Office Doc

MS-OFFICE 2016 - EXCEL
English version

Managing data
Organize, sort & filter, subtotals, pivot tables and charts …

Introduction to Power Bi Add-ins
Power Query
Power Pivot
Power View (version Pro Plus only)

Table of contents

ORGANIZING DATA

IMPORTANT

If your worksheet contains a list of records that is not recognized as a *list* by Excel, many tools to manage your data will not be available or only partially.

Consequently, this section presents the rules you must follow to make sure Excel correctly detects your *list* and also some useful tools to organize your data.

1 Criteria for a *list* of records

Here after the beginning of such a list :

	A	B	C	D	E	F	G	H
1	**Number**	**Inv. Date**	**Customer Nr.**	**Qty**	**Price/Piece**	**Amount**	**Salesman**	**Product**
2	100	15.déc.16	12	1	100.50	100.50	BRUNO	EAO
3	101	19.déc.16	6	3	120.60	361.80	BRIAN	EAO
4	102	12.janv.17	3	2	111.00	222.00	JOHN	Office
5	103	04.févr.17	5	4	111.95	447.80	BRUNO	EAO
6	104	25.févr.17	6	1	88.50	88.50	PETER	Language
7	105	05 mars 17	7	2	77.30	154.60	BRUNO	EAO

A header row with *column labels.* It is not compulsory but usually the header row has a specific format.
Each row is a *record*
Each column represents a *criteria field*

The list can contain *empty cells* but should never contain *empty rows or columns.*

> If a given column must remain empty, here after a hint : type an x or any other character into the cell containing the *column label*. That way Excel will not consider that the column is empty (even though the rest of the cells below are indeed empty !). And if you do not want to see the character you have typed, make it « disappear » by applying to it the color for the cell fill.

Should you select before sorting, filtering … ?
Make sure that the active cell is located inside the table and the Excel will detect it automatically. If Excel – exceptionally – fails to properly detect the table or if you must perform a partial sort or filter – this should be rare – then you may select the required range of cells.

2 Converting from text to columns

External data bases – sometimes not Microsoft programs – usually include an export command to Excel. Most of the time this is full satisfactory but it can happen at times that the result is not a real *list or Excel table.*

The data exportation ends into one column as the following screen capture shows it :

5	*Second-hand cars*
6	Trademark;Type;Color;Year;KM;Price
7	Peugeot;106;White;2002;10000;14500
8	Opel;Omega;Black;2003;60000;23000
9	Renault;Clio;Green;2005;120000;10200
10	BMW;Z3;Dark Blue;2000;8000;39000
11	Mercedes;SLK;Yellow;2004;30000;45000

It is therefore necessary to CONVERT this into a list of records

DATA Tab – DATA TOOLS Group – TEXT
TO COLUMNS Button

Follow the Wizard instructions

Convert Text to Columns Wizard - Step 1 of 3

The Text Wizard has determined that your data is Delimited.

If this is correct, choose Next, or choose the data type that best describes your data.

Original data type

Choose the file type that best describes your data:

- ⦿ Delimited   - Characters such as commas or tabs separate each field.
- ◯ Fixed width - Fields are aligned in columns with spaces between each field.

Preview of selected data:

```
2 Trademark;Type;Color;Year;KM;Price
3 Audi;A3;Violet;2015;55000;25000
4 BMW;Z3;Dark Blue;2016;8000;39000
5 BMW;M3;Black;2007;10000;85000
6 Chrysler;Neon;Blue;2012;26000;34000
```

Cancel | < Back | Next > | Finish

Delimited   The separation corresponds to a character. Check carefully

Fixed width   There is no character to make the field separation. You set a
fixed number of characters beyond which a new column will be
created.

Convert Text to Columns Wizard - Step 2 of 3

This screen lets you set the delimiters your data contains. You can see how your text is affected in the preview below.

Delimiters
- ☐ Tab
- ☑ Semicolon
- ☐ Comma
- ☐ Space
- ☐ Other: ____

☐ Treat consecutive delimiters as one

Text qualifier: `"`
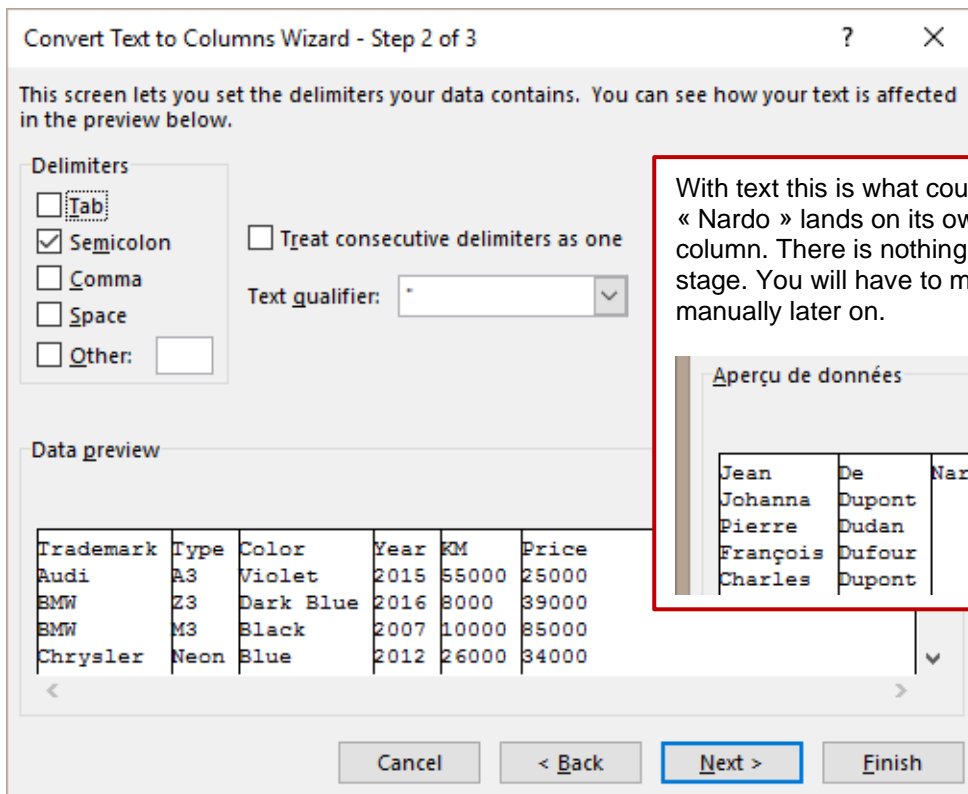
> With text this is what could happen :
> « Nardo » lands on its own into an additional column. There is nothing you can do at this stage. You will have to manage the problem manually later on.

Aperçu de données

Jean	De	Nardo
Johanna	Dupont	
Pierre	Dudan	
François	Dufour	
Charles	Dupont	

Data preview

Trademark	Type	Color	Year	KM	Price
Audi	A3	Violet	2015	55000	25000
BMW	Z3	Dark Blue	2016	8000	39000
BMW	M3	Black	2007	10000	85000
Chrysler	Neon	Blue	2012	26000	34000

Cancel   < Back   Next >   Finish

Check the delimiter symbol

Convert Text to Columns Wizard - Step 3 of 3

This screen lets you select each column and set the Data Format.

Column data format
- ⦿ General
- ○ Text
- ○ Date: DMY
- ○ Do not import column (skip)

'General' converts numeric values to numbers, date values to dates, and all remaining values to text.

Advanced...

Destination: `=$C$2`

Data preview

General	Gener	General	Gener	Genera	General
Trademark	Type	Color	Year	KM	Price
Audi	A3	Violet	2015	55000	25000
BMW	Z3	Dark Blue	2016	8000	39000
BMW	M3	Black	2007	10000	85000
Chrysler	Neon	Blue	2012	26000	34000

Cancel   < Back   Next >   Finish

Column data format   Each column can be formatted according to the nature of the data it contains (text or date …)

Do not import column	This means that the selected column will be totally omitted with « separating » or distributing the data.
Destination	Caution : by default Excel suggest the first cell of the column to distribute, which will lead to overwriting it. If you leave it, Excel will prompt you to confirm. Change the destination cell – *only on the active worksheet* – to insert the distribution somewhere else.

Here below the result :

Trademark	Type	Color	Year	KM	Price
Audi	A3	Violet	2015	55000	25000
BMW	Z3	Dark Blue	2016	8000	39000
BMW	M3	Black	2007	10000	85000
Chrysler	Neon	Blue	2012	26000	34000
Fiat	Punto	Red	2014	48000	18000
Ford	Fiesta	Grey	2012	42000	8500
Ford	K	Grey	2016	9000	15000
Mercedes	SLK	Grey	2010	500	60000

3 Transposing data

Sometimes data could be used but they spread out in the wrong direction …

14	January	16
15	February	17
16	March	45
17	April	23
18	May	12
19	June	29
20	July	12
21	August	56
22	September	89
23	October	35
24	November	63
25	December	14

au lieu de :

January	February	March	April	May	June	July	August	September	October	November	December
16	17	45	23	12	29	12	56	89	35	63	14

To solve the problem you must TRANSPOSE your data

- Select the data
- COPY (CTRL + C or any other method)
- Select the cell from which the transpose must start
- HOME Tab – CLIPBOARD Group – PASTE Button – PASTE SPECIAL Option
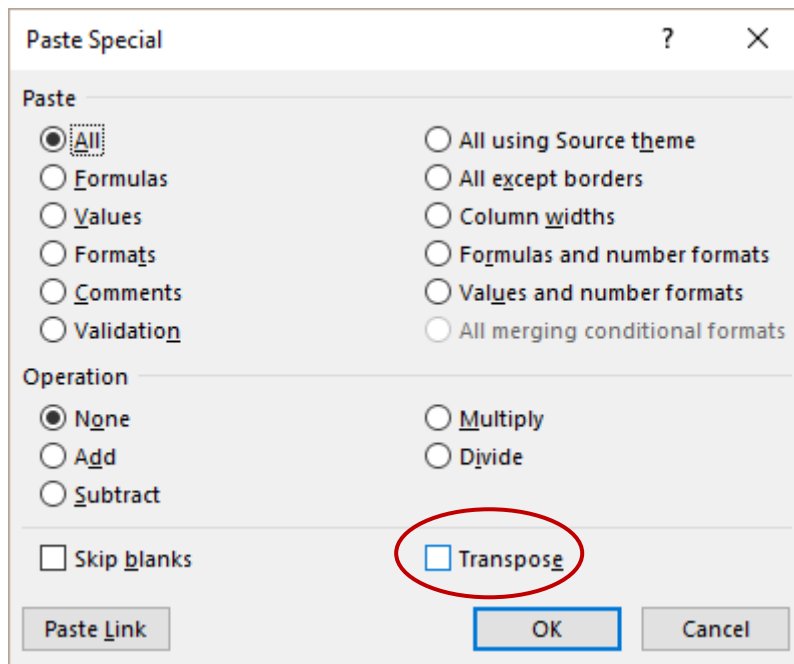
4 Text functions such as TRIM

In French : SUPPRESPACE

Syntax : TRIM(text)

It can sometimes happens that when you export data to Excel, the result columns all start with a space character.

You may opt for a global replace of the space by nothing but the command will also remove spaces between words …

The TRIM function can be an interesting solution as it removes spaces before or after a string of characters but not between words.

	A	B	C
	Name	Using the TRIM function	Retrieving the results through a copy - paste as values
1	Name	Using the TRIM function	
2	Charles Van Deer	Charles Van Deer	Charles Van Deer
3	Jack The Ripper	Jack The Ripper	Jack The Ripper
4	Frida Evans	Frida Evans	Frida Evans
5	Luke Skywalker	Luke Skywalker	Luke Skywalker

Important : you cannot delete the columns and only keep the result column without first go through a copy-paste as values

Other text functions can be handy, especially when you are working with massive data …

    LOWER - UPPER : to manage the case
    PROPER : first letter of each word in capital, the rest normal
    LEN : total number of characters in the cell

5 The CONCATENATE function

In French CONCATENER.

Syntax : CONCATENATE(text1 ;[text 2] …)

But also   =Ref_cell&Ref_cell ….
The & sign is called a concatenation operator

This function is used to "merge" the contents of two or more cells.

Important to mention : when you merge the contents of cells, you should always add the *space.* The space sign must always be placed between quotes.

Example :

	A	B	C	D	E
1	**First name**	**Last Name**	**Age**		
2	Charles	Bloom	37		
3	John	Bonnet	36		
4	Edna	Evans	35		
5	Peter	Ford	38		
6	Mike	Olaf	40		
7	Franck	Siny	29		
8	Luke	Skinner	42		
9	Keith	Smith	31		
10					
11	**Full name**	**Age**			
12	Charles Bloom	36			
13	John Bonnet	35			
14	Edna Evans	31			
15	Peter Ford	29			
16	Mike Olaf	37			
17	Franck Siny	38			
18	Luke Skinner	40			
19	Keith Smith	42			

=A2&" "&B2
or
=CONCATENATE(A2;" ";B2)

Important : you cannot delete the columns and only keep the result column without first go through a copy-paste as values

Since 2013 : note that some CONCATENATE and other text functions can now be replaced by the new FLASH FILL (DATA Tab) feature :

Type in the first cell the required result

	A	B	C
1	FirstName	LastName	Name
2	John	Evans	John Evans
3	Peter	O'Neil	
4	Luke	Smith	
5	Mark	Greenaway	

Select the cell – FLASHFILL and the column is automatically completed

	A	B	C
1	FirstName	LastName	Name
2	John	Evans	John Evans
3	Peter	O'Neil	Peter O'Neil
4	Luke	Smith	Luke Smith
5	Mark	Greenaway	Mark Greenaway

6 Tracking duplicates

When a table is built through pasting various ranges of cells (coming from external sources for instance), it is frequent that some records appear twice.

2 possibilities :

❶ **Display** duplicate values through a conditional format
   (simply select DUPLICATE VALUES)

❷ **Delete directly :**
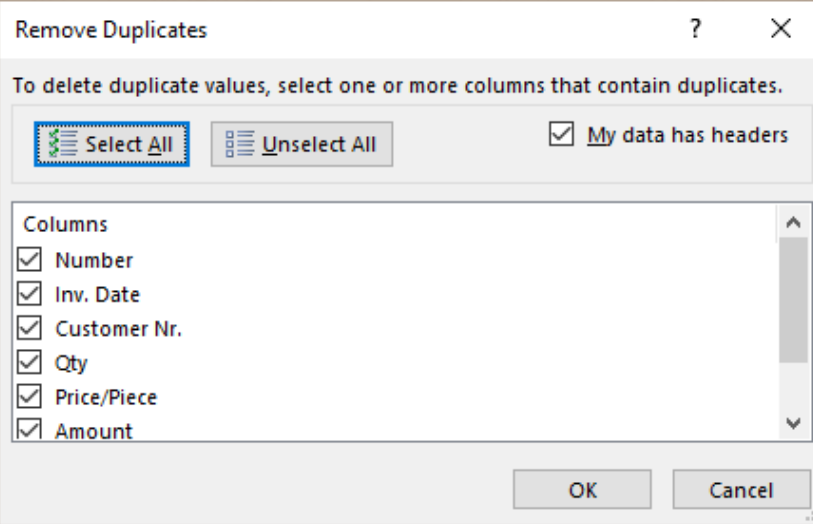
DATA Tab – DATA TOOLS Group –
REMOVE DUPLICATES Button :
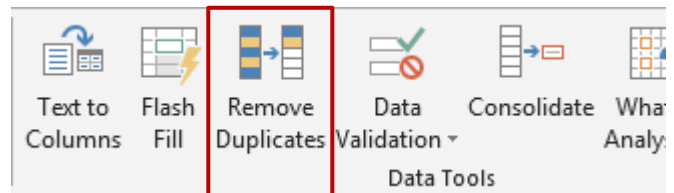
A dialog box will let you select the columns where duplicates should be tracked down:

Here below an example :

Leave every column checked to track *full duplicates*

Caution if you decide to uncheck columns : in the above screen capture, leave only the column SALESMAN and the list will be reduced to the first occurrence of each salesman, 5 rows altogether as there are 5 salesmen in this list.

Note : the advanced filter (see corresponding chapter) provides an *extraction without duplicates* and this can also be an interesting alternative.

7 Consolidation

Large data to be turned into a list can also be generated by consolidation.

7.1 Simple using a 3D reference

The cells reference (their "address" such as B4, C18 …) must be identical and the sheets to consolidate must be consecutive.

	A	B	C	D	E
7	**Top sales - Harry Potter**				
8					
9	**Title**	**January**	**February**	**March**	**Total Qtr1**
10	Harry Potter and the Sorcerer's Stone	60	100	92	252
11	Harry Potter and the Chamber of Secrets	70	89	46	205
12	Harry Potter and the Prisoner of Azkaban	80	69	95	244
13	Harry Potter and the Goblet of Fire	83	40	98	221
14	Harry Potter and the Order of the Phoenix	80	98	85	263
15	Harry Potter and the Half-Blood Prince	65	79	89	233
16	Harry Potter and the Deathly Hallows	50	45	56	151

Tabs: **Qtr1** | Qtr2 | Qtr3 | Qtr4 | Year-total | Switzer...

Tables on Qtr1, Qtr2, Qtr3 et Qtr2 are strictly identical in term of location, structure, even color. The last table on the Year-total sheet is empty.

- Activate the sheet *Year-total*

	A	B
7	**Top sales - Harry Potter**	
8		
9	**Title**	**Total**
10	Harry Potter and the Sorcerer's Stone	
11	Harry Potter and the Chamber of Secrets	
12	Harry Potter and the Prisoner of Azkaban	
13	Harry Potter and the Goblet of Fire	
14	Harry Potter and the Order of the Phoenix	
15	Harry Potter and the Half-Blood Prince	
16	Harry Potter and the Deathly Hallows	

- Click in the cell where the first result is required – here on B11.
- Click on the SUM button (HOME Tab – EDITING Group)
- Activate the first sheet and click on the first cell that will be added (here E10)
- SHIFT + click on the *tab* of the last sheet to be consolidated.
- ENTER

Here below the formula on the consolidation sheet (Year-total) :

| B10 | ▼ | ⋮ | ✕ | ✓ | *fx* | =SUM('Qtr1:Qtr4'!E10) |

Sum on the sheets Qtr1 to Qtr4, each time the cell E10

- Drag the autofill handle to fill in the table

7.2   Consolidation using DATA - CONSOLIDATE

Advantage : you may consolidate tables that are not strictly identical and the consolidated results can be linked to their source cells through the outline view mode.

