Mapping with mobiles

Lessons learnt from the use of smartphones for fast humanitarian surveys in Zimbabwe

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HIFC
Humanitarian Information Facilitation Centre

IMS
INTERNATIONAL MEDIA SUPPORT

Mapping with mobiles

Questionnaires on smartphones can replace traditional paper forms and transmit answers directly from the field to a centrally placed server for immediate analysis

Mobile telephony has long been praised for its ability to connect people to friends and families in even the poorest parts of the world. What is less appreciated is that mobile communication technology can also be utilised to create links between populations and authorities that are supposed to assist them.

This is particularly true in the field of humanitarian information. SMS services have become a very efficient tool to warn people of health threats such as epidemics or water pollution, but smartphones can also be utilised to stream information in the opposite direction when they are used as tools for snap surveys. In both emergency settings and well-planned national surveys, questionnaires on smartphones can replace traditional paper forms and transmit answers directly from the field to a centrally placed server for immediate analysis. This report documents the experience of such a survey that was piloted in Zimbabwe by a local NGO, the Humanitarian Information Facilitation Centre (HIFC). The survey had two main objectives:

- To test the tool itself and ascertain the feasibility of the open-source Nokia Data Gathering (NDG) software in an environment that is both technically challenging and politically sensitive.

- To carry out a national survey on the population's use of various sources of information in order to help humanitarian organisations and government agencies to improve their communication strategies.

The survey would map people's sources of information – from newspapers and TV to the village headman – and gauge the perception of the credibility of these sources. This knowledge could be life saving during epidemics and other emergencies and helpful for campaigns against health risks such as HIV/AIDS. The survey was carried out by sending 30 volunteers with smartphones into both urban and rural settings across Zimbabwe.

Access to information is a highly relevant research topic in Zimbabwe where particularly the rural population has suffered from decades of deliberate attempts to limit the flow of independent information. State controlled propaganda has played an important part in political power struggles; meanwhile dissemination of information on issues ranging from health to education and housing has also been affected. This was very evident during a cholera epidemic that ravaged Zimbabwe in 2008. The many outbreaks were initially shrouded in secrecy as the ruling party was trying to cover up the results of an almost complete breakdown of the health sector. Many humanitarian NGOs were afraid to speak up, as they feared being accused of politicking.

Four years later a coalition government now rules Zimbabwe. This has to some extent improved the humanitarian situation. Delivery of services – not least food aid, fertilizers and seeds – does however at times remain politicised. Solid evidence of needs is therefore crucial for any NGO who wants to get itself involved in humanitarian work.

This was one of the reasons that HIFC decided to test smartphones with the Nokia Data Gathering software as an affordable and easy method to do quick and reliable surveys. It was however with some trepidation that the large national survey was carried out as any gathering of information, especially in heavily politicised rural areas, is viewed with suspicion. Some of the volunteers involved in the survey were indeed questioned by the police. The technical challenges were however more evident. But as evidenced in this report, the overall results of the pilot were encouraging. Most of the volunteers involved managed to overcome the logistical problems and were able to carry out interviews and transmit the completed questionnaires after just one day of training. The pilot study has created significant interest among humanitarian organisations in Zimbabwe who are either borrowing HIFC's pool of smartphones or buying their own to carry out various humanitarian surveys.

In rural Africa mobile phones are most often used to communicate with families and friends. But a pilot survey has proved that smartphones can also be used to map humanitarian needs and communicate these to governments and aid organisations.

Getting ready to go

Due to glaring holes in the data network, monitors doing the survey had to be innovative and were trained in both direct transmission of data and storage on memory cards

Training in the use of smartphones with the data gathering software can be done in just one day. But the pilot showed that particularly people with limited experience of advanced technology would benefit from an extra day and the ability to test the equipment extensively before being deployed.

