M&Excel

A practical guide to building results monitoring tools in Excel
Imprint

M&Excel – A practical guide to building results monitoring tools in Excel
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Preface

Imagine the following dialogue between a project manager and his supervisor:

Supervisor: “Please create a short overview of the impacts and the degree of goal achievement of your project. Until tomorrow morning would be great.”

Project manager: “No Problem. I’ll just open my monitoring tool, have a look into the Management Cockpit and ... done!”

Now, you would certainly ask yourself: what is a “monitoring tool” and what is a “Management Cockpit”? And above all: How can I get one?

I’m glad the guide at hand will provide you with answers to those questions. It originates from practitioners, it is written for practitioners and it summarizes the experiences gained during the set-up and operation of efficient Excel tools for supporting a results-based monitoring approach.

A particularly promising and new aspect of this guide is the presentation of a “Management Cockpit”. Experienced project managers know how important it is to have a fast and at the same time comprehensive overview over their project for steering the project as well as making efficient and timely decisions.

We hope that this practical guide will give you some inspiration and hands-on instructions on how to improve your monitoring tool! Please get in touch if you have any questions or comments.

“We develop Excel tools and web-based monitoring tools to improve the quality of the monitoring process. The top priority is that an M&E system is relevant and useful: Data should inform decision-making and enable projects to prove and improve their impact. This is part of a greater vision to make development cooperation more transparent, efficient and effective. That’s why I founded energypedia and energypedia consult.”

Robert Heine
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1. Our Approach

Energypedia consult is a fair IT provider with its roots in international development cooperation. We know and understand the needs of our customers from this sector. We therefore develop IT solutions which carefully adapt to your requirements – not the other way around!

“We strive to build a long-lasting relationship with our customers thanks to quality service and results, not by establishing dependency.”

We also believe in open approaches, i.e. that collaboration is better than top-down approaches. When we develop Excel tools, we make sure that the customer is empowered to also make changes himself or herself, or hire other consultants to do so. We strive to build a long-lasting relationship with our customers thanks to quality service and results, not by establishing dependency.

When designing Excel tools we are guided by two imperatives: Make them useful and make them simple.

1) Together with the customer we find out what data is available and how to structure and display them in a way to maximize usability. If the requirements change after time, we are always available to make the necessary adjustments. Our tools grow with the projects.

2) At the heart of our tools is the Management Cockpit (see Chapter 3: The Management Cockpit), also called dashboard, summarizing at a glance key figures and developments to quickly inform decision-making.

3) Our tools are accessible for everybody with intermediate Excel skills, because
   a. We do not use Macros or Visual Basic;
   b. We always leave a comprehensive manual. This way we want to make transparent how everything works and enable the users to implement adaptations themselves.

Excel services offered by energypedia consult

- **Tools**: Based on your requirements and wishes, we will build a tool for you in the spirit of this guide’s principles.
- **Trainings**: We teach a group of people how to implement the formulas from this guide to build their own tools.
- **Feedback**: If you already have a tool, we can help you upgrade it by proposing a better structure, linking and ideas for a Management Cockpit. Implementation is then done by yourself or by us.
- **Coaching**: In the coaching format, we have one-on-one sessions working on your tool, either improving an existing one or developing one from scratch. This way, the customer is empowered to understand all the steps and develop the tool further by him- or herself.

Our services are available in English, German and French.

Contact [info@energypedia-consult.com](mailto:info@energypedia-consult.com) for more information.
2. Introduction

The experience in this Excel guide stems from, amongst others, the monitoring system of the multi-donor initiative Energising Development implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), but also other M&E systems. The guide’s target group are those in charge of M&E in the non-profit sector. We presume basic or advanced experience with Microsoft Excel. When presenting formulas, the focus is on their application and benefit, not on their syntax.

For technical details about formulas, please access the Microsoft Office Excel Help which can be reached by pressing the F1 key within Excel or under https://support.office.com/en-us/excel. Please note that the functions described in this brochure are available since Excel 2007.

To make sense of data, proper visualizations are key. This guide shows, besides other things, how to implement the traffic light function of Excel. Aside from this function, it is in general very easy to visualize information with Excel. In this respect, the progress of indicators along the results chain of a project, but also the cash flow can be graphically presented. The visual presentation of all indicators relevant for decision making is called the “Management Cockpit” and is discussed in the third chapter.

From a technical perspective, a monitoring system consists of the data input, data processing and data output. The fourth chapter presents the most important Excel functions necessary for those tasks. Another goal of this manual is to stress the point that Excel is much more than a static tool in which data can be handled in tabular format. By means of cross-linking data, the whole monitoring system becomes dynamic so that the whole data processing works nearly automated. Time and resource intensive double entries of information can be avoided, since the majority of data can be updated, calculated and visualized automatically (Chapter 4).

