DM&E Tip Sheet #8: Data Management

This Tip Sheet is for managers and staff involved in developing data management systems for monitoring and evaluation information. Subsequent pages include discussion of key issues and examples from Mercy Corps projects.

Table of Contents

Introduction to data management

In this tip sheet, data management refers to the approaches, tools and information technology applications we use to store project or program-level monitoring and evaluation information.[1] These can also be referred to as Management Information Systems (MIS), or database solutions. While various strategies have evolved across Mercy Corps field programs for managing data, many still feel they have to "reinvent the wheel" when developing project or country-specific systems.

The purpose of this tip sheet, therefore, is to draw on lessons learned and provide a general reference guide for setting up data management systems for project information. More detailed guidance, including examples and case studies of specific applications, can be found by following the links throughout this tip sheet and at the end, as well as in the DM&E-in-a-Box toolkit.

Data management checklist

Systems should:

Be strategic, collecting only the most useful or required information.

Reflect the technology environment of the project or country.

Stay utility-focused, facilitating management and reporting tasks.

Strive for simplicity so staff can learn & use easily, even if high turnover.

Ensure timely and accurate data entry, with multiple quality checks

Avoid duplication & ease analysis with an integrated solution.

Clearly define roles & responsibilities for data entry, storage and analysis.

Adapt easily to programming changes, like new indicators or sectors.

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[1] Monitoring information refers to the documentation of program work by routinely tracking data on project activities and outputs and comparing that information against targets as part of standard program management. Evaluation information typically refers to data that measures objective-level changes and is therefore collected only periodically, typically at baseline, mid-term and final evaluations.

Key questions to ask before considering IT solutions

1. What are our key data needs and uses?

Data management systems generally work best when they track key information that is used strategically for project management. The project logframe and indicator plans should be our starting point for determining this.[2] Be careful of a common tendency to collect too much data, which can over-complicate our systems. Instead, try to simplify and focus only what is most important or relevant.

We should also look at any existing M&E forms or reporting formats to get a better sense of what information we're looking to manage and see how we can build on processes already in place for collecting and managing data.

Next, think about how the various stakeholders – project managers, program staff, country leadership, partners, M&E staff – will want to use the information (management, reporting, etc.). The optimal solution will manage information in a format that is usable for these tasks. This could

> ### Outputs vs. objective-level data
>
> It can be useful to distinguish between monitoring data tracked routinely, and data on objective-level indicators that are part of one-off activities like baselines and evaluations.
>
> The former requires a mainstreamed system geared towards daily use, while the latter may only be used by the specific survey team.

include automatically generating tables or charts that facilitate visual analysis, or organizing data monthly or quarterly to reflect reporting timeframes.

2. What are the major components or desired features of the system?

We should think about how answers to the first question above will affect our system requirements. Some factors to consider include:

- **Integration and compatibility:** Think about which data sets can be stored in one integrated place, and whether they should be compatible with or linked to other data management solutions for standardization, aggregation, or analysis/reporting purposes. For example, project data may require a certain standardized format to feed into larger country-wide systems.

- **Quantity and organization of data:** The amount of information we will be storing, as well as the number of dimensions to the data (i.e., regional, sector, etc.), will help determine the best solution. Some projects find it useful to organize the data by objective, as this can ease reporting to donors. In other cases, a geographical approach organizing data by location can be useful for discussing program strategy, resource allocation and management. Data with many dimensions or units may require a more advanced database such as MS Access, while MS Excel may be appropriate for more limited data sets.

- **Data transfer:** Who needs to access the information, from where, and how often is a major issue. Sometimes, data can be stored in one central field office and transferred only occasionally by email. Other times, we might prefer information to be updated and shared in real-time from multiple locations, and a web-based solution may be desired. There are other technical solutions as well, such as using Access replicas in field offices or establishing virtual private networks (VPNs).

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[2]

- **Adaptability:** The simpler the system, the easier it can adapt to changes. We can test this by assessing how easy it is to add new objectives or sectors. Back-end linkages, such as look-up tables and auto calculations, ease data entry but can also make the system more complex and less flexible.

