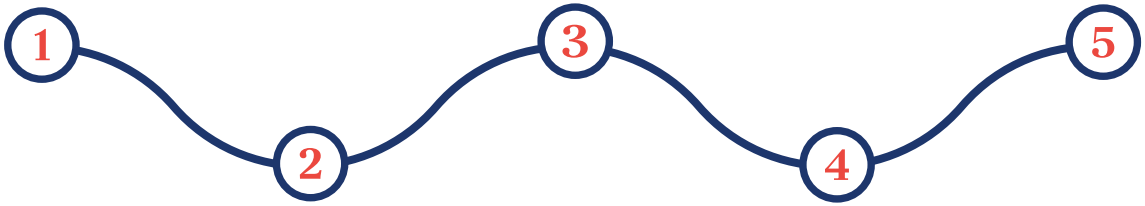
- What do you want to track?
- Do you need continuous tracking or a one-off localisation?
- Do other actors use systems that you can also use or that you should clearly distinguish your system from?

3. Fill infrastructure gaps

- How will staff record if an item has arrived or is leaving a location?
- Does recording happen automatically (e.g. with active sensor) or manually?
- How will you send entries to a central database?

5. Register delays or losses

- If the system depends on manual reporting, how will you determine if a package is lost?
- How will you report and follow up on losses?
- If you notice delays or problems, can you change the delivery approach to circumvent them?



2. Register items, select identifiers

- How will you identify items as you are following their delivery?
- Can you use a logic that is easy to understand for all users?
- How and where will you attach the identifier (e.g. tag, sticker, transmitter) to the item?

4. Visualise records on map

- Where is the central database keeping track of all items and their location records stored?
- How often is the data updated?
- Who needs to access tracking records?
- Are there existing online tools or software you can use to process and visualise the data?

SELECTING PARTNERS AND SERVICE PROVIDERS / COMMERCIAL PARTNERS

Provider	URL	About
CommCare Supply	**https://www.commcarehq.org/solutions/**	CommCare is an online platform agencies can use for mobile logistics and supply chain management. It works with mobile phones and internet connection. Originally, it was developed for the health sector, but has been adjusted since to meet the need of any emergency programme. A demo of the tool is available online.
UPS	**https://www.ups.com/content/us/en/bussol/browse/article/National-Preparedness-Month-UPS.html**	The delivery and logistics company has made it a stated priority to extend its expertise to disaster response. The UPS Foundation is currently sponsoring tracking support for CARE and Aidmatrix.
FedEx	**http://www.fedex.com/sn/about/citizenship/philanthropy.html#1**	FedEx, like other logistics companies, supports selected crisis responses and accepts applications from organisations that bring relief to victims of emergencies or natural disasters.
MAERSK		MAERSK has worked with WFP and other aid agencies during Typhoon Haiyan and in other emergencies, contributing logistical capacity and expertise.

OPEN-SOURCE TRACKING SOFTWARE AND SUPPORT

Provider	URL	About
Commodity Tracking System, CTS	**http://cts-project.readthedocs.io/en/develop/**	In order to keep track of its commodities, the IRC built its own FedEx-style package-tracking system called CTS (short for commodity tracking system), which is based on smartphones and digital forms. Anyone can use and adjust this system.
QGIS	**http://www.qgis.org/en/site/**	The QGIZ project is a free and open-source geographic information system. It is a good alternative to commercially available, expensive software used for creating maps and representing different types of information visually.

Provider	URL	About
Track 24	**https://www.track24.com/**	Provides mobile applications and hardware for personnel and asset locating, and situational awareness software through localised mapping. Offers customisable applications for individual organisations' requirements.
Sahana EDEN	**http://sahanafoundation.org/**	The Sahana Foundation provides free, open-source disaster management software. Through their software, organisations can access free applications for tracking staff and assets, making risk assessments, and planning disaster management activities.
Life360	**https://www.life360.com/**	Life360 is a free to use GPS tracking service available to download on mobile devices. It allows organisations to securely track staffs movements and has an in-app messaging service that allows for constant communication between users, too.

COSTS

Humanitarian organisations have been using barcode and RFID (radio-frequency identification) readers as passive sensors to track equipment for years, especially for logistics and delivery tasks.

Costs vary depending on the type of sticker and the required functions – e.g., the required amount of memory – or whether the sticker should be active vs. passive. Active stickers cost about $25 and more if protective housing or extra battery life are required. A passive 96-bit chip costs from seven to 15 US cents. If the tag is embedded in a label onto which a bar code can be printed, the price rises to at least 15 cents.

Overall, tracking is comparatively inexpensive and, once set up, can be easily used for multiple projects and over a long period of time. Using self-printed barcodes, QR codes or stickers is of course even less expensive. If interested in working with the IRC's commodity tracking system (below), no upfront costs would be involved, but staffing and hardware needs would have to be accounted for.

4.4 Solution stories

FEDEX, FREE FOR ALL: THE IRC'S OPEN-SOURCE COMMODITY TRACKING SYSTEM IN SYRIA

Country: Syria
Technology: Smartphone and digital forms
Task: Commodity track aid packages

Problem

Operating in Syria, with no access for its own staff in large areas, the IRC was searching for a solution to keep track of aid deliveries sent in and shipped throughout the country. GPS-trackers were not an option, as armed groups often react negatively to the devices, which they associate with intelligence and spying operations. The solution also needed to be affordable and easy-to-handle for local partners' staff without prior in-person training.

Solution

In 2012, a team out of the IRC's office in Jordan began developing a solution, supported by grants from UK and US governments as well as the Dutch foundation Stichting Vluchteling. Based on the widely-used OpenDataKit (ODK) software, the team developed a tracking solution using an android app and printed stickers.

Deliveries are tagged with a QR code sticker at their pick-up location. There, staff use a phone equipped with an app to enter basic data points into a digital package delivery form, such as location, date, intended destination, and anticipated arrival date. This information is associated with the QR code sticker. Then the package is shipped.

At each location the package reaches, staff scan the same sticker and send information to headquarters. If a package gets lost, this system would not be able to locate it. It can, however, point to the last location where an item was tracked and highlight where it might have been lost.

Adjustments

The source code behind the tool was released along with very clear documentation. Adjustments included creating 'roles' to allow the organisation to limit access to sensitive location and user information. The forms for data entry were adjusted to allow room for relevant information and customisation as needed. The IRC invites and encourages others to use and alter the tool. They also started using it for voucher tracking.

Lessons

1. **Don't reinvent the wheel; adapt it to fit your needs.** This type of tracking is not new, but the combination of well-tested and simple tools is ideal for the Syrian context, with data collected this way adding great value.

2. **Support open-source innovation.** Releasing the code attracted positive media coverage and encouraged new people to become interested in supporting, using, and continuously advancing the tool. Where possible, funders of similar innovation should push for open-sources solutions.

Documentation for understanding and learning how to use and adjust the tool is available as an online manual developed by the IRC's CTS team:
https://cts-project.readthedocs.io/en/develop/
The source code of the smartphone app and server tracking system is available as free and open source on GitHub: https://github.com/theirc/CTS

WHERE THE WATER IS: AN ICRC ONLINE MAP SHOWS PEOPLE IN ALEPPO WAYS TO BOREHOLES

Country: Syria
Technology: GPS, mapping tools
Task: Share water source location information

Problem

In Syria, the ICRC was refurbishing and monitoring local water sources, which are critical lifelines in the context of armed conflict and division. However, there was no effective way to share water source locations with the local population. Four years of fighting and destruction had rendered existing city maps outdated and unusable.

Solution

The team decided to make use of the fact that most Syrians have access to smartphones with built-in GPS. They shared the coordinates of water sources on an online open source map, similar to Google Maps. The map can be found online at: https://app.icrc.org/app/maps/aleppo-boreholes/

People with smartphones could thus easily navigate to the nearest well.

Adjustments

Once the map had been set up, no major adjustments were needed, and dozens of places where highlighted in the first months. A team keeps a close eye to ensure that information is always up-to-date, adding new wells as they are being refurbished.

Lessons

1. **Adjust technology level to context.** As many people in Syria have frequent access to phones and Internet, a smartphone-based solution was more efficient and inclusive than paper maps.

2. **Think about protection concerns.** A careful assessment of risks showed that publicising the location of wells is unlikely to put people at risk. However, in other contexts and with other infrastructure types, it can be preferable not to show information on publicly accessible online maps.