Here below a screen capture showing a workbook with three sheets that have been consolidated into a fourth one :
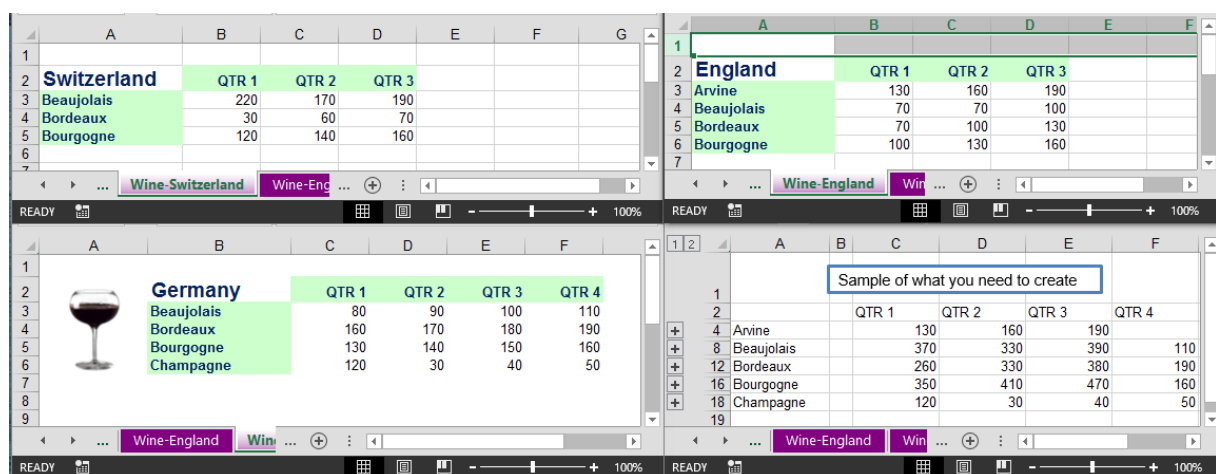
- Activate the "corner" cell of the future consolidation, in the destination sheet or workbook (here the cell A1 on CONSOLIDATION-EXAMPLE (that would be empty of course).
- DATA tab – DATA TOOLS Group – CONSOLIDATE Button.
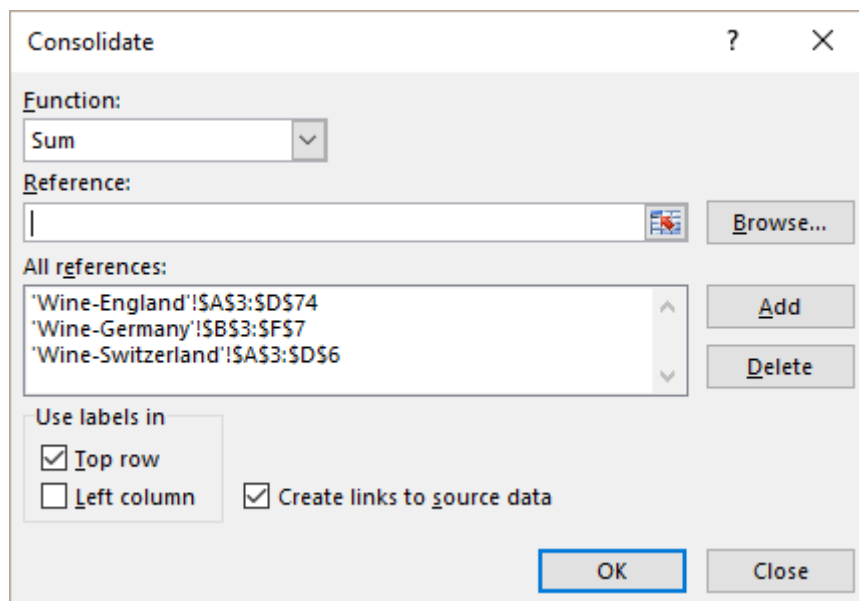
Function	The consolidation = adding several sheets, subtracting them or multiplying their data ?
Reference	In order to collect the required data, make sure the cursor is placed in this box. Then you activate the first sheet and select the range of cells. Finally you click on the ADD button.
	Note : if the data includes labels in line or columns, it is necessary to include them in the selection.
	Using a name instead of a range of cells: *Sheet inside current workbook* : type the name *Sheet of another workbook* : activate the workbook and the required sheet and then type the name
Use labels in	Check the boxes corresponding to the required labels. They will be displayed in the consolidated result.
Link to source data	The consolidation will be in the outline form. A link will exist between the source sheet (or file) and the client sheet (or file).
	Caution : if the option is not activated the result will be a simple consolidation inserted at the active cell.
BROWSE … Button	To consolidate ranges of cells located in external workbooks. But caution, these files will not be opened. You can manually type in the range of cells or better its name (provided you know the address or the name). *Caution : do not use HOME or any arrow in this box as this selects cells in the current sheet.*

COMMENTS

- The collected references remain in DATA - CONSOLIDATE in case you wish to run the consolidation again or change its settings. This is important if you need to modify the data source. If you change the figures, the update is automatic. If the reference areas are the same but you have changed some labels, you can simply run the consolidation function again. If the changes are important, it is advisable to run a new consolidation.

- To remove the outline

  DATA Tab – OUTLINE Group – Drop-down list of the UNGROUP Button – CLEAR OUTLINE Option. All rows and columns will be displayed.
  Caution : no undo for this operation.

- Selecting the visible cells only (on a collapsed outline) : (to create a chart for example)

  Collapse outline to required levels and select the area.
  HOME Tab – EDITING Group – Drop-down list of the FIND & SELECT Button – GO TO SPECIAL Option – In the dialog box : VISIBLE CELLS ONLY.

  You can also add this button : to the Quick Access toolbar. Caution, scroll down the list to the "s" section (for Select visible cells).

8 Outline mode

The Outline mode will help you to structure data *manually* (by creating groups of rows or columns when they belong to a same *level*) or automatically (the subtotals command automatically generates an outline).

8.1 Generalities

The Outline mode is a powerful tool to hierarchize, navigate or structure a worksheet containing large amount of data.

When ?

When you need to hide rows or columns in order to improve the « readability » of the worksheet. You may group rows or columns that are rarely read or modified. This is far more comfortable than *hiding* them.

If there is a hierarchy in the data - that is if some data can be grouped under one topic and several topics can also be grouped together etc... then an outline can be created.

Several functionalities automatically create an outline : subtotals added to a list of records, when you consolidate data and set that the source data be linked to the consolidated result …

Automatic   Excel analyzes the formulas, if they are the result of others and groups them.

Manual   There are no formulas and you indicate the hierarchy yourself.

8.2 Creating

DATA Tab – OUTLINE Group
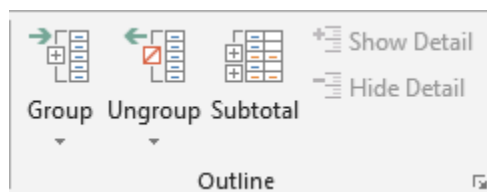
8.2.1 *Automatically*

Automatic because formulas or functions are applied to rows or columns and Excel can automatically detect the required hierarchy.

Drop-down menu of the GROUP Button - AUTOMATIC OUTLINE

Example :

If there is no specific selection, the outline is generated automatically for the existing data (Excel groups rows **and** columns).

If specific lines are selected, the outline can be restricted to those lines.

8.2.2   Manually

- Select the rows or columns to group and that represent the lowest level
- Click on the top part of the GROUP button and then choose the GROUP …option

- Do the same for the other levels.

✎   If you select cells rather than rows, Excel will ask you whether the operation will affect rows or columns.
It is not possible to select discontinuous rows or columns to group even if they belong to the same level.

8.3   Expanding/Collapsing levels

1 2		

Click on the required number to collapse or expand as needed.
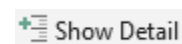
+	to expand a level.	*or*	Show Detail
−	to collapse a level	*or*	Hide Detail
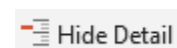
8.4 Viewing or hiding the outline symbols

If the outline includes many levels, the outline panes at the top right and left of the Excel window can considerably reduce the editing area. Without removing the outline you may simply hide the expand/collapse buttons (momentarily of course)

- FILE – OPTIONS - ADVANCED Category – DISPLAY OPTIONS FOR THIS WORKSHEET Topic – SHOW OUTLINE SYMBOLS IF AN OUTLINE IS APPLIED Option.

8.5 Ungrouping a level

 Make sure not to ungroup a collapsed level. The operation is successful but the rows or columns remain hidden.

- Select the rows/columns to ungroup.
- Click on the lower part of the UNGROUP button or drop-down menu of the button and click on the UNGROUP … option.

8.6 Removing the outline

- No prior selection is required but we advise you to check that no level is collapsed.
- Drop-down menu of the UNGROUP button and click on the CLEAR OUTLINE option

8.7 The outline options

The dialog box launcher of the OUTLINE Group
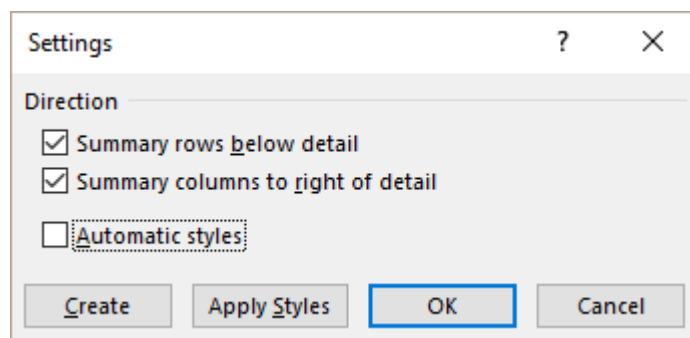
Automatic styles	Excel applies preset cell styles called RowLevel_1, ColLevel_1 (for instance italic) to all synthesis rows/columns. Select outline (totally or partially – expanded or collapsed) and then click on the APPLY STYLES button.
	You will certainly find these styles a bit « light », compared to the new 2007 cell formats and … and no UNDO …
Summary rows/columns below detail	If you uncheck these options, the *direction* is reversed as show in the following screen capture :
Create	To create an automatic outline

Aim : avoid selecting the hidden (or invisible) rows/columns in order to copy and pate only the collapsed outline, apply a format or create a chart from the outline.

- Collapse to the required levels and select
- Restrict the select to those levels only through :.
- HOME Tab – Drop-down menu of the FIND & SELECT Button – GO TO SPECIAL Option –VISIBLE CELLS ONLY Option.
- Then you can perform the needed operation :

   Format

   COPY-PASTE : it will be *values only*

   Chart

   Notes for charts

   Freezing the selection to the visible cells only makes sure that the chart will remain unchanged even when the outline levels are expanded. But if the chart still becomes smaller or bigger when modifying the height/width of the worksheet rows/columns, you also need to free the object from the underlying cells:

   To free the chart :

   Double-click on the chart outside border – FORMAT Tab – SIZE Group – Dialog box launcher – PROPERTIES Tab – Turn on DON'T MOVE OR SIZE WITH CELLS.

9   Get typing help using data validation

9.1   The purpose of this option and how to set the cell restrictions

It is possible to set data restrictions to one or more cells. When the user types the data, a warning message might either inform him of the set restriction or prevent any invalid entry. This command is often used when creating forms but can at times be used with lists.

DATA Tab - DATA TOOLS Group – DATA VALIDATION Button
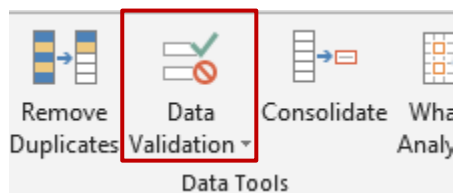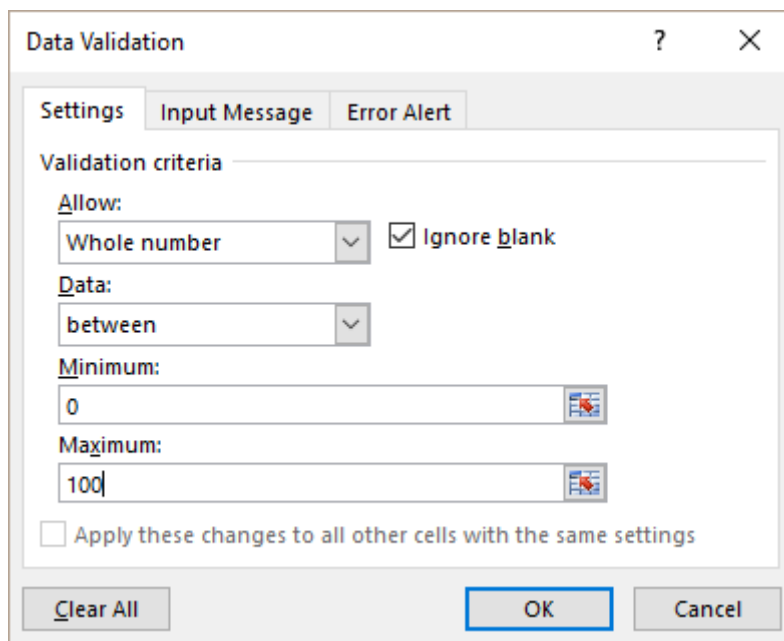
9.2 Setting the restrictions

Drop-down list
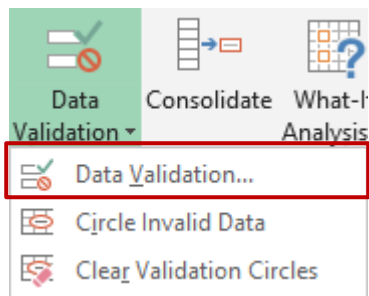
<u>SETTINGS Tab</u>

Possibilities :
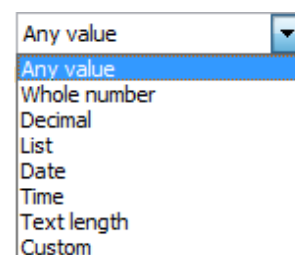
<u>An interesting choice : List</u>

It is possible to create a list of entries to limit typing. Choose the option LIST from the drop-down list and indicate below the corresponding range of cells. (the data must be on the same sheet if you wish to select cells directly (**=$K$2:$K$27** for ex.) but you may indicate an external sheet provided the corresponding range of cells has been named (**=depts.** for ex))

You may also type the list items manually (with the list separator). Drawback : you need to type manually. Advantage : there is not "external" list.

<u>Another interesting choice : Decimal</u>
Choose *Decimal* from the drop-down list and set that the number of decimals must be *comprised between 0 and 2* if you wish to limit the data entering to numbers with no or maximum 2 decimals.

<u>INPUT MESSAGE Tab</u>
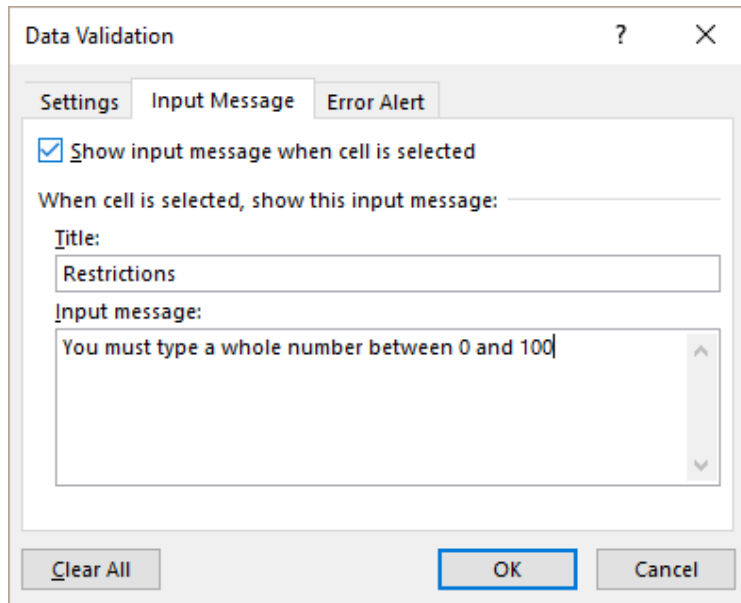
Input Message : set for a large range of cells, it can finally become very irritating. Possible solution : set the message for the first cell(s) only.

<u>ERROR ALERT Tab</u>

If the user tries to enter invalid data, *a message of stop, warning or information* can appear.
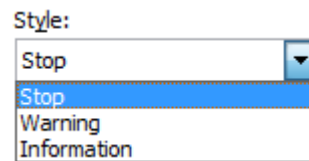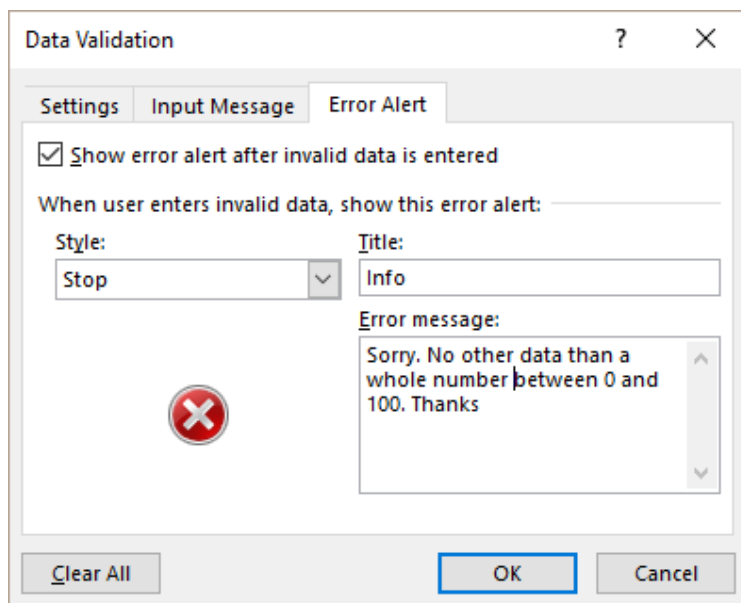
Information
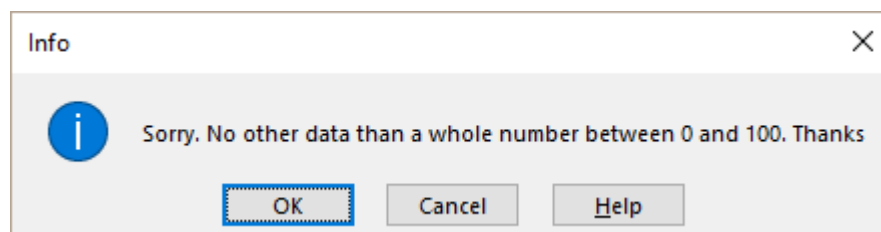
Warning
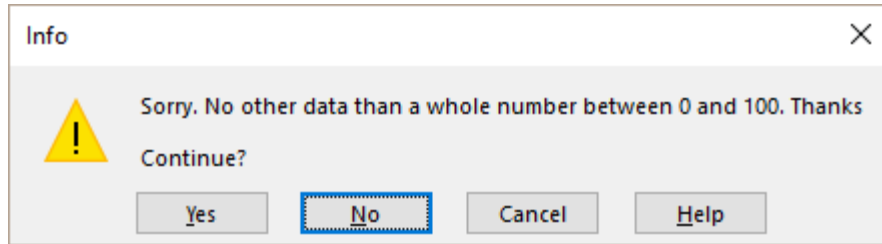
Stop
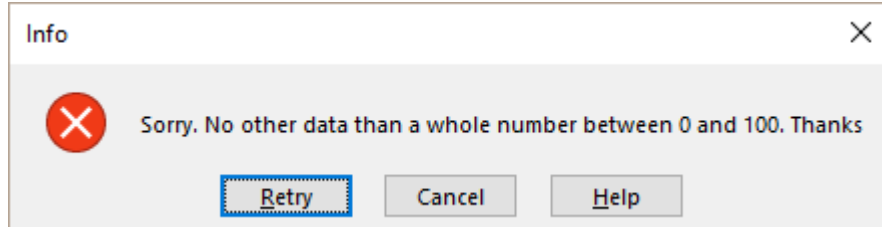
If the message is not a stop message, the user can ignore the information or the alert, and type what he wants.