3. What are our main constraints?

In thinking about what is feasible for our project or country office, we should keep in mind some practical issues that affect design as well as implementation and sustainability of the data management system over time.

- **Budget:** The costs of implementing and maintaining data management solutions are often under-estimated. It is common for programs to develop cost estimates for system development, which can include consultant fees and software or equipment upgrades. The costs of *maintaining* the system, however, are often overlooked and can be far more significant. These include employing knowledgeable staff, training, adjusting to changes, and updating or replacing technologies if they break down or become obsolete.

Tradeoffs: technology vs. cost/IT expertise
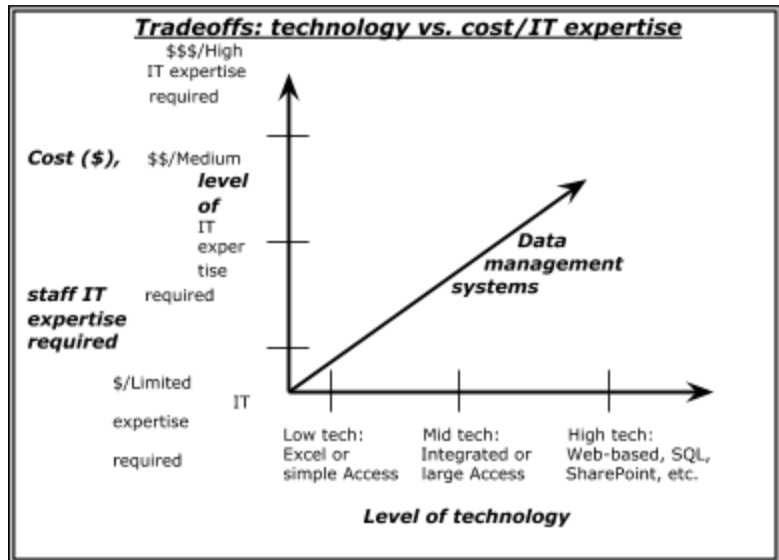
- **Time:** Another important, often overlooked factor is the time needed to design and implement the system. The more complex the system, the more it will take staff away from other activities and cause delays in actually generating data. Systems with higher-end technology or a large number of data points generally require more staff time to design, implement, and maintain.

Data management challenges from Iraq:

Time-consuming system was difficult to maintain and teach to new staff.

Repetitive data entry and tedious calculations led to inefficiency and mistakes.

Did not fully address information needs.

Data management solutions from Iraq:
Simplified tool integrates project indicators and other info into one Excel database.

Auto-calculations in Excel limit errors.

Easily aggregates data and links to summary tables and charts for analysis.

- **Technology environment:** The level of technology we use should be consistent with the local project or country environment, in terms of IT sophistication, Internet connectivity, etc. This is important for sustainability of the system in the face of staff turnover or programming changes. Also, program staff feel more comfortable entering and analyzing data in software programs that they are more familiar with.

- **Staff capacity:** Data management structures should be developed in line with the capacity of program staff to implement these systems. There can be difficulty in maintaining the system or making changes if the level of technological sophistication outstrips the knowledge or capacity of Mercy Corps staff. Over-reliance on outside help, or even on one or two tech-savvy staff members, can lead to time

delays and threaten overall sustainability, particularly in cases of high staff turnover.

Analyzing software options

MS Excel and MS Access.
The table below discusses two very common software programs for data management and analysis, Microsoft's Excel and Access.

The table illustrates how MS Excel may be preferable in a project with a relatively simple data set and fairly basic IT capacity. MS Access, on the other hand, could be advantageous for multi-faceted programs that have the expertise to maintain it. Staff tend to be more familiar with Excel, and it requires less back and forth database developers to design and maintain. However, Access offers more options for integrated management of complex data sets.