For more information, see also http://www.syriadeeply.org/articles/2015/11/8719/icrc-urgent-humanitarian-call-action-aleppody/

LOCATION MAPPING IN THE WEST AFRICAN EBOLA RESPONSE

Country: West Africa region
Technology: Social media analytics, data visualisation tools
Task: Map affected areas; track aid delivery

Problem

During the Ebola crisis in West Africa from 2014 to 2015, limited information on new cases and a lack of systematic, timely data on the geographic spread of the virus made delivering aid difficult. Moreover, a solution was needed to track the delivery of supplies and map health care facilities.

Solution

Statistics Without Borders (SWB) deployed through the Digital Humanitarian Network to assist with the visualisation of data related to the crisis response. Tools such as DHIS2 and Open Data Kit were used to collect, manage, visualise and explore the relevant data.

Open source technology was used to map and geo-tag Ebola outbreaks and to collect and share data in real-time. Through UN-OCHA, SWB used social media analysis to locate burial teams, testing laboratories and infected healthcare workers. SWB also tracked the volume of food, locations of internet, radio, and voice communications services, and educational facility needs.

Adjustments

The activities did not require any major adjustments as these organisations were well-versed in carrying out such operations. The free, open-sourced platforms used were already known to be reliable. Moreover, the relationships between the organisations had already been established, allowing for efficient cooperation.

Lessons

1. **Use crowdsourcing.** Use free open source platforms and crowdsourcing to gather and analyse as much data as possible to locate and track aid supplies and staff. Past cooperative experience in non-emergency scenarios can be used as a solid basis for building a working relationship and ensuring all those involved are aware of shared goals.

2. **Risk of geo-tagging.** Depending on the scenario, geo-tagging of sites may cause potential threats if armed groups are active within the region. Thus ensuring data integrity is vital.

For more information, see http://digitalhumanitarians.com/content/ebola-crisis-health-care-facilities-activation and the West Africa Ebola response story board: http://digitalhumanitarians.com/DHNEbolaStoryboard/

4.5 Links and resources

For additional resources, also refer to chapter 3, 'Remote Sensing'.

Tappis H, Doocy S, Amoako S. (2013). ***Food commodity pipeline management in transitional settings Challenges and lessons learned from the first USAID food development program in South Sudan. Global Health, Science and Practice*****. 2013;1(2):193-202. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4168578/**

Based on an audit of the programme's commodity tracking system and interviews with 13 key programme staff, this case study documents the experiences of organisation implementing the first USAID-funded non-emergency (development) food assistance programme approved for Sudan and South Sudan.

Sphere (2016). Sphere on Supply Chain Management**. Available at http://www.spherehandbook.org/en/food-security-food-transfers-standard-4-supply-chain-management-scm/**

A key indicator defined in the Sphere Standards for Supply Chain Management is that commodity tracking systems, inventory accounting and reporting systems are in place from the beginning of an intervention. Guidance notes 7-8 and 11-13 give more details.

Digital Globe**: https://www.digitalglobe.com/**

DigitalGlobe is the largest commercial vendor of space imagery. It provides an array of data types and services that are relevant for humanitarian applications and has supported various disaster response efforts in the past. In 2014, the company created the first baseline map for the entire African continent, which will make it easier to capture and compare images over time. Its humanitarian operations have included free imagery provision for the 2015 Nepal earthquake response, relief efforts during Hurricane Patricia in the US, the search for flight MH17 and others.

Kyrgyzstan Spatial**: http://www.kyrgyzstanspatial.org/**

The University of Central Asia and IFPRI (International Food Policy Research Institute) recently launched Kyrgyzstan Spatial, an online, interactive mapping tool, designed to help policy makers and practitioners make evidence-based decisions in agriculture and food security.

World Food Programme (WFP) Logistics Execution Support System (LESS)**: https://www.wfp.org/logistics/cluster**

The system provides a food supply chain management system enabling real-time tracking of food supplies via sea, air, land or in a transit warehouse. It provides accurate information from the point of food receipt into the WFP supply chain until it is in the hands of a beneficiary or a partner for final distribution to a beneficiary.

5. Complementing feedback mechanisms with radio programmes

Radio remains the most popular technology that people use to receive news and updates in many resource-constrained contexts. In many insecure environments, it is the most reliable way to reach communities. But in humanitarian programming and monitoring, radio has not yet received much attention. It is often understood as a one-way communication tool that offers limited use for humanitarian purposes. Challenging this perception, this chapter shows that radio programming can also be used for active engagement, involving or supporting communities in creating their own shows. Broadcasts can be used to share important announcements or explain aid efforts and feedback mechanisms to crisis-affected communities.

In this chapter:

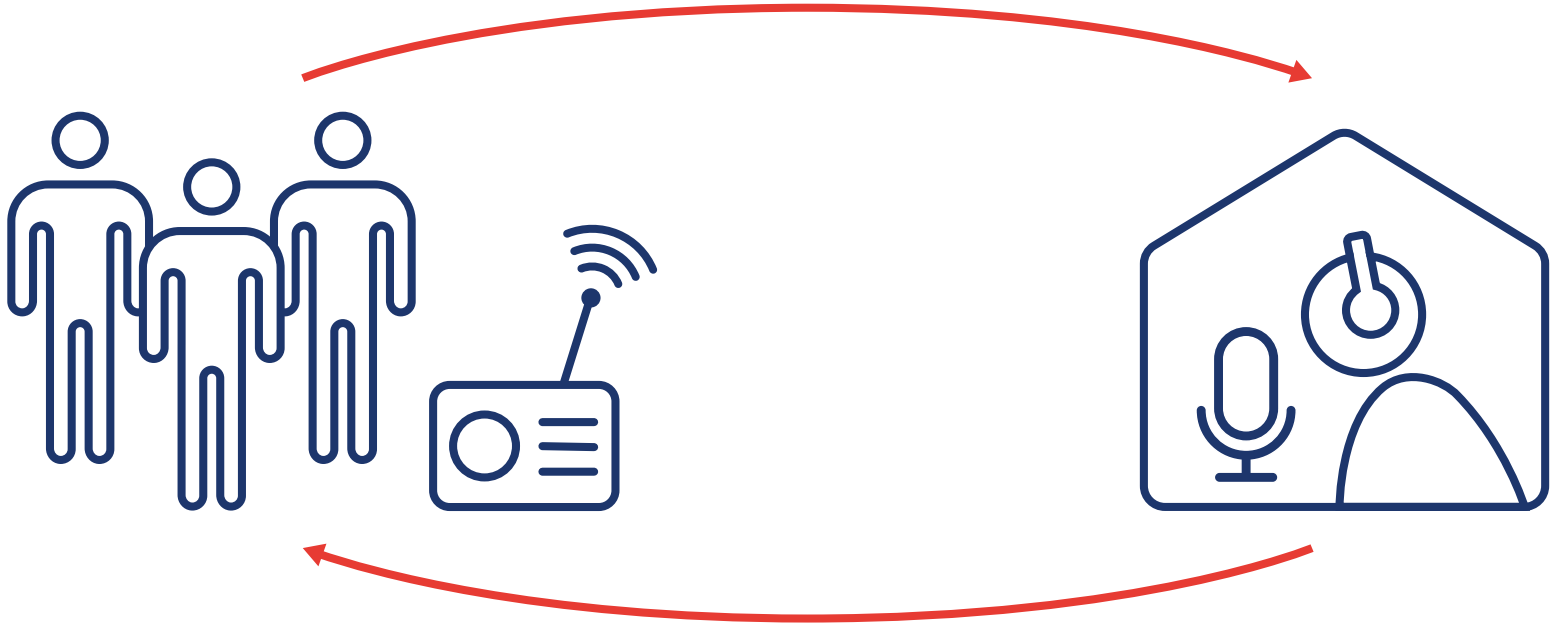
5. Complementing feedback mechanisms with radio programmes

5.1 Introduction

Radio broadcasts are a popular source of information in remote settings –and oftentimes the only one. Where all other infrastructure fails or is destroyed, radio offers a resilient, reliable channel to share vital announcements or invite public debate. Aid agencies can take advantage of this communication channel that locals already are used to.

Technically, aid actors have different options:

- Using national broadcasts for urgent or regular announcements;
- Contributing humanitarian shows to existing radio stations;
- Setting up small, new radio stations for local humanitarian information, or where no station exists;



Broadcast widely or target humaanitarian information, advertise feedback channels, explain programming, accountability, etc.

