DATA AND KNOWLEDGE MANAGEMENT

M&E data is routinely used by different stakeholders, in different locations, for different purposes. This means it needs to be properly stored, processed and shared, either physically or electronically. The goal of a knowledge management system is to generate and share usable knowledge based on this data. Data and knowledge management systems are often supported through information technology (IT) solutions.

Every project or programme, no matter how small, needs a system to handle data. In very simple projects this may be as straightforward as maintaining a manual filing cabinet, and making sure that documents are properly organised within it. In larger projects and programmes, with multiple stakeholders, more sophisticated systems of data management may need to be developed to ensure that the right information gets to the right people at the right time.

Monitoring and evaluation (M&E) systems almost always result in the generation of data, which is then routinely used by different people, in different locations, for different purposes. An M&E system therefore needs to cover not only the collection and analysis of data, but also the *"communication system in which information flows between all the people involved"* (Gosling and Edwards 1995, p86). This means data needs to be properly stored, and then moved around – either physically or with the support of information technology (IT) solutions. Consequently, data management is an integral part of most M&E systems.

Data management

Within M&E, data management refers to the systematic storage, management and sharing of raw data – the facts and opinions generated and recorded through an M&E system. Clearly, a data management system needs to be designed according to the needs, size and complexity of a project or programme. However, many features are common (see box below based on IFRC 2011).

Features of Data Management

Data format: This covers the format in which data is recorded and stored. Data can come in many different forms, but is normally either numerical, descriptive, visual or audio. Standardised forms and templates for collecting information can help ensure that data is generated and stored in the correct format. Forms and templates can be physical (designed to be printed out and filled in by hand) or electronic.

Data organisation: Data needs to be stored in a logical way that is easy to understand and access. Data organisation is usually tailored to the specific needs of a project or programme. Data is typically classified according to time (e.g. chronologically), location, content area (e.g. different objectives of a project), format (e.g. project reports, donor reports), or any other category considered useful.

Data availability: Data needs to be available to its intended users. This means ensuring that the right people can access the data at the right time, also taking into account security protocols to ensure that data is safe from unauthorised use. Data needs to be searchable to ensure that it can be found when needed. Data management systems often include processes for archiving – long-term storage for data not in current use.

Date security: Projects and programmes need to ensure that there is sufficient security for confidential data, and to comply with any legal requirements, such as data protection legislation. This often involves IT protection methods, such as passwords, firewalls and virus checks. But it might also simply mean having a lock on a filing cabinet. CSOs also need to ensure that they are conforming to privacy or auditing regulations.

Data quality control: Projects or programmes need procedures for checking data, amending it if necessary, and dealing with missing data. Data can be false for many reasons – mistakes made in data entry, duplication, inconsistency of data, accidental deletion, etc. These problems are particularly common with numeric data, but may affect qualitative data as well.

Data responsibility: Within any data management system it is important to identify the individuals or teams responsible for developing and maintaining the system, and for ensuring that others are able to use it. This includes being responsible for ensuring that policies and regulations are enforced, and that access to confidential data is properly authorised.

It is important to recognise that a data management system designed to support M&E is rarely developed in isolation. It is usually part of a wider data management system, and therefore needs to fit in with wider organisational policies and requirements. This means that M&E staff, or staff engaged in M&E activities, may need to liaise with other internal actors, such as IT support staff.

Whilst data management often goes beyond M&E, there are times when the requirements of an M&E system merit special considerations. Some examples of this are described below.

- Many M&E methodologies require the development of baselines, or baseline surveys. Several years may elapse between a baseline and a follow-up data collection exercise. Sometimes the follow-up is conducted by a different agency. For example, a baseline survey is often done by internal project staff, and a repeat survey is later done by external evaluators. It is therefore vital to ensure that proper, detailed records are kept of the original baseline. This may include details of who was interviewed, along with their names, addresses and access details.
- Some methodologies for data collection and analysis (e.g. Outcome Mapping, outcome harvesting, the most significant change (MSC) technique) are data intensive, and result in a large amount of qualitative data being collected over time. It is important to design dedicated data management processes to ensure that all this data is stored properly, and can be accessed and analysed when needed.
- Other methodologies, such as qualitative comparative analysis (QCA), social network analysis, quasi-experimental trials or randomised control trials, require data to be stored or processed in very specific ways, often in dedicated databases or spreadsheets.
- Many CSOs produce photographs, recorded audio materials, videos, and other kinds of audio-visual media. These need to be properly stored, along with associated data (e.g. dates, locations, permissions for use). The same is true for narratives such as case studies, stories of change and testimonials.
- Participatory M&E methods are designed to involve supported communities throughout monitoring and evaluation processes. In these circumstances it is important to ensure that any data generated is stored in a way that is useful to those communities, or to ensure that they are able to store and access their own data in their own way.
- Most CSOs generate large amounts of qualitative data, which can be difficult to process and analyse. Qualitative data management often involves sorting information according to different categories, groupings or themes, such as evaluation questions, objectives or indicators. Without this, it can be impossible to retrieve and analyse qualitative information after it has been used for its immediate purpose.
- Most larger CSOs suffer in one form or another from the evaluation graveyard syndrome, where old reports, reviews and evaluations sit gathering dust on shelves. This is often because they have not been incorporated into a data management system that allows the information within them to be easily accessible.