✎ In fact the protection against unwanted data is not secured 100% and it is better to take this functionality as a simple *help to enter data*. Indeed, if you wish to by pass the validation restriction, a simple COPY-PASTE will work …

9.3 Viewing the cells containing invalid data (because the warning message has been ignored)

Drop-down menu of the DATA VALIDATION Button –CIRCLE INVALID DATA Option
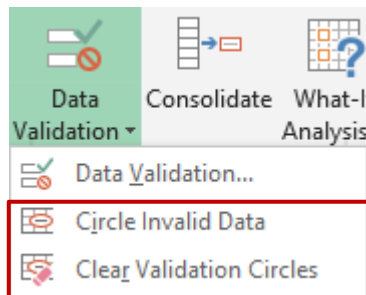
Removing the circles : the last option of the drop-down list : CLEAR VALIDATION DATA

10 Hints and tips to select, move, type ... into a very long list of records

10.1 Extending a selection

Click on the start cell or range of cells of the future selection
Point the top, side … border (according to the direction you need)
SHIFT + Double-click

The selection is extended to the first empty cell
You may then carry on double-clicking or resize the selection by using keyboard keys such as SHIFT + arrow for instance).

10.2 Filling a range of cells with data or a formula

Typing

Select the range of cells
Type the data or the formula
Validate with CTRL + ENTER

Recopying a text or a formula

Point the copy handle
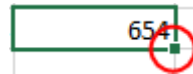
Double-click
(copying is extended until the last filled cell of the column located right next to it (on the left or on the right)

10.3 Copy-paste using the mouse but with no overwriting

Select the row(s) / column(s)
SHIFT + drag the selection border = moving + inserting
CTRL + SHIFT + drag the selection border = copy + inserting

10.4 Naming a cell to navigate faster

Click in the name box and type the required name

✎ If you copy the cell, you also copy the name.

Go to the named cell :

Get the same drop-down list and click onto the name

Managing the names : FORMULAS Tab
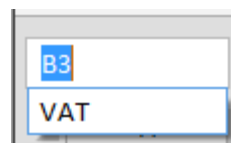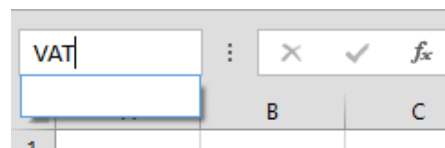
TOOLS TO MANAGE DATA

1 Adding new records

You may type manually new records at the end of the list. But you can also use a form dialog box, which provides a nice alternative when there are hundreds or thousands of rows …

The command is not on the Ribbon, its button has to be added to the Quick Access Toolbar.

- Click on the toolbar chevron (right end) and select MORE COMMANDS
- Choose to display ALL COMMANDS
- The command to be added is the following :
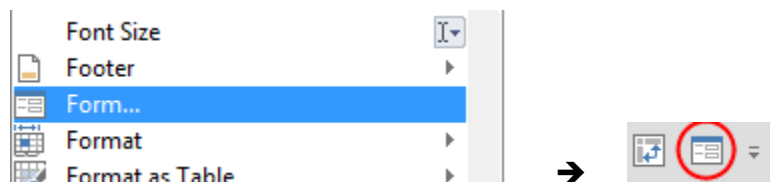
It will generate the following dialog box :

The buttons are quite clear. Interesting to mention :

NEW
To add a record. It will be automatically added as the last entry at the bottom of the list

CRITERIA
The form fields are all emptied. Type what you are searching and press the ENTER key

The dialog box will show the matching record

2 Sorting

HOME Tab- EDITING Group - SORT & FILTER Button
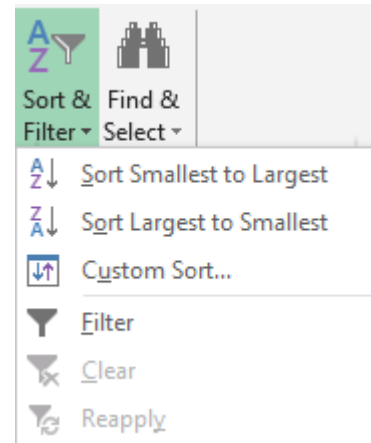
The label depends on the nature of the data in the column

Sort A to Z ➔ Text
Sort Smallest to Largest ➔ Numbers
Sort Oldest to Newest ➔ Dates

The rest of the functionality commands as well as others related to it, are located on the DATA Tab, the SORT & FILTER / DATA TOOLS / OUTLINE groups.

2.1 Important rules about sorting

Sorting is impossible
Sorting is not possible if the table contains merged cells. But it is a little bit tricky as Excel allows you to set custom sorting keys but when you perform the sort, a warning message will be displayed telling you it is not possible.

If the active cell is not inside the cell, the following warning message will be displayed : *the command could not be completed by using the range specified. …*

Header row or not ?
Usually tables have header rows but it is not compulsory. However, sorting si more difficult as Excel will display the column fields as *Column A, Column B, Column C* instead of *LastName, FirstName, Address* for instance.

Default sorting order
Numbers – punctuation signs – text (no difference between small letters and caps) – logical values – error values – empty cells.

2.2 Standard sorting

The AZ and ZA commands from the drop-down menu of the SORT & FILTER button.

2.3 Custom sorting

- CUSTOM SORT
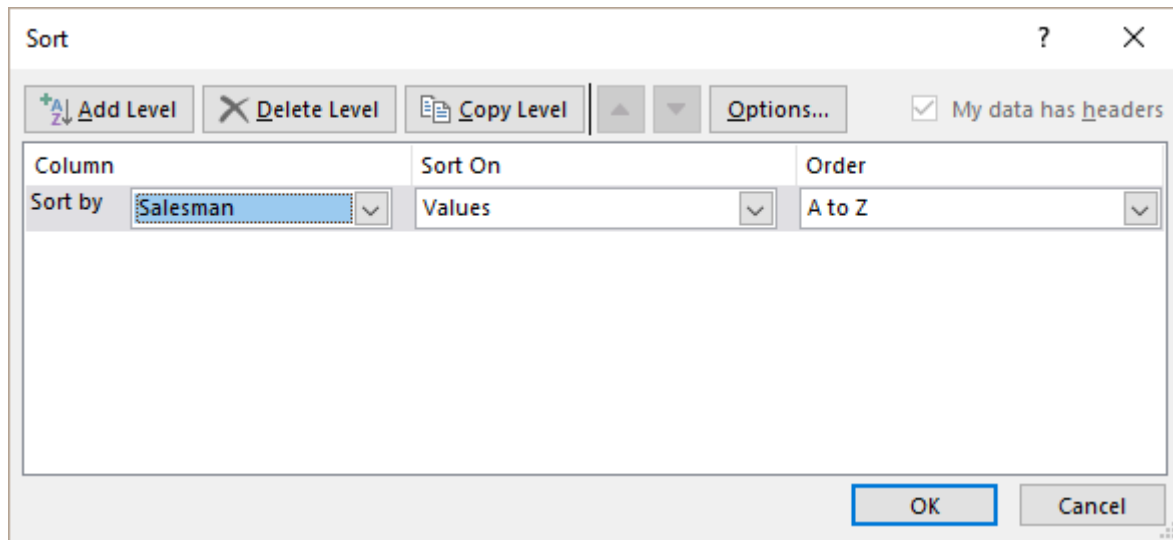
* *Sort On - Values :* the word *Values* means *data* as opposed to *cell color, icon.* It does not refer to *numbers.*

Multi-level sort

- You can add up to a maximum of 64 keys

  Multi-level sort will give you the possibility to sort first by *Number of years in the company,* then by *Department,* then by *Name …*

Selecting a level	Click between two levels. It will be more comfortable
ADD LEVEL Button	An empty key is added *after the selected level*
DELETE LEVEL Button	The selected level is deleted. No confirmation message
COPY LEVEL Button	The selected level is copied after the current one
Arrows	To change the keys order

- ✎ Performing a multi-level sorting does not force you to work with the custom sort dialog box. You may also perform simple sorts, in sequence by using the AZ / ZA commands or buttons but remember to *go from the lowest level to the highest level.*

- ✎ Sorting keys remain active in the above dialog box, provided you do not add a new record at the end of the list (in the middle : it is OK).

Special criteria: cell color and icon

- Here after an example of sorting on fill color:
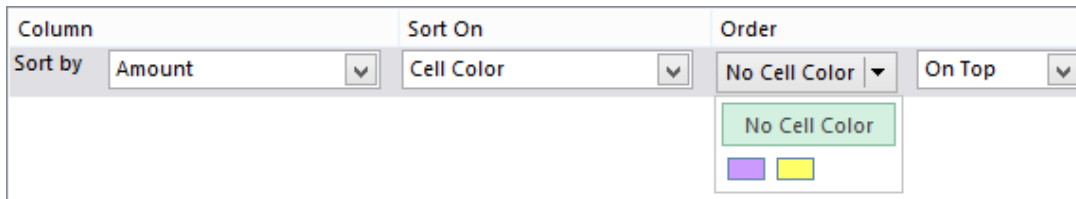
When working with colors (fill or font), order does not mean that you can sort *first* on a color, *then* on another one … In this latter case, simply apply successive sorts.

You can sort on the cell icon – coming from a conditional format applied to the column :
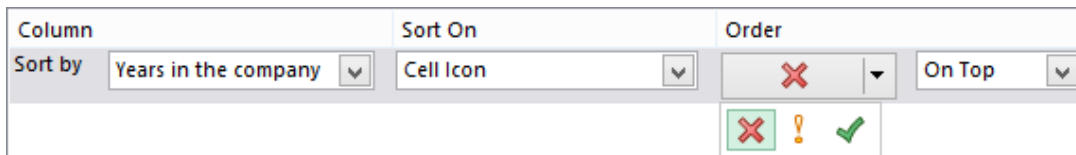
Click on the OPTIONS *button* for additional settings : CASE SENSITIVE and ORIENTATION (sort direction).

<u>Sorting on custom lists</u>

What to do when you need to sort on a column containing *text dates* (months typed as standard text for instance) ? By default Excel will apply an A to Z sort and the result will be : *April, August, December, February …* Here below the solution :
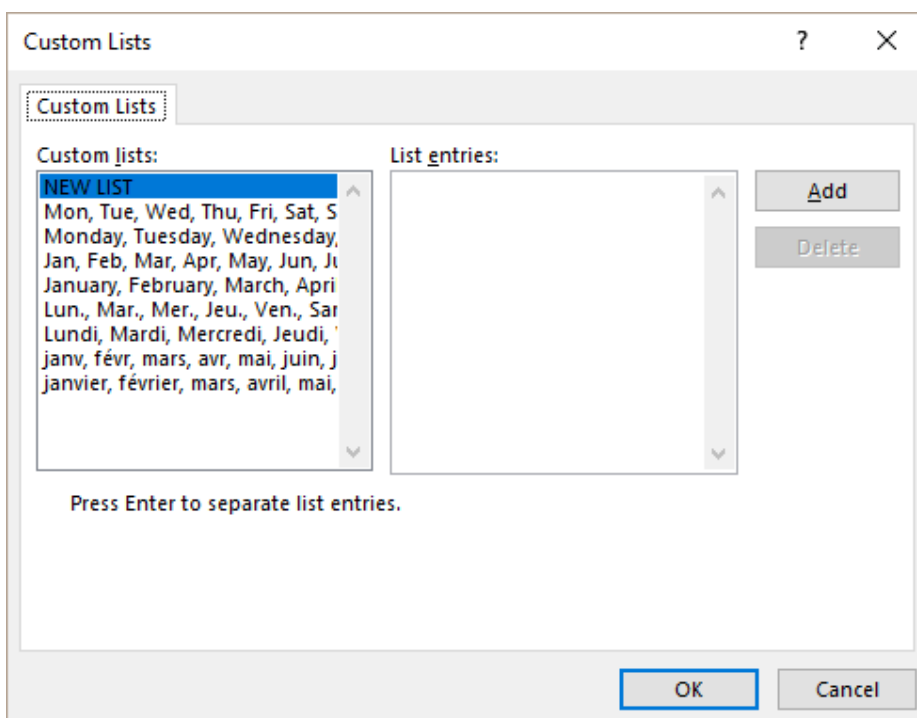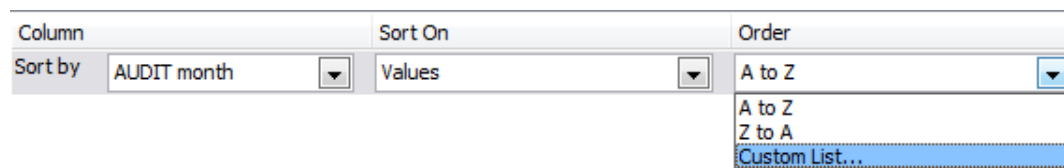
Select the list that corresponds to the characters used in the column
(Caution : Excel does not understand abbreviations).

These lists are the standard Excel custom lists that you certainly regularly use to create series : (from one given element : click and drag using the autofill handle and Excel automatically creates the corresponding series).

These lists can also be checked, modified, created … through : FILE – OPTIONS – ADVANCED Category - GENERAL Section – EDIT CUSTOM LISTS Button.

3 Standard filtering

3.1 Turning on the autofilter mode

Three methods :

Data table	HOME Tab – ÉDIT Group – SORT & FILTER Button – FILTER	DATA Tab – SORT & FILTER Button – FILTER Button
Automatically on		
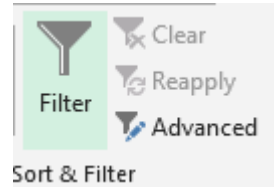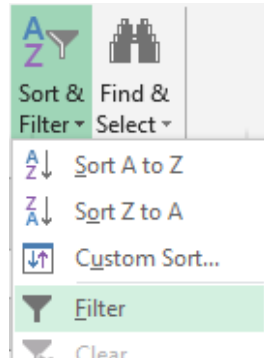
Turn on the autofilter mode and the filtering triangles will be displayed at the right of every column field, with the following drop-down list of options :

The list retrieves all the column entries – appearing at least once. Maximum entries that can be displayed : 10'000 (Microsoft help file). Search zone : handy with a great number of entries.

If there is at least one empty cell in the column, the list of entries will end by *Blanks*

The first section relates to sorting (previous chapter)
The second section relates to filtering criteria
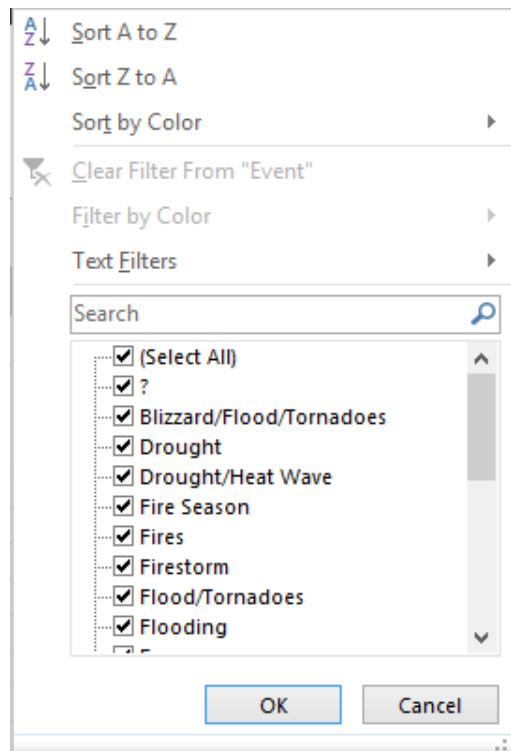
3.2 Simple filter : by value, format or special criteria

3.2.1 Filtering by value – 1, 2, 3 … criteria

- Check/Uncheck the criteria in the drop-down list
- If you wish to check on just a selection of specific criteria, first turn off all of them (*Select All*) and then turn on the required criteria.
- *New 2010 : the SEARCH box can help you search a specific criteria:*
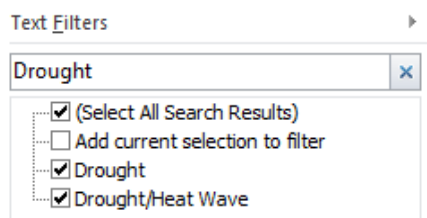
The list is automatically filtered while you are typing. Finally you simply click on the OK button.

When a criteria has been set, the color and the drawing on the triangle change. When you point the triangle a tooltip displays the criteria :

Clearing the filter : click on the triangle
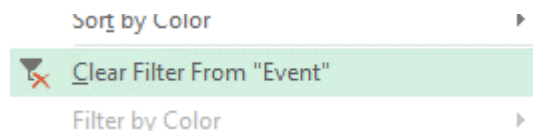
3.2.2 Filtering by fill color, font or icon

When the column contains filling colors, special font colors or icon from conditional formats, the filter drop-down list includes the corresponding options.

For example : our department has applied a yellow filling to the natural disasters we have managed, we can now filter « our » disasters :
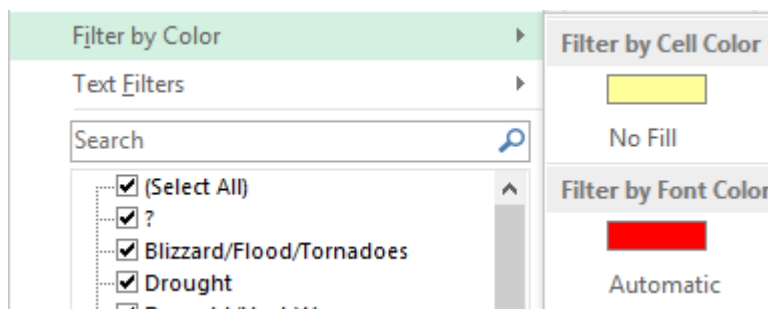
Clearing the filter : tick off the filter by cell color
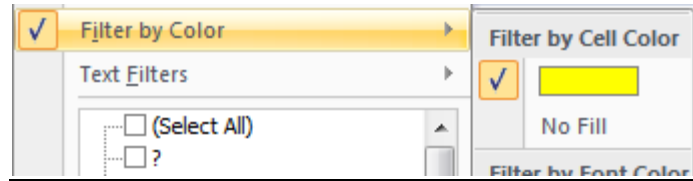
✎ It is not possible to *combine* formats filters

3.2.3 *Number or text or date filters*

The option is automatically labeled according to the data in the column

Number filters	*Text filters*	*Date filters*
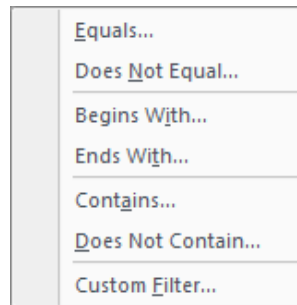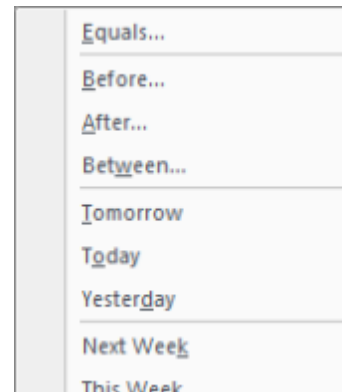
Make your choice. If necessary a dialog box will be displayed to type the criteria. Options linked to dates often provide a date navigator. The dialog box is the one displayed by the CUSTOM FILTER option :
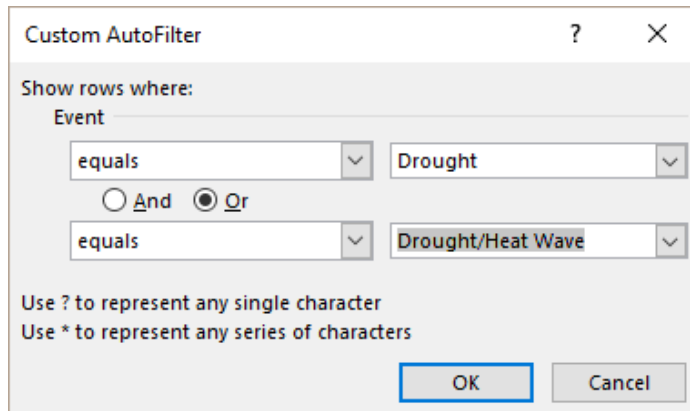
💣 Caution with the "spoken" logic and the pure mathematical logic !