Record informative radio programme with and for local communities.

Benefits	Problems	Recommendations
Widespread and popular	Radio itself does not receive feedback or messages	Design shows with locals
Reliable, also where infrastructure is damaged	Difficulties with targeting and assessing reach, i.e., knowing who is tuning in	Include entertaining elements to make programmes engaging
Can support accountability mechanisms and strengthen dialogue with communities		Target programming in volatile settings by playing pre-recorded shows in selected locations

TECHNOLOGY TYPES

Radio programmes can be recorded and streamed with different technological tools. In many cases, humanitarian organisations will work with existing (ideally popular) radio stations. In others, they will set up their own stations.

The following variations exist:

Shortwave radio

'Shortwaves' enable highly disaster-resistant radio: Reflected back to earth by the atmosphere, they can reach any point on earth, allowing information to be streamed from secure and stable areas to those that need information.

FM radio stations

The most common radio stations use FM waves and are often already in place.

Humanitarians can get airtime on channels or within specific shows.

Shoebox-size FM

These small radio transmitters can be used to independently host shows and build radio channels where none exist.

Targeted broadcasts

Humanitarians can pre-record shows or information and transfer it to a USB stick or MP3 player to play the audio recording in select areas. That way, agencies can restrict as well as oversee the reach of their show.

Satellite radio

Ideal for broadcasting to people listening to the radio while on the move, because the service will remain available in changing locations as long as there is a portable receiver. The audio quality is much higher and reception is more reliable than with FM.

Internet radio

Everything from producing, mixing, streaming and archiving radio shows can be done with computers and online. This can be easier than traditional radio technology and extremely effective – so long as an Internet connection exists.

MONITORING USES AND APPLICATIONS

Popular local media with wide reach can help make beneficiaries more aware of and responsive to aid programming. A number of ways to support monitoring using radio have been developed and tested:

Spread vital humanitarian information in a timely manner

- Radio provides communication channels where all other networks are damaged, banned or out of service, e.g., in war-damaged or censorship settings.
- It can be used to inform local communities about scheduled aid deliveries, possible threats or news and details that are relevant to their needs.

Explain feedback channels and show that feedback is valued and used

- Use radio as powerful reminders for communities that their feedback is welcome. Consistent reporting on scheduled deliveries, for example, will also help communities know when they should report delays or suspicion of fraud.
- Use radio as a channel to publicise other feedback mechanisms.
- Report back publicly to demonstrate that feedback is welcome and effective.

Create community programmes that give people a voice

- Support or help build local radio stations or programmes that can become self-sustainable and operate long-term.
- Work with local communities both in creating the programme and feature their views and opinions in the programmes.

Collect data and information and complement other monitoring systems

- Interview listeners or affected communities to learn about their perspectives and spread it across the community to both receive and model feedback.
- Host discussion groups on radio shows, inviting local community members.

WHEN NOT TO USE RADIO PROGRAMMES FOR MONITORING

Where sensitive information related to humanitarian emergencies and programmes is broadcast, the security of aid staff and recipients could be threatened.

- **Do not broadcast information on radio when it reveals the location or other sensitive data about vulnerable populations.**
- Do not set up new radio programmes when you cannot guarantee long-term commitment to cater to the need of your listeners. Advertising to an audience may not be worthwhile if the show ends within a few weeks or months.
- Do not use radio to support monitoring efforts when you cannot combine it with other tools. For monitoring and accountability, it is critical to use radio as part of a larger system, e.g., making sure responses to questions asked in radio shows will be analysed, used and reacted to by responsible staff.
- Do not contribute to shows that have not been vetted for potential political or ethnic biases, or their role in the media coverage of a conflict**.**

5.2 Benefits and challenges

BENEFITS

Wide and reliable reach

Because radio is reliable and cheap to receive, it remains the most popular medium for news and public debate in most humanitarian contexts. It makes sense to utilise communication channels that local communities are already using, rather than to reinvent the wheel.

Improved relationships and more trust

Reliable information flows improve aid accountability and the relationship between humanitarian organisations and locals. Listeners can become more familiar with aid programming and the purposes of monitoring. Streaming complaints and feedback can send a clear signal that critique is welcome, thus increasing the likelihood that people start to use other feedback mechanisms as well.

Ability to collect unique individual input

Listeners who call in might otherwise be unreachable or overlooked. If SMS feedback is explicitly requested on a radio show, for example, the immediacy and sense of urgency can prompt people to respond who might not use such a tool otherwise. In addition, interviews and radio guests can explore ongoing issues in-depth. Through interviews, reporters can collect detailed qualitative accounts and anecdotes to find out what aid recipients want and if they are satisfied with the aid they are receiving.

Local engagement, input and ownership

Radio programming offers new engagement avenues with local communities. They can take substantial roles in daily operations as well as the design and contents of radio shows. This also enables local journalistic trainings and radio capacity improvement in the country and can allow access to public debate on air.

CHALLENGES AND MITIGATION MEASURES

Rating	Challenges	Mitigation options
severe	**Security risks to staff and communities** Broadcasting details about planned interventions and publicising feedback numbers increases the visibility of projects and organisations and can create security threats.	**Narrow targeting** • Investigate the reach of different networks carefully. • Use targeted local broadcasts in risky contexts.
high	**Costs can accumulate** Radio is considered a cheap technology. However, setting up an entirely new radio programme or even a small station can be costly and expenses will add up over time.	**Collaborate and find funders** • Seek out partnerships. Consortia can help share costs and risks. Companies or sponsors may be willing to provide equipment or services for free in crisis- response contexts.
medium	**Translation needs and dialects** To effectively reach intended audiences, radio shows need to be translated. Where different local communities have their own dialects, this can be challenging. For international staff not fluent in these languages and dialects, it can be difficult to assess the content and impact of streamed shows.	**Plan and budget** • Hire staff members who are fluent in the relevant languages and dialect. • Survey local communities to understand if the shows are accessible as well as relevant.
medium	**Potentially low uptake** Building an active listenership and regular audience takes a lot of time. There is a significant risk that radio programming will not take off immediately and early investments will seem sunk or ineffective.	**Engage communities in show design** • Start small with short announcements in existing local shows first, with the potential to move on to self-run programmes or stations later on. • Ensure continuity of timing and themes. • Cater to local needs and tastes; mix announcements with entertainment; address both regular and new listeners.
medium	**Biases toward men** Research finds that radio broadcasts are often male-dominated, both in terms of operations and the audience that content is designed.	**Engage women presenters, contributors** • Include women in programme design and broadcasting, either as radio hosts, guests or through interviews.

5.3 Implementation

To work with radio in conflict settings, aid actors should be aware of local radio-usage patterns and able to adjust messages to the interests of local audiences. Beyond that, the appropriate uses and set-ups can vary from context to context.

SET-UP

1. Assess context

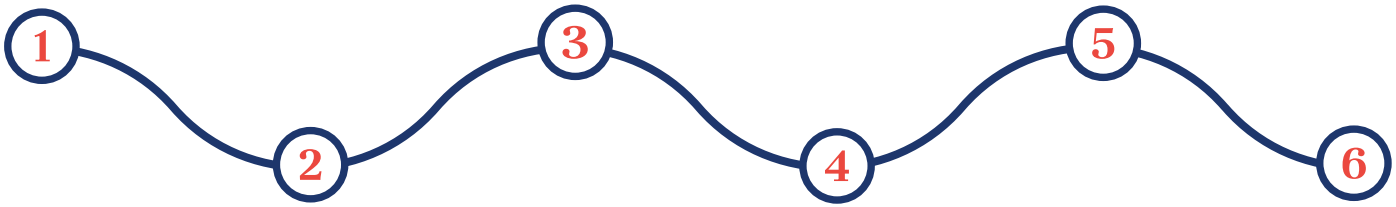
- How widely and commonly are radios used and available?
- Would it be unsafe to broadcast certain information?

3. Set technical parameters

- Should the broadcast reach a broad audience or be targeted?
- Will you use radio frequencies or simply play recordings at select places?
- Do you need to provide portable radios or does your audience have the required equipment?

5. Broadcast regularly

- At what times are people most likely to listen?
- Should you update your programme monthly, weekly, or more often?
- How often will you repeat shows for those who missed them?