Knowledge management

Data management is a necessary feature of most M&E systems. But it is not sufficient on its own, especially in larger projects and programmes. Knowledge management goes further than data management, and can be defined as the *"systematic processes by which the knowledge required by an organisation is created, captured, refined, stored, accessed, shared and used"* (Britton 2005, p8).

Knowledge management is based on an assumption that data management is not an end in itself, but should instead be seen as a way of enabling organisational goals to be achieved. The goal of knowledge management is to enable organisations to acquire or create useful knowledge, and then make it available to those who can use it at an appropriate time and place (King 2009). So while data management simply looks at how raw data is collected, stored and accessed, knowledge management goes further to generate usable knowledge based on this data.

A useful way of looking at this is to see data (or information) as raw facts and opinions, knowledge as processed and/or analysed data, and wisdom as the desired end product (see box below, based on Britton (2005)).

Information, Knowledge and Wisdom	
Information (or data)	Information includes raw facts and opinions. It can be developed through formal processes, carried out as part of monitoring, evaluation, impact assessment or research exercises. But it can also be generated through informal processes.
Knowledge	When information is systematically organised through storage, processing and analysis it turns into knowledge. This knowledge can be used to answer questions and draw conclusions.
Wisdom	Wisdom is a process that involves combining knowledge with experience, understanding, common sense and insight to guide action and make decisions.

A common model used to support knowledge management is the people, process and technology model. This model identifies three main elements for successful knowledge management:

1. connecting ***people*** who have the knowledge to help each other, and developing their willingness and ability to ask, share and listen;

2. developing ***processes*** to simplify the sharing, validation and distillation of knowledge; and
3. developing reliable, user-friendly ***technology*** to facilitate communication.

In smaller projects there may not be much need to invest in processes and technology. But as development interventions progress from smaller to larger projects, and then to programmes and organisations, things get more complicated, and it becomes necessary to rely more on processes and technology for sharing knowledge, and less on personal contacts and relationships.

However, there is a danger that CSOs become too focused on data management, and thereby lose sight of its purpose. In the early 2000's many larger NGOs developed comprehensive data management systems, but found these only delivered benefits if there was a sufficient focus on people (see case study opposite). Processes and technologies need to be planned and developed to serve the people who use them, and not the other way around.

Case study: Knowledge sharing in Concern

In around 2008, the information technology (IT) department in Concern took the lead in developing its approach to knowledge management (KM). The result was a technology-centric version of KM. Databases capable of capturing lessons learned were created, with the assumption that staff would use them to improve their practice. For example, a knowledge repository was created which housed over 4,000 documents.

Unfortunately, the technology-heavy solution did not yield positive results. This was partly because many staff did not know how to upload content onto the platform being used - Microsoft SharePoint. In addition, for field offices to use the databases they needed to be connected to Concern's intranet. Limited connectivity, a lack of stakeholder buy-in, and access challenges, combined with a level of technophobia, all united to undermine the system.

These issues led to a change in focus for Concern in 2011. A new newsletter was introduced, centring on connecting people who had knowledge and wanted to share it, as opposed to simply compiling knowledge in databases. In its initial stages the results of this renewed effort were impressive, and were considered much more valuable to the organisation.

Source: Matturi, 2014

Key elements of knowledge management

As with data management, knowledge management can cover a number of different aspects. Some of these are contained in the table below (based on Britton 2005, King 2009). However, the precise methods used will inevitably vary from CSO to CSO according to need. There is no *'one size fits all'* method, because each organisation has different needs and objectives, and each requires a tailored knowledge management approach.

Elements of Knowledge Management

Knowledge creation happens whenever new data is created; for example when information is recorded on a template or form, or opinions of staff are written down. But it can also happen when people combine information and/or existing knowledge in new ways to create new knowledge. For example, CSO staff might generate new knowledge through sharing experiences at a meeting or workshop.

Knowledge capture is about identifying and/or recording knowledge from within or outside an organisation. This could include explicit knowledge in the form of printed documents or information held on databases. But it could also include implicit knowledge. This is the knowledge held by CSO staff, or by teams working on specific issues. Implicit knowledge may also be embedded in a CSO's products, processes and relationships.