Pros & Cons of MS Excel and MS Access				
	Excel		**Access**	
	Advantages	*Disadvantages*	*Advantages*	*Disadvantages*
Data entry	• Open interface to see entries & note mistakes • Minimal training required	• Data entry form not as user-friendly • Less automatic standardization of entries to guard against error	• Simple, user-friendly forms easy to enter data • Separate form for each data record • Can use data validation to guard against errors	• More difficult to set up and adjust to changes • Harder to readily see errors
Data storage	• Easy to maintain due to staff familiarity, especially if high turnover	• Hard to store many different types of data (flat structure) • Not as effective as an integrated data solution • Difficult to manage multiple versions	• Can store many types of data and high volume • Allows for multiple databases with one interface for integration	• Requires advanced technical staff to maintain; staff turnover a major issue • Can cause delays if relying on database experts
Data analysis	• Easier for program staff to manipulate • Can readily convert to pivot tables, charts, graphs, etc. (with training)	• Does not automatically generate formatted reports as in Access • Harder to integrate data from multiple sources	• Can generate auto-formatted reports based on data • One report integrates multiple data sources • Multiple analysis tools include Data Access pages, pivot charts, etc.	• Program staff not as familiar with software • Requires IT/M&E staff to format reports and make changes
Some M&E systems use a mixture of both Excel (for entering data and analyzing outputs) and Access (for storing all data in central location).				

An intermediary option could be using Access as the main IT solution, but having data entry tables linked to Excel and enabling users to export the Access data into an Excel for analysis. The need for linking to Excel may diminish as staff capacity and familiarity with Access in increases. However, starting with data analysis in Excel can help encourage program staff to use the data more readily and tailor it their unique needs or preferences. It can also help staff begin to understand the linkages among different data sources in Access and how a report is generated through the use of queries.

Other data management software.
Database options could also include use of a Microsoft SQL server. This is a back-end[3] data management tool robust in storing and synchronizing large quantities of data. Some Mercy Corps programs have found it useful to back up more user-friendly front-end solutions such as Access, Excel or InfoPath. Staff capacity to manage an SQL server can be an issue, however.

There is also a range of more sophisticated software developed by private companies specifically for managing M&E data. While these may prove handy for some projects, they can be unsustainable due to the need to repeatedly train staff and the lack of in-house expertise.

TolaData

Tola is Mercy Corps' primary system for managing and organizing program indicator data. The goal of TolaData is to improve program performance through quick insights into program indicator data that help teams make informed and timely decisions to maximize program impact during implementation. Another major goal is to ensure that all indicator results are supported with evidence, reducing the risk that program-critical data is misplaced or inaccessible.

Data management problems from Sri Lanka:

Multiple, uncoordinated M&E processes and databases; no consolidated country strategy.

Difficulty accessing information when needed.

Data management solutions from Sri Lanka:

Country-level logframe articulates strategy & key program indicators.

Integrated Access system stores only the most relevant info in real time.

Well-trained M&E focal points ensure quality data collection and entry.

All objective-level program indicators consolidated into one annual survey.

Investments ease proposal writing, reporting, strategic planning, and management.

A link with additional information Tola can be found here: TolaWiki

Setting up the process

Team approach to system design. The end-users of the system, including program managers and staff, should be involved in the design of the system as much as possible. M&E, IT and program staff need to work together to ensure that data management processes are able to be implemented and strategic in terms of programmatic information needs and uses.

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[3] The term *back-end* refers how the data is stored within the IT system, while *front-end* refers to the user interface that staff interact with to enter and analyze data. Systems can maintain different software solutions for each task.

Key data management roles and responsibilities

- Designing the database
- Developing data collection forms
- Training on data collection forms
- Collecting the data
- Entering the data into a database

- Maintaining the database
- Cleaning/sorting data for analysis
- Producing analysis formats
- Analyzing the data
- Writing up findings in reports

Training staff. Continual staff training, particularly in data entry procedures, can help reduce errors and ensure standardization. It is important to be detailed and specific, with written instructions for how to fill in each data point (e.g., does one enter "5" or "5%", or leave blank vs. write "NA").

Training of program staff on key Excel data analysis functions, like pivot tables and creating charts, can also greatly increase use of M&E data. More sophisticated software solutions may require more even extensive training to increase comfort levels. Training takes time but is a worthwhile investment: the more staff with intricate knowledge of the system, the better guarded we are against sustainability threats such as staff turnover and programming changes.

Defining roles and responsibilities. Clearly defining who will do what, and when, is critical. Responsibilities should be clearly detailed in indicator plans and staff position descriptions. It usually works best when M&E responsibilities are shared among the project team, with focal points coordinating overall M&E activity and specific staff are assigned data entry roles. Supervisors or others should conduct routine data quality checks to ensure accuracy and consistency.

Other data management considerations

Data entry. As a general rule, we should configure our data collection forms and systems so that data-entry staff enter exactly what is on the form into the spreadsheet or data-entry form. This helps to reduce error.

Many Mercy Corps programs find that setting up auto-calculations in Excel or Access, as opposed to tasking staff to make these manually, reduces mistakes. Look-up tables are also useful for ensuring standardization. Be careful of the tradeoffs, however: they can make the IT set-up more complex and less flexible to changes.

Data storage. Sometimes events like staff turnover or computer breakdowns cause projects to lose important data. Keeping the data in one central location, and making sure it is backed up in multiple formats (hard-drives, servers, CDs, etc.), is crucial to sustainability.

It is also recommended to keep an updated manual-type document describing the data management system, so that

later staff can understand the set-up details and the rationale behind decisions made.

Data security. We need to ensure that data is kept safe from corruption and that access to it is suitably controlled. This requires protecting databases and networks from unauthorized users through passwords and other encryptions.

Data sharing and access. Facilitating timely access to data is a common challenge for M&E systems. In projects with more limited geographic scope, data can be entered, stored and accessed on a central intranet or stand-alone server. Larger programs, however, have to work creatively to update and access information. A few options for this are listed below:

● *Low-tech options* include having field officers send their data sets electronically by email or flash-disk. These can then be aggregated manually by someone in a central location and shared. This limits over-reliance on Internet access or IT systems. However, it will not be possible to have real-time data, and manual updates and aggregations can be prone to error and cause confusion about different versions of data sets.

● There are also a variety of *Web-based* options that can facilitate access to databases through the Internet or VPN. These include Microsoft's SharePoint[4] and Groove, both of which provide an Internet website, or portal, in order to link many users in different sites to common databases in Access, SQL or other applications. Central servers accessed through the remote desktop function are another option. These solutions have proven effective where the technology environment is appropriate, though some may require significant IT expertise to maintain.

Refining and maintaining the system

Start small and field test. Setting up a large, complex system in one go can be overwhelming for staff, and make it more difficult to correct mistakes. It can be useful to start with only one project, or one component or objective of a project, to develop and test IT solutions. Lessons learned on a smaller scale can then be incorporated into wider roll-out.

> **Only collect data we can use**
>
> Some Mercy Corps projects complain that they are collecting lots of data, but only some of it is actually useful.
>
> Every single data point has time and resource implications for collection, entry, storage and analysis. Streamline the system by focusing only on the most useful data!

Continually adjust and refine. Major events like annual surveys, evaluations, workshops or reporting

> **Data analysis meetings should:**
>
> Clearly compare expected and actual results.
> Identify reasons for lower than expected results (if applicable).
> Outline a plan of action in response to results.
> Communicate info to stakeholders (partners, beneficiaries and donors) and solicit feedback.

cycles can be useful times to step back and analyze the system. At each instance we should validate the utility of each set of data, and decide what is most relevant and what elements could be eliminated. We should also double-check to ensure that data collection and documentation responsibilities are able to be carried out by staff, in a quality manner and without over-burdening other activities. Routinely assessing quality and identifying areas that are error-prone is also important.

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[4] MS SharePoint is a common web-based software facilitating real-time data entry and analysis from multiple locations. See *SharePoint: Pros and Cons (https://clearspace.mercycorps.org/docs/DOC-1563)*.

Conduct data analysis meetings. M&E data can be useful for project management, learning, reporting and accountability. It is important that our data management solutions have the ability to aggregate and display data in tables, charts and graphs that are easy to understand. Regular analysis meetings including all project or program team members should be an integral part of the work-plan.

Consider the role of partners. Think about which elements of the system would be appropriate for local implementing partners to manage or input directly into. In the push for more participatory M&E, we should be wary of overly-complex M&E systems and IT solutions which may alienate partners or add to the perception of M&E as requiring very specialized expertise. Instead, can look to simplify basic processes and encourage partners to play an increasing role in collecting, managing, analyzing and reporting on project information.