The fifth chapter provides you with some tips and tricks when using Excel for budget monitoring, a crucial aspect when establishing value for money evidence, and concludes with the presentation of two real-life examples of Excel tools that were created in the spirit of this guide.
3. The Management Cockpit

A Management Cockpit, also known as dashboard, is a visualization of large amounts of data in condensed form. It is usually one of the instruments of a management information system (MIS). In other words, it is a tool to structure information and upgrade the monitoring from the image on the left to the image on the right.

In the context of results-based monitoring of projects, Management Cockpits visualize the progress of the project or its subcomponents based on the indicators of the project or of the operational planning. By doing so, it aims at giving project managers a quick overview over the project’s status. For example, the (Excel-based) Management Cockpit of the internationally operating program Energising Development (EnDev) shows all relevant indicators measuring the progress of individual project subcomponents as well as figures relating to expenditures and budget use, and a prognosis of expected expenditures (see Figure 1: The Management Cockpit of the EnDev Monitoring Tool).

The main characteristic of Management Cockpits is the clarity of visualizations combined with a high density of information. Additionally, colors (in particular traffic light colors) can be used to indicate progress (see Chapter 4.3.2: Conditional Formatting). Alternatively, scaled-down versions of Excel diagrams can be used, so that for example more than 20 diagrams would serve as an overview of the target achievement of components or subcomponents of the program, while still maintaining a good overview (see Figure 10: Visualization of results by means of graphs).

If the M&E system consists of multiple Excel files, it is important that an efficient and user-friendly data input and data processing is ensured. For example it is important to avoid redundant data input at multiple places in the tool chain. Otherwise there is the risk of outdated data or that the Management Cockpit would not show all relevant data automatically (see Chapter 3: Basic Principles and Relevant Excel Functionality).

Figure 1: From chaos to a proper Management Cockpit (example EnDev Cockpit).

What’s a Management Cockpit?

A visualized summary of a project’s status. It displays key information for

- Evidence-based decisions
- Evaluations
- Reports
- Communication within the project and with donors and partners

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4. Basic Principles and Relevant Excel Functionality

From Data Input to a Management Cockpit

The dataflow in an Excel-based result monitoring system consists of the three steps “data input”, “data processing” and “data output”.

![Dataflow Diagram]

- **Input**
  - Manually by user
  - Linking from other systems or Excel files
- **Processing**
  - Links
  - (Statistical) calculations
- **Output**
  - Diagrams and other visualisations
  - Reporting and management overviews

Figure 2: Dataflow in a results monitoring system

For simplifying data verification, a clear and consistent structure of the data should be ensured. Therefore, it could be advisable to restrict certain working steps to experienced users and block some cells for less experienced users by means of the protect feature.

4.1 Data Input

The traditional form of data input is the manual input of data by hand. The manual data input by hand is usually used for the input of text or smaller amounts of numeric data. Generally, for data input, be it manual data input, data import or linking of data from external sources, it is important to check the consistency of the data. Besides the values themselves, also the data format needs to be kept consistent in order for the subsequent data processing to yield the expected result. Generally, all data should be structured in a manner that allows the user to immediately see where to enter what kind of data. Furthermore, it is essential to make sure that data is only entered once. Should the same data be needed to be displayed at multiple places, the redundant multiple entries of data can be replaced by links between data cells. In such cases, it is important that the original data cell is visually highlighted. As mentioned earlier, it is advisable to lock cells into which no data should be entered.

In order to prevent mistakes during data entry, Microsoft Excel offers the possibility to enter values by means of a drop-down menu. This can be created in Microsoft Excel under Data in the menu field Data Validation, by then selecting List as the validation criterion and selecting an area in the sheet containing the values that should be listed in the drop-down menu.
This way it is possible (see Figure 3: Creating a drop-down box for data selection) to e.g. create a drop-down menu, which enables the user to select a weekday from a drop-down box. This saves time on the one hand since manual entry of data is no longer needed, but also ensures that only values from the list of allowed values are entered. That way, the tool remains lean and clean and typos from users are prevented.

Figure 3: Creating a drop-down box for data selection.