2. Seek partnerships

- Are there local radio stations or programmes that would be suitable partners?
- Are there local communities or individuals who could staff a new programme?
- Can companies provide support?

4. Design, write and record shows

- Who in the community can you consult or involve in the show?
- Which information is critical to report and broadcast?
- Which other content or elements might engage your audience?

6. Reassess, follow up and hand over

- How did local communities react to the broadcast?
- What did individuals like about it or find lacking?
- Can the local community start to run this or similar projects or shows?

SELECTING SERVICE PROVIDERS AND PARTNERS

The following table includes an overview of organisations and initiatives involved in humanitarian radio programming.

Provider	URL	About
Internews	**https://www.internews.org/**	Internews aims to build local media capacity, with the understanding that communication is a form of aid in itself. It supports aid actors in setting up their own programmes and provides materials on community radio programmes.
BBC Media Action	**http://www.bbc.co.uk/blogs/bbcmediaaction/tags/resilience-and-humanitarian-response**	The BBC has a dedicated team to support local radio and media. They provide resources, lessons and direct help to humanitarian actors.
International Media Support	**http://www.mediasupport.org/what-we-do/professionalising-journalism/humanitarian-information/**	International Media Support (IMS) aims to boost information dissemination during crises to affected populations. In Somalia and Kenya, for instance, IMS runs Radio Ergo, a daily one-hour humanitarian radio service.
International Radio for Disaster Relief	**http://www.hfcc.org/humanitarian/irdrtrial.phtml**	International Radio for Disaster Relief (IRDR) was trialled successfully in June 2014 in Jakarta as a tool to disseminate information between any wanted points in the world using short-wave radio.
UNESCO	**http://en.unesco.org/radioict/**	The Empowering Local Radios with ICTs project helped expand the capacity of local radios across Africa. Its website offers valuable resources and lessons.
Politics and interactive media in Africa	**http://www.cghr.polis.cam.ac.uk/research-themes/pdtm/pima/**	Based out of the university of Cambridge, PiMA provides various resources for designing interactive radio programmes.

In addition, there are a number of free online tools and services that support interactive radio:

Provider	URL	About
Audacity	**http://audacityteam.org/**	Free and open-source software for recording and editing audio files.
RADCOM	**http://rebaixada.org/radcom/**	App for streaming radio programmes.
Freedom Fone	**http://www.freedomfone.org/**	A telephony platform that interlinks well with radio programming.
FrontlineSMS	**http://radio.frontlinesms.com/**	Pre-built tools to combine SMS surveys with radio programming.

COSTS

The table below offers a worksheet for estimating the costs a radio-based project would involve. Exact numbers depend on country rates and project needs.

Item	Details or staff time to be paid (insert costs depending on your context)	Total
Hardware	..... + ... + ... + ... Recording device Microphones Computer Audio-player	=
Production cost	..... + ... Staff time for interviews/research Staff time for recording and playing	=
Airtime	..... or ..... Fee to local/national radio station License/fee for own radio frequency	=
Incoming messages	..... + ... SMS or calling costs for incoming survey responses, etc. Data processing	=
TOTAL (add all sums from right columns)		=

PROGRAMME FORMATS AND CONTENT

Experience suggests that crisis-affected communities respond better and listen more consistently to radio shows that go beyond pure information dissemination. Good programmes bring together several elements including information and entertainment. From a technical view, there are three formats for bringing together and broadcasting this content:

Pre-recorded shows

Shows are designed, recorded and mixed ahead of time.

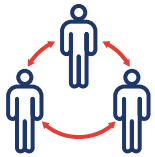
Benefit: Shows can be fine-tune and improved during editing to make the best possible programme.
Downside: It likely involves extra time and it may be less appealing to listeners.

Live broadcast

The show is streamed immediately to audiences, and recorded elements can be mixed in.

Benefit: Suitable for transmitting important, immediate information. It is technically simple and cheap.
Downside: The broadcast can be interrupted by damaged lines or suffer from poor connections. It also requires training and practice.

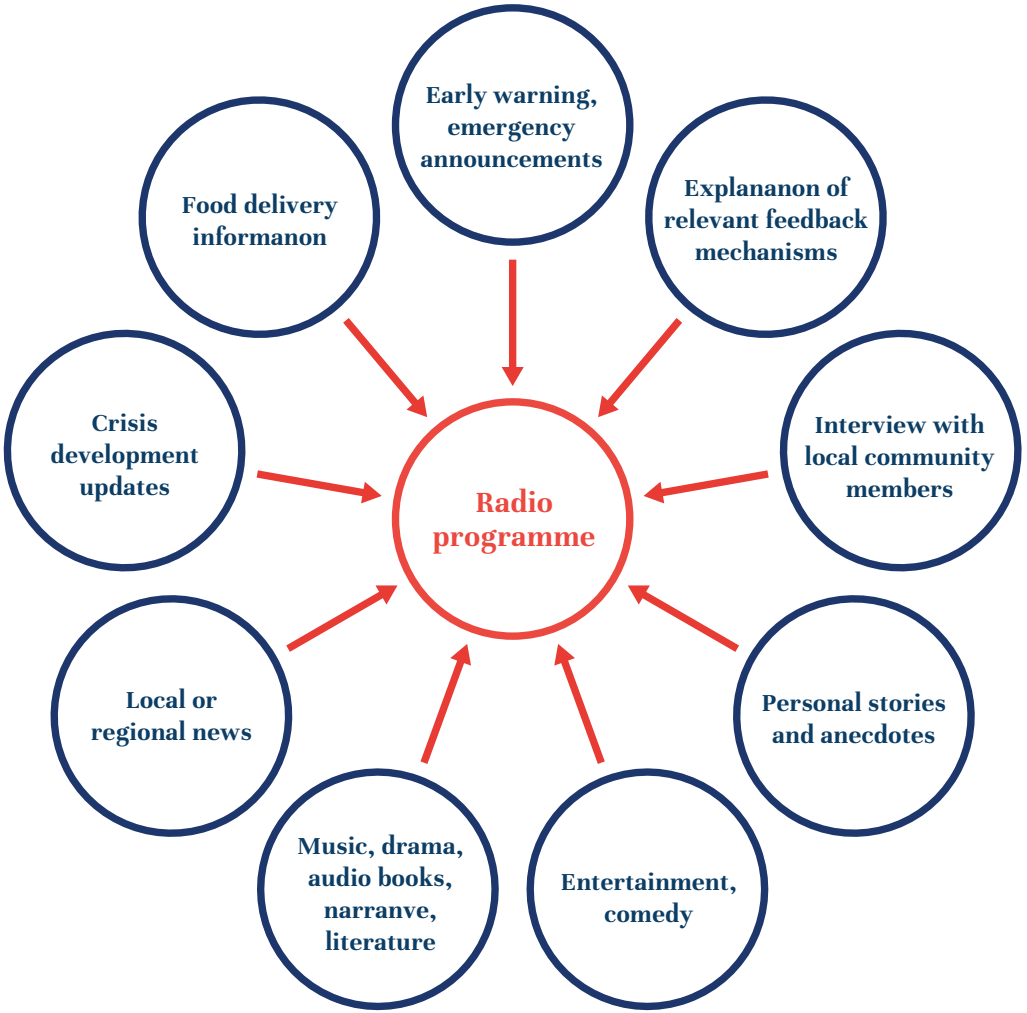
Interactive programmes



The show is streamed live and guests are invited. Alternatively, listeners can call in or send SMS in response to questions.

Benefits: Research suggests listeners prefer interactive shows. Hosts can build relationships with audiences and increase listening rates.
Downside: Takes preparation and skill to handle incoming information and callers.

Maintaining a regular audience is key to assuring that critical information is heard. The diagram below shows what kinds of components an attractive radio programme could include:



JOURNALISTIC VALUES

Over the last decades, professional journalists have established values and guidance that can inform humanitarian broadcasts.

- **Accuracy and accountability:** Report facts and details to the best of your knowledge and always correct errors openly and immediately. Hear the concerns of your audience.
- **Fairness and impartiality:** Aspire to objectivity to the best your ability. Add context to stories. Respect privileged information and protect sources.
- **Balance and independence:** Try not to let your own views or agenda influence your reporting. Remain free from bias and reveal and address conflicts of interest.
- **Responsiveness and openness:** Always give people the chance to respond to issues that affect them, for example, in the case of accusations.
- **Humanity:** In journalism and outreach, as in aid, aspire to do no harm.

