

## MOBILE DATA COLLECTION FOR M&E – BRIEFING PAPER

### INTRODUCTION

Clearly, to understand, learn from and improve agricultural development projects, it is important to obtain reliable data, to analyse it effectively and to distribute to a wide range of stakeholders.

Currently, there is some reported scepticism about the validity and reliability of evaluation reports due to contradictory and exaggerated results [8]. A review of ten evaluation reports from various countries [8] found that most evaluations reported positive impacts which were not in line with reports of productivity growth in the region. The author concludes that this is due to use of poor impact evaluation methodologies, lack of reliable data and insufficient capacity to conduct rigorous impact evaluations.

New technologies offer new ways of doing this and improvements in infrastructure have made the mobile phone the most common and adaptable tool used worldwide [11], but ICTs on their own are not a panacea. Technology cannot be viewed as a replacement for human input and involvement in analysis and interpretation tasks [2], [11], [12].

### BENEFITS OF MOBILE DATA COLLECTION

- Can enable more rigorous, higher quality and more complete data collection [7]
- Can hear from wider range and number of stakeholders about a wider range of issues [7]
- Can incorporate multimedia [7]
- Can help to meet five standards of validity, integrity, precision, reliability and timeliness [10]
- Can identify duplicate or inefficient processes and inconsistent data standards [10]
- Can make data more open, transparent and accessible to many stakeholders [10]
- Can reduce time and costs [7]
- Can improve experience and skills of staff [7]
- Allows nearly real-time feedback from the field [11], [10]
- Regular feedback and early insights are increasingly possible using these methods [10]

### CHALLENGES OF MOBILE DATA COLLECTION

- There will be no singular solution that will fit 100% of project's needs [10]
- Mobile device sector is highly competitive and rapidly changing, and new mobile applications constantly coming onto the market [10] and the plethora of ICT tools available is daunting [11].
- Staff or associate consultants need significant skills in managing, designing and implementing mobile applications as well as working with people, project management, training and data analysis [10]
- Lack of organisational capacity to decide when, why, how and what ICTs to use [7]
- Lack of interoperability between ICT solutions [7]
- Security and privacy not always well understood or managed [7]

- Poor understanding of motivation and incentives for staff and community members to participate or share data [7]
- Tendency to focus on surveys rather than qualitative input [7]
- Tendency to collect data ‘because we can’, rather than strategic choices of what is needed/will be used [7]
- Differing types of environment mean that different ICT solutions to different challenges presented in varying geographical settings, e.g., if there is no grid electricity solar power may be an option [10]
- Gender issues may present in unexpected ways. For example, female field agents in one programme liked the technology as they could use it at home to help children learn and they felt it helped them garner more respect from men in the field [10]
- Need to consider possible sample bias around mobile phone ownership, connection, charging, etc [3]
- Issues with character sets for some local languages [3]

## RECOMMENDATIONS FOR INTEGRATING ICT TOOLS INTO PROJECT M&E

- Complex ICT or complex platforms are not necessarily essential [2], so ICT methods should only be utilised if they meet the project needs, maximise efficiency and effectiveness, and contribute to project goals [11].
- Clarity of purpose and holistic picture of project’s M&E system is needed in order to review and decide options [7]
- Contextual factors, such as lack of resources, should be taken into account when deciding upon appropriate ICT solutions [2]
- ICTs for M&E is not just a technology issue, is a people and process issue too [7]
- To work effectively, the use of mobile data collection will need to be included in project plans from the very beginning, incorporating ICT into budgets, staffing etc. [10]
- Requires partnership between programme, M&E and IT staff [7]
- Don’t duplicate existing systems or create parallel systems [7]
- Don’t underestimate need for staff training and ongoing technical assistance to ensure positive user experience [7]
- Hiring analysts who can perform quality data analysis, incentivizing adoption, and managing risks are important [11].
- Useful to implement ICT in phases, both to manage risk and to deliver a functioning system in a timely manner [10]
- Data integrity and security must be ensured throughout the project [2]
- Consider ways in which ICTs can provide added benefits/incentives to those being surveyed, e.g. CRS have given additional value to farmers using ICT by utilising a tool called Farmbook that also provides market planning training and business analysis to those in the field [10]

- Ensure that information and results are shared both ‘up’ and ‘down’ to stakeholders in a timely manner [12]
- Select an important but modest project to pilot – important to have a successful first experience for staff and community [7]

## CHOICES

In order to make decisions on which technologies, if any, to use, there are four technology components [9]

1. **Hardware devices:** from low-end phones to smart phones, specialised tablets and add-on services;
2. **Data collection software:** to control how data is entered. May be custom built, licensed or subscribed to;
3. **Data transmission:** transmitting or transferring data from the field to a remote location or server via SMS, voice, internet, etc.
4. **Data aggregation and analysis:** to receive, collate and analyse data using spreadsheet, database of statistical software.

Each component offers different options and requires project decisions [9].