If you are asked to filter disasters of the following types : *Drought* and *Drought/Heat Wave,* **verbally** the person will say AND but the real logical link is OR !

Clearing the filter : as for a standard filter (CLEAR FILTER FROM ...)

3.2.4 Filtering using the right click on a given cell

- The autofilter need not be active
- Right click the cell

Filter	▶	▼	Clear Filter
Sort	▶	⬚	Reapply
Insert Comment			Filter by Selected Cell's Value
Format Cells...			Filter by Selected Cell's Color
Pick From Drop-down List...			Filter by Selected Cell's Font Color
Define Name...			Filter by Selected Cell's Icon
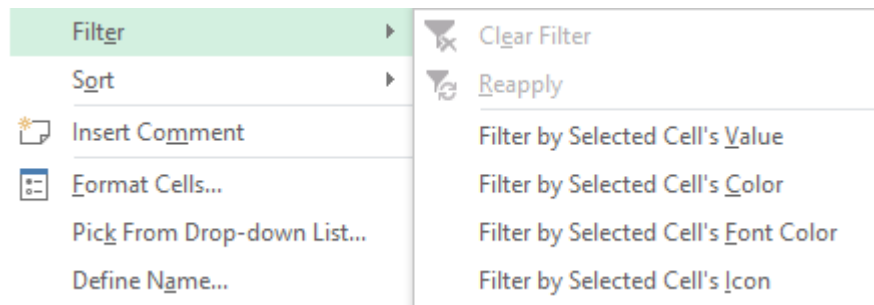
- Select the required filter command
- The autofilter mode is automatically turned on

Clearing the filter : as for a standard filter (CLEAR FILTER FROM …)

3.2.5 Filter criteria working on more than one column

Caution, filter criteria are *added.* Each new criteria is added to the current one, which consequently reduces the filtered result.

Example about the impact this can produce :

- You filter the sales of BRUNO and JOHN - then you filter sales amounts above Frs 1000.--. This is applied both to Bruno and John's sales.

Impossible to show all BRUNO sales but only JOHN's sales only above Frs 1000.-. To obtain this you will have to work with the *advanced filter.*

3.2.6 Updating the filter

You have manually modified data in the criteria column and you now need to update the filter : click on the SORT & FILTER button (HOME Tab) and choose the REAPPLY command or the same button on the DATA Tab.

3.2.7 Clearing ALL criteria

The active cell can be located anywhere : click on the SORT & FILTER button (HOME Tab) and choose the CLEAR command or the same button on the DATA Tab.

3.2.8 Turning off the autofilter mode

Click on the FILTER button (DATA Tab) / option FILTER (HOME Tab). It works like a switch.

3.2.9 Copying-pasting-printing the filtered result

No problem. Select and *only the filtered rows* will be copied-pasted-printed.
Caution : the autofilter mode is the only functionality where copying-pasting … is automatically restricted to the filtered rows and is consequently "secured". It is not the case with manually hidden rows, with an outline view mode and so on.

4 Advanced filter

The advanced filter provides tools to filter on criteria that prove impossible to set using the autofilter mode. Even when the two commands are equivalent, the advanced filter allows you to save the criteria range, a handy disposition.

It requires :   *A data table*
               A criteria range placed at the top or bottom of the table

4.1   Setting the criteria range

- Copy the required column label
- Type the required criteria below

Link OR : salesmen BRUNO or JOHN or JOHANNA	Link AND : sales between 500 and 1300	BRUNO's sales between 500 and 1300 OR all JOHN's sales

Salesman
BRUNO
JOHN
JOHANNA

Amount	Amount
>=500	<=1200

Salesman	Amount	Amount
BRUNO	>=500	<=1200
JOHN		

Can be obtained with the autofilter	Can be obtained with the autofilter	Cannot be obtained with the autofilter

✎ For the criteria range : you can copy-paste the whole header row, even though criteria will be typed only below specific labels.

Number	Inv. Date	Customer Nr.	Qty	Price/Piece	Amount	Salesman	Product
						BRUNO	

Indeed, any empty cell is understood by Excel as *criteria = no restriction.* Provided the *number of rows containing the criteria* does not change, you may add criteria without having to reset the criteria range. This can prove very handy.

4.2   Filtering

- Active cell in the data table

- DATA Tab – SORT & FILTER Group – ADVANCED Button
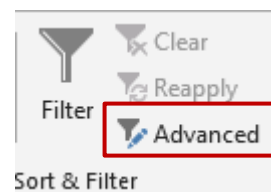
	A	B	C	D	E	F	G	
16	**Number**	**Inv. Date**	**Customer Nr.**	**Qty**	**Price/Piece**	**Amount**	**Salesman**	**Prod**
23	106	06.avr.17	8	3	68.25	204.75	PETER	Lang
24	107	10.avr.17	5	7	89.50	626.50	JOHN	Lang
25				4	95.00	380.00	BRIAN	EAO
26				3	73.25	219.75	JOHANNA	EAO
27				6	84.75	508.50	BRIAN	Lang
28				12	99.90	1'198.80	BRUNO	Lang
29				13	100.30	1'303.90	BRUNO	Offic
30				8	110.00	880.00	JOHN	Gam
31				1	130.60	130.60	PETER	Offic
32				1	56.30	56.30	BRIAN	Offic
33				9	25.90	233.10	PETER	Offic
34				6	25.00	150.00	JOHN	Lang
35				4	3.00	12.00	BRUNO	Offic
36				3	49.50	148.50	BRIAN	Offic
37				8	29.90	239.20	JOHANNA	EAO
38				2	18.60	37.20	JOHN	Offic
39	122	30.déc.17	9	7	88.90	622.30	BRUNO	Lang
40	123	31.déc.17	10	8	25.00	200.00	JOHANNA	Lang
41								
42								
43	Salesman							
44	JOHN							
45	PETER							
46	JOHANNA							

Advanced Filter ? ×

Action
- ⦿ Filter the list, in-place
- ◯ Copy to another location

List range: $A$16:$H$40
Criteria range: r'!$A$43:$A$46
Copy to:
☐ Unique records only

[OK] [Cancel]
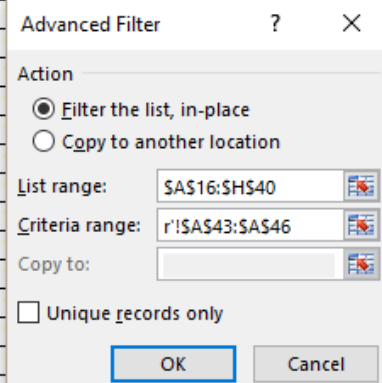
4.2.1 Filter the list, in-place

The word *list* means *data table.* Filtering is performed directly into the table. When you change the criteria, the previous filter result is removed and replaced with the new one.

Updating the criteria : if you do not need to reset the criteria range, you can run again the filter from this dialog box.

4.2.2 Copy to another location and copy to

Click directly onto the cell from which you want to *paste* the filtered result.

Caution : you must select a cell from the current worksheet. Impossible to set another worksheet as the destination. Excel allows you to select another sheet but when you validate to run the filter, there will be an error message.

Also : make sure that the destination range of cells is free of data and large enough. If there are data, they will be overwritten with no warning message.

Note : this is one of Excel commands that cannot be UNDONE

4.2.3 Partial extraction

You may copy-paste the filtered result of selected columns only to a new destination.

- Set the criteria range as usual
- Copy-paste the header row corresponding to the criteria at the destination location
- *Copy to* : make sure to select the *pasted header row*

	A	B	C	D	E	F	G	H
16	**Number**	**Inv. Date**	**Customer Nr.**	**Qty**	**Price/Piece**	**Amount**	**Salesman**	**Product**
35	118	10.août.17	4	4	3.00	12.00	BRUNO	Office
36	119	13.sept.17	5	3	49.50	148.50	BRIAN	Office
37	120	17.oct.17	7	8	29.90	239.20	JOHANNA	EAO
38	121	02.nov.17	8	2	18.60	37.20	JOHN	Office
39	122	30.déc.17	9	7	88.90	622.30	BRUNO	Languages
40	123	31.déc.17	10	8	25.00	200.00	JOHANNA	Langages
41								
42								
43	**Number**	**Price/Piece**			**Amount**	**Salesman**		
44					*empty cells = the whole list*			
45								
46	**Number**	**Price/Piece**			**Amount**	**Salesman**		

Advanced Filter ? ✕

Action
○ Filter the list, in-place
◉ Copy to another location

List range: $A$16:$H$40
Criteria range: r'!$A$43:$D$44
Copy to: r'!$A$46:$D$46

☐ Unique records only

[OK] [Cancel]

4.2.4   Duplicates (only when you copy to another location).

This will help to remove any duplicates. But be careful as this can be tricky when you are working with partial extractions. Here below an example. The only difference between the two records is the date. The *table or list* has been reduced to those two rows just to make the example easier to follow :

	A	B	C	D	E	F	G	
1	**Number**	**Inv. Date**	**Customer Nr.**	**Qty**	**Price/Piece**	**Amount**	**Salesman**	**Produ**
2	122	30.déc.14	9	7	88.90	622.30	BRUNO	Langu
3	122	30.déc.14	9	7	88.90	622.30	BRUNO	Langu
4								
5								
6	**Number**	**Price/Piece**			**Amount**	**Salesman**	*empty cells = the whole liste*	
7								
8								
9	**Number**	**Price/Piece**			**Amount**	**Salesman**	*unique records : off*	
10	122	88.90			622.30	BRUNO		
11	122	88.90			622.30	BRUNO		
12								
13	**Number**	**Price/Piece**			**Amount**	**Salesman**	*unique records : on*	
14	122	88.90			622.30	BRUNO		

4.2.5   Reverting to a whole table or list

Same as for the autofilter mode : click on the CLEAR button.

4.2.6   Special : calculated criteria

Most of the time you will work with simple criteria. But it could happen that you need a more complex criteria such as « the sales during the last 2 months », « all sales above the global sales average » etc … These criteria are called *calculated criteria.* But true to say, they are a heavy to work with.

Here are some calculated criteria and the corresponding filtered result :

	A	B	C	D	E	F	G	H
1	**Number**	**Inv. Date**	**Customer Nr.**	**Qty**	**Price/Piece**	**Amount**	**Salesman**	**Product**
20	118	25.oct.16	7	8	29.90	239.20	PETER	EAO
21	119	02.nov.16	8	2	18.60	37.20	JOHN	Office
22								
23	Date	20.11.2016			Sales for the past two months			
24					FALSE			
25								
26					=B2>=TODAY()-60			
27								

	A	B	C	D	E	F	G	H
1	**Number**	**Inv. Date**	**Customer Nr.**	**Qty**	**Price/Piece**	**Amount**	**Salesman**	**Produc**
3	101	04.févr.16	5	4	111.95	447.80	BRUNO	EAO
7	105	10.avr.16	5	7	89.50	626.50	JOHN	Langua
8	106	13.avr.16	2	4	95.00	380.00	BRIAN	EAO
10	108	19.avr.16	7	6	84.75	508.50	BRIAN	Langua
11	109	01.mai.16	4	12	99.90	1'198.80	BRUNO	Langua
12	110	02.mai.16	9	13	100.30	1'303.90	BRUNO	Office
13	111	08.juin.16	5	8	110.00	880.00	JOHN	Games
22								
23	Average	72.43			Sales above sales average			
24					FALSE			
25								
26					=F2>AVERAGE($F$2:$F$21)			

Caution : the function AVERAGE must refer to a range of cells with absolute references.

Three important things to respect if you set calculated criteria :

- The formula must produce the logical value TRUE or FALSE. Only the lines whose result is TRUE will be shown once the list is filtered.

- The formula must refer to at least one column of the list. The reference of the cell must be in relative mode. This reference can be any cell from the column (if the reference is the column label , the formula will produce the result #NAME? but you can ignore it as this will not affect the list filtering.). *On the other hand, if the formula calculates, searches etc… a range of cells, this range must be set in absolute references.*

- When you type a label for the calculated criteria ***you must not use the name of an existing label.***

5 Formatting as a table

This was introduced for the first time in the 2003 version. Very handy as it gives the following possibilities :

- Securing adding new records (new records are always *inside* the table – something most important when you create and manage pivot tables)
- Easy filtering as the autofilter mode is automatically active
- No need to freeze the header row : scroll down and it is automatic
- Working with a *row total,* at the bottom of the table.

5.1   Creating the data table

- Active cell inside the table

❶ Through the HOME Tab

- STYLES Group – FORMAT AS TABLE Button
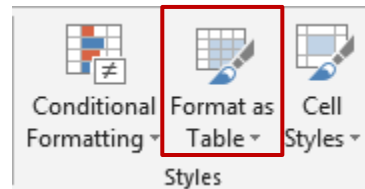
- Select the required format in the gallery

  If the table (fully or partially) has an existing format (cell font, fill …), Excel does not overwrite the existing format, unless you first right click the style and decide to clear any existing formatting :
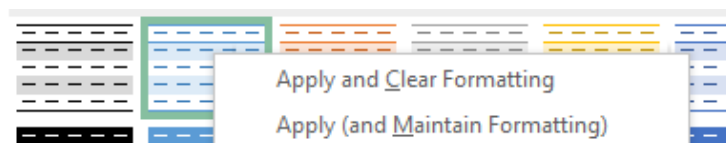
- You are prompted to confirm the range of cells corresponding to the table and specify if the table has a header row or not

❷ Through the INSERT Tab

- TABLE Group – TABLE Button
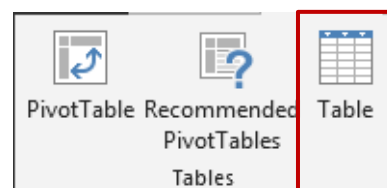
- Confirm the range of cells … (selecting the format comes after)

Whatever the method, a data table has the following characteristics :

- Autofilter on

- No need to freeze the header row : scroll down and it is automatic

- If you carefully examine the table, you will notice that there is a border line around the records, with a little triangle on the last cell, at the table right end. This line represents the *security* mentioned in the introduction : the table will be automatically enlarged if you add a new row at the end of the table.

- A DESIGN Tab is displayed in the Ribbon.

- You can change the fill, font color but the inside border lines cannot be removed.
  (you may remove them only if you convert the table to a range of standard cells)

5.2   Headers row

No need to split/freeze … The headers row remains on the top :

	Number	▼	Inv. Date	▼	Customer Nr.	▼	Qty	▼	Price/Piece	▼	Amount	▼	Salesman	▼	Product	▼
22	120		17.oct.11		7		8		29.90		239.20		PETER		EAO	
23	121		02.nov.11		8		2		18.60		37.20		JOHN		Office	
24	122		30.déc.11		9		7		88.90		622.30		BRUNO		Languages	
25	123		31.déc.11		10		8		25.00		200.00		BRUNO		Languages	

5.3   Adding a record to the table

- Click on the table last cell (right bottom corner) and press the TAB key   *or*
- First empty row at the bottom of the table : click in the first cell and type the required data – then press the ENTER key.

  In both cases, the new record *belongs to the table.* The table format is automatically applied and the record is displayed inside the security border line around the table.

✎ If the table displays a total row (see corresponding topic), pressing the TAB key to add a record works fine, provided you click on the last cell *before* the total row.

✎ Contrary to simple sorting, adding a new record at the end of the table does not lead to loosing the multiple sort keys memorized in the custom sort dialog box.

5.4   Selecting

Selecting a column or a row is similar to what you do in Word :

Row   Point the beginning of the row. The mouse pointer becomes a horizontal arrow : click

Column   Point the top of the column. The mouse pointer becomes a vertical arrow : click

Whole table   Point the table top left corner. The mouse pointer becomes a diagonal arrow : click

5.5   Inserting a calculated column

- Insert a column in the table
- Create the formula/function in the first cell
- The formula/function is inserted *in the whole column*

Deleting the column : as usual

5.6 DESIGN tab

5.6.1   Naming and sizing the table

The PROPERTIES Group

| Table Name: |
| Table1 |
| ⬛ Resize Table |
| Properties |
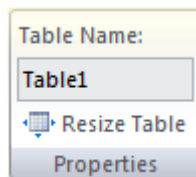
Table Name   You may give a name to the table (*handy for pivot tables)*
                        No space and cannot begin with a number

Resize Table   It is the dialog box about confirming the range of cells (when you
                        create a table). You can modify

5.6.2   Removing duplicates and converting to range

The TOOLS Group

| Summarize with PivotTable |
| Remove Duplicates |
| Convert to Range |
| Insert Slicer |
| Tools |
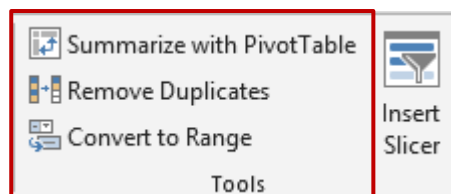
Summarize with PivotTable   Explained later

Remove Duplicates   Same option as explained in a previous topic. *See page 10*

Convert to Range   To remove the *table definition* and keep only the table
                                format. You will be prompted to confirm.

5.6.3   Filtering using segments

The following
group :

Insert Slicers   ?   ✕

☐ Number
☐ Inv. Date
☐ Customer Nr.
☐ Qty
☐ Price/Piece
☐ Amount
☐ Salesman
☐ Product

OK   Cancel
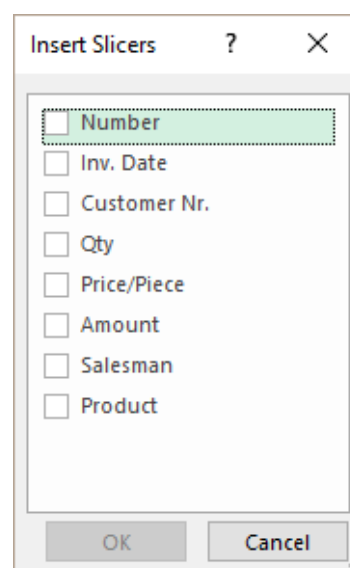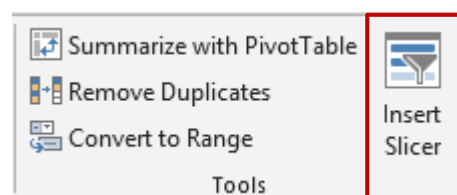
Segments are simply a nice visual tool to make filtering a bit easier

Result choosing PRODUCT / AREA / SALESMAN

Simple click	To select one criteria
CTRL + click	To select multiple criteria
	To clear the filter
DELETE on the segment border	To delete the segment

5.6.4   Modifying the style that has been applied

The following groups :
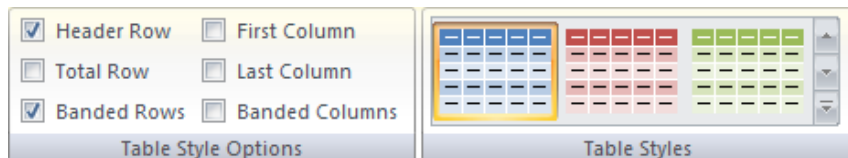
You can apply another format (TABLE STYLES Group)
You can change the fill, bold … attributes applied to given rows/columns (TABLE STYLE OPTIONS Group). Reminder : you cannot remove the borders lines.