If data is already available in digitalized form, an automatic or semi-automatic data import is recommended. A completely automatic data import can be achieved by means of interlinking multiple Excel sheets or by programming macros (the topic of macros will not be covered further in this guide). Analogously to linking cells within one Excel sheet or between different Excel sheets of the same Excel file, links can also be established between cells from different Excel files (see Chapter 4.2.2) remaining on the same computer or on a shared network drive, i.e. a common server or Dropbox. This is particularly useful in projects in which individual components of the project maintain “their own” monitoring tool, which is then linked to the monitoring tool of the overall project manager. In such cases it is important to ensure that the location as well as the file name of the interlinked Excel files are never changed when data is updated, as otherwise cell relations between the files will break.

Besides the completely automatic way of data entry, data can also be imported semi-automatically. For this purpose, it is advisable to create a separate sheet within Excel file (the “transfer sheet”), in which data from external sources can be transferred semi-automatically. Using links within the Excel file, the data can then be accessed. It is very important that the order of data in the transfer sheet (rows and columns) does not change, as otherwise the cell relations would no longer function and data could not be correctly transferred to other parts in the Excel file any more. An example for this form of data entry is the import of data from SAP, which is further described in Chapter 5, Budget Monitoring: Linking Excel and SAP.
4.2 Data Processing

After the initial entry of the raw data, the data processing takes place.

For obtaining the desired information regarding progress as well as results and impacts of the project, the data will be modified and recombined. Not all steps in that process need to be understood by all users. However, all users need to know exactly in what format the data needs to be entered in the data entry step and understand what the resulting display means (see Chapter 4.3 Data Output / Management Cockpit).

In that regard, data processing can be seen as a closed system running in the background. For this reason, it is advisable to move complex calculations to a separate calculation sheet and hide it from the common user.

4.2.1 Important Formulas

Basic calculation operators (+, -, *, /, <, >) as well as simple cell links ("=A2") are assumed to be known to the reader.

The IF function checks if a condition is true, and returns different values based on the result.

Syntax: IF(Check, Then, Else)
Syntax example: IF(Expenditures>Budget, “Yes”, “No”)

Using the above formula, the Excel cell can be triggered to make a statement on whether the expenditures of a project exceed the planned budget (see Figure 5). For that to happen, it is first checked whether the sum of expenditures is greater than the budget. If this is true, the Excel cell yields the result “Yes”, otherwise “No” is displayed.

![Figure 5: Example of application of the IF function for a budget table.](image)

Using SUMIF, either the values of cells can be added up which match a search criterion or the values of cells neighboring those cells can be added up.

Syntax: SUMIF(Search_Area, Search_Criterion, Sum_Area)

Syntax example: SUMIF(Search_Area, “Solar”, Sum of individual expenditures)

That way, it is for example possible to check how much money in total has been used for a certain group of projects. SUMIF searches the specified searching area in the monitoring tool for the given search criterion and then adds up the numbers from the sum area neighboring it. That way it is e.g. possible to specifically add up all expenditures for “solar” technology in a specific region (see Figure 7).

![Figure 6: Example of application of the SUMIF function.](image)

Using COUNTIF the amount of (non-empty) cells of an area can be determined, which match a specified criterion.

Syntax: COUNTIF(Area, Search_Criterion)

Syntax example: COUNTIF(Area, “Solar”)

If one would like to know how many solar projects in total were supported, the function COUNTIF is helpful (see Figure 8). This function searches the search area which can be a full list or parts of a list, such as columns, for the search criterion “solar” and determines the number of found projects in the list.
The function **VLOOKUP** checks, if the first column of the table or part of a table contains a specific value and then returns a value of the same column.

**Syntax:** \( \text{VLOOKUP}(\text{search criterion}, \text{matrix}, \text{column index}, \text{area link}) \)

This function is e.g. used for calculating the “Expenditures in the current month” in the EnDev monitoring tool. VLOOKUP is used in a way so that it dynamically identifies the total sum (cumulated expenditures) for a measure in a specific table as well as the one of the previous month (expenditures until previous month cumulated) before subtracting the one from the other.

The following example shows this based on a table in which the user enters a rating number for each of a number of technologies while the function VLOOKUP delivers the according textual result (e.g. “very good” for 1, see Figure 9). Based on the changeable legend, the results in the light-blue field changes dynamically with the help of VLOOKUP depending on which rating number was entered for the item.

**Insertion of a dynamic date with the TODAY function.**

**Syntax:** \( \text{TODAY}() \)

The function TODAY offers many more possibilities than the simple output of today’s date. Used in the right way, it can e.g. be used to dynamically execute a necessary step in the calculation of the “Expenditures of the current month” (see previous example). Just like all other Excel functions it is mainly the possibility of combining functions with other functions that raises the usefulness of this function far beyond the use of the individual function itself.