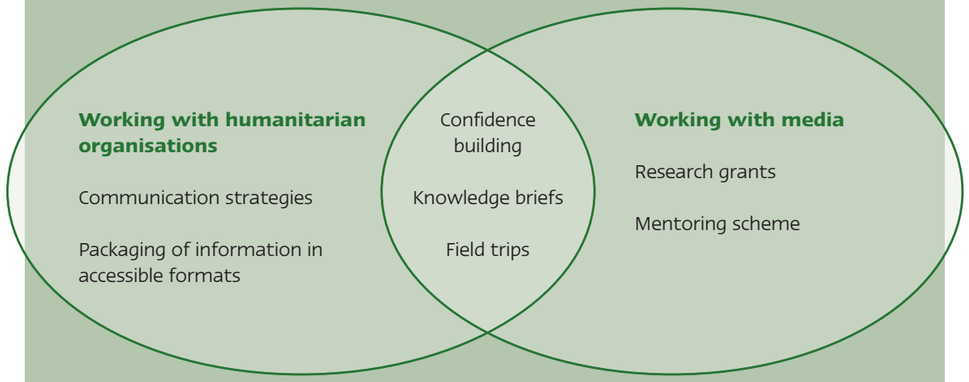
The plans for HIFC's national survey on access to information in Zimbabwe were based on the somewhat daring assumption that the interviewers could use smartphones to transmit data from the rural areas to a centrally placed server. Technically this should be possible as data transmission via 3G and GPRS has been available for some time; the quality of mobile communication in Zimbabwe has improved dramatically and far quicker than most other service delivery in the country. It was however clear from the outset that the coverage for cellular phones had glaring holes. Monitors therefore had to be innovative and were trained in both direct transmission of data and storage on memory cards. Over and above this, they were expected to apply a lot of diplomacy to engage often sceptical interviewees and navigate in political hotspots where any data gathering was viewed with suspicion.

HIFC could however take advantage of its relationship with humanitarian organisations as three of them promised to provide a total of 30 community based members to carry out the fieldwork: Action Aid, Zimbabwe National Network for People Living with HIV/AIDS (ZNNP+) and Batanai HIV and AIDS Service Organisation (BHASO).

Training the monitors

Within just a couple of weeks, a solid cooperation was established and the three organisations appointed 23 women and 7 men to do the survey. The selected monitors varied in age from 18 to 55 years and had vastly different levels of exposure to advanced technology. Most people can be trained to use the equipment; but the NDG software and the smartphones are best suited to younger individuals who are computer literate, have good eyesight and previous exposure to similar equipment. The mapping exercise suffered from HIFC having to depend on volunteers who in some cases did not live up to the prescribed criteria.

THE HUMANITARIAN INFORMATION FACILITATION CENTRE



THE PARTNERSHIP BEHIND THE SURVEY

The Humanitarian Information Facilitation Centre (HIFC) was established in 2009 to increase the flow of information on humanitarian issues. The organisation is based on the idea that knowledge is power. Decision makers can act if they are presented with facts about the humanitarian situation in a country ravaged by ten years of economic crisis; the population at large can improve the chances of staying healthy (and of holding politicians accountable) if they are properly informed on crucial topics such as HIV/AIDS and a serious cholera epidemic that was part of the backdrop for the creation of HIFC.

HIFC uses two approaches: Humanitarian organisations are assisted in developing efficient communication strategies and producing timely and concise information; and a grant and mentor scheme for journalists improves the media's ability to research and write high quality stories on humanitarian issues. The two programme components intersect when humanitarian organisations meet journalists for daylong knowledge briefs and on field trips to areas in which the organisations run programmes. These events and networks go way beyond traditional press conferences and establish the necessary trust for reporting on sensitive issues. This is crucial, as many NGOs have kept their extensive knowledge of the dire state of the nation to themselves out of fear of being accused of politicking and shut down as a consequence.

International Media Support (IMS) is a Danish based NGO working in some 50 countries affected by armed conflict, human insecurity and political transition. IMS helped establish HIFC as part of its efforts to promote the concept of humanitarian information. Other countries with humanitarian information projects include Haiti (in the aftermath of the earthquake) and Kenya where Radio Ergo is an important source of information for war-torn Somalia and its many refugees who have fled into neighbouring countries.

Over and above the technical training, the one-day course given to the monitors involved discussions on entry strategies in volatile areas and advice on the appropriate terms and expressions when it was necessary to translate the questions into local languages. It became clear that a two-day course would have been more appropriate than a single-day one as it would offer the monitors a chance to digest the inputs overnight and test the questionnaires on each other before leaving for the field. The extra day can also be utilised to test the connections, software and coding of the questionnaires one last time before deployment.

Designing the questionnaire

One of the lessons learnt from HIFC's first pilot with the NDG tool was that qualitative questions with open answers are problematic as they are time consuming to punch into the smartphones. Choosing between predetermined answers is more feasible.

The loading of the questionnaires onto the smartphones proved more difficult than expected because of network glitches. Problems were also encountered in the programming when it proved difficult to handle sections with more

than 10 questions in each. It is imperative to test compatibility and connectivity in the entire chain of the survey well in advance.

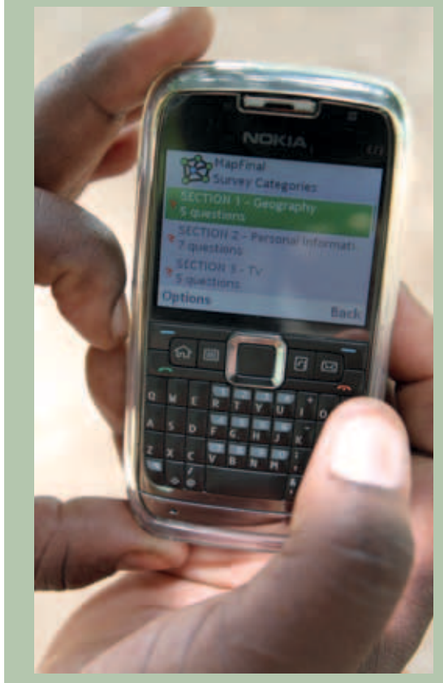
Securing data, phones and monitors

Data security and storage was another technical obstacle. HIFC's internet service provider was unreliable at the time of the survey and the server was physically moved to the provider's data centre to secure connectivity. This service cost HIFC a monthly fee of 1000 USD and resulted in a lot of bureaucratic problems in recovering the server afterwards.

The NDG system ensures automatically that all data sent from devices to the server is encrypted. Sensitive data and the identity of the respondents are thus protected during transmission, but storage on the server is volatile. A cloud-based backup of the data on the local server was secured through Media Frontiers, a subsidiary of International Media Support that provides secure data solutions for online media and civil society organisations.

Due to potential security problems in a highly politicised environment, a legal aid system was established to assist monitors in need. Protection against theft and abuse of the smartphones was handled through installation of software (F-Secure) that immediately would report to HIFC via SMS, if a change of the SIM card was detected.

The monitors were each given 60 USD on deployment – half of the agreed allowance for the fieldwork. The balance would be paid out on the safe return of the smartphone.



THE NOKIA DATA GATHERING TOOL

Nokia Data Gathering (NDG) is an open source software and data gathering technology developed by Nokia Corporation for non-profit organisations. NDG enables collection of data using mobile smartphones wherein electronic questionnaires uploaded onto mobile devices replace traditional paper-based questionnaires.

Tagged with GPS coordinates, data is transmitted instantly or in near real time to a pre-existing, remotely located database or server using normal mobile networks (GPRS and 3G data connectivity). This rapid relay of information could mean the difference between life and death, particularly in emergency settings.

Nokia was very helpful in HIFC's preparations for the survey described – but the responsibility for the use of the software (including any errors made) remains entirely with HIFC. For further information see www.mobileactive.org/mobile-tools/nokia-data-gathering

Into the field

The smartphones were not just useful as research tools. The instant transmission of results also allowed HIFC to keep an eye on the monitors' progress and dispatch supervisors when problems were encountered

After just three weeks of preparations, 30 monitors were deployed across Zimbabwe with six days to carry out 100 interviews each. They were backed by HIFC staff who did a number of fieldtrips to support the exercise. It quickly became clear that the allocated time of 15-20 minutes per interview in order to reach the daily target was too short. An average of 35 minutes was more realistic in order to both establish contact with the interviewees (which was particularly demanding in politically sensitive areas) and handle the smartphones. The total target of 3.600 interviews was reduced to 3.000 as a consequence.

HIFC could monitor the number of submitted questionnaires from each phone to the server and dispatch supervisors to check for specific challenges encountered by the individual monitors. Some monitors by mistake erased the entire questionnaire from their phones – but the software allowed for reinstallation over the mobile data network.

Most of the monitors found the smartphones to be a useful tool for the task at hand. Some older monitors did initially struggle with a number of issues including having forgotten how to turn on the devices and how to send the questionnaire; they were however capable of saving the answers on the device. A more common problem of poor connectivity prevailed; again the monitors were being encouraged to just save on the memory cards.

Other technical problems included: No electricity for three days or more to charge the phone; no network coverage – less than half of the deployed monitors were able to send data straight from the field immediately after the interview, excluding 3-4 who straight away decided to save the questionnaires because they could not remember how to transmit them; and loss of completed questionnaires because of wrongful operation of the phone.