## HARDWARE OPTIONS

Option	Low end phone	Feature phone	Smart phone	Tablet	Notebook
<b>Cost (US\$)</b>	15–50	50–150	150–300	200–400	300–600
<b>Screen</b>	Small, grey scale	Small colour	Touch	Large touch	Large
<b>Data entry</b>	Keypad	Keypad	Touch keyboard	Touch keyboard	Keyboard
<b>Calls/SMS</b>	Yes	Yes	Yes	With SIM slot	No
<b>Mobile internet</b>	No	Yes	Yes	With SIM slot	No
<b>Wifi/cable internet</b>	No	No	Yes	Yes	Yes
<b>Connect to printers etc</b>	No	No	Yes	Yes	Yes
<b>Apps/ data collection</b>	No	Some	Yes	Yes	Yes
<b>GPS</b>	No	No	Yes	Some	No
<b>Multimedia</b>	No	Some	Yes	Yes	Yes
<b>Synch to other devices</b>	No	Some	Yes	Yes	Yes
<b>Battery life</b>	Full day	Full day	Half day	8–10 hours	4–5 hours

## SOFTWARE OPTIONS

	Custom built	Licensed	Subscribed
<b>Ownership</b>	You own it	You own it	You rent it
<b>Customisability</b>	High	None	Low
<b>Set up time</b>	Long	Short	Short
<b>Set up cost</b>	High	High	Low
<b>Ongoing cost</b>	Medium	Low	Low
<b>Upgradability</b>	Low	None	High
<b>Stability</b>	Low	High	High

## KEY SOFTWARE QUESTIONS

**Device or Operating System Compatibility:** Which kind of devices or operating systems (OP) will the software work on?

**Usability:** How are questions, formats and rules created in the software? Does it require programming skills? Can it be created in-house, or does it require ongoing technical assistance?

**Question Types:** What types of data (questions) can be collected by the software, for e.g. text, numeric, single or multiple choices, date, time, photos, location, etc.?

**Formatting and Organization:** What types of display formats are supported by the software like tables and matrices, sections, single-page grouping, hint text, coloured fonts, video or audio content, etc.?

**Logic Functions:** Does the software allow for logical, rule-based actions such as repeating of questions, skip rules, answer limits and validations, pre-loading of data, randomization, etc.?

**Deployment and Storage:** Can data-entry formats be updated remotely on the devices? How much data can be stored on the mobile devices? Can the data be edited after entry? Does it create back-ups?

**User Management:** How does the software control user access? Can multiple users access the same questionnaires, edit data, etc?

**Security:** Is access to the software password protected? Is the data encrypted?

**Language Support:** Can local (non-Latin) fonts be supported by the software for displaying questions, as well as data entry?

## KEY QUESTIONS THAT YOU SHOULD ASK OF A POTENTIAL SOFTWARE VENDOR:

1. Will their software work with the technology options applicable to you?

(a) Devices: Will it work with the *specific models* of the phones, tablets, or other devices that you intend to use in the field?

(b) Data transmission: How will their software transmit the data from the devices—SMS, USSD, GPRS or 3G, IVR-calls, hot-syncing?

(c) Data aggregation: How will data get aggregated? Where will the data be stored? In what format will the aggregated data be available for analysis?

2. Which kind of modules will their software contain? Some generic modules that a mobile system is likely to contain are mentioned as under:

(a) Device application: Through which data will be entered and recorded.

(b) Form creation module: To create mobile forms and questionnaires that are to be filled by field staff.

(c) User management module: To control who can fill the monitoring forms and view field-level data.

(d) Data management module: For storing, viewing, exporting and importing data from the devices as well as other sources.

(e) Report modules: To view data in generic formats such as map-based views for tracking location data, etc.

(f) Security module: How secure is the software? What kind of security features does it provide?

3. How easy is the mobile system to use? Does the software require technical skills like programming? How are the following activities managed within the software?

(a) Installation of the various software modules: Does the system work on a website or does it need to be installed on local computers? How is installation done on mobile devices?

(b) Creating questionnaires and forms: How much time does it take to create a data collection form? Can multiple users collaborate in developing the forms and questionnaires?

(c) Updating questionnaires: How often can surveys and forms be updated? Can field staff access updated forms in real time?

(d) Managing and controlling access: How can multiple users access the system? Can users be added, blocked, or removed easily? Is the system secure and protected in any way? Can you monitor who is sending data in real-time?

(e) Data aggregation: How is data from the field aggregated? Is it a manual or automated process? What format is the data stored in? Can data from multiple sources (not necessarily from the mobile devices) be integrated together in the system? How?

(f) Data export and reports: What kind of formats can the mobile system export the data in? Can data be exchanged with other software packages and systems?

4. Will the device application support the data types and features you require? Use your existing paper-based monitoring forms and surveys to identify the data types and features you require. These can include:

(a) Question types: Text, decimal, integer, single choice, multiple choice, date, time, location, photos, audio, video, barcodes, signatures, ranking, etc.