In some cases it is also helpful to prefix the function with “=DAY”, “=MONTH” or “=YEAR”, so that the cell value gets the current day, month or year respectively, which can then be used for subsequent calculation operations.
4.2.2 Links

Relative cell links vs. absolute cell links

Cell links in a formula such as “=B3*D5” contain relative cell relations. If a formula with a relative link is copied, the cell values are automatically adjusted to the new position. If this is not desired, but the formula should instead point at one particular cell, the $-sign can be used.

Excel offers the functionality for the user to define names for cells or areas of cells. The cells that are defined as names are equivalent to absolute references. To define new names, the cells or the area of cells first need to be selected, and then the name can be set with the command Insert – Names – Define name… (or using the name field). When cells are now linked, the defined name appears instead of the row and column reference which makes it easier to handle.

Links across spreadsheets

A big advantage of Excel is the possibility to link different spreadsheets with each other. That way it is possible to summarize data from subordinated sheets (such as individual pages for each component of a project) on an overview sheet. At the same time, the possibility of linking cells across different sheets helps avoiding redundancies, as information from one table sheet is “imported” to another sheet and does not need to be re-entered there.

4.3 Data Output / Management Cockpit

In most cases, the use of Excel is limited to showing the result in a simple table. Of course tables are an appropriate tool for the presentation and organization of data. However, often they tend to be confusing. Furthermore, it takes long to find data or to extract the desired information out of a large amount of data.

An appealing visualization of the data instead offers substantial advantages in the communication of important information. A visually optimized data output helps the user to quickly gain an overview over the progress of a measure. A successful data output therefore needs to present the calculated data adequately and make the information easy to understand.

During this step technical knowledge in the form of formulas or calculation methods is less important. What is needed instead is creativity in the choice of the optimal presentation format of the information for gaining maximum user-friendliness.

The goal needs to be that decision-makers, but also external persons are able to understand and process important information in a short amount of time. For this reason, it is essential to keep tables short and reduced to relevant data. (See 4.3.1)

Another good possibility is the visualization by means of colors. The cells may change their color to green, yellow or red depending on the degree of target achievement (see 4.3.2).
Diagrams are also an excellent form to present complex matters in a simple way. When using diagrams, it is always important to keep in mind which type of diagram is best for conveying the information. By means of a clever choice of diagrams, it is often no longer necessary to use legends for explaining them and thereby free the data output from unnecessary information. A large number of small diagrams can powerfully display results (see Figure 10: Visualization of results by means of graphs).

### 4.3.1 Top 10 Tables

Often only the very high or very low values of a list of information (such as degree of reaching a target) are important when analyzing data. We call this Top or Bottom Tables, e.g. Top 10. For those cases, the raw data can be searched by the function LARGE. For obtaining the correct label / description for the values, the LARGE function is combined with the INDEX function.

It is also possible to e.g. show the 10 countries with the smallest number of inhabitants in tabular form (using the function SMALL).

The dynamic tables created like this always show the current values and resort themselves automatically when changes to the data are made.

The following example illustrates how a listing of countries and their respective costs can be used for well-presented Top 3 tables (see Figure 11).
A comprehensive explanation of the SMALL, LARGE, INDEX and LOOKUP functions can be found in the Microsoft Office Excel Help which can be reached by pressing the F1 key within Excel.

Figure 1: Example of application of a combination of LARGE, INDEX and LOOKUP function for creating a top 3 table.

4.3.2 Conditional Formatting

Conditional formatting is an important instrument to illustrate data in a simple way. It offers countless possibilities to highlight cells depending on their values. The formatting adjusts itself automatically when values change. A simple example is to switch the background color of a cell to red if its value exceeds a specific benchmark. There are also other possibilities such as the afore-mentioned traffic light function and event bar charts can be presented in cells (see Figure 12).
Figure 12: Conditional Formatting in Microsoft Excel 2007
5. Budget Monitoring: Linking Excel and SAP

If financial aspects need to be regarded in the monitoring (such as cost efficiency or the “value for money” approach), it is rather easy to integrate financial data from accounting software such as SAP into an Excel-based monitoring tool.

1. Save the desired data of one or more project numbers (PN) in SAP to a file with type *.xlsx (name e.g. SAPtoExcel.xlsx).
2. Select and copy the data in “SAPtoExcel.xlsx”.
3. Create an extra sheet in your monitoring tool which you call “transfer sheet” (see Figure 13) and paste data.

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<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
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<td>Current cum.</td>
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</tbody>
</table>
```

Figure 13: Example of a transfer sheet

4. Now the sheet with the financial data can be linked to the current project values and expenditures. The best function to use for that purpose is the SUMIF function (see Figure 14 and Chapter 4.2.1). Again, a short explanation of the function: SUMIF searches in an area for a search criterion and sums all values from the accompanying value area if the search criterion matches the description.

**Syntax:** 

\[ \text{SUMIF(Search\_Area, Search\_Criterion, Sum\_Area)} \]

**Syntax example:** 

\[ \text{SUMIF(“Area with PNs [Transfer:Column C]”, “PN”, “Column for sum [Transfer:Column J] “)} \]
Note: By means of the above-mentioned link between SAP and Excel it is easy to copy the cumulated sum of expenditures into a monitoring tool. That way e.g. the monthly expenditures of a project or a sub-component of a project can be integrated into the tool. However, each month the financial data will be overwritten with the then current data, as the data from SAP will always be copied into the same transfer sheet. One needs to keep in mind that the areas (columns) which the SUMIF function relates to always stay exactly the same, since otherwise the formula needs to be adjusted each time. Usually, the columns with project values and expenditures are always the same when exporting data from SAP in the Excel format.

If the monthly state of expenditures should be archived and not overwritten, a macro or Visual Basic need to be used instead of the above-mentioned procedure.
6. Real-Life Examples

6.1 Example: EnDev Monitoring Tool

The Energising Development (EnDev) program has the goal to sustainably improve the provision of modern energy services to poor households, social infrastructure and small to medium sized enterprises in selected countries. The goal is to reach more than eight million people worldwide with provision of energy services.

For supporting the management of that program, the EnDev Monitoring Tool was developed, of which the functions and technical implementation are explained below (see Figure 15).

Figure 15: The structure of the Management Cockpit of the EnDev Monitoring Tool
6.2 Example Infrastructure Monitoring Tool Liberia

The monitoring tool that energypedia consult developed for an infrastructure project in Liberia focuses on indicator progress and activity monitoring. The current status of activities is updated by project staff on four separate component sheets. Activities are clustered by outputs. To enable the project manager to easily comprehend the current status of output implementation without having to go through four large tables, we have created an interactive cockpit specifically for this purpose. In the two yellow cells, the users can set the parameters for the lists themselves, depending on what time period and level of achievement they are interested in. In cell H5 a level of achievement is entered, for example 60, meaning that only major outputs will be displayed whose level of achievement is below 60%. In cell H6, a date is entered, for example 31.12.2015, meaning that only major outputs are displayed that are due before December 31, 2015. In the background, these parameters are used by the functions RANK (not discussed in this guide) and VLOOKUP (Chapter 4.2.1) to create dynamic Top tables (Chapter 4.3.1).

Users enter parameter to define the Top tables (Chapter 4.3.1).

Outputs are coloured by conditional format (Chapter 4.3.2).

Figure 16: The Component Cockpit of an Infrastructure Project’s Monitoring Tool
7. About Energypedia Consult

Energypedia consult offers innovative IT solutions as well as consultancy services for organizations and programs in the field of development cooperation. We are a team of passionate people believing that the development sector needs modern tools for collaboration, monitoring and knowledge management.

It all started in 2007 with an internal wiki developed for the multi-national impact-oriented initiative “Energising Development” supporting people to get access to energy, which is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (www.endev.info). In 2011, parts of the internal wiki were publicly launched under the name “energypedia”. Since this time, www.energypedia.info is a wiki platform promoting the expansion of renewable energy and energy efficiency in developing countries through knowledge exchange.

In 2012, energypedia became an independent nonprofit organization. In the same year, energypedia founded energypedia consult as its commercial subsidiary to meet the growing demand of more and more people from the development sector for web-based knowledge management solutions like energypedia.info and web-based project management systems. Consequently, together with our clients, we developed Excel tools and web-based solutions for project and knowledge management. However, we do not only provide IT services. Our custom-made online platforms go hand in hand with consultancy on results-based monitoring as well as on knowledge and project management. Doing this, we place great value on a solution-based approach. Currently, we support over 40 web platforms with more than 5,000 users worldwide.

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**Excel services offered by energypedia consult**

- **Tools**: Based on your requirements and wishes, we will build a tool for you in the spirit of this guide’s principles.
- **Trainings**: We teach a group of people how to implement the formulas from this guide to build their own tools.
- **Feedback**: If you already have a tool, we can help you upgrade it by proposing a better structure, linking and ideas for a Management Cockpit. Implementation is then done by yourself or by us.
- **Coaching**: In the coaching format, we have one-on-one sessions working on your tool, either improving an existing one or developing one from scratch. This way, the customer is empowered to understand all the steps and develop the tool further by him- or herself.

Our services are available in English, German and French.

Contact [info@energypedia-consult.com](mailto:info@energypedia-consult.com) for more information.