

Information and communication technologies for health: how can ICT improve demand-side financing schemes?

We live in exciting times where, in an increasingly networked, connected world more and more people have access to mobile phones. In this world, Information and Communication Technologies (ICT) have the potential to help address a wide range of health, social and economic problems through improving the development and use of information and communication strategies. This in turn will facilitate efforts to reach national and internationally agreed targets such as the Millennium Development Goals, including reducing child mortality, improving maternal health and combating disease.

Our own experience tells us that using ICT in support of demand side financing (DSF) schemes in the health sector can yield promising results in low and middle income countries. This paper is a useful resource for anyone currently designing or implementing DSF programmes or thinking of integrating ICT solutions into existing health programmes. Below we summarise some of the key uses for ICT and highlight where we think ICT can best be used to improve demand side financing programmes, with a particular focus on the use of ICT for vouchers and conditional cash transfer (CCT) programmes in developing country contexts.

£1

The price of the new Alcatel One Touch 232 handsetⁱ



Mobile phone penetration rate in the developing worldⁱⁱ

89%



Battery life of the Nokia 105ⁱⁱⁱ

35

What is demand side financing?

Demand side financing (DSF) describes a set of mechanisms designed to increase access to specific goods and services by transferring purchasing power to targeted population groups^{iv}. DSF is used to channel funds and services to those who would otherwise find it difficult to access them^v. In healthcare, DSF mechanisms can include voucher programmes, conditional cash transfers, social health insurance schemes, or health equity funds. They were born out of a realisation that centrally planned and financed health services often fail to address issues concerning the efficiency, fairness and quality of health systems^{vi}. The result is an underutilisation and low uptake of services by those who would benefit from them the most (i.e. the poorest and most vulnerable groups). In the health sector, this is particularly true for services such as family planning, maternal and child health and immunisation.

“There is robust evidence that voucher programmes increase utilisation of health goods/services”

Meyer et al. 2011^{vii}

Vouchers for health are commonly used to stimulate demand for priority health goods or services by underserved population groups. Consumers are given a voucher - certificate, coupon or other token – that is given to an approved provider in return for goods (such as an insecticide-treated bed net) or services (such as a defined package of maternal newborn health services). For health services, providers are then reimbursed a pre-agreed amount for the services they have provided, as set out in their contract with a managing agency. Vouchers are particularly relevant when there are gaps in the provision of critical public health services (e.g. institutional delivery or long-acting family planning) and for targeting these services to particular underserved population groups (rural poor, adolescents, sex workers, and so on). **Conditional cash transfers (CCTs)** can also stimulate demand for services by providing cash payments to eligible persons or households conditional on their achievement of a desired and measurable behaviour. While CCTs have long been used in the education sector, in health they act in a similar way to vouchers in promoting and enabling the up-take of underutilised services by specific groups.

What are information and communication technologies (ICT)?

ICTs are a broad range of digital and computing tools which provide access to information through telecommunication. This includes using the internet, mobile phones and wireless networks to collect, share and interpret data. In health, the applications of ICTs are varied and range from helping a health worker diagnose a patient through text messaging, to monitoring stocks of consumables at a facility level using a computer database. These applications are often referred to as “eHealth”, an umbrella term which includes mobile health or “mHealth”. mHealth relates more specifically to the use of hand held mobile devices such as mobile phones and tablet computers. Some of the advantages of using ICT in healthcare are generating real time data, streamlining processes, reducing administrative overheads, supporting the continuum of care and cutting the cost of primary healthcare in remote areas where access can be facilitated via telemedicine^{ix}.

“ICT can help deliver better care to more people in a cost-efficient manner”

John Dalli, EU Health Commissioner^{viii}

“Information and communication technologies (ICT) will be instrumental in collecting, sharing and analysing health data.”

United Nations Commission on Information and Accountability for Women’s and Children’s Health^x

Different ICTs have the potential to help patients become more involved with their own care, which is of particular interest for patients who suffer from chronic conditions, by making information available almost anywhere at any time. ICT is also increasingly used for enhancing voice and accountability of clients and providers. With a mobile phone penetration rate in the developing world of 89 per cent in 2013ⁱⁱⁱ, ICT can significantly contribute to empowering

communities with the information they need to make informed decisions about their health as well as improving the way health services are being delivered, monitored and evaluated.

How can DSF schemes be supported by ICT?