CONFLICT-SENSITIVE REPORTING

When broadcasting within conflict settings, language needs to be used carefully. The NGO Internews suggests the following adjustments for conflict settings:

Traditional terms	Conflict-sensitive suggestions by Internews/PiMA
All-out war, battle...	Skirmish, conflict, disagreement...
Terrorist, Islamist...	Religious extremist, acts of terror...
Murderers...	Attackers, alleged killers...
Mob...	Angry crowd...
Our people...	People living here...
An ethnicity...	Other attributes that describe the person...

5.4 Solution stories

"HYPER-LOCAL" RADIO IN SOUTH SUDAN

Country: South Sudan
Technology: Radio broadcasting, USB recording and player
Task: Keep people in a protection of civilian site well-informed and hear their feedback

Problem

South Sudan presents a challenging context for the use of technologies. Many people do not have mobile phones, nor smartphones or Internet access, and the mobile network is patchy, especially in rural areas. Moreover, years of aid deliveries, frequent surveys and consultations of affected populations by aid agencies have left many people disillusioned about their ability to influence aid programming.

Solution

Internews attempted to develop a reliable information and communications channel both to keep communities updated and alert, and to hear their feedback. They did so in selected Protection of Civilian (PoC) sites, where more than 10 per cent of the South Sudanese population live in great need for information. Internews wanted to provide a community radio station that people inside PoCs could help create and shape, which would provide them with reliable information, including updates on conflict developments, but also offer something that they would enjoy in daily life. The programme also needed to be somewhat discrete, as publicly blasting information intended for those who require protection could potentially cause harm.

The small team working in South Sudan chose not to use radio-broadcasting waves that could be picked up by anyone. Instead, they used a setup where shows were pre-recorded, stored on USB sticks and then attached to and played using speakers that were physically brought to select locations by bike. To build an audience, the team stuck to specific times in specific places. As Internews expected, people were typically timid at first. Eventually they picked up what they heard, became curious and soon crowds would form at scheduled broadcasting times.

Importantly, the shows themselves were recorded together with the community. This allowed Internews to create a programme that communities would continue even after they had left.

Adjustments

Over time, the team adjusted the content of the shows to develop stronger engagement by communities. For example, it was important to combine critical information within entertaining and fun elements. The elements used in programmes included jokes, interviews with local people, drama, and news.

Lessons

1. **Do not only consider your own information needs, but also create something that people enjoy.** Including entertaining elements was critical for the success of the initiative.

2. **Plan early for how to maintain the programme in the long run.** Locals were involved in creating the show from the beginning. The local team grew with time, replacing internationals.

For more information on the 'Boda Boda Talk Talk' Project by Internews and USAID, see:

- https://internews.org/our-stories/project-updates/boda-boda-talk-talk
- https://www.theguardian.com/global-development/2015/may/08/south-sudan-nile-radio-project-calming-community-tensions

LOCAL BROADCASTING SUPPORT TO AMPLIFY SOMALI VOICES

Country: Somalia
Technology: Radio
Task: Improve communication between communities and humanitarians

Problem

Information sharing in Somalia can be an enormous challenge: Humanitarians struggle to get important messages to local communities, while these do not always find it easy to make their voices heard by agencies.

Solution

'Radio Ergo' was founded in 2008 to fill this gap. The Somali-language radio station is based out of Kenya and supported by the International Media Support (IMS) and the Swedish Fojo Media Institute. The word 'ergo' means mediator, reflecting the show's purpose: providing information to help people make informed decisions.

Radio Ergo streams every day from 3 to 4 PM on shortwave radio in order to reach people in remote areas who are not served by FM radio. Some local FM stations re-broadcast the show, and it is also available on the station's website. The show is based on local reporting gathered by a network of correspondents. Themes include health, education, protection, agriculture and livestock, gender, youth and employment, environmental protection, culture and issues of governance.

Adjustments

Originally, Radio Ergo was run by IRIN news. After gradually handing over responsibilities, it is now run locally. The station was able to secure funding from various donors and to carve out a clear niche and develop loyal listenership.

To make the show more interactive, Radio Ergo partnered with FreedomFone, a tool for managing and sending large numbers of SMS that is suitable for radio programming, allowing listeners to text in requests, comments or poll responses.

Lessons

1. **Effective information channels take time to build.** Rather than simply setting up a radio station and starting to broadcast, significant investments were required to create community buy-in.

2. **Transition projects into local hands as soon as possible.** While international experience and funding channels were useful in setting up the project, the transition to a locally run project inspired community support and improved the relevance of the content.

More information is available online:

- Radio Ergo: http://radioergo.org/index.php?lang=1#
- International Media Support: https://www.mediasupport.org/areas/africa/somalia/

5.5 Links and resources

Humanitarian Broadcasting in Emergencies: a synthesis of evaluation findings. **http://www.bbc.co.uk/mediaaction/publications-and-resources/research/reports/Humanitarian-broadcasting-in-emergencies-synthesis-report-2015**

This report documents the findings of four evaluations of responses around the 2015 Nepal earthquakes, the 2014/15 Ebola epidemic, the Syrian refugee crisis and the 2014 conflict in Gaza.

Combining 'missed calls with radio and other media'. **http://www.eventuresincyberland.com/2014/11/disruptive-mobile-plays-well-with-older-radio/**

This article explains how development professionals are increasingly pairing radio and 'missed calls' to facilitate interactive communication.

Toolkit for conflict-sensitive reporting in violent contexts. **https://internews.org/research-publications/reporting-atrocities-toolbox-journalists-covering-violent-conflict**

Built a as an actionable resource and guidance for hosts, this toolkit explains broadcasting principles, provides practical examples, templates, and advice for radio and other reporting in conflict settings.

Improving communication between humanitarian aid agencies and crisis-affected people: Lessons from the Infoasaid project. **http://odihpn.org/resources/improving-communication-between-aid-agencies-and-crisis-affected-people-lessons-from-the-infoasaid-project/**

Infoasaid was established in 2010 to improve the quality of humanitarian responses by maximising the amount of accurate and timely information available to humanitarian responders and crisis-affected populations through enhanced communication between them in an emergency. This paper documents the experience of Infosaid in setting up the project and summarises main lessons from the perspective of the project and its partners.

Evaluation of the NRC Humanitarian Access Communication Project. **http://www.nrc.no/globalassets/pdf/evaluations/afghansitan-humanitarian-access-evaluation.pdf**

This evaluation report specifically focuses on the media component of a project implemented by NRC in Afghanistan and its use of radio to share information and engage communities.

6. Communications with online platforms

Where online communication platforms are popular, aid agencies can use them for their monitoring, feedback and accountability efforts. This includes social media networks such as Facebook and Twitter, as well as instant messaging applications like WhatsApp. These tools make it possible to transmit information and messages via online connections – often free of charge.

For monitoring, online platforms are unusual, though elements can be used to share and collect information. When using them in insecure or conflict-affected contexts, several challenges need to be addressed, especially around information security and data protection.

In this chapter:

6. Communications with online platforms

6.1 Overview

With the advent of the Internet, online communication platforms have surged in many countries and are used to facilitate communications among aid staff and local communities. Two types of platforms can be distinguished: first, social media and publicly accessible networks, and second, direct online messaging apps for one-on-one or group conversations.