(b) Formatting and organization of question display: Grouping of questions into sections, tables, or matrices; horizontal or vertical sequencing of questions on a single screen; display of instructions or hints; displaying audio or video content; formatted text—in bold, colors, etc.

(c) Logic functions: Does the software allow for logical, rule-based actions such as—repeating of questions, skip rules, answer limits and validations, preloading of data, randomization, compulsory answer required, etc.

(d) Language capabilities: Can the device application display and allow data entry in local languages?

5. How does the software vendor price their services? Will the software vendor develop a customized system for you? Will it be a software package for which you buy licenses? Or will the software services be provided through monthly subscriptions?

Irrespective of the type of engagement model you have with the software vendor, you should clarify: One-time cost, recurring costs, cost of scalability (from few to large number of users), maintenance and support costs, and costs not included by the software vendor).

#### DATA TRANSMISSION OPTIONS

	Call	IVRS	SMS	USSD	Mobile internet	Wifi/cable internet	Hot synch
<b>Set up time</b>	None	2–3 weeks	1 week	1 week	None	None	None
<b>Set up cost</b>	None	High	Low	Medium	None	Low	None
<b>Ongoing cost</b>	High*	High**	Low	Medium	Fixed	Fixed	None
<b>Demand data (pull)</b>	Operator calls	Automated outbound	Outbound reminders	No	No	No	No
<b>Receive data (passive)</b>	Inbound calls	Inbound calls	Inbound SMS	Receive USSD code	Yes	Yes	Cable connect
<b>Send data (push)</b>	Outbound calls	Outbound calls	Outbound SMS	No	No	No	No
<b>Send data on request</b>	Inbound calls	Inbound calls	Outbound SMS	Receive USSD code	Yes	Yes	Yes

\* (human operators)

\*\* (per minute)

#### DATA AGGREGATION OPTIONS

	Remote	Local
<b>Hardware</b>	Web servers	Desktops or laptops
<b>Set up time</b>	Immediate	Within a day
<b>Set up cost</b>	None	Local computer
<b>Ongoing costs</b>	Server and hosting costs	Local maintenance
<b>Data security</b>	High	Requires stringent protocols on local machine
<b>Data access and sharing</b>	Easy: create additional user accounts	Difficult: share password for encrypted data

## CONCLUSION

The most appropriate way of collecting data for monitoring and evaluation depends on which criteria are important for the project. Thakkar *et al* [9] suggest:

Criteria	Paper	ICTs
Easy to develop and field test questionnaire up front	✓	
Allows unstructured, impromptu notes and qualitative data	✓	
Manage large surveys across regions with large numbers of surveyors		✓
Data quality is paramount		✓
Cost and time		✓
Ability to collect new data types, e.g. location (GIS), multi-media		✓

## EXAMPLES OF PROJECTS – FROM [10]

### GREAT LAKES CASSAVA INITIATIVE

Four year, Gates Foundation funded project, managed by Catholic Relief Service (CRS). Aim of project to assist in disease identification and diagnosis. Decision taken to rework the proposed M&E system with an ICT solution.

CRS purchased nearly 300 netbooks. A standardized training programme was used – Aglix Learning Management System (LMS). Netbooks also used to conduct field based data collection to assess project impact. Data was gathered offline and synchronized into a central database for analysis and onto a public website for reporting. A combination of WiFi zones, office networks, Bluetooth connections and GSM dongle modems used.

Project achieved its goal of reaching approximately 1.15 million farm families. Basic service questions were answered with accuracy. ICT methods ensured that the previous proliferation of duplicate surveys was eliminated. A second generation of the training module was developed which developed courses in multiple languages. The system enabled increased communication between managers and field staff leading to much more detailed and spatial data allowing new types of analysis.

### LIBERIA AGRICULTURAL UPGRADING NUTRITION AND CHILD HEALTH PROJECT (LAUNCH)

Aim of project to improve food security and reduce chronic malnutrition of vulnerable women and children under five. Aims to provide food supplementation, nutritional information and child feeding practices.

Mobile phones with EpiSurveyor (rebranded as Magpi- a cloud based platform that enables users to design data collection forms, collect data via a mobile phone and immediately upload and analyse the data) used for improving beneficiary registration and monitoring nutrition practices. Project was able to use data collected using this method to produce several conclusions and recommendations that allowed the team to better understand and address the needs of their beneficiaries and streamline project implementation.

## COMMUNITY KNOWLEDGE WORKER (CKW) PROGRAMME

Programme provides market price information, weather information, farming best practices, supplier directory and Google Trader (a mobile platform to advertise produce) through a network of over 800 village representatives. The programme has developed a suite of mobile applications for the knowledge workers to use including means to search for information for farmers, to conduct and submit surveys, and to allow communication between knowledge workers. These mobile apps are based on open sourced technologies and work with Android or Java-enabled phones. The apps collect usage statistics every time the workers use them, including GPS data. It processes that data into a dashboard presentation that displays detailed data into an aggregated and summarised form.

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