In some instances the monitors had to overcome scepticism before getting answers to the questionnaires

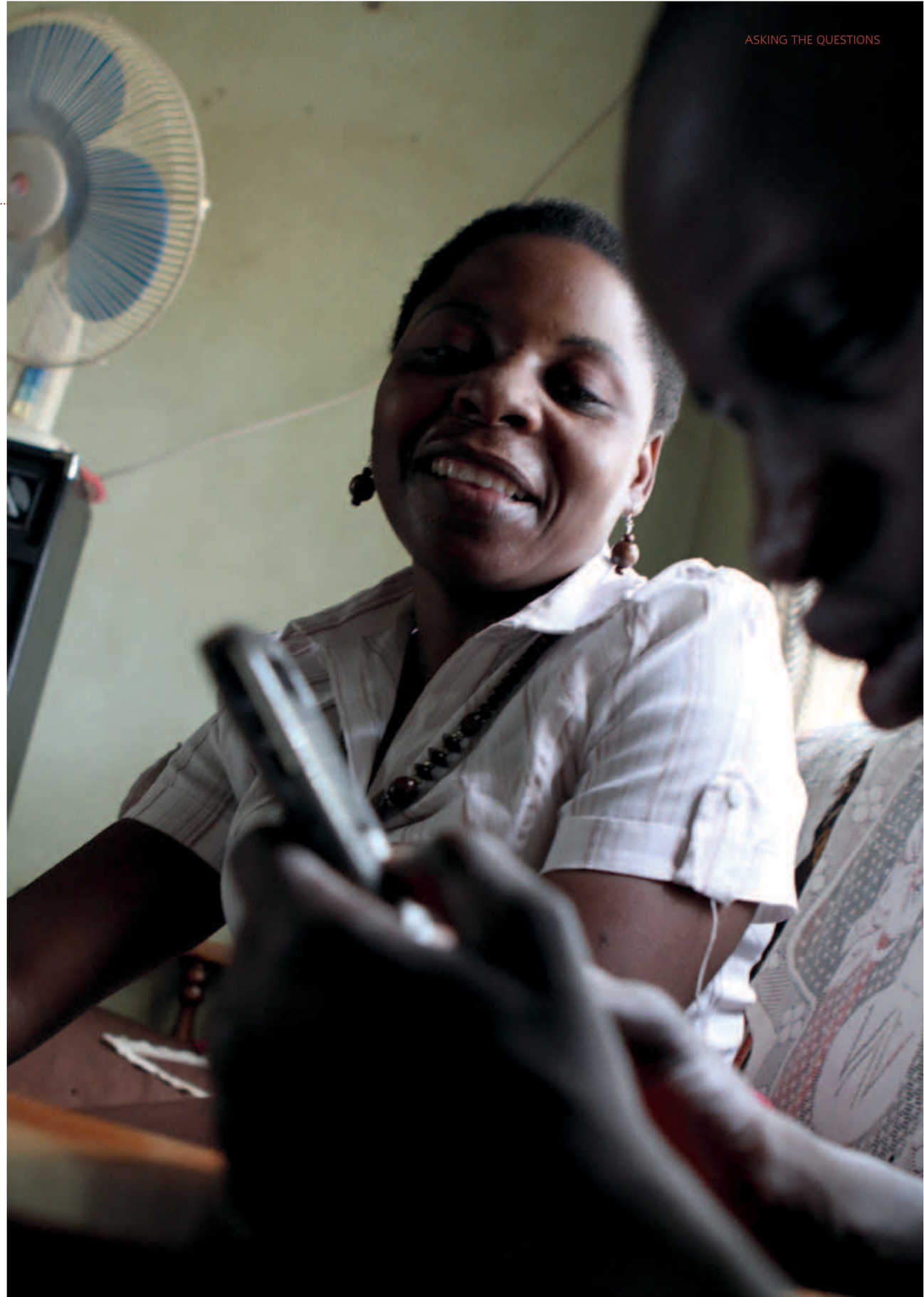
Challenges encountered when doing the actual interviews included general suspicion and unwillingness of people to be interviewed without a financial reward. Some wanted to be addressed by the organisers of the survey before responding to questions. One monitor was briefly detained by the police who questioned the use of a mobile phone to collect data. She was released again after the officers had gone through the questionnaire to ascertain that she was not collecting political information.

The risk of intimidation in political hotspots was a real concern to the research. In some districts monitors were advised not to approach respondents as this could result in confrontations with political leaders averse to any exercise that involved outsiders asking questions. In some instances the monitors chose not to use the smartphones during the questioning in order to keep as low a profile as possible. Instead they resorted to using paper and pen and only transferred the answers to the smartphones once they got home.