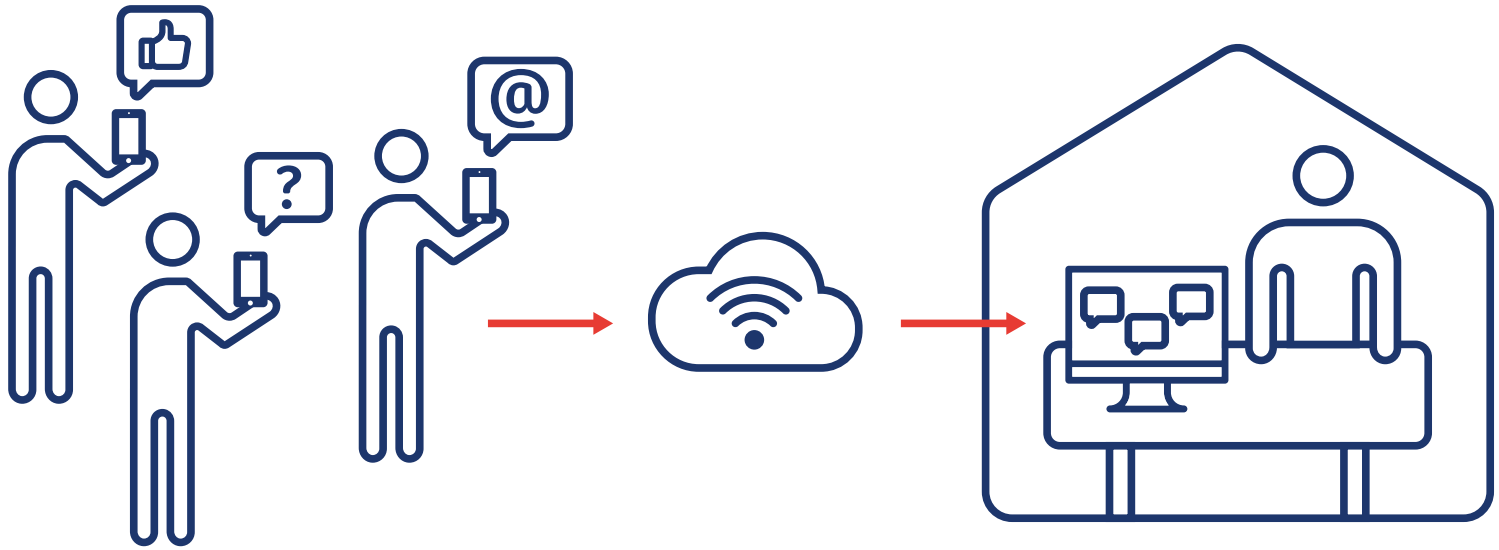
If used carefully, social media can fulfil effective complementary functions for:

- **Complaints and suggestions channels:** Instant messaging apps make it is easy to provide communities with a number for sending comments directly to organisations. Unlike SMS, sending instant messages over the internet is free and can be more practical and efficient than using complaints boxes or making calls.
- **Outreach and accountability efforts:** Where local communities already use online platforms, they offer practical channels for aid actors to report back to – for example, on feedback they received and acted on. This can happen via public social media platforms or bulk communications on instant messaging apps. Being visibly responsive can in turn make aid recipients more likely to submit feedback.
- **Internal communications for staff:** In remote programming settings, M&E and programme teams use available online communication channels to coordinate their work amongst each other as well as with partners or third parties.
- **Analysing responses:** Analysis of large amounts of social media data is possible for organisations that wish to better understand local perceptions on aid programmes and services. Using social media analytical tools, organisations are able to judge support of programmes through positive or negative feedback, analysing large amounts of data in a short period of time.

However, several limitations and challenges need to be considered when using online communication platforms. First, they still often introduce a bias toward those people who can afford internet access and are comfortable using them, i.e., young and relatively more-affluent people.

Second, challenges around data privacy as well as security have not yet been sufficiently recognised and addressed.

Third, analysing large volumes of data, especially in multiple languages, can be very time consuming and requires a great deal of skilled labour.



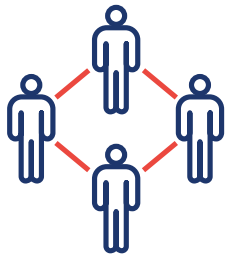
People in local communities can post comments, send questions or feedback via online/cloud channels directly to the aid organisation.

Benefits	Problems	Recommendations
Low cost or free of charge	Privacy and security risks involved with using public channels that are owned by private companies	Use as complementary channels, never exclusively
Easy to use	Online communication requires connectivity, infrastructure and computers/smartphones	Check and verify messages and trends for possible bias and accuracy
Hugely popular in increasing number of contexts	Risk of expectation mismatch as those sending feedback might assume immediate response/ impact	Develop standards and guidance on responsible use of online platforms
Analysis of online communication can inform programming and M&E		Clearly inform local communities about what they can expect when submitting messages

TECHNOLOGY TYPES

'Online communiations platforms' cover a range of different tools, softwares, smartphone apps, browser extentions and more. The list below introduces two different types that are relevant to humanitarian action.

Social media networks and platforms



Social media websites and applications are used for social networking among larger groups, such as Facebook, Twitter, Instagram etc. To engage, users typically need to join the network and / or create a profile.

Instant messaging or call services

Various tools enable online text or voice communication with applications such as WhatsApp, Skype, Viber or other messenger apps. Providers often do not charge money. Users add each other's numbers or ID to reach one another.

MONITORING APPLICATIONS FOR ONLINE PLATFORMS

Where Internet and technology access are reliable, online communication can offer cheap and useful communication channels. The following uses for monitoring are summarised:

Improve context understanding

- Scan public social media conversations and photographs to understand what local communities are discussing and concerned about.
- Analyse indirect data. Use analytical tools to examine comments, likes and dislikes, and negative and positive feedback on any issues.
- Stay up to date with local developments and, in certain regions, understand pressing issues virtually.

Applications: Facebook, Twitter, YouTube, Instagram, Flickr

Receive messages and comments via messaging applications

- Publicise numbers or IDs where local communities can reach you directly.
- Receive and respond to complaints or suggestions.
- Analyse these messages and react through the same channels.

Applications: WhatsApp, Facebook Messenger, Google Hangout, Viber, Email

Remote meetings or trainings

- Train M&E staff inside an inaccessible area via online calling or messaging tools.
- Hold daily or regular meetings via online platforms to maintain relationships even from a distance.
- Offer affected communities the chance to reach out to and talk with M&E staff.

Applications: Skype, Viber, WhatsApp, Google Hangout

Spread messages widely

- Use public platforms to promote the feedback channels aid recipients can use.
- Publish beneficiary selection criteria, minimum standards and other information that can help improve transparency.
- Send mass messages directly to people who opt in to receive information or updates from your organisation.

Applications: Facebook, WhatsApp, Email

WHEN NOT TO USE ONLINE PLATFORMS

Online communication platforms are easy to use and cost-efficient, but they can entail strong biases and introduce severe risks. Aid activities should thus not rely exclusively on online platforms, nor require aid recipients or staff to use them without offering alternatives.

- **Do not use online messaging platforms when these would reveal sensitive delivery or warehouse locations, or names of people and information that could put them at risk.** Once information has been published online, it becomes impossible to know who has seen it. In insecure environments, revealing the location of planned deliveries or vulnerable populations can entail significant risks.
- **Do not use online platforms where you cannot balance inherent biases with other sources of information.** People post voluntarily on online platforms but those who make their voice heard the loudest are not necessarily the most representative nor the most vulnerable.
- **Do not use online platforms that most potential users will have to register for.** It can be problematic to ask aid recipients to accept the terms of services of these tools. It is generally preferable to focus on channels that communities are already actively using.

6.2 Benefits and challenges

Habits and use patterns of online communication platforms differ across cultural contexts. In all contexts, social media is best used to supplement monitoring efforts, not to substitute for the bulk of monitoring.

BENEFITS

Platforms provide an easy-to-use and popular channel for feedback

If many members of a local community are already communicating on a given platform, aid agencies can 'meet them where they are'. The most popular online platforms are often designed to be very user friendly. This makes it very efficient for aid organisations themselves to establish a presence.

They can open an alternative communication channel to otherwise isolated populations

In South Syria, for example, WhatsApp is sometimes one of the only communication channels working with very little bandwidth even in areas where regular phone networks have collapsed.

There is room for innovation and custom tools for humanitarians

The surging interest in online platforms for humanitarian purposes, including from the companies that provide them, suggests a lot of room for expansion and customisation. Add-ons, new features and new tools can be developed to meet specific needs.

Messages do not expire

A great advantage over traditional phone hotlines, for example, is that online a message can be sent at one moment and then accessed later when the reader's device is connected to the Internet. Messages can also be archived easily.

Unique accounts offer benefits for communicating with mobile populations

For online communication platforms such as Facebook and WhatsApp, user-IDs or profiles are not tied to a phone number, but stay the same even when users change locations or networks. Nomadic or displaced individuals can thus be reached through the same ID throughout their journeys.

CHALLENGES AND MITIGATION MEASURES

With increasing use of social media and other online communication platforms in humanitarian contexts, the inherent limitations and challenges have become more obvious. Issues around social media use could, for example, be observed in Facebook's use as a feedback mechanism in the humanitarian response to Typhoon Haiyan:[1] while many organisations were excited about its promise, research later showed that the messages coming through were heavily biased.