5.6.5   Dynamic subtotals

In the previous group : check on TOTAL ROW
A total row is automatically added at the end of the table and various subtotals are possible :

✎ **Count** = count non empty cells whatever their content

Count Numbers = counts non empty cells containing only numbers

These subtotals are said *dynamic* because they automatically adapt to the current filter :

| | fx | =SUBTOTAL(109;[Amount]) |

...mer Nr. ▼	Qty ▼	Price/Piece ▼	Amount ▼	Salesman ▼	Product ▼
5	7	89.50	626.50	JOHN	Languages
5	8	110.00	880.00	JOHN	Games
12	6	25.00	150.00	JOHN	Languages
8	2	18.60	37.20	JOHN	Office
			1'915.70 ▼		5,

Standard SUM 8'526.60

Why ?

Take a closer look at the formula bar and you will notice that the function is not the SUM function but the SUBTOTAL function.

5.7 Defining a table using the quick analysis tag

Select the list
The following tag will be displayed (bottom right of selection) :
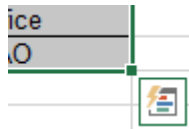
Point the TABLE button and a preview of the suggestion will be displayed. Click to validate

Then DESIGN tab to finalize the table.

* MORE : a dialog box displays more table suggestions

Numbe ▼	Inv. Da ▼	Customer Nr ▼	Qty ▼	Price/Pie ▼	Amou ▼
100	15.déc.16	12	1	100.50	100.5
101	19.déc.16	6	3	120.60	361.8
102	12.janv.17	3	2	111.00	222.0
103	04.févr.17	5	4	111.95	447.8
104	25.févr.17	6	1	88.50	88.5
105	05.mars.17	7	2	77.30	154.6
106	06.avr.17	8	3	68.25	204.7
107	10.avr.17	5	7	89.50	626.5
108	13.avr.17	2	4	95.00	380.0
109	16.avr.17	3	3	73.25	219.7
110	19.avr.17	7	6	84.75	508.5
111	01.mai.17	4	12	99.90	1'198.8
112	02.mai.17	9	13	100.30	1'303.9
113	08.juin.17	5	8	110.00	880.0
114	18.juin.17	2	1	130.60	130.6
115	22.juil.17	4	1	56.20	56.2

Formatting   Charts   Totals   **Tables**   Sparklines

Table   PivotTable PivotTable PivotTable PivotTable   More

Tables help you sort, filter, and summarize data.

5.8 Strong points – weak points

Strong point : subtotals are not located inside the table, they are displayed at the end of the table, as a separate row. Consequently no extra « weight ».

Weak points :

No synoptic view for these subtotals. It goes one by one, filter after filter. If you need subtotals and groups, it would be advisable to consider creating subtotals through the following option : DATA Tab – OUTLINE Group – SUBTOTALS Button.

Also, sheets containing data tables must be copied into another workbook one by one. No multi-selection.

6 Subtotals integrated into the list

- Sort the table to display the required groups

- DATA Tab – OUTLINE Group –
  SUBTOTAL Button
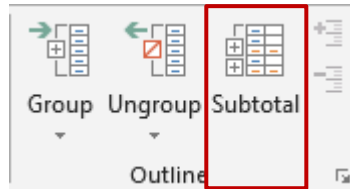
- Here after the following dialog box :

Caution, default propositions sometimes
show little common sense (computer
thinking …), therefore check the settings
carefully.
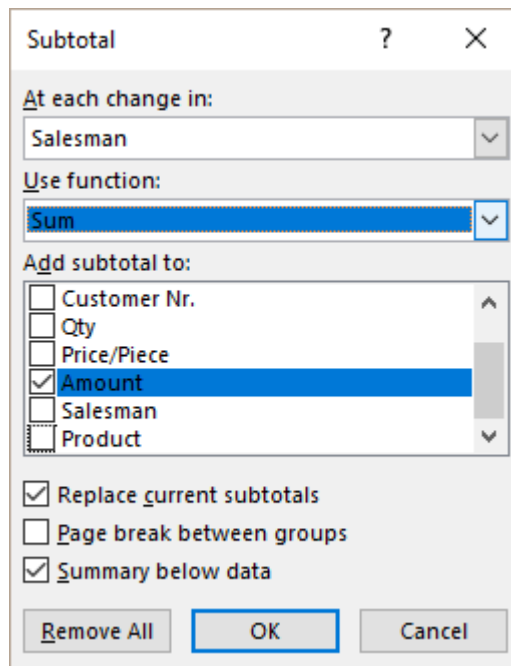
Replace current subtotals	An important option when you need to add a subtotal to a column that already has one.
	Example : to add the AVERAGE, MIN, MAX functions to the *Amount* column when there is already a SUM subtotal.
Page break between groups	To print each group on a separate page
Summary below data	Usually subtotals are added at the *bottom* of the groups. If this option is unchecked, subtotals are added at the *top* of the group.
REMOVE ALL Button	To revert to a normal list of records (with no subtotals)

✎ Subtotals by month :
   The date format must omit the day (for instance : mmm-yy, mmm. yyyy etc….)

Example of subtotals

1 2 3		A	B	C	D	E	F	G	H
	1	Number	Inv. Date	Customer Nr.	Qty	Price/Piece	Amount	Salesman	Product
	2	101	19.déc.16	6	3	120.60	361.80	BRIAN	EAO
	3	108	13.avr.17	2	4	95.00	380.00	BRIAN	EAO
	4	110	19.avr.17	7	6	84.75	508.50	BRIAN	Languages
	5	115	22.juil.17	1	1	56.30	56.30	BRIAN	Office
	6	119	13.sept.17	5	3	49.50	148.50	BRIAN	Office
−	7						1'455.10	BRIAN Total	
	8	100	15.déc.16	12	1	100.50	100.50	BRUNO	EAO
	9	103	04.févr.17	5	4	111.95	447.80	BRUNO	EAO
	10	105	05.mars.17	7	2	77.30	154.60	BRUNO	EAO
	11	109	16.avr.17	3	3	73.25	219.75	BRUNO	EAO
	12	111	01.mai.17	4	12	99.90	1'198.80	BRUNO	Languages
	13	112	02.mai.17	9	13	100.30	1'303.90	BRUNO	Office
	14	118	10.août.17	4	4	3.00	12.00	BRUNO	Office
	15	122	30.déc.17	9	7	88.90	622.30	BRUNO	Languages
−	16						4'059.65	BRUNO Total	
	17	123	31.déc.17	10	8	25.00	200.00	JOHANNA	Langages
−	18						200.00	JOHANNA Total	
	19	102	12.janv.17	3	2	111.00	222.00	JOHN	Office

The outline mode is applied to the subtotals (chapter at end of present documentation)
To expand/collapse levels : + and – or detail buttons located right to the SUBTOTAL button.
Expand/collapse all levels : click on the 1-2-3 buttons located at the top right corner*.

6.2   How to copy-paste the subtotals or apply a special format ?

In the chapter about filtering we did mention that the filtered result could be safely printed, copied-pasted …. It is not the case with subtotals.

- Collapse levels to what is required and select
- Copy-paste, formatting … will not work properly …. because

   ❶   The hidden rows are always selected
   ❷   For a paste : you will get false results, 0 values or horrible #REF!.

<u>Solution</u> :   *Paste* : if pasting hidden rows does not matter to you, use the PASTE SPECIAL command (*or the Paste Options tag at the bottom right of the pasted range of* cells) and choose to paste *values* only.

   Paste or format : if you want to get rid of the hidden row, <u>restrict the selection to the visible levels (or cells) only</u>

   Normal selection then HOME Tab – EDITING Group – Drop-down menu of the FIND & SELECT Button – GO TO SPECIAL Option – VISIBLE CELLS ONLY Option.   *(ou ALT [+] ;)*

   Then perform the required command : apply the format, copy-paste (in the latter case it will be automatically values only)

Weak point : the subtotals are inserted *directly into the list* and consequently filtering, sorting becomes difficult and sometimes impossible unless you remove them. So most of the time, subtotals are "momentarily" inserted in the list. Moreover the subtotals must be formatted to stand out (only the function title is in bold but not the function result).

7 Adding totals using the quick analysis tag

Select the list to display the quick analysis tag (bottom right of selection):
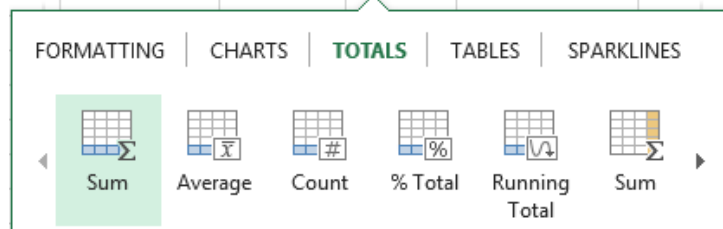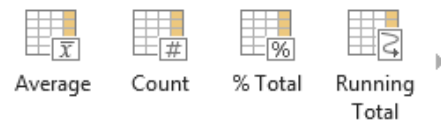
The colored area indicates where the subtotal will be inserted.

Example with the following table :

Sales	Qtr 1	Qtr 2	Qtr 3
Product 1	45	25	46
Product 2	96	63	13
Product 3	85	65	34
Product 4	74	45	58
Product 5	45	75	26
Product 6	65	35	95
Product 7	89	86	32
Product 8	87	35	14
Product 9	41	79	78

SUM (1st button) :

Product 7	89	86	32
Product 8	87	35	14
Product 9	41	79	78
	627	508	396

COUNT (3rd button) : function that count the non empty cells

Product 8	87	35	14
Product 9	41	79	78
	9	9	9

% OF TOTAL (9th button)

Qtr 3	
46	7.58%
13	11.23%
34	12.02%
58	11.56%
26	9.54%
95	12.74%
32	13.52%
14	8.88%
78	12.93%

RUNNING TOTAL (the last button)

Qtr 3	
46	116
13	288
34	472
58	649
26	795
95	990
32	1197
14	1333
78	1531

If the list has already been defined as a TABLE, the function buttons automatically add the *total row* (an option users usually ignore). Then there is a change : the SUM button still generates a *Sum* but it will be the one managed by the SUBTOTAL function :

F26		×	✓	fx	=SUBTOTAL(109;[Amount])		

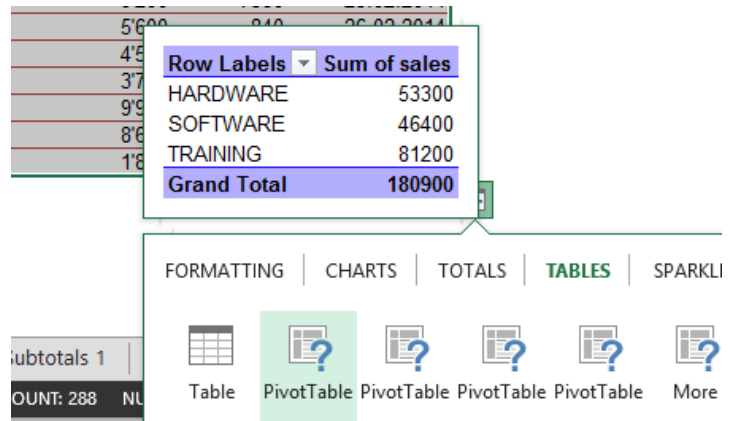|	Number ▾	Inv. Date ▾	Customer Nr. ▾	Qty ▾	Price/Piece ▾	Amount ▾	Salesman ▾	Product ▾
22	106	06.avr.17	8	3	68.25	204.75	PETER	Languages
23	114	18.juin.17	2	1	130.60	130.60	PETER	Office
24	116	25.juil.17	2	9	25.90	233.10	PETER	Office
25	120	17.oct.17	7	8	29.90	239.20	PETER	EAO
26						8'526.60 ▾		
27								

8 Pivot tables and pivot charts

The concept behind pivot tables is rather simple : it is a dynamic « single or double entry table ». They use detailed lists in order to generate various syntheses such as sales by area and salesman, by salesman and product etc... Pivot tables are a very powerful analysis tool.

8.1 Creating

❶ **Based on a list of records (not defined as a data table)**

Select the list and the quick analysis tag will suggest pivot tables (when you point)

Row Labels ▾	Sum of sales
HARDWARE	53300
SOFTWARE	46400
TRAINING	81200
Grand Total	**180900**

* More : dialog box showing all possible suggestions

FORMATTING | CHARTS | TOTALS | **TABLES** | SPARKLI

Table | PivotTable | PivotTable | PivotTable | PivotTable | More

❷ **Based on a list of records (not defined as a data table)**

Click inside the list
INSERT Tab – TABLES Group

PivotTable | Recommended PivotTables | Table
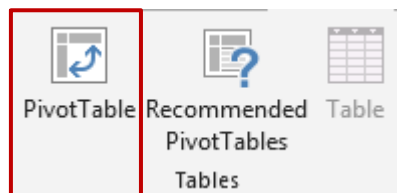
Tables

❸ **Based on a list of records defined as a *data table***

Make sure the active cell is inside the table

TABLE TOOLS – DESIGN Tab – TOOLS Group – SUMMARIZE WITH … Button

Summarize with PivotTable
Remove Duplicates
Convert to Range

Insert Slicer

Tools
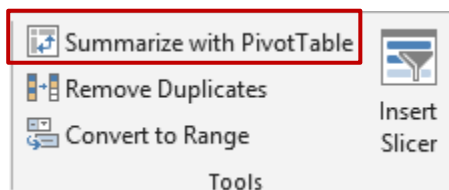
The list happens to belong to another open workbook :
Nothing really special : select the destination cell of the future pivot table and start creating it through INSERT Tab – TABLES Group –PIVOTTABLE Button – Select the required data …

Creation (whatever the method)
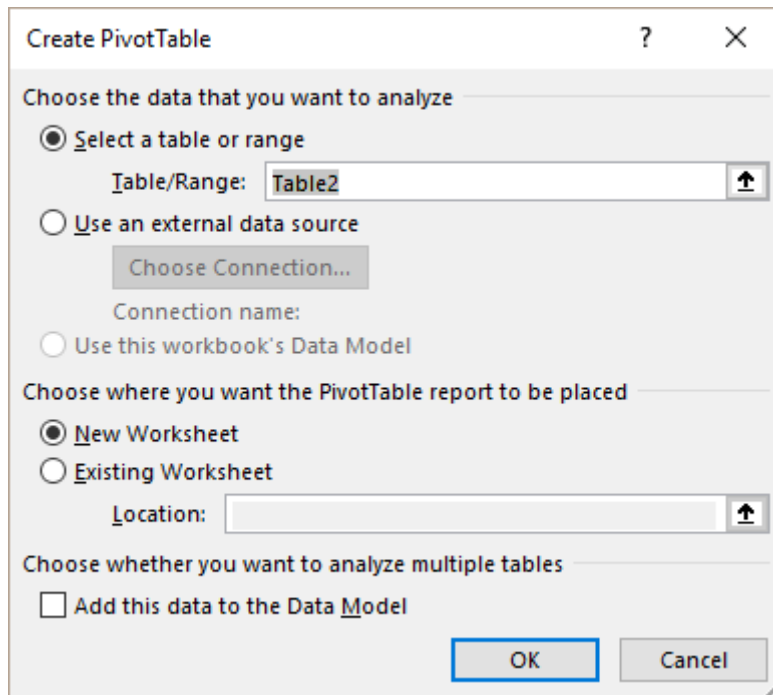
Select a table or range   *The list is not named* : Excel automatically retrieves the range of cells corresponding to the list. The range is in absolute references.

The list has been manuelly named : Excel automatically retrieves the name.

Data table : Excel automatically retrieves its name (if you have not renamed the table, the name will be *Table1, Table2 …*

The list or the data table belongs to another workbook: select the list or the table in the workbook (it must be open)

Use an external data source   For files created by database programs such as Access. Excel calls this a *connection.* Follow the Wizard instructions

• Choose the location

New Worksheet : a new blank sheet named *Sheet1* is inserted *before* the sheet containing the list or data table

Existing Worksheet : click in the *Location* text box and select the required worksheet and the starting destination cell

- Left – at the destination cell :
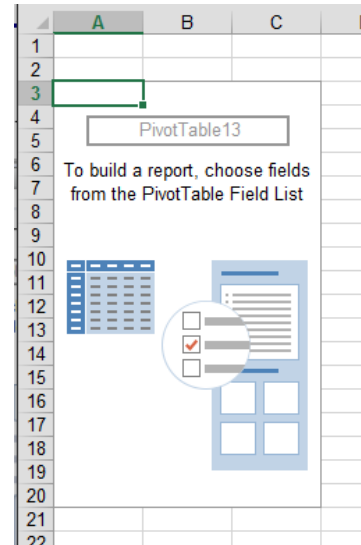
- On the right side : the PIVOTTABLE FIELD LIST pane
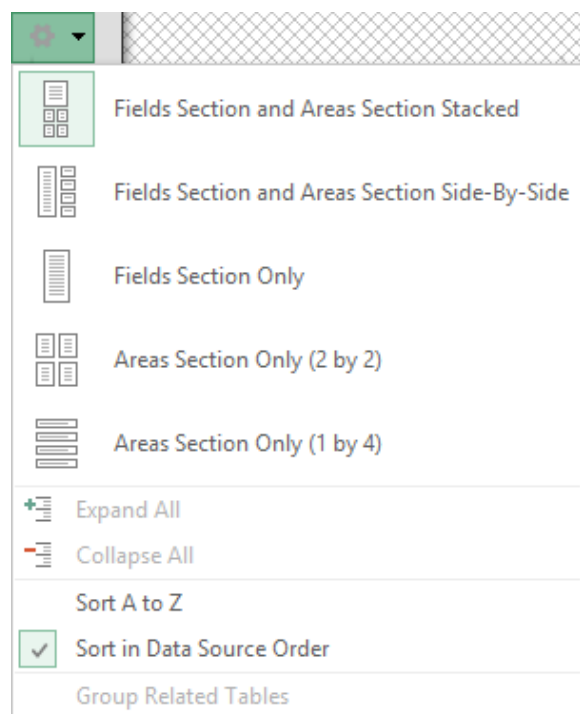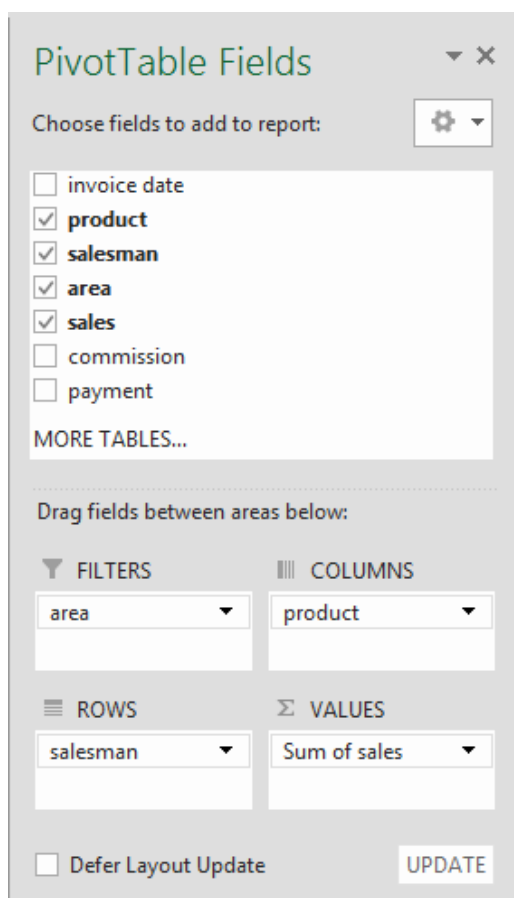
Result using the above settings :

	A	B	C	D	E
1	area	(All)			
2					
3	Sum of sales	Column Labels			
4	Row Labels	HARDWARE	SOFTWARE	TRAINING	Grand Total
5	JOHN	7300	29300	7500	44100
6	KEITH	6300	2500	31400	40200
7	MAX	19500	14600	20400	54500
8	PETER	20200		21900	42100
9	Grand Total	53300	46400	81200	180900

Fields to add to report	Drag the field into the required section

You can also simply check the field. In this case, Excel will try to automatically figure out its position by analyzing the nature of the data

Number	➔	Values
Text and dates	➔	Row Labels
Special : OLAP date/time	➔	Column Labels

Most important : show common sense ! the way the pivot table is arranged is totally up to you. Do not drag too many fields into the sections, or the table will get …. unreadable and incomprehensible.