DSF schemes can be supported by ICT to improve efforts to control fraud, facilitate payments, increase efficiency of claims processing and strengthen management information systems (MIS) and monitoring. Evidence reviewed for this paper suggests that ICT can be particularly useful in these areas through mechanisms such as mobile money transfers, electronic vouchers (e-vouchers) and electronic claims (e-claims), and data management applications. Multiple software and applications can perform these functions and selected examples are summarised in Table 1.

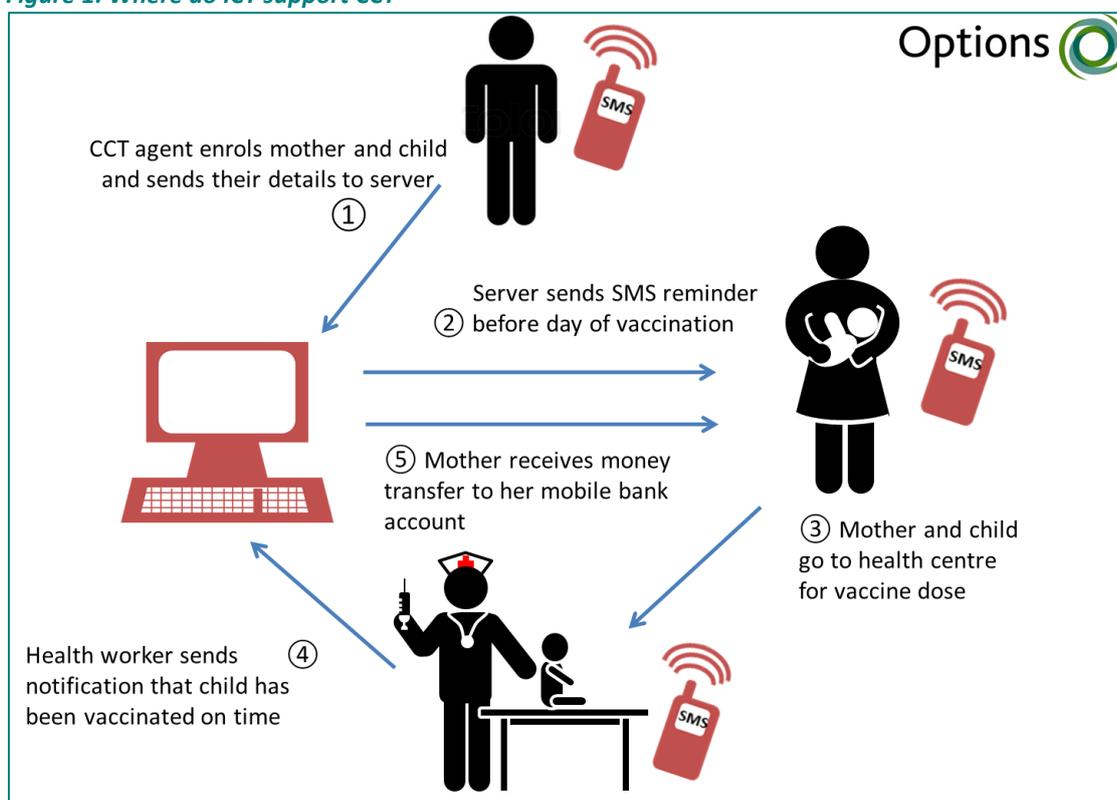
Table 1: Examples of mobile software, systems and applications which can support DSF schemes

Type of technology	DSF components	Examples of mobile software, systems and applications
Mobile money transfers	Fraud Control and Facilitating Payments	M-PESA, M-KESHO, MTN Mobile Money, easypaisa
Electronic payment systems	Fraud Control and Facilitating Payments	Pre-paid debit cards, Smart Cards, Electronic voucher scratch cards
e-vouchers and electronic claims processing	Claims Processing (and Fraud Control)	SMS voucher codes, SMS short codes. A variety of bespoke claims processing software
Data management	Strengthen MIS and monitoring	Frontline SMS, Rapid SMS, CommCare, Magpi, Open Data Kit, formhub
Mapping, and crowdsourcing applications	Strengthen MIS and monitoring	Magpi, Open Data Kit, Ushahidi
Strengthening transportation	Fraud Control and Facilitating Payments	M-PESA, M-KESHO, MTN Mobile Money, easypaisa Pre-paid debit cards, Smart Cards, Electronic voucher scratch cards

For more information on these software and applications, please refer to the end of this article.