Rating	Challenges	Mitigation options
severe	**Bias towards certain groups** Access to social media and online platforms requires internet and a digital device. Less wealthy and more vulnerable people may not be able to use these channels to voice their views.	**Cross-check with other sources** • Carefully assess the biases your data contains before drawing conclusions. • Establish standards and good practice on how information will be regularly cross-checked with other sources.
severe	**Infiltration and fraud** The open nature of online channels makes it possible to register fake accounts and send fraudulent messages or false accusations. Similarly, people can copy the branding of an organisation and claim to report back as them. Aid organisations are typically not in a position to verify the identity behind online accounts.	**Verify, ask and report** • Use offline and online sources to confirm the identity of vocal users communicating with your agency. • Monitor media accounts to see if someone has created an account claiming to present your organisation. • Report fraudulent accounts imitating your brand directly to the platform provider.
severe	**Privacy risks of social media platforms** On public pages such as Facebook, and also in WhatsApp groups, other people can read messages posted. Furthermore, governments may engage in surveillance of online and phone communication.[2] In conflict environments, messages need to be carefully managed so as not to put individuals or aid efforts at risk.	**Limit use and data sent via platforms** • Do not promote public Facebook pages as channels for feedback. If people do post on a Facebook page, respond with a direct message and point them to alternative channels. • Never share confident or personal information that could be used against someone via such online channels. • For smaller projects with a defined set of beneficiaries, set up secure messaging apps like Threema or Signal.

[1] Humanitarian Technologies Project: www.humanitariantechnologies.net
[2] See the Secure Messaging Guide for a security assessment of apps and tools: https://www.eff.org/secure-messaging-scorecard

Rating	Challenges	Mitigation options
high	**Expectation management** The invitation to send direct messages to an aid organisation can raise expectations for direct responses or reactions. This may be difficult for capacity constraints or because complaints lie outside the organisation's mandate. This can lead to frustration and disappointment among local communities and harm the organisation's reputation.	**Communicate and explain** • Communicate realistic expectations clearly. When publicising numbers and online channels, also add an explanation how soon you can realistically react. • Explain the purpose of feedback clearly, if possible in person. Tell people why their opinion is valuable to aid efforts even when not all wishes can be fulfilled. • Respond publically to frequent feedback. If many messages are addressing similar concerns, make it publically known when you do react.
medium	**Divert time and attention away from other important channels** The immediate and "urgent" style of communication on social media can attract a lot of attention. It is easy and quick to set up, but it can quickly draw people into its "buzz." As a result, limited available time may be taken away from other feedback channels.	**Assign responsibility and establish policy** • Determine how social media and messaging platforms fit into the broader feedback strategy. • Stick to your own policies and monitor time spent on various channels. • Crowd source to avoid essential staffs time being consumed by sorting through large datasets
medium/low	**Dependency on third parties** When using messaging applications or social media, aid actors rely on and agree to the third party providers' terms of use. These are not accountable to the humanitarian principles. Providers could also stop or interrupt a service if they so desire. Moreover, they typically can control and own the content users share and receive.	**Engage providers or, if necessary, consider self-hosted alternatives** • Reach out to providers and explain how you use their product. They may be able to assure reliable service or even adjust some regulations to your needs. • In some instances, it may be better to explore self-hosted platforms, or open-source alternatives that give you complete control over all content. • Look at the history of providers. A new platform might be exciting and meet your needs, but an established platform is less likely to disappear in a few months.

6.3 Implementation

SET-UP

1. Identify the most widely used tool
- How many people are using it actively?
- What is the communication "culture" around it? Is it used for voice or text communications or both?

2. Define and assess monitoring goal
- What kind of data can you realistically expect to receive?
- Have other organisations around you used it? What was their experience?
- What volume of messages can you expect to start coming in?

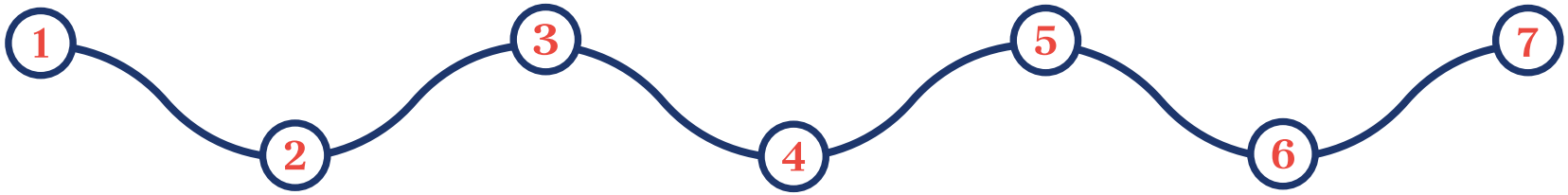
3. Assign responsibility to process and respond
- Does your staff have the capacity to respond to a possibly large volume of communication?
- How will the messages fit with other feedback mechanisms already in place?

4. Advertise the channel widely
- What will be the most prominent way that the intended community can find out about your system?
- How will you verify that they are picking up your communication?

5. Receive messages
- Do you need those submitting information to identify themselves to you?
- Do you need them to submit information about their location or background?
- Where will messages be stored? On your server or in the cloud?

6. Respond to messages
- Will you send answers to each incoming message?
- Will you react in any other publically visible way by following up with those sending messages or sharing updates elsewhere?

7. Review if the content you receive makes a difference
- Are the incoming messages what you expected they would be?
- Are you receiving insights that are different to those from other channels?
- Do you gather that local communities are content with having the extra channel?



SELECTING SERVICE PROVIDERS

If aiming to reach as many people as possible, it makes sense to use platforms that technical experts have built and that local communities already use. These commercial providers often offer services free of charge. However, in exchange, service providers often maintain rights over data and services.

COMMERCIAL SERVICES

Provider	URL	About
WhatsApp	**https://www.whatsapp.com/**	The messaging app can be used as a 'hotline' that crisis-affected communities can report and send questions to, or as 'groups' for communication with colleagues.
Facebook / Facebook Messenger	**https://www.facebook.com/**	The biggest social media network is often useful to give M&E staff context information on their operations. It is less effective, or even risky, as a feedback channel. Facebook also offers its own app called Facebook Messenger that functions like a one-on-one or group messaging tool.
Skype	**http://www.skype.com/**	Skype is appreciated for conference calls or virtual meetings.
Webex	**https://www.webex.com/**	Webex is an online conferencing and collaboration tool that is frequently used for trainings and meetings. The service is free for up to three persons per meeting, while paid subscriptions allow unlimited meeting services.
Zoom	**https://zoom.us/**	Zoom offers cloud-based video communications and webinar software. Free plans limit the possible meeting time, but paid subscription includes diverse collaboration and meeting functions.
Threema	**https://threema.ch/en**	Threema offers an independently hosted, end-to-end, encrypted alternative to WhatsApp for messages, group chats and sending files. Because it is not as widespread as WhatsApp, Threema lends itself to specific uses such as secure remote team communication. A licence currently costs 2 CHF.

Provider	URL	About
Signal	**https://whispersystems.org/**	Signal is a free alternative to Threema, offering equally trusted end-to-end encryption and independent hosting. In addition, Signal enables video messaging which can come in handy for remote team communication.
Viber	**http://www.viber.com/**	Just like WhatsApp, Viber enables messaging and picture sharing via Internet connections and, like Skype, free phone calls. It is less common than the other two platforms.
Twitter	**https://twitter.com/**	Millions of users share messages on this platform. Aid organisations can use it to follow select users or to "tweet" out to people themselves.

An interesting – though not yet widely used – alternative is offered by more security and privacy-conscious 'free and open source software (FOSS)'. The builders publish the code of these tools to allow security experts to review it. In addition, they build encryption into the design to prevent interception, even from the providers.[3] Two stand out as ready-to-use for humanitarians:

OPEN-SOURCE SOFTWARE

Provider	URL	About
Signal Private Messenger	**https://whispersystems.org/**	Computer security experts endorse and use this messaging app. It works nearly the same way as WhatsApp and Viber, enabling messaging and calls. However, all information is end-to-end encrypted and can only be read by sender and receivers. Moreover, many people in humanitarian contexts are not yet registered users and would have to download the app.
GlobaLeaks	**https://www.globaleaks.org/**	Currently used in human rights contexts, this tool for anonymous whistleblowing can also be utilised in humanitarian conflict settings. It allows people to submit information but does not collect any identifiable data that could put users at risk.

[3] **For more information on messaging apps that protect your privacy see: https://myshadow.org/alternative-chat-apps and https://www.eff.org/secure-messaging-scorecard**

COSTS

At minimum, these apps require users to pay for an Internet or mobile data connection and devices to access them. While most do not charge a fee for basic services, they do charge for additional services as part of a subscription. Notably, apps that use voice communications use up more bandwidth and thus are more costly.

Even if registration and use of the platform does not cost money, it does require organisations to put staff time and capacity into it. The cost will thus depend on the context and extent to which a project uses social media or messaging. When used at scale, aid organisations will need to hire one or more full-time staff to receive, sort and respond to incoming messages. Additionally these messages may be in more than one language depending on respective country.

For analytics, a number of free tools, such as Google Analytics, exist. Others are available for a cost. See this overview for more details.

6.4 Solution stories

THE ROLE OF WHATSAPP IN THE SYRIAN CONTEXT

Country: Syria and neighbouring countries
Technology: WhatsApp online messaging
Task: Collecting feedback channel and facilitating daily communication among staff

Problem

Aid agencies working in Syria struggle to provide reliable, constant channels to collect feedback and communicate with aid recipients to maintain contextual awareness. In addition, the remote (i.e. cross-border or cross-line) nature of most aid programmes means that also within organisations, regular communication poses challenges.

Solution

WhatsApp is very popular in and around Syria. People use WhatsApp to stay in touch with friends and families, and receive news and security updates. As WhatsApp IDs stay the same even as people move across locations and network providers, it is especially useful for displaced populations and people on the move. In this information ecosystem, national aid organisations have relied on WhatsApp since the early phases of the crisis. Their international peers followed more recently and integrated WhatsApp into their work. It is now used to create and run groups that connect agency staff outside Syria with monitoring teams in-country.

Moreover, agencies announce WhatsApp numbers during distributions and publicise them in their outreach. Just like phone hotlines, aid recipients and local actors can use these numbers to send their complaints or inquiries to aid organisations.

Adjustments

As the app became more popular with communities, agencies realised the need for standards and guidelines on who is responsible for handling and responding to incoming messages and follow-up. This was challenging for national aid organisations who did not have experience in setting up feedback systems. International aid agencies also struggled to develop clear guidelines for what type of information should be shared with them by implementing partners and what should be reacted to and handled in the field.

Lessons

1. **Meet people where they are.** If channels like WhatsApp are already widely used and popular, it is advisable to tap into these information flows rather than setting up entirely new channels.

2. **For specific information needs and feedback on quality, use targeted questions rather than open feedback channels.** Similar to phone hotlines, communications received via WhatsApp concerned mostly targeting and basic operational questions. If agencies have specific information needs or want to learn about corruption, additional channels and in-person consultations are necessary.

3. **Make sure the capacity to react to feedback is in place before setting up new channels.** While easy to set up, a WhatsApp number needs systematic processes to handle incoming feedback in order not to disappoint expectations of those providing feedback.

THE USE OF SOCIAL MEDIA IN THE NEPAL EARTHQUAKE RESPONSE[4]

Country: Nepal
Technology: Social Media Analysis
Task: Improve context-understanding through social media conversations

Problem

Understanding social media communication could increase context understanding and allow a richer interpretation of pressing issues for the population. However, individual aid agencies are generally not in a position to monitor communications in a structured way and collect the required volumes of data.

Solution

The ACAPs project commissioned a three-month analysis of social media communication in Nepal to help aid agencies improve their understanding of the situation and reach better programming decisions. Through an analysis of mainly Twitter, Facebook, YouTube, Flickr and blog content, the project sought to identify concerns and trends emerging amongst the affected population and understand conversations related to the quality and accessibility of aid. This allowed aid agencies to see which issues communities cared about and also which topics flared up and which ones communities discussed continuously. In addition to a general understanding of topics and their intensity, qualitative analysis also revealed trends and shifts in concerns – for example, response-related topics immediately following the earthquake and greater communication about reconstruction in later phases of the response.

The project also showed the limits of social media analysis to inform humanitarian programmes. It was not useful for breaking down needs geographically and the data showed considerable bias towards urban and more affluent segments of the society.

Adjustments

Some tools initially considered for the analysis had to be discarded, because they did not offer the required features or were too expensive. Moreover, most available media analysis tools only support content written in English, French and Spanish. Thus it was difficult to find tools to analyse content written in Devanagari script, and some functionalities had to be dropped to allow analysis of Nepali. After evaluating different options, the team chose four applications: Mention, Flipboard, Crimson Hexagon, and Geofeedia.

Lessons

1. **Historical data is essential to interpret today's communications.** Software that allows analysis of historical data should be employed to establish baselines and determine whether changes in social media communication patterns have occurred.

2. **Strong biases limit usefulness of data.** While some issues after a crisis affect all members of a society, social media is strongly biased to show the perspective of the urban population and youth.

3. **The usefulness of social media analysis in conflict-affected contexts is not clear.** To be included in social media analysis, information needs to be public. Naturally, users tend not to communicate about sensitive issues in public networks. In most conflict settings, use of social media is subject to a range of constraints and its use can entail considerable risks. More research is necessary to determine the usefulness of social media analysis in conflict-affected contexts with high numbers of potential users, such as Syria and Iraq.

[4] This example is based on a report prepared for ACAPs by Timo Lüge. For the full report, see http://sm4good.com/2015/10/12/lessons-learned-social-media-monitoring-humanitarian-crises/

6.5 Links and resources

Communicating with communities in armed conflicts and other situations of violence.

At the time of completing this toolkit, a new research project was being launched by The Engine Room, the International Committee of the Red Cross (ICRC) and Block Party. This research aims to increase knowledge and understanding of the global messaging app market, including apps' functionalities and considerations around privacy and data protection. It will document examples of how local communities and humanitarian organisations are using messaging apps and provide recommendations for how these could be used responsibly.

More information will be available at https://www.theengineroom.org/upcoming-research-brief-messaging-apps-humanitarian-sector-armed-conflicts/

Guidance for Incorporating Big Data into Humanitarian Operations. **Available at: http://digitalhumanitarians.com/sites/default/files/resource-field_media/IncorporatingBigDataintoHumanitarianOps-2015.pdf**

This general guidance document provides an in-depth analysis of social media data, the benefits and challenges of its use for decision-making, considerations to be taken and how best it can assist in a humanitarian response to crisis. It is intended to support information or data focal points in humanitarian organisations, surveying possible approaches to integrating big data into their organisations and making informed decisions about its use.

Seminar recording on social media for humanitarian protection. **Available at: https://vimeo.com/51451865**

This recording from 2012 summarises the increased use of social media in disaster-affected areas including Somalia and Syria and what this means for humanitarian protection.

REACH study on social media use in Syria. **Available at: http://www.reachresourcecentre.info/syria/syrreportcommunication-channels-and-social-media-usage-in-syriaseptember-2015**

This study presents the results of a survey on media use in Syria, conducted with the help of informants identified in the neighboring countries Jordan, Lebanon, Turkey and Iraq. It shows, amongst other findings, the important role of WhatsApp and Facebook.

The use of ICT in contemporary mixed migration flows to Europe. **http://regionalmms.org/fileadmin/content/rmms_publications/RMMS%20Briefing%20paper%202_Social%20Media%20in%20Mixed%20MigrationUPLOAD.pdf**

This briefing paper produced by DRC and the Regional Mixed Migration Secretariat for the Horn of Africa and Yemen provides an analysis of how migrants use applications such as WhatsApp, Facebook, and other online communication platforms.

***Social Media in Disaster Risk Reduction and Crisis Management*. Available at: https://www.researchgate.net/publication/259202727_Social_Media_in_Disaster_Risk_Reduction_and_Crisis_Management**

This study reviews the use of social media in emergency, disaster and crisis situations. More specifically, it looks at uses of social media to understanding public debate, monitoring situations, extending emergency response and management, crowd-sourcing and collaborative development, creating social cohesion, furthering causes (including charitable donation) and enhancing research.

***Verily*. https://veri.ly/**

Verily is a crowdsourcing platform designed to rapidly crowd source the verification of information during a humanitarian disaster.