Knowledge access happens when a CSO looks for, and acquires, knowledge from a specific source. This could include knowledge based on an individual staff member's experiences, or those of colleagues. But it could also include knowledge from documentation (including policies, procedures, guidelines, standards or academic publications) or the experiences of staff from other organisations. Knowledge could also be accessed from communities of practice, external experts, networks, or events (such as conferences or workshops).

Knowledge storage is linked to data management, and often uses the same technologies and processes. But it may go further than the storage of raw data and opinions, and may involve the capture of lessons learned, or other kinds of processed and analysed information.

Knowledge sharing is about making knowledge available to others. For knowledge to have wider organisational use it must be transferred or shared. Transfer can be defined as focused and purposeful communication to a known receiver, whilst sharing normally means disseminating knowledge more widely.

Knowledge use involves using knowledge for specific purposes. This, of course, is the ultimate goal of knowledge creation, capture, access, storage and sharing. As far as M&E is concerned, purposes might include learning, accountability, project/programme management, providing evidence for advocacy work, enhancing communications, fundraising and marketing, amongst many others.

Databases

CSOs often store M&E data in databases. Smaller projects, programmes and organisations may not need to develop electronic databases, but ones generating large volumes of data often do. Sometimes, M&E information can be added to existing organisational databases, or other forms of IT platform, and sometimes databases need to be specially designed for the purpose.

The added-value of a database lies mostly in its ability to organise and combine information from multiple sources, and share it with different stakeholders in different locations. But when deciding what sort of database to develop, the benefits need to be carefully balanced against the costs. These include the costs of computers and software, the time taken for staff to enter data, induction or training requirements, and the costs of maintaining the database. If a CSO already has a database then the financial costs of adding M&E information may be small.

IT systems, such as databases, can perform a number of basic functions for M&E. For example:

- basic records – such as names, addresses, telephone numbers – can be stored, allowing staff to easily contact different stakeholders;
- documents such as plans and reports can be attached for easy retrieval when needed;
- many databases hold bespoke M&E information such as objectives, indicators, targets, planned activities, etc., along with associated achievements;
- databases can allow the latest versions of forms and templates to be downloaded or completed online;
- some databases allow for the automatic processing of statistical information, e.g. adding up numbers from different locations;
- many databases allow information to be searched, through the use of word searches, or tagging using keywords; and
- databases often allow data to be coded or sorted in different ways – for example, reports of change could be coded according to the relevant objective or indicator.

In some cases, databases may be designed to enable not only data management, but also wider aspects of knowledge management. For example, databases may be designed to enable staff within an organisation to input comments, suggestions, ideas and lessons learned so that others may access and use them. In this way, a database can support the wider use of information – helping to translate data / information into knowledge, and then into wisdom.

There are three main options for developing a database (see Levine et. al. 2016).

- The first is to use existing (usually Microsoft) software such as Excel or Access to develop a customised database. The big advantage of this is that the software is often already on staff computers, thus avoiding problems with poor internet connectivity when people are working in the field. In addition, many staff nowadays are familiar with the software, which reduces the need for training or IT assistance. The downside – especially if large amounts of data are generated in multiple locations – is that it can be difficult to manage and coordinate data, particularly if data is loaded onto multiple Excel or Access sheets on different computers and then sent to staff centrally for cleaning and consolidation.
- Another option is to use *'off-the-shelf'* software. This is usually software designed to manage project results data (such as district health information) that can be customised by a CSO. It is usually cheaper to buy this kind of software then to develop a bespoke system. However, it may be difficult to adapt it to a CSO's particular needs.
- Some CSOs pay an IT company to produce a custom-made database. This has the obvious advantage that it can be produced to meet all of a CSO's requirements. However, additional costs are often incurred if these requirements change, and IT support may be needed on a regular basis. In addition, it can take a long time for databases to be developed, and they may be very expensive.

The three options above are the main options for CSOs wishing to cover the full spectrum of their work. But if a CSO is only looking to support an individual project or programme then other options can be applied. For example, different statistical packages, such as the Statistical Packages for the Social Sciences (SPSS), can be used to stored and process large amounts of numerical data from an individual project. Similarly, a variety of software packages have been produced than can be used to help with qualitative data analysis. These products tend to be used more on a project-by-project basis.

Common challenges with databases

A well-designed and maintained database can help support CSOs' M&E systems immensely. However, there are many potential challenges that need to be clearly understood at the outset. Some of these are described below.

- Databases usually need to be supported by dedicated IT staff, either within or outside an organisation. It is vital that M&E and IT staff work together, and in collaboration with the field staff responsible for data collection. IT staff may not understand the needs of an M&E system, or may not appreciate that not all processes can be automated.
- Information duplication is often a significant problem. Many CSOs end up entering data manually more than once, especially CSOs with multiple departments, such as M&E, fundraising and communications departments. A recent study by ITAD (2014) revealed that most NGOs duplicate data to some degree or other, and end up storing the same data in different forms.

- The same study suggests that CSOs find it much easier to design databases to store and analyse quantitative data. This means that qualitative information (or indeed any information reflecting unanticipated change) is often missed out. INTRAC has seen many examples of IT systems that are only capable of handling quantitative indicators and targets, and do not allow staff to process qualitative indicators, or reflect lessons learned.
- A critical factor is how far a database is designed with the capacities and realities of the staff collecting and using the data in mind. Any database needs to be user-friendly and accessible. If it is not, people will either not use it, or they will be careless when entering data. If a system or database saves them time and effort they are much more likely to use and appreciate it.
- If a CSO is not careful, a database can lead to the prioritisation of explicit knowledge (facts, numbers, reports) to the exclusion of staff's implicit knowledge, such as insights, intuitions and experiences. Capturing this kind of knowledge is much more difficult, but it is often just as important for decision-making.
- It can be very difficult to get people to enter information onto a database unless data entry is compulsory and enforced (as it is in a financial management system). It is very hard, for instance, to get people to enter lessons learned onto a database unless they feel it will benefit them, and unless it is made easy for them.
- Most people in the social development world appreciate that power and knowledge are related. There is a risk that reliance on technology can lead to a commodification of knowledge, because the people that have access to the knowledge contained within a database have greater power than those that do not. For CSOs that strongly believe in helping to empower communities, the central management of data and information can be a concern.

Whichever option is chosen, the fundamental issue still remains. A database can help a CSO capture, store, retrieve and process M&E information to a certain extent. It can thereby help translate raw data / information into usable knowledge. But using that knowledge – and translating it into organisational wisdom – requires human interaction.

> *"People will share knowledge through workshops; they will learn together. But encouraging people to document is a Herculean task" Wakwabubi (2011)*

Further reading and resources

Different sections of the M&E Universe focus on three key topics of knowledge management: data collection, data analysis and data use. These papers contain further guidance on how to collect, generate, share and use knowledge within an M&E system. Another paper in this section of the M&E Universe deals with the supporting environment for M&E systems. Separate papers deal with project and complex M&E systems.

Project M&E systems

Overview of complex M&E systems

The supporting environment for M&E

Data collection

Data analysis

Data use

The paper by Bruce Britton (2005) referenced below is a good starting point for people wishing to know more about knowledge management in CSOs, and how it can be used to support organisational learning. It is available from INTRAC's website at https://www.intrac.org/praxis-paper-3-organisational-learning-in-ngos-bruce-britton/

In 2006, the Overseas Development Institute (ODI) produced a document called *"Tools for Knowledge and Learning: A Guide for Development and Humanitarian Organisations"*, by Ben Ramalingan. It contains many practical examples of tools used to enhance knowledge management and organisational learning. It can be downloaded from the ODI website at https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/188.pdf

The IFRC guide to M&E, referenced below, contains a long section on data management. This is based on a longer piece of work by Rodolfo Siles, called *"Project Management Information Systems"*. This was written in 2004.

References

- Britton, B (2005). *Organisational Learning in NGOs: Creating the Motive, Means and Opportunity.* Praxis Paper No.3. INTRAC, March 2005.
- Gosling, L and Edwards, M (1995). *Toolkits: A Practical Guide to Assessment, Monitoring, Review and Evaluation*. Save the Children Development, Manual No.5, London.
- IFRC (2011). *Project/programme Monitoring and Evaluation (M&E) Guide*. International Federation of Red Cross and Red Crescent Societies. Geneva, 2011.
- ITAD (2014). *Investing in Monitoring, Evaluation and Learning: Issues for NGOs to consider.* ITAD, in association with NEF Consulting. Edited by Jennifer Chapman, March 2014.
- King, W (2009). Knowledge Management and Organizational Learning. *Omega. 36. pp167–172*.
- Levine, C; van Vijfeijken, T and Jayawickrama, S (2016). *Measuring International NGO Agency-Level Results.* InterAction, May 2016.
- Matturi, K (2014). *Knowledge sharing in action: The case of Concern Worldwide's Knowledge Matters.* Praxis Note, No. 68. INTRAC, Oxford, UK.
- Wakwabubi, E (2011). Comments ascribed to senior Kenyan development practitioner, quoted in Matturi (2014).

Author(s):
Nigel Simister

INTRAC is a specialist capacity building institution for organisations involved in international relief and development. Since 1992, INTRAC has contributed significantly to the body of knowledge on monitoring and evaluation. Our approach to M&E is practical and founded on core principles. We encourage appropriate M&E, based on understanding what works in different contexts, and we work with people to develop their own M&E approaches and tools, based on their needs.