

# Computer Solutions

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## Designing a spreadsheet - a brief guide

### Uses of computer spreadsheets

There is no definitive meaning of two phrases commonly used so, to avoid misunderstanding, in this information sheet -

a workbook is an (Excel) file which contains one or more spreadsheets; and

a spreadsheet (also called a worksheet) is a single sheet (tab) within an (Excel) file.

The main uses for spreadsheets are, in broad terms, record keeping (database) and analysis.

Of course not everything included here is applicable to each use.

### Database Basics

Having looked at Spreadsheet design principles and practices now let's look to the use of a spreadsheet as a database. It can be argued that the proper place for a database is database management software like Access. However, Excel can be used extensively for this purpose and work well.

If you think of the old record cards, all the information on the card is a record. Each 'type' of information on the card is a field. On a spreadsheet each row is a record and each column holds a piece of information so is a field.

It is important to design a spreadsheet not just type everything in. By design I mean, at the very least, stop, have a cup of tea and think about what information available and how the spreadsheet is to be used. Consideration also needs to be given to Data Protection legislation.

### Data fields

It is advisable to split data as much as possible. It is easy to bundle together information like the various elements of a name but this approach makes it difficult to unbundle information when trying to analyse data or to use data for example to produce letters, envelopes and labels.

The data fields may include –

Type of data	Field
Name	Title (Dr / Miss / Mr/ Mrs / Ms)
	First name
	Initial
	Family name
Address	Business name
	Building
	DP1 - Distribution point1 (house number)
	DP2 - Distribution point2 (road)
	Building
	Dependent locality (locale – sometimes required to distinguish roads of a similar name in an area)
	Post Town
	Post Code
Country	

It is advisable to also have a field for a "Unique reference number". This reference number, being the only piece of data which should not change may be used to compare entries (when looking for duplicates and for sorting the database).

Data may be checked / validated. This is useful to produce an error 'flag' pointing up a possible error (or at least a deviation from the expected situation) and produce data. This will need use of formulas.

Secondary data may be produced. This is useful to provide a 'flag' to indicate a certain condition or to calculate prices. It is strongly advised that any input of a repetitive nature (e.g. VAT) should be entered only once and referred to by a formula. Not only does this reduce the amount of data to be keyed in but also the possibility of error.

### **Spreadsheet design principles and practices**

Spreadsheet design principles and practices may be applied to most uses of spreadsheets.

There is no simple answer to the question "How do I design spreadsheet?" It depends so much on the job in hand as to how simple / complex it needs to be. There is one guiding rule. A simple spreadsheet is quick to design and produce and takes up little space on a hard disk but is more prone to error and, perhaps, has a less effective output. A complex spreadsheet takes a while to design and produce, takes up more space on a hard disk, is less prone to error and has a more effective output.

Having, say, three spreadsheets enables separation of three key elements, 'Input', 'Calculation' and 'Output'. It is recommended that all three spreadsheets should be contained in a single workbook. The main advantage of this is that

#### **Method**

The method for designing of a spreadsheet (each step of which there should be agreement with the Client) may include –

Taking an outline of available information (input) and expectations (output)

Revising unrealistic requirements and advising on, possibly unknown, expectations

Designing an outline spreadsheet which tests proof of concept – that you both have a common understanding of the job in hand

Refining the proof of concept

Producing a provisional product

Inputting dummy data to include extremes of data in all fields when compared with manual calculations should show up shortcomings in assumptions and design

Testing the provisional product in a parallel working situation

Releasing the provisional product as a finished product

Reviewing the product and fine-tuning after a period agreed with the Client

#### **Input**

This could have labels prompting for information to be input. It could also include formula to check that input data is within a predetermined range and indicate a 'possible' error if it is out of range. This is called 'idiot proofing'. The inclusion of blank cells, apostrophes, dashes, full stops etc should also be trapped at this stage. It should be borne in mind that this can trap only those instances identified as potentially possible. Users may find other shortcomings.

It is recommended that cells in this and other spreadsheets containing formula are colour coded (background and / or text) to indicate that information is the result of a computation and that it should not be changed.

This should be the only spreadsheet on which users should change data.

**Calculation**

This could include formula necessary to process input data into output data. This could also include variables – a computer misnomer for information which does not change much and which are common to a number of calculations. This could include ‘mark-up’ and ‘VAT’.

Naming these cells and referring to the cell name rather than the cell address saves having to put the same data many times and eliminates the possibility of a data input error. It also facilitates ‘universally’ recalculating when a rate changes occurs or to do a ‘what if’ scenario.

This spreadsheet may be hidden from view but cannot be made inaccessible.

It is strongly recommended that assumptions and calculations are thoroughly tested and checked using data at the extreme ends of the possible range against manual calculation. Great (often too much) trust is often placed on the output of computers. Thorough testing of calculations will help to avoid errors on which possible critical decisions will be made.

**Output**

This could have graphs and tables (including pivot tables) ready for printing or output to other software (e.g. Word). Design (layout) of the output is even more important than the preceding areas as the visual impact is often to be seen outside the boundaries of the business. Indeed, on the basis that a graphic that is easy on the eye may attract more attention than if it is, say, cluttered a graphic artist may need to be used at this stage. A few hints (all to increase presentation and readability) may be appropriate here –

Reduce white space by reducing column widths to that of a ‘typical’ width.

‘Wrap’ text in ‘overlength’ columns

Avoid merging cells wherever possible as this may produce unwanted effects

Use mixed fonts sparingly, font size, background colour, text colour, shading and borders

Reducing font size by 0.5 point and / or reducing the top / bottom / left/ right margins by just a small amount may be all that is required to shoe-horn text into a page

## **Security**

Firstly, there is no such thing as 100% security. What can be coded can be decoded. Remember, during WW2, the Germans thought their codes could not be cracked and, to make matters worse, couldn't accept evidence that their codes were being cracked. There are several ways of protecting information. All have disadvantages in terms practicality and effort which should be weighed against advantages gained.

An easy way of protecting a worksheet is to hide it. Another way is to set both background and text colour to white. Yet another way is to set both column width and row height to "1". These methods are far from being sophisticated but may just put information out of view of a casual browser. Spreadsheets (but not individual worksheets) may be password protected. However, password protection can be cracked within minutes so don't rely on it. Another way of securing information is to use a password manager. A1 Roboform Pro and Keepass Password Safe received a good rating from PCPro recently. Even with these you have to be careful not to 'leave the key in the front door'.

Consideration may need to be given to the possibility of a casual browser looking at the spreadsheet over your shoulder or whilst available on an unattended monitor. This doesn't have to be a physical (personal) browse. With unsecured wireless networking the browse could be from outside the building.

A further degree of protection may be gained by setting up 'access rights' on an office network or intranet to allow a flow of information in one direction.

On another level it is very important to make sure that Windows and threat prevention software (e.g. McAfee, Norton) is kept up to date on a daily basis in order to maximise your protection from attack over the Internet.

Further information may be found at –

[www.jegsworks.com/lessons/numbers/design/analysis.htm](http://www.jegsworks.com/lessons/numbers/design/analysis.htm)

[www.ozgrid.com/excel/excelspreadsheetdesign.htm](http://www.ozgrid.com/excel/excelspreadsheetdesign.htm)

**If you have any further queries on this subject please contact me.**