It is also not advisable to choose the *Column Labels* section for a field containing mostly unique entries, such as dates for instance. You should rather choose the *Row Labels* section as our eyes read better a long table rather than a large one. Or you could choose the *Report Filter* section, which will guarantee a real fluid reading.

Special : field with lots of dates
If you table has a column full of dates, Excel can automatically group them <u>as soon as you select the corresponding field label</u>.
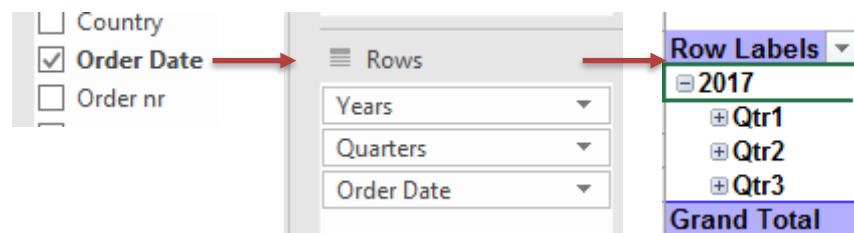
If you do not like it this way, simply delete the grouping fields and keep only the main label.

Report Filter	To automatically adjust the calculations according to an additional field, here *area.*

Users of previous versions : this filter is the old *page field*

⚙ ▾	This button displays a drop-down list of views for the *Field List* pane (see above screen capture)

Defer Layout Update and the UPDATE Button	When you drag a new field to one of the four sections, the pivot table is automatically updated accordingly. Unless you turn on this option. It will be updated only when you manually click on the UPDATE button.

<u>Note</u> : caution when this option is active, a fair number of commands to manage the pivot table are no longer available (for instance the buttons on the OPTIONS Tab).

Some other examples of pivot tables

Synthesis : sales by product. It is a single-entry table :

Row Labels	Sum of sales
HARDWARE	53300
SOFTWARE	46400
TRAINING	81200
Grand Total	**180900**

FILTERS · COLUMNS

ROWS: product · VALUES: Sum of sales

Synthesis : sales and commissions by product : a single-entry table

	Values	
Row Labels	Sum of sales	Sum of commission
HARDWARE	53300	7995
SOFTWARE	46400	6960
TRAINING	81200	12180
Grand Total	**180900**	**27135**

FILTERS · COLUMNS: Σ Values

ROWS: product · VALUES: Sum of sales, Sum of com...

Synthesis : sales by salesman and by product (with a possible filter by area).
It is a double-entry table:

	A	B
1	area	(All)
2		
3	Row Labels	Sum of sales
4	⊟JOHN	44100
5	HARDWARE	7300
6	SOFTWARE	29300
7	TRAINING	7500
8	⊟KEITH	40200
9	HARDWARE	6300
10	SOFTWARE	2500
11	TRAINING	31400
12	⊟MAX	54500
13	HARDWARE	19500
14	SOFTWARE	14600
15	TRAINING	20400
16	⊟PETER	42100
17	HARDWARE	20200
18	TRAINING	21900
19	**Grand Total**	**180900**

FILTERS: area · COLUMNS

ROWS: salesman, product · VALUES: Sum of sales

8.2 Sorting and filtering the pivot table

Pivot tables are said *dynamic* because there are filters to make the result vary

8.2.1 Report filter
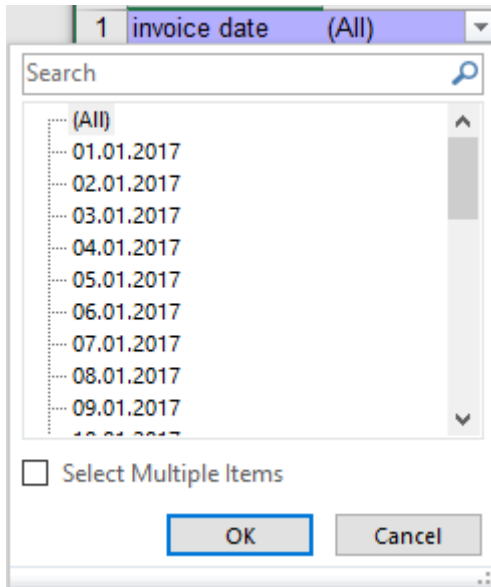
One item : click to select

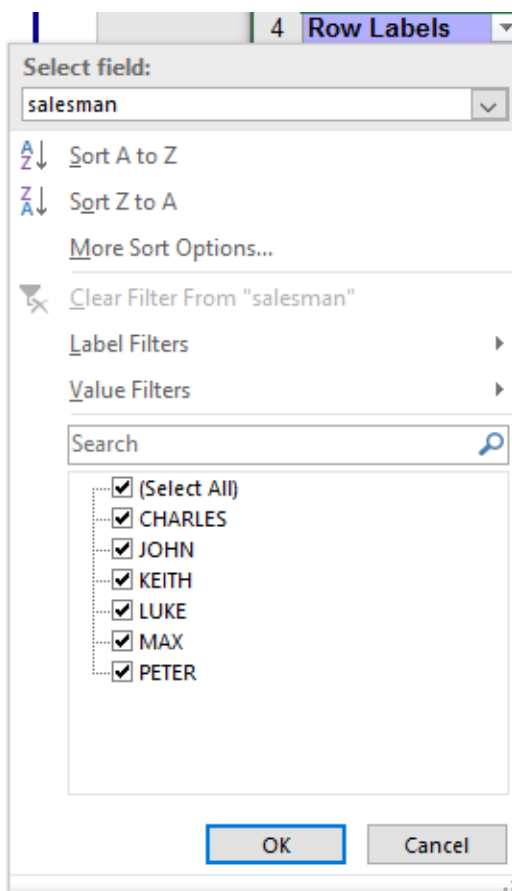*Multiple selection* : first check the SELECT MULTIPLE ITEMS option. Each item then displays the selection case.

Closing the pull-down list : CANCEL button, ESC key, click in the table or into the worksheet.

8.2.2 Field filter (rows or columns)

✎ The first section corresponds to the SORT Group on the OPTIONS Tab.

Other access to the sorting options : right click the field label or any item.

Select field : *salesman*	The drop-down list displays more than one item when there are several row fields. Here *salesman* and *product*
Sort A to Z / Z to A	*AZ and ZA :* standard ascending/descending sort.

    ✎   Note that it is possible to manually drag an item (here one given salesman) and its details, subtotals … into the pivot table to set a custom order.

More Sort Options …	The first dialog box shows the above options. The MORE OPTIONS button provides additional settings such as :

                           - Automatic sort each time the table is updated
                           - Sort using custom lists

Filters	Standard filter criteria
Selection cases	Check/Uncheck as required

    ✎   Clearing filters
        Criteria for one field : option CLEAR FILTER FROM XXX
        All criteria (all fields) : one by one or OPTIONS Tab – ACTIONS Group – Drop-down menu of the CLEAR Button – CLEAR FILTERS Button

---

8.3   Simple modifications in the FIELD LIST pane

8.3.1   Dragging a field into another section – Removing a field

Fields can be dragged from one section to another. You may also right click the field label.

You can also check/uncheck the field in the Field List, at the top of the pane. The destination section is automatically set by Excel according to the nature of the data.

If you drag the field outside the pane, you remove it.
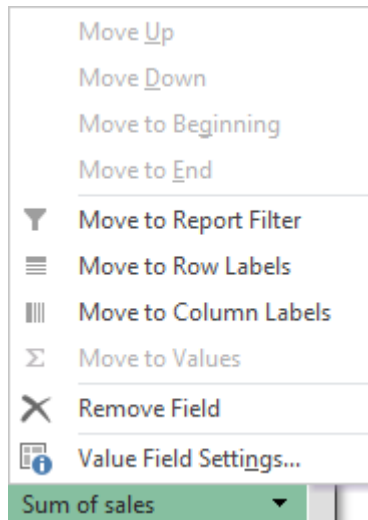
Order of the fields : click and drag to set the order.

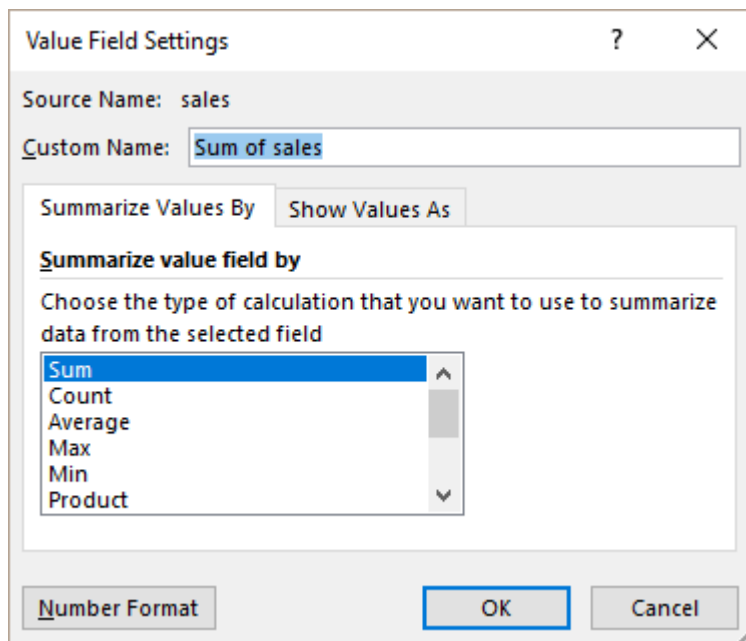   ✎   You can also work with the field's drop-down list and its commands.

8.3.2   Changing the default function

Adding is the default calculation but you can change to another one.

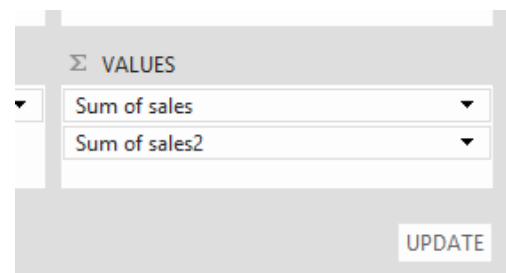- Click on the triangle located at the right of the value field

| Move Up |
| Move Down |
| Move to Beginning |
| Move to End |
| ▼ Move to Report Filter |
| ≡ Move to Row Labels |
| ||| Move to Column Labels |
| Σ Move to Values |
| ✕ Remove Field |
| 🔳 Value Field Settings... |
| **Sum of sales** ▼ |

- VALUE FIELD SETTINGS

Value Field Settings ? ✕

Source Name: sales

Custom Name: Sum of sales

Summarize Values By | Show Values As

Summarize value field by

Choose the type of calculation that you want to use to summarize data from the selected field

Sum
Count
Average
Max
Min
Product

Number Format | OK | Cancel

8.3.3 Adding a function

A value field can be dragged twice

Σ VALUES

| ▼ | Sum of sales | ▼ |
| | Sum of sales2 | ▼ |

UPDATE

Then you change the function (see previous topic). Why not also rename the cell label ?

Caution : the layout automatically applied by Excel is often not the best choice ...

Area	Product HARDWARE Sum	Average	SOFTWARE Sum	Average	TRAINING Sum	Average	Total Sum	Total Average
EAST			11300	3767	31400	7850	42700	6100
NORTH	24200	6050	9000	9000	9500	4750	42700	6100
SOUTH	13600	6800	10100	3367	29100	7275	52800	5867
WEAST	15500	5167	16000	5333	11200	5600	42700	5338
Grand Total	53300	5922	46400	4640	81200	6767	180900	5835

The table is too large and it is quite … ugly !
The Field List shows to what the VALUES field will refer (COLUMNS or ROWS ?) :

FILTERS

COLUMNS
product ▼
Σ Values ▼

ROWS
area ▼

Σ VALUES
Sum ▼
Average ▼

The Σ VALUES can be dragged from the COLUMNS box into the ROWS box and the layout will be greatly improved :

Area	Product HARDWARE	SOFTWARE	TRAINING	Grand Total
EAST				
Sum		11300	31400	42700
Average		3767	7850	6100
NORTH				
Sum	24200	9000	9500	42700
Average	6050	9000	4750	6100
SOUTH				
Sum	13600	10100	29100	52800
Average	6800	3367	7275	5867
WEAST				
Sum	15500	16000	11200	42700
Average	5167	5333	5600	5338
Total Sum	53300	46400	81200	180900
Total Average	5922	4640	6767	5835

**FILTERS**

ROWS
area ▼
Σ Values ▼

8.4   Creating a worksheet showing the calculation details

Double-click a total and a worksheet will be automatically created. It will list all the records used in the calculation. (Here the total of sales of someone called Max) :

	A	B	C	D	E	F	G	H	
1	invoice date	product	salesman	area	country	free-lance	sales	commission	pay
2	22.01.2017	HARDWAR	MAX	NORTH	SPAIN	NO	6800	1020	22
3	16.01.2017	TRAINING	MAX	NORTH	SPAIN	NO	4600	690	16
4	13.01.2017	SOFTWARI	MAX	NORTH	SWITZERL	NO	9000	1350	13

8.5 DESIGN Tab : changing the layout and the format
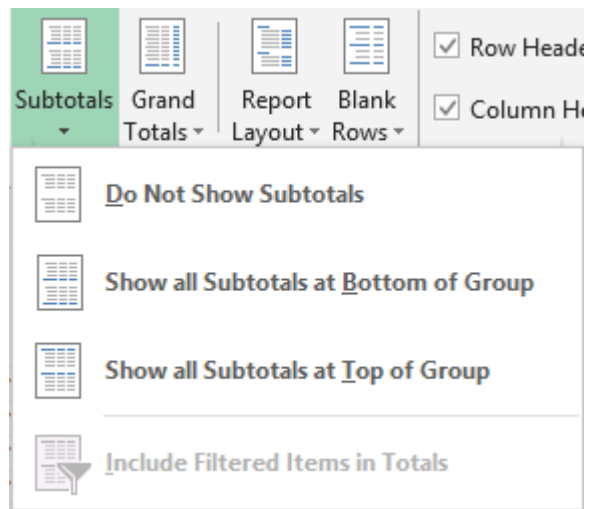
LAYOUT Group
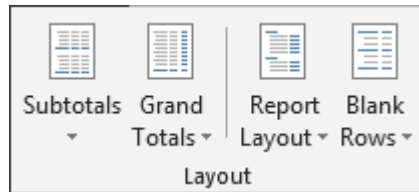
8.5.1 Subtotals

If the table has more than one row or column fields, then internal subtotals are created

The drop-down menu of the SUBTOTALS button

* *Last option* : available only for pivot tables connected to an OLAP data source.

Here below a pivot table (sales by product and by salesman) :

Default subtotals

	Row Labels	Sum of sales
3	Row Labels ▾	Sum of sales
4	⊟JOHN	44100
5	HARDWARE	7300
6	SOFTWARE	29300
7	TRAINING	7500
8	⊟KEITH	40200
9	HARDWARE	6300
10	SOFTWARE	2500
11	TRAINING	31400
12	⊟MAX	54500
13	HARDWARE	19500
14	SOFTWARE	14600
15	TRAINING	20400
16	⊟PETER	42100
17	HARDWARE	20200
18	TRAINING	21900
19	Grand Total	180900

Do Not Show Subtotals

Row Labels ▾	Sum of sales
⊟JOHN	
HARDWARE	7300
SOFTWARE	29300
TRAINING	7500
⊟KEITH	
HARDWARE	6300
SOFTWARE	2500
TRAINING	31400
⊟MAX	
HARDWARE	19500
SOFTWARE	14600
TRAINING	20400
⊟PETER	
HARDWARE	20200
TRAINING	21900
Grand Total	180900

Show all Subtotals at Bottom of Group   Show all Subtotals at Top of Group

                                               Corresponds to the default subtotals

Row Labels	Sum of sales
⊟JOHN	
HARDWARE	7300
SOFTWARE	29300
TRAINING	7500
JOHN Total	**44100**
⊟KEITH	
HARDWARE	6300
SOFTWARE	2500
TRAINING	31400
KEITH Total	**40200**
⊟MAX	
HARDWARE	19500
SOFTWARE	14600
TRAINING	20400
MAX Total	**54500**
⊟PETER	
HARDWARE	20200
TRAINING	21900
PETER Total	**42100**
Grand Total	**180900**

8.5.2   Grand Totals

The drop-down menu of the GRAND TOTALS button
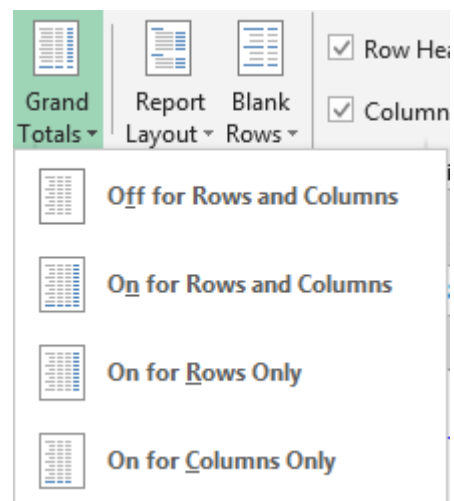
Here below a pivot table (simple : sales by salesman)

Sum of sales	Column Labels				
Row Labels	JOHN	KEITH	MAX	PETER	Grand Total
HARDWARE	7300	6300	19500	20200	53300
SOFTWARE	29300	2500	14600		46400
TRAINING	7500	31400	20400	21900	81200
Grand Total	**44100**	**40200**	**54500**	**42100**	**180900**

Off for Rows and Columns

Sum of sales	Column Labels			
Row Labels	JOHN	KEITH	MAX	PETER
HARDWARE	7300	6300	19500	20200
SOFTWARE	29300	2500	14600	
TRAINING	7500	31400	20400	21900

On for Rows and Columns = *By default*

On for Rows only

Sum of sales	Column Labels ▾				
Row Labels ▾	JOHN	KEITH	MAX	PETER	Grand Total
HARDWARE	7300	6300	19500	20200	53300
SOFTWARE	29300	2500	14600		46400
TRAINING	7500	31400	20400	21900	81200

On for Columns only

Sum of sales	Column Labels ▾			
Row Labels ▾	JOHN	KEITH	MAX	PETER
HARDWARE	7300	6300	19500	20200
SOFTWARE	29300	2500	14600	
TRAINING	7500	31400	20400	21900
Grand Total	44100	40200	54500	42100

8.5.3 Report Layout

The drop-down menu of the REPORT LAYOUT button

The options will let you make <u>very light changes</u>.