Fraud control and facilitating payments can be supported by mobile money transfer technologies which allow individuals or organisations to send payments from their *mobile wallet* or bank account to a variety of different actors, both public and private, via mobile phones^{xi}. This can be particularly convenient for CCT programmes (Figure 1) and for vouchers for transportation programmes as they allow money to be made available almost instantly. This approach simplifies monitoring and improves fraud control by creating automatic records of the transfers. As a cashless system it also reduces opportunities for fraud. Electronic registration systems, such as Radio Frequency Identification (RFID) tags and barcodes contribute to mitigating fraud by proving a client’s eligibility for a particular service or to ensure that the right client is receiving the right goods or services.

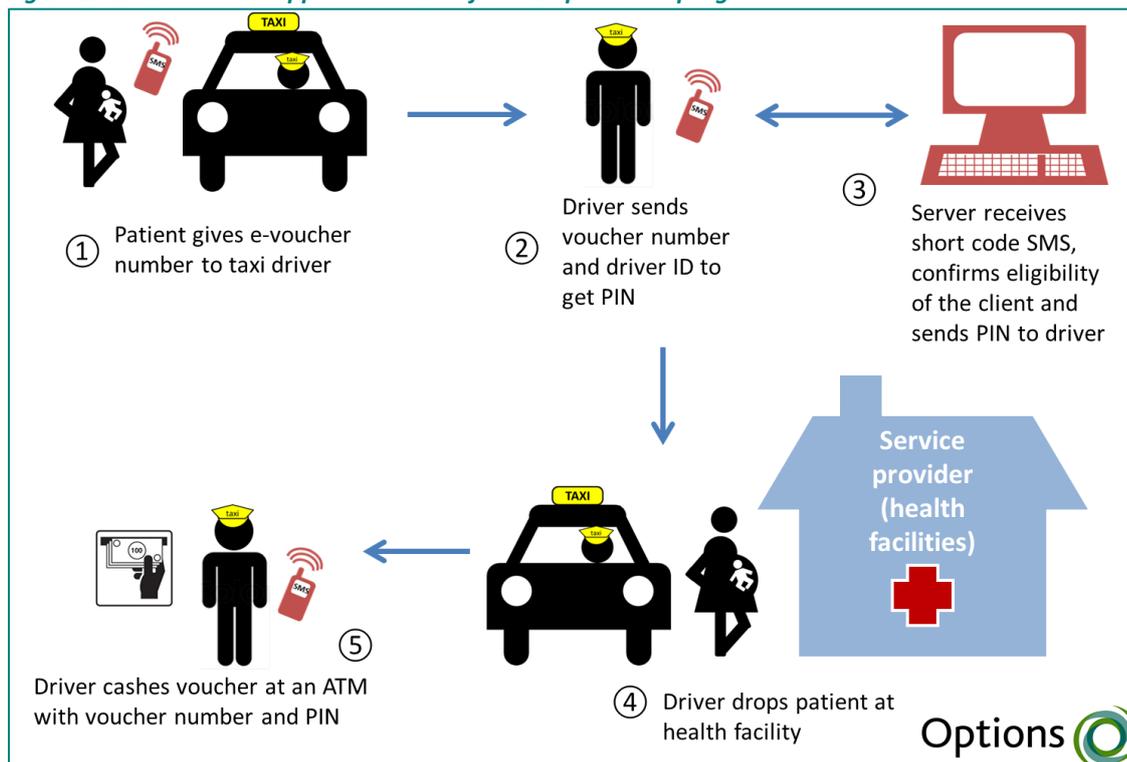
Figure 1: Where do ICT support CCT



This is a simplified representation of how a CCT programme functions. Numbers in the figure refer to the sequence of events.

Other forms of “electronic payment systems” which can support CCT and vouchers for transportation programmes with similar results are pre-paid debit cards and Smart Cards to transfer cash. For a woman unable to access the financial resources for transportation to a health facility to deliver her baby, an e-voucher for transport can remove this barrier. As soon as a woman starts her first contractions, she would call a participating driver (this could be a taxi driver, private owner of a car or other means of transport, or even a registered ambulance) and provide her e-voucher number (Figure 2). The driver would verify the woman’s eligibility and receive a PIN number which then allows him to retrieve cash for transporting the woman, at an ATM or other service point. These technologies, however, rely on the local availability of cash (liquidity) through ATMs or other service points and the lack of access to cash can have a considerable negative impact on the scheme.

Figure 2: Where do ICT support a voucher for transportation programme



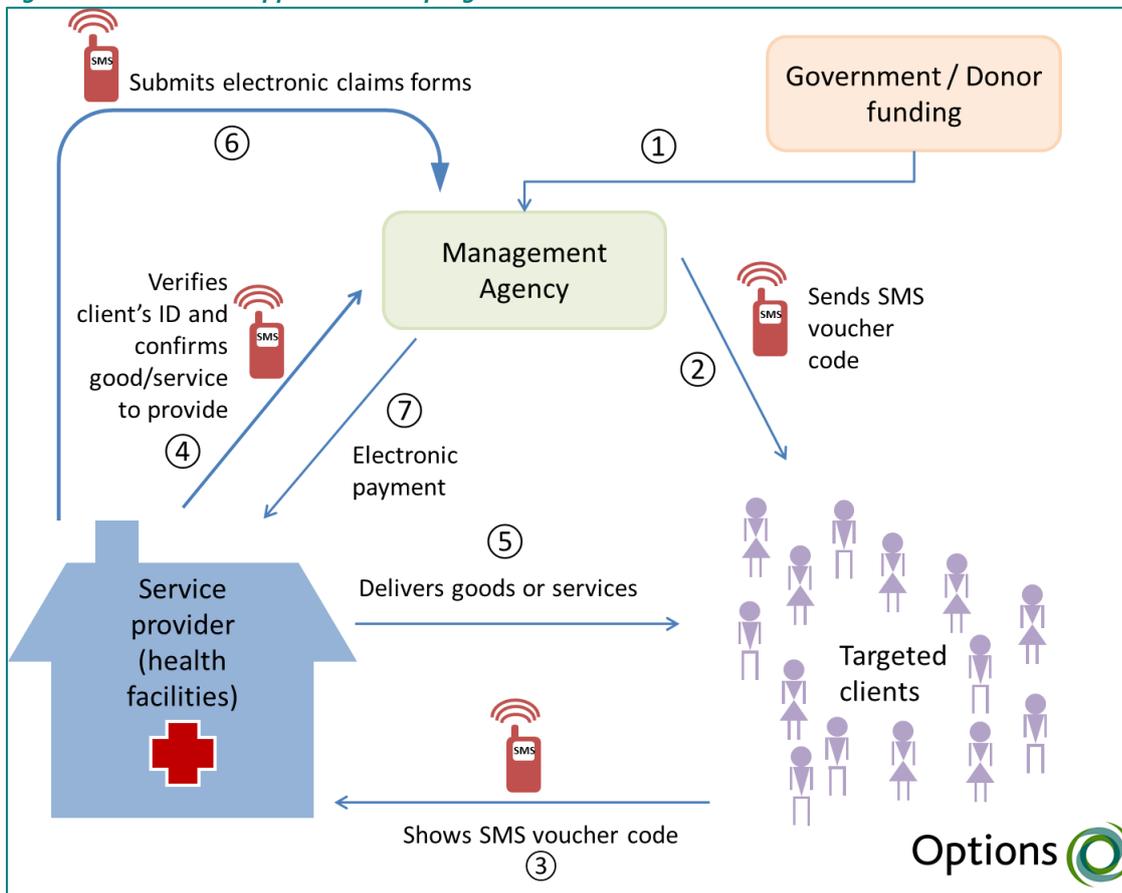
Numbers in the figure refer to the sequence of events.

Claims processing (and fraud control) can benefit from e-vouchers and e-claims which are an electronic version of a paper voucher or a paper claims form. SMS based voucher codes enable a recipient to receive a unique identifier via SMS on their mobile phone. This code can then be used by the client to redeem the services or goods they are entitled to and allows the service provider to verify the client’s identity and confirm the value or service they are to provide. Similarly, electronic claims forms can be filled in on a mobile phone and sent via SMS to the management agency (Figure 3). In addition, some platforms allow service providers to send queries to the management agency via mobile phone and to receive live updates on the status of a claim (i.e. whether it has been processed and/or approved). SMS money transfer (another term for mobile money) can also be used to reimburse service providers in a voucher scheme. There are currently 183 live deployments of mobile money services for the unbanked, covering over 60 countries, and 108 more deployments are planned in the near future^{xii}, demonstrating the great potential for using mobile money for voucher and CCT programmes.

These tools have the potential to reduce costs and delays associated with the production, distribution and management of paper vouchers or claims forms and reimbursement to service providers. They produce automatic records for every transaction reducing the risk of fraud by tracking clients and minimising or eliminating cash from the system.

Strengthening MIS and monitoring can be reinforced by data management applications which enable individuals and organisations to send and/or receive and organise large amounts of information to and from mobile and static devices (e.g. desktop computers and land-line phones). These tools permit greater and faster accumulation of data to inform DSF programme management. For example, they can be used to register and monitor the clients of a programme, or to collect information from claims forms. These applications can also provide real time information which improves management decision making.

Figure 3: How do ICT support voucher programmes



Numbers in the figure refer to the sequence of events.

A range of software applications and technologies can support DSF. This paper presents a selection of approaches that are particularly relevant to vouchers and CCT programmes. However, of course many of these and other tools can also be used to support health insurance and other DSF schemes. Electronic claims processing and the use of mobile phones to confirm eligibility of a policy holder are just a couple of examples, and crowdsourcing and mapping technologies also add value to DSF interventions by identifying potential health service providers and clients. Many more tools are currently being developed. As a major provider of technical assistance and management services in the health sector, there is no doubt that ICT is increasingly becoming an integral part of the work that Options does in supporting DSF programme design and implementation.

What are some of the key challenges in bringing mHealth programmes to scale?

The mHealth arena has been plagued by what some refer to “pilotitis”, which is a condition characterised by a multitude of pilot projects which struggle to reach scale. ICT experts seem to agree that a proliferation of pilots is simply the natural phase in the cycle when developing innovative approaches and new fields of work. Nonetheless, many developing country governments have become wary of the lack of coordination between pilots and insufficient evidence generated by the studies. In January 2012, the Ugandan Director General of Health Services issued a moratorium on all mHealth pilots in the country^{xiii}. The same month, the Ghana Health Services introduced an ICT Review Committee chaired by the Director of Policy Planning, Monitoring and Evaluation to review all mHealth projects in the country and assess their effectiveness and

efficiency. Several other countries across the developing world are likely to follow suit. It is therefore important to examine some of the key challenges in bringing mHealth programmes to scale.

In the words of Dr Patricia Michael^{xiv}, Executive Director of the mHealth Alliance, the key challenges to bringing mHealth pilots to scale are: evidence, standards and interoperability, sustainable financing, capacity and policy. This forms a useful framework within which to examine the multitude of pilots currently being implemented.

- **The lack of evidence** is mostly due to the majority of pilots either not being adequately monitored and evaluated (i.e. lack of, or weak study designs), or the evaluation results not being disseminated. This means that even mHealth programmes which may have the potential to bring about positive change remain unproven or unknown.
- **The lack of interoperability and the lack of standards** refer to the limited ability of diverse systems to work together. Designers and managers of mHealth pilots should strive to adopt a common platform and should work better together to improve exchange between systems. The focus must be on open source software and applications that can also be adapted to different contexts and environments.
- **Sustainable sources of financing** to bring pilots to scale are essential and need to be considered from the outset. Where pilots yield promising results and are proven to be successful, scaling from just a few smart phones to equipping large numbers of health workers with both phones and credit is likely to be beyond the budget of most governments. However, technology is evolving very rapidly and the price of smartphones continues to drop. As network coverage increases day by day in the developing world, the cost of transmitting data and making a call will also fall. Moreover, stronger partnerships between mHealth programmes and network operators and phone providers are crucial to reduce the cost of operating these programmes and making them more sustainable.
- **Lack of capacity** is also a barrier to scaling up and can be more difficult to address since this refers variously to the lack of network capacity or coverage, the lack of health worker capacity, the lack of IT capacity to develop and/or adapt the technology, or even the lack of M&E capacity to yield evidence. Nonetheless, these challenges are not unique to mHealth interventions and should not stop governments and international organisations striving to achieve better results through new and promising approaches.
- **Similarly, the policy environment** is not always favourable to mHealth programmes, but this will change once sufficient evidence has been put forward and can be used to influence policy development.

Despite the fact that, until recently, mHealth interventions have been largely confined to small-scale pilots, some of these are now being brought to scale. For example, in Rwanda, UNICEF is working with the government to put in place a system where CHWs track and report pregnant women through the whole continuum of care using mhealth. Infants' HIV tests results in Malawi and Zambia are being sent back to clinics via SMS; and in Nigeria the same SMS system is used to register every birth^{xv}. There is no doubt that within a few years effective and efficient frameworks for developing mHealth strategies will have emerged.

Our key principles for developing mHealth solutions

To address these challenges, Options has developed and abides by a set of key principles for developing mHealth solutions which we believe are essential to a successful project. These principles are:

1. *Focus on the end-user;*
2. *Keep the technology simple, particularly in low resource settings;*
3. *Do not re-invent the wheel; use what already exists when possible;*
4. *Adapt to the local context; try, test and adjust before rolling out;*
5. *Aim to align and harmonise with local systems and processes;*
6. *Build for sustainability.*

More about mobile software, systems and applications which can support DSF

Table 2: Description of mobile software, systems and applications

Software or Application	Developers	Open source	Free	Description
M-PESA	Safaricom (Vodafone)	No	No	M-PESA is a mobile payment system based on accounts held by a mobile operator. The conversion from cash to mobile money and vice versa is done at retail stores and all transactions happen in real time via SMS. It has no set up fees, no minimum balances or monthly charges. Some transactions costs are involved when transferring to accounts on certain banks or withdrawing from an M-PESA account at an ATM.
M-KESHO	Safaricom (Vodafone)	No	No	M-KESHO is a mobile savings account which links M-PESA accounts to Equity Bank savings account via mobile phones. It has no set up fees, no minimum balances or monthly charges. Unlike M-PESA, these accounts pay interest, have no balance limits and offer emergency credit and insurance facilities
MTN Mobile Money	MTN	No	No	MTN Mobile Money is a mobile payment service similar to M-PESA developed by MTN and operating in Uganda, Ghana, Cameroon, Cote D'Ivoire, Rwanda, Benin and other countries. International mobile money transfers are at a flat fee.
Easypaisa	Telenor Pakistan / Tameer Microfinance Bank	No	No	Easypaisa is a unique mobile payment service in Pakistan with over 11,000 agents processing bill payments and money transfer. Its uniqueness lies in the fact that customers do not need to have a mobile account or a mobile phone but can go to an easypaisa agent with their bill and money and the agent will complete the payment on a mobile phone for a small charge.
FrontlineSMS	FrontlineSMS	Yes	Yes*	Frontline SMS is a two way SMS communication tool which can manage and analyse large amounts of SMS. It is particularly well suited for low resource settings as only the server needs to be connected to the internet. End users can receive and send messages with the most basic mobile phones. However, the amount of data that can be sent is limited to the number of characters in an SMS (i.e. 160 characters).
RapidSMS	UNICEF	Yes	Yes**	RapidSMS is a tool for mobile data collection, communication and logistics coordination. End users do not need Java-enabled phones or smartphones to use RapidSMS when sending and receiving small volumes of data. Larger volumes do request more sophisticated phones.
CommCare	Dimagi	Yes	Yes*	CommCare is a community health and extension worker focussed tool which provides case management, data collection and data management. CommCare is easily customizable and runs on Java-enabled phones or Android phones. It can support multimedia formats for the low-literate users.

Table 2: Description of mobile software, systems and applications (continued)

Software or Application	Developers	Open source	Free	Description
Magpi	DataDyne	Yes	Yes*	Magpi (formerly known as Episurveyor) is a data collection tool which is used by more than 23,000 users in over 170 countries in health and all other international development sectors (e.g. education and agriculture). It is designed to be user friendly and collects data on iOS, Android, Symbian, and SMS mobiles phones online or offline.
Open Data Kit (ODK)	University of Washington	Yes	Yes**	ODK is a set of tools which allow to create a data collection form or survey, collect data on a mobile device which then sends information to a server and aggregate data on a server and extract it in various formats (e.g. graphics, maps etc.). Works on phones which can connect to the internet.
formhub	Columbia University	Yes	Yes**	Formhub allows designing surveys in an Excel format which can be uploaded to a mobile device for collecting responses. Responses are then sent back to a server which can analyse the data. Formhub works on an Android device or the web and can generate graphs, and maps.
Ushahidi	Ushahidi	Yes	Yes*	Ushahidi (“testimony” in Kiswahili) is a platform originally created to map acts of violence in the aftermath of the 2008 Kenya elections via SMS, email or the web (this is also referred to as crowdsourcing). It has since evolved into a powerful coordination, management and advocacy tool. Some of its recent applications include coordinating relief in the aftermath of the 2010 Haiti earthquake and tracking pharmacy stockouts in several East African countries.

* Basic versions are free, while more advanced versions with added features (e.g. management and adaptation of the software) can be at a cost.

** Unlike, ‘off the shelf’ or other ‘ready to use’ applications, these are ‘raw’ sets of tools which, despite not involving software licensing costs, require significant time and investments in order to be developed into an application which can be used effectively.

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