EXAMPLES OF CHALLENGES ENCOUNTERED	DISTRICTS							
	Bindura	Shamva	Marondera	Hwedza	Makoni	Chipinge	Bulilima	Insiza
General unwillingness of people to be interviewed for no reward	●	●					●	
There are other programmes going on in which people are given food and maize seed in return for participation. This makes it less attractive to be interviewed for nothing in return	●	●						
People want to know the direct benefits of the programme for their daily life			●		●	●	●	●
People want to be addressed first by the organisers before they respond to questions	●						●	
The questionnaire is too long	●	●					●	●
Failure to switch on the phone						●		
No electricity for 3-4 days to recharge the phone						●	●	
No network making it impossible to send the completed questionnaires directly from the field				●		●	●	●
Political perceptions on the nature of the research limited the interviews	●	●		●				●
Monitor falling sick				●				
Lost questionnaires from phone after completing them			●					

ASKING THE QUESTIONS

Most monitors found that the smartphones were useful tools for the survey



Wrapping up

Despite technical and political challenges, five out of six of the planned interviews were carried out and in three out of four cases transmitted electronically to the central server. The survey also managed to recover all smartphones

A total of 2.508 questionnaires were received out of the revised target of 3.000. Approximately 1.800 of these were sent electronically over the mobile network, either immediately after they were finalised or transmitted at a later stage when the monitor had data connectivity; this figure could have been improved by better planning as evidenced by an earlier and smaller study by HIFC that produced more completed questionnaires than anticipated. The remainder of the 2.508 submissions were extracted from the memory cards. A range of problems – most of them related to political tension and suspicion over data collection – meant that the number of rural interviews was lower than planned. Approximately 25% of respondents were rural as opposed to 75% urban.

Due to impending Christmas holidays many of the monitors handed in the phones at the provincial offices of the organisations they work for rather than returning them to HIFC's offices in Harare. The final collection of phones and memory cards thus took much longer than anticipated, delaying the analysis and taking some of the rapidness out of the exercise.

There were some issues with incomplete questionnaires, mainly relating to the design and length of the questionnaire. The NDG software ought to prevent this; but as the system does not allow for numbering of questions (which is only done automatically when the completed questionnaires lands in the server), it nevertheless demands some attention by the interviewer to make sure everything is covered.

HIFC registered a total of 11 attempts to change SIM cards that were detected by the anti-theft software. Some issues of abuse of airtime and credit were also noted. This could have been prevented by converting all credit into data bundles, leaving just a few dollars for emergency calls.

There is a significant dilemma in giving people equipment they cannot afford themselves and expect them to hand it back safely afterwards. This is particularly evident when people are used to a culture of NGOs giving them things to keep. Some monitors were disgruntled by the fact they could not keep the phones or receive remuneration beyond the 120 USD in allowances. Some referred to the example of the Ministry of Health that purchased mobile phones for provincial hospitals to allow the staff to report shortages of medicine. The nurses were not expected to return these phones.

For an NGO such as HIFC, it is impossible to follow this example, particularly given the price of the smartphones. It would also be counterproductive for the planned lending of the pool of phones to other organisations interested in benefitting from HIFC's experiences. The lending scheme does however also increase the need for sustainable solutions to address the monitors' expectations, if one is to ensure the safe return of phones.

In this survey, all phones were returned in the end, mostly through the provincial offices of the participating organisations. Some devices had scratches and missing chargers or batteries that had been exchanged for worn out ones. Long-term sustainability of a lending programme for the phones needs a budget to take care of this.

SUMMARY OF LESSONS LEARNT

Humanitarian surveys on smartphones have been received with both excitement and scepticism among organisations in Zimbabwe who recognise the huge potential benefits but also harbour concerns over poor connectivity in remote areas. The phones are however able to store completed questionnaires for later transmission. In the survey described, 1.800 questionnaires were eventually transmitted over the mobile network while 700 were extracted from memory cards.

The smartphones demand a large capital investment unless the employees of the organisation involved already have their own or have access to a pool such as HIFC's. The actual surveys are however fast and cost-effective alternatives to traditional paper based ones.

In the Zimbabwean political context any gathering of information is treated with suspicion, particularly in rural areas where some respondents refused to be interviewed using the tool. A majority of respondents nevertheless appreciated what advanced mobile phones can do and were receptive to new methods.

Following HIFC's pilot surveys, a number of humanitarian organisations have shown interest in the technology; some have borrowed HIFC's pool of smartphones. These include FAO and World Vision who use the tool to collect field data on the rearing of small stock. This will help the organisations make informed decisions about funding. HIFC was also commissioned to conduct a study using the smartphones to investigate climate change effects on vulnerable populations.

The results of the survey on access to humanitarian information will be published in a separate report available from HIFC.

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