By default : the pivot table is in Compact Form
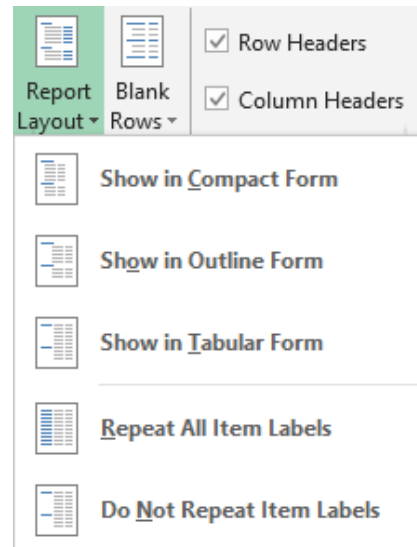
Here below the modifications applied to the pivot table on page 56

Outline Form

salesman ▾	product ▾	Sum of sales
⊟JOHN		44100
	HARDWARE	7300
	SOFTWARE	29300
	TRAINING	7500
⊟KEITH		40200
	HARDWARE	6300
	SOFTWARE	2500
	TRAINING	31400
⊟MAX		54500
	HARDWARE	19500
	SOFTWARE	14600

Tabular Form

salesman ▾	product ▾	Sum of sales
⊟JOHN	HARDWARE	7300
	SOFTWARE	29300
	TRAINING	7500
JOHN Total		44100
⊟KEITH	HARDWARE	6300
	SOFTWARE	2500
	TRAINING	31400
KEITH Total		40200
⊟MAX	HARDWARE	19500
	SOFTWARE	14600
	TRAINING	20400
MAX Total		54500

Repeat All Item Labels (option to combine with an Outline or Tabular mode)

product	area	Sum of sales
⊟ HARDWARE		53300
HARDWARE	NORTH	24200
HARDWARE	SOUTH	13600
HARDWARE	WEAST	15500
⊟ SOFTWARE		46400
SOFTWARE	EAST	11300
SOFTWARE	NORTH	9000
SOFTWARE	SOUTH	10100
SOFTWARE	WEAST	16000
⊟ TRAINING		81200
TRAINING	EAST	31400
TRAINING	NORTH	9500
TRAINING	SOUTH	29100

8.5.4   *Blank line between items*

The drop-down menu of the BLANK ROWS button
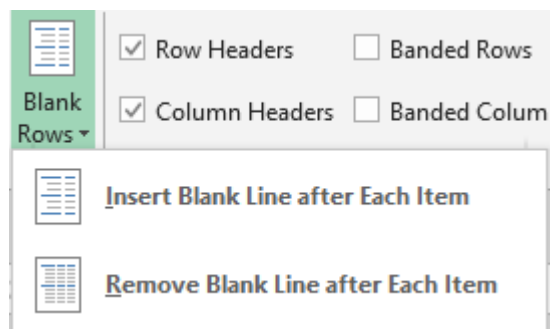
By default : no blank line separates the groups

The beginning of the previous table showing blank lines :

	product	area	Sum of sales
3	product	area	Sum of sales
4	⊟ HARDWARE		53300
5	HARDWARE	NORTH	24200
6	HARDWARE	SOUTH	13600
7	HARDWARE	WEAST	15500
8			
9	⊟ SOFTWARE		46400
10	SOFTWARE	EAST	11300
11	SOFTWARE	NORTH	9000

✎   Border, fill color … are allowed but no data typing

8.5.5   *Modifying the table format*

The PIVOTTABLE STYLE OPTIONS and PIVOTTABLE STYLES groups :
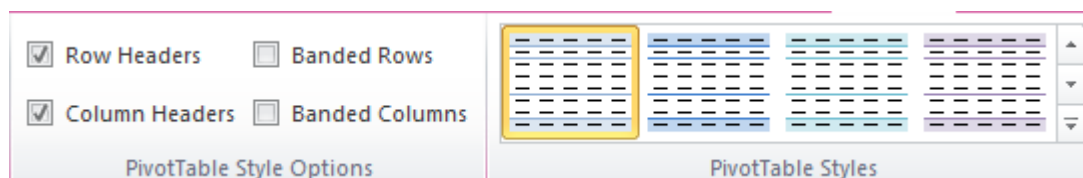
Row Headers
Column Headers
Banded Rows
Banded Columns

Caution, turning off headers does not mean that the information is removed. Only the format will be removed (border for instance)

The Styles Gallery

If you have manually changed the format, it will be maintained when you click on the style. Unless you right click it and set otherwise :

| Apply and Clear Formatting |
| Apply (and Maintain Formatting) |
| Modify... |
| Duplicate... |
| Delete |
| Set As Default |
| Add Gallery to Quick Access Toolbar |
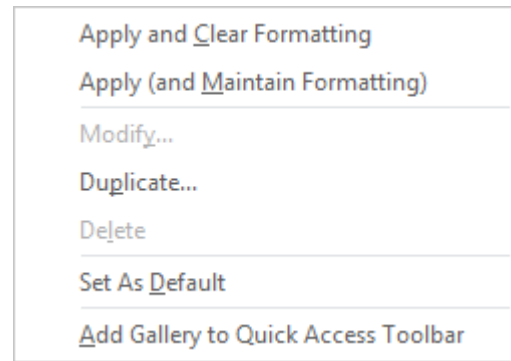
Please note that a style can be set as the *default style.*

8.5.6 *Removing the table format / Creating a new custom table style*

The last two options at the bottom of the styles gallery :

New PivotTable Style...
Clear
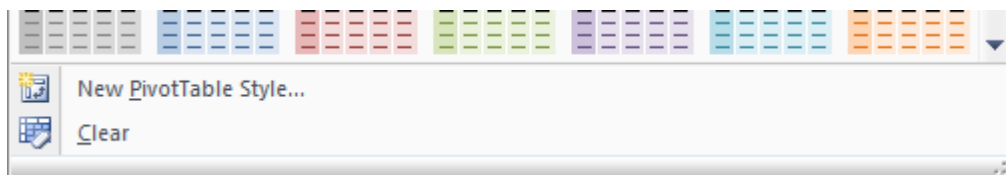
Clear

Font color, fill color, borders … everything is removed

New PivotTable Style

Here the dialog box :
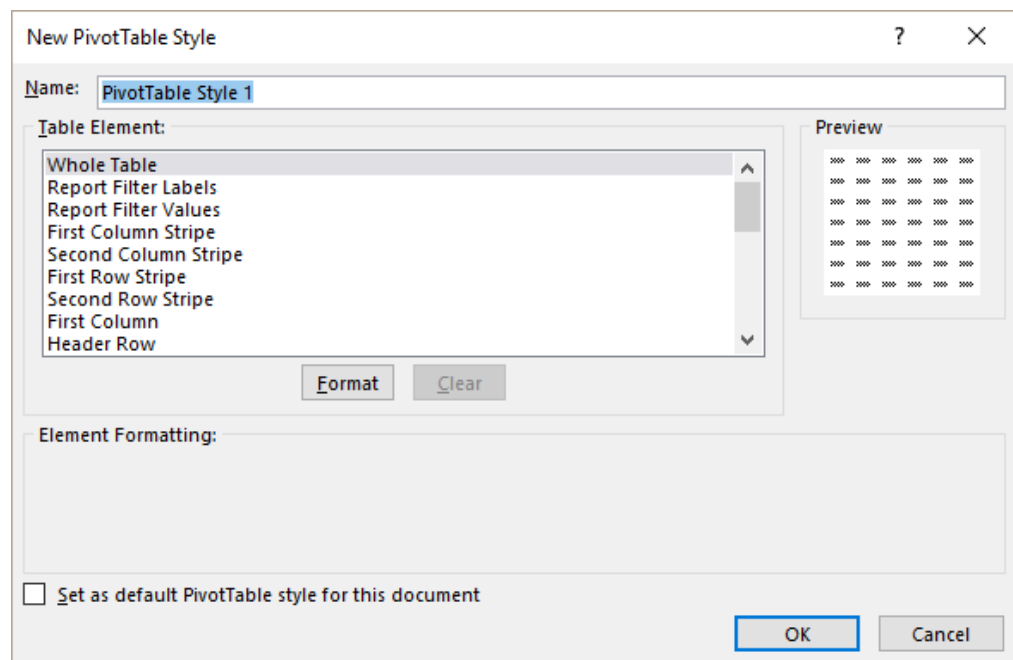
Name the style and set its format attributes (font, border, fill) for each item in the table. To do so click on the FORMAT button.

Note : starting from scratch is a little bit long and heavy. It will be more comfortable to start from the closest style and then customize it :

- Right click the style in the gallery
- DUPLICATE Option
- The dialog box is the same as the one for a new style
- Name the copy of the style and modify as necessary
- Validate

The new pivot table style will be displayed at the top of the styles gallery. Point and Excel will show its name. Right click and you will be able to edit it, remove it, set it as default style etc ..
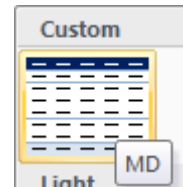
8.6   ANALYZE Tab : working more deeply

8.6.1   *Displaying/Hiding table elements*

The SHOW/HIDE Group
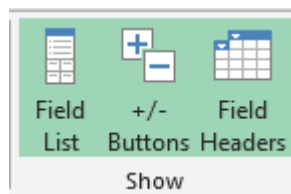
The buttons are clear : you can hide the *Field List* pane*,* the Outline *Buttons* that are automatically added in case of internal subtotals, *Field Headers* (headers are the *row* and *column labels* that can be at times a bit "bulky").

8.6.2   *Deleting the table, selecting, moving*

The ACTIONS Group
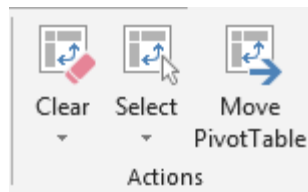
Clear   The available options from the drop-down list : CLEAR ALL (deleting the whole table and leaving only the empty structure) or CLEAR FILTERS (where there are more than one fields).

Deleting the table : you can also delete the rows manually

Select
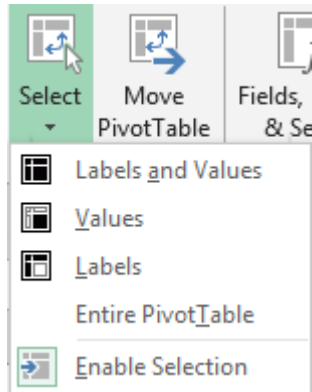
💣 When the drop-down list is displayed, the first three commands are never available. You must first select the entire table ((Entire PivotTable), then the options become available.

Enable Selection : to select a row by simply pointing the beginning of it (the mouse pointer will show the following shape : ➔)

Move PivotTable
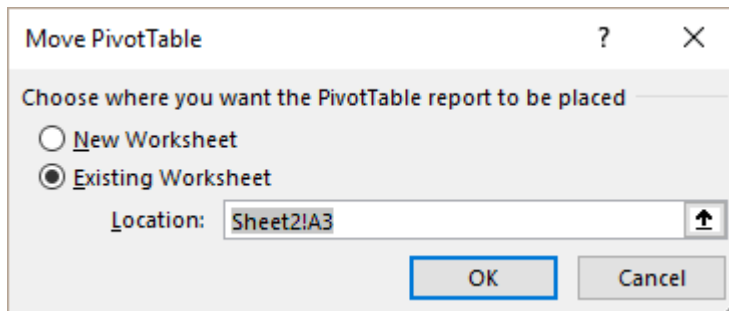
8.6.3 *Updating the table data*

The DATA Group

Refresh   Indeed there is no automatic link between the table and its source data.
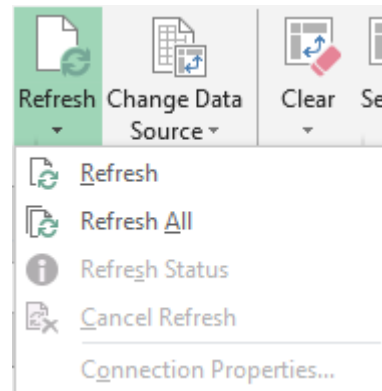
Refresh	All tables based on the same source
Refresh All	All tables in the current workbook, even though the data may come from different sources
The other options	Related to *external source data.*

**Change Data
Source**
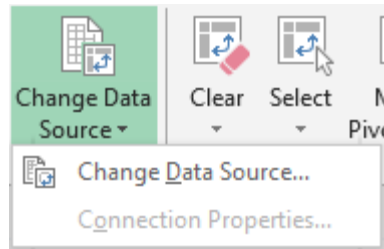
Connection Properties : for *external source data*

Clicking on the top of the button = CHANGE DATA SOURCE :
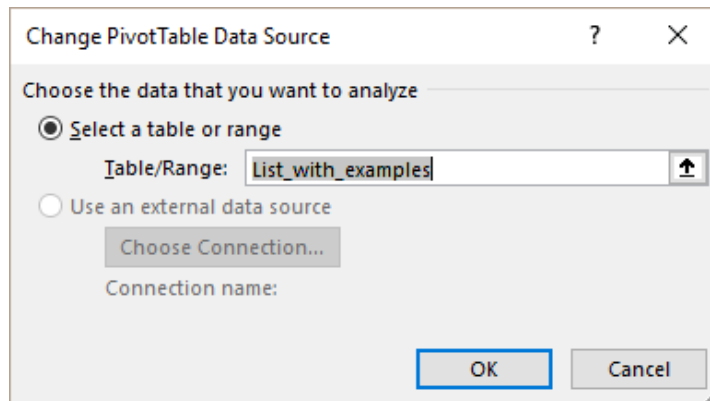
*Note : naming the table can be a great help when there are more than one
source data in the workbook.*

8.6.4   Adding a slicer

The command is located in the SORT & FILTER group
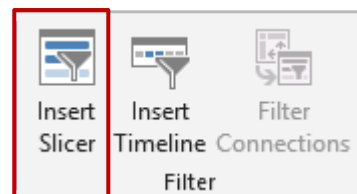
Principle : it works just like the REPORT FILTER but has a great advantage : it is very
visual. The slicer is used to update the table result according to an additional criteria.

Simply click on the required criteria and the table is automatically filtered to match the
selected request :

Back to full list : click on the filter button (at the slicer top right)

Create

Here after the dialog box :
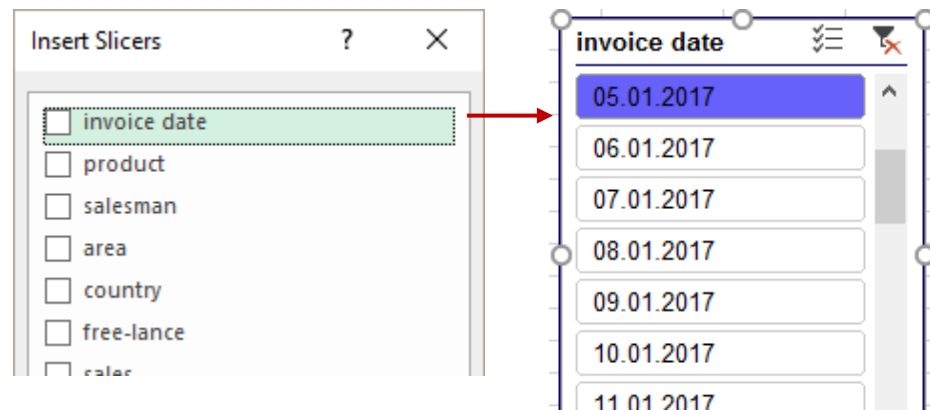
Manage the slicer (OPTIONS Tab)

Use the SLICER STYLES, BUTTONS and SIZE groups to manage the « look » of the slicer..
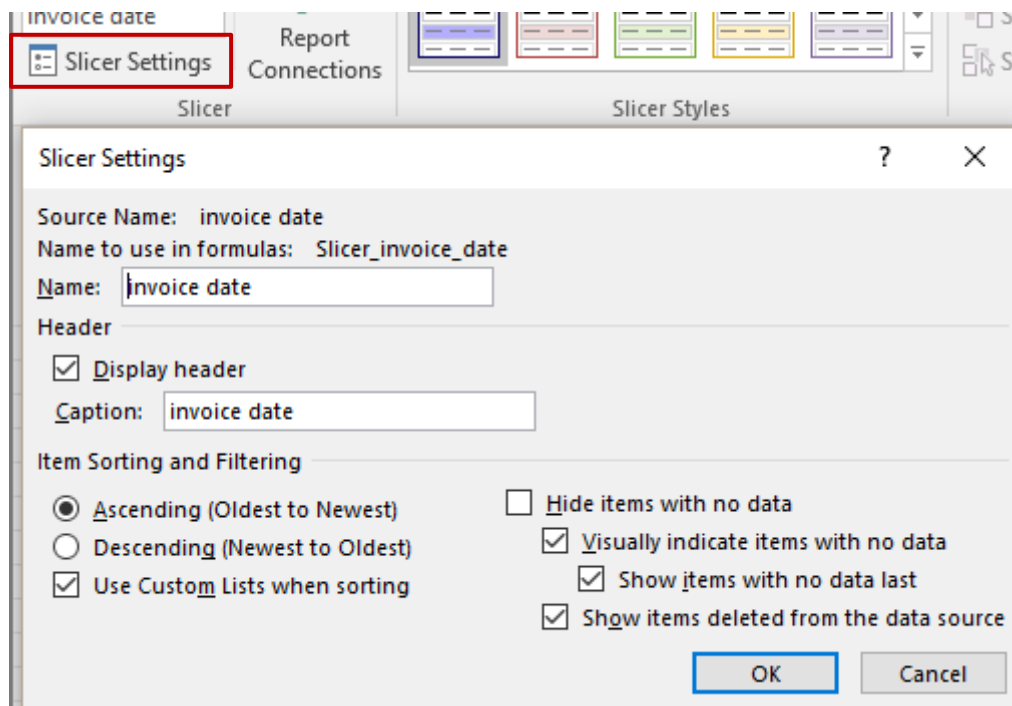*Note : sizing can also be done using the mouse. More comfortable.*
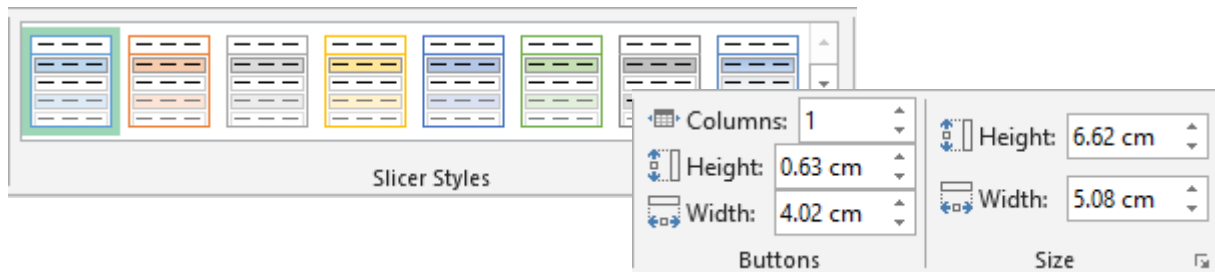
The PIVOTTABLE CONNECTIONS button
By default all tables created on the same source are linked to the slicer. Use this button to control and act on the links :
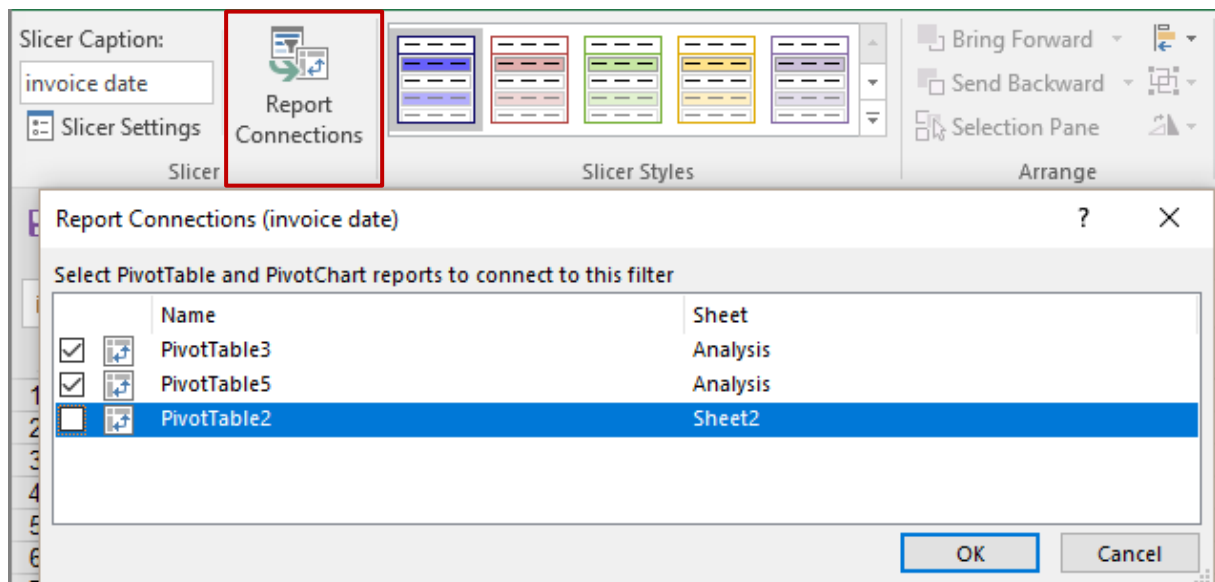
The SLICER SETTINGS button gives access to its properties (display the header or not, name …)

8.6.5   Using TIMELINE to display the data for a specific period of time

For which tables ? Pivot tables where dates are part of the source list (whether the date field is visible or not in the pivot does not matter). As this one below .

Sum of TotalPrice	Column Labels					
Row Labels	01.01.2017	02.01.2017	03.01.2017	04.01.2017	05.01.2017	06.01.201
Berglunds snabbköp						
Blondel père et fils						
B's Beverages						
Centro comercial Moctezuma						
Chop-suey Chinese						
Comércio Mineiro						
Ernst Handel						
Folk och fä HB						
Frankenversand		13090				
GROSELLA-Restaurante				4950	556	
Hanari Carnes						
HILARIÓN-Abastos						
Hungry Owl All-Night Grocers						
Lehmanns Marktstand						
LILA Supermercado						

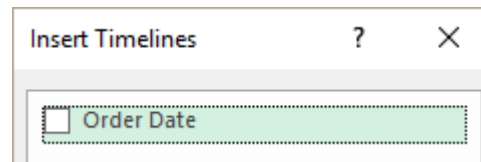The values end up scattered and the pivot table is quite … ugly …

The option is found in the FILTER group
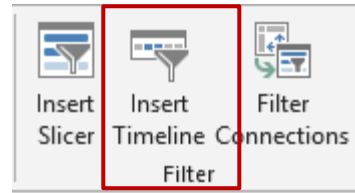
Also INSERT Tab – FILTER Group

Creating

- TIMELINE Button
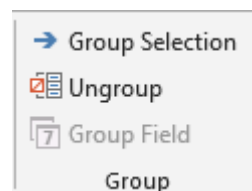- Excel finds fields with dates

- Select the filter criteria
- Drag the handles to set the beginning and end of the required time span

  The pivot is reduced to the set period, here the first week in January 2013

8.6.6   Manually grouping rows & columns – grouping date fields

The GROUP Group

Group Selection   Corresponds to a manual Outline (see chapter about it). You
                        may then select rows (more rarely columns) and group them

Ungroup   Corresponds to a manual Outline (see chapter about it).
                        To remove any custom grouping on rows or columns

Group Field   This option becomes available when the *nature of the data is
                        compatible with grouping*. Classical case : dates as in the
                        following example :

<u>Particularly interesting with fields containing dates</u> (as in the table on page 65)

Right click one of the
date occurrences and
select the GROUP
command (equivalent to
the button on the ribbon).

Excel automatically
suggests to group by
year, quarter, month, day
… *The whole table gets
drastically reduced*

Sum of TotalPrice	Column Labels					
Row Labels	janv	févr	mars	avr	mai	juin
Berglunds snabbköp	9054					
Blondel père et fils		7100				
B's Beverages		2397				
Centro comercial Moctezuma						400
Chop-suey Chinese					1713.6	
Comércio Mineiro		10845				
Ernst Handel						15799.4
Folk och fä HB						3478
Frankenversand	13090					
GROSELLA-Restaurante	5506					
Hanari Carnes				385	10402	
HILARIÓN-Abastos					5599.5	
Hungry Owl All-Night Grocers		3040	7905			
Lehmanns Marktstand	5769.37					
LILA-Supermercado	5834	3093				
Magazzini Alimentari Riuniti	1254					
Morgenstern Gesundkost	6004					
Ottilies Käseladen						6578.25
Que Delícia		813.6				2240

<u>Automatically grouping dates</u> - Reminder : Excel can automatically detect a column with
dates and group the dates directly in the *Field List.* (already mentioned on page 50)
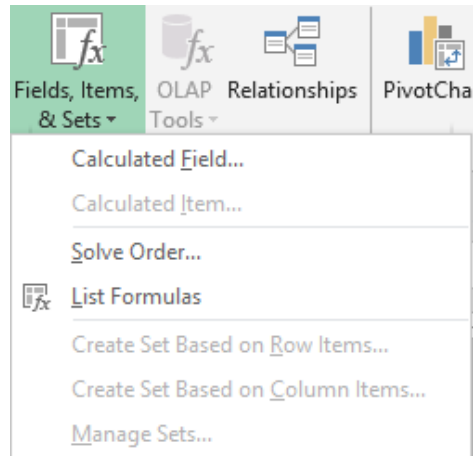

Simply remove the fields you do not need
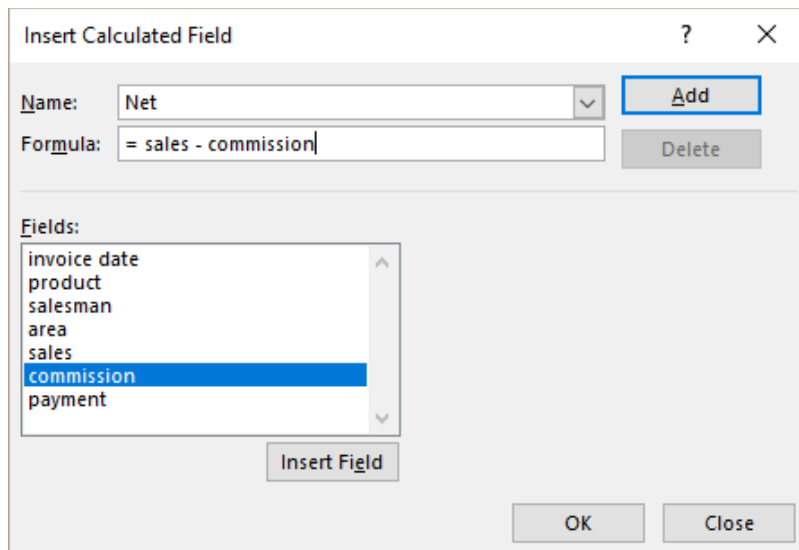
It is the CALCULATIONS Group
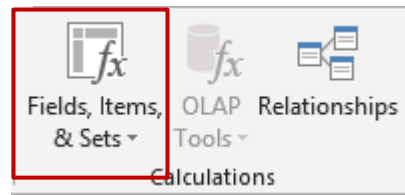
Drop-down list of the FIELDS,
ITEMS & SETS Button

- Calculated field

- Indicate the name of the field and create the required mathematical formula. You <u>must</u> use existing fields because as you can notice, the dialog box does not let you click onto the worksheet on any cell. On the other hand, you can use a constant as a percentage for instance.

  Insert the fields by clicking on the INSERT FIELD button, link them with the appropriate mathematical operator and click on the ADD button when you have finished.

  You can include functions such as an IF but true to say it is … heavy.

- A column with the new field is automatically added to the table and in the *values* section of the Field List …pane.

*The other options are more complicated and will not be covered in this documentation.*

Calculated Item : creating a special row item
Solve Order : priority order for custom formulas
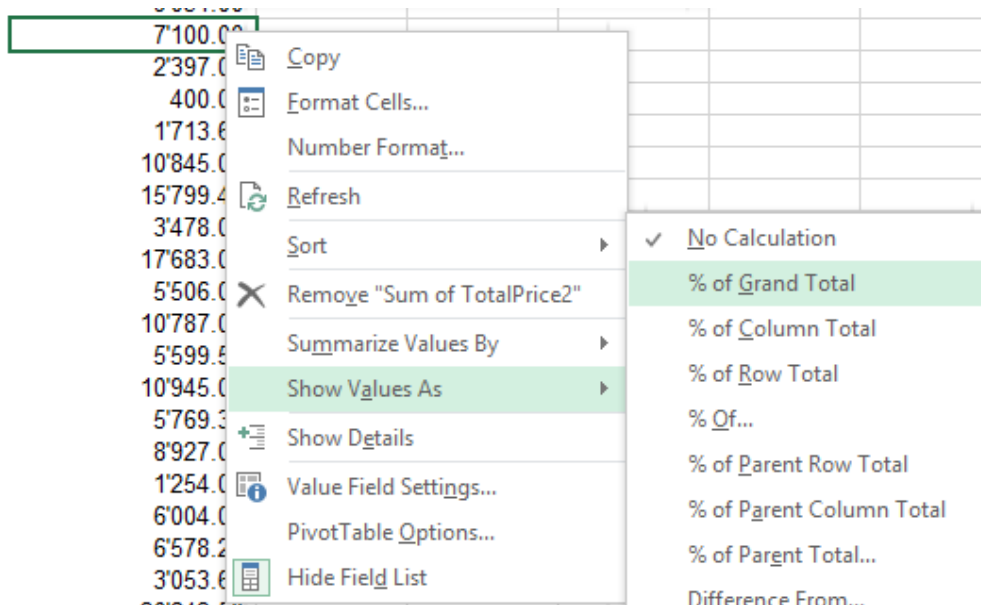*List Formulas : creating a worksheet that will list all the formulas and their order.*

8.6.8   Adding a value setting such as "in % of Grand Total"

First add the calculated field a second time
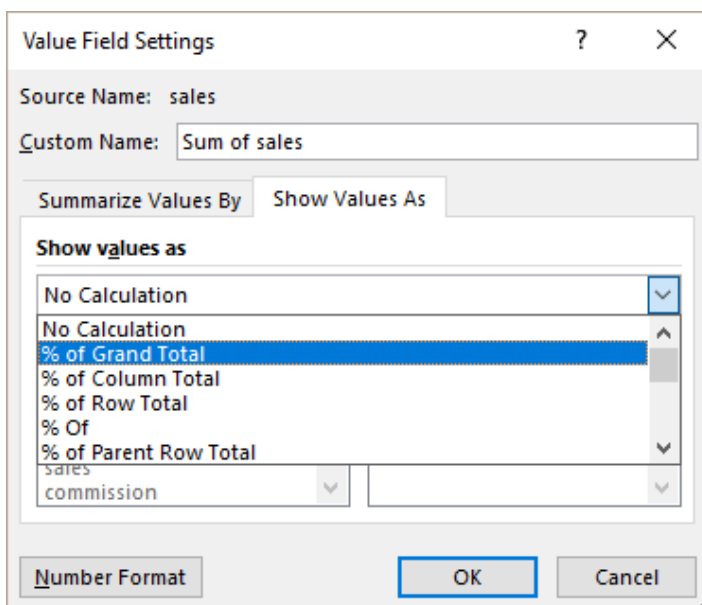(unless you need a replacement)
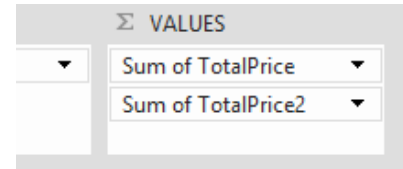
Several possibilities :

❶   Right click in the field column and select the SHOW VALUES AS option
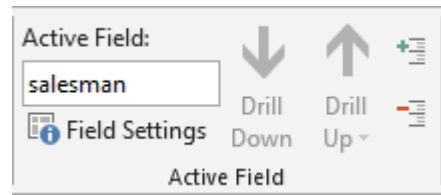
❸   In the FIELD LIST – Drop-down list of the field and VALUE FIELD SETTINGS option

The ACTIVE FIELD Group

* Options related to hierarchy (Drill) options are for tables created using the *data model* feature (a bit like in Access).

All the group options correspond to commands already explained.

The + and – buttons
To expand/collapse the groups when there are several row/columns fields.
Corresponds to clicking on the + or – buttons located in the table, left to the item name.

If the row/column has only one field, then clicking on the + or – buttons generates a dialog box to choose which field to add (the dialog box calls this *detail*). The chosen detail or field is automatically added to the Field List pane.
This corresponds to dragging the field into the required section.

Field Settings
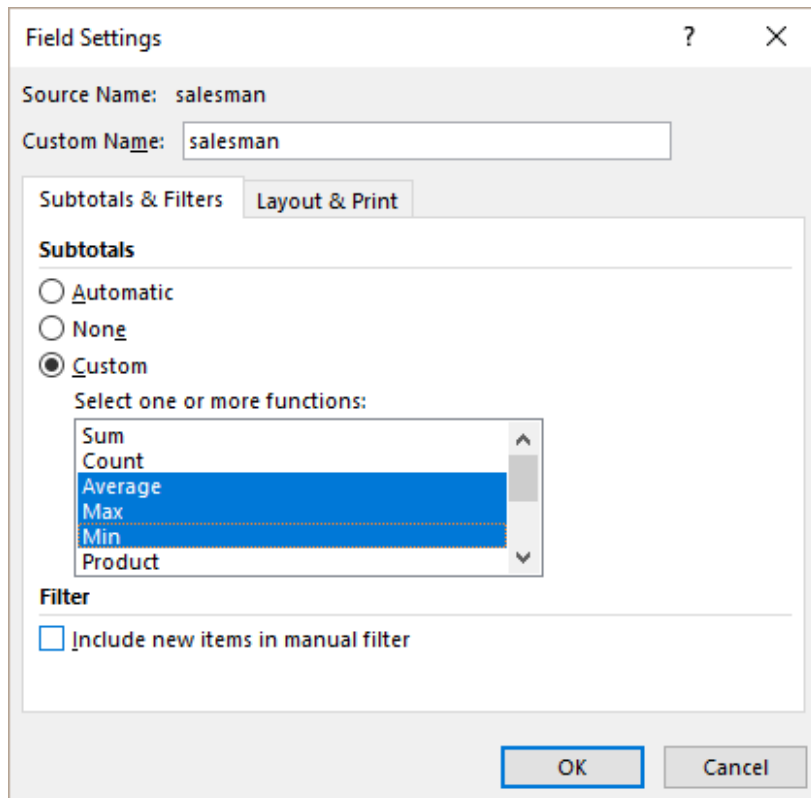
Custom Name
Up to you. The name has no incidence on the data source but it can be helpful when the source field names are not very clear.

The custom name is displayed in the Field List … pane and in the pivot table.

Caution : it is not allowed to choose the same name as the source name.

Subtotals & Filters Tab

<u>Subtotals</u>

To add functions to a row/column field. Click to select or deselect the function. But caution, adding a function is only visible if the table has more than on row/column field.

Row Labels ▼	Sum of sales
⊟JOHN	44100
HARDWARE	7300
SOFTWARE	29300
TRAINING	7500
⊟KEITH	40200
HARDWARE	6300
SOFTWARE	2500
TRAINING	31400
⊟MAX	54500
HARDWARE	19500
SOFTWARE	14600
TRAINING	20400
⊟PETER	42100
HARDWARE	20200
TRAINING	21900
Grand Total	180900

A standard table
Sum by default

AVERAGE – MAX – MIN are added
to the salesmen (click a first name)
(a number format has been applied)

Row Labels ▼	Sum of sales
⊟JOHN	
HARDWARE	7'300
SOFTWARE	29'300
TRAINING	7'500
JOHN Average	4'900
JOHN Max	9'200
JOHN Min	1'800
⊟KEITH	
HARDWARE	6'300
SOFTWARE	2'500
TRAINING	31'400
KEITH Average	5'743
KEITH Max	8'600

AVERAGE – MAX – MIN are added
to the products (click a product)
(a number format has been applied)

Row Labels ▼	Sum of sales
⊟JOHN	44'100
HARDWARE	7'300
SOFTWARE	29'300
TRAINING	7'500
⊟KEITH	40'200
HARDWARE	6'300
SOFTWARE	2'500
TRAINING	31'400
⊟MAX	54'500
HARDWARE	19'500
SOFTWARE	14'600
TRAINING	20'400
⊟PETER	42'100
HARDWARE	20'200
TRAINING	21'900
HARDWARE Average	5'922
HARDWARE Max	8'500
HARDWARE Min	3'000
SOFTWARE Average	4'640
SOFTWARE Max	9'200
SOFTWARE Min	1'800
TRAINING Average	6'767
TRAINING Max	12'000
TRAINING Min	1'800
Grand Total	180'900

Note : working with the field settings has no influence on the presence and location of the main fields dragged into the Field List …pane. It is a fully internal work.

Removing the additional functions

Revert to the above dialog box and set subtotals as *automatic*

What is the difference with dragging a field once more into a given section in the Field List pane and then simply changing the function ?

Here after the same pivot table but the functions have been added in the Field list pane :

	Values			
Row Labels ▾	**Sum of sales**	**Average of sales**	**Max of sales**	**Min of sales**
⊟ **JOHN**	**44'100**	**4'900**	**9'200**	**1'800**
HARDWARE	7'300	7'300	7'300	7'300
SOFTWARE	29'300	4'186	9'200	1'800
TRAINING	7'500	7'500	7'500	7'500
⊟ **KEITH**	**40'200**	**5'743**	**8'600**	**1'800**
HARDWARE	6'300	6'300	6'300	6'300
SOFTWARE	2'500	2'500	2'500	2'500
TRAINING	31'400	6'280	8'600	1'800
⊟ **MAX**	**54'500**	**6'056**	**12'000**	**3'000**
HARDWARE	19'500	4'875	6'800	3'000
SOFTWARE	14'600	7'300	9'000	5'600
TRAINING	20'400	6'800	12'000	3'800
⊟ **PETER**	**42'100**	**7'017**	**9'900**	**3'000**
HARDWARE	20'200	6'733	8'500	3'700
TRAINING	21'900	7'300	9'900	3'000
Grand Total	**180'900**	**5'835**	**12'000**	**1'800**

Filter

To include or exclude new items in the pivot table report when a filter has been applied
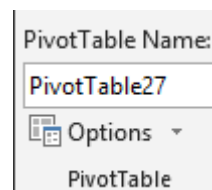
Layout & Print Tab

Relates to the previously explained subtotals
To define layout settings such as inserting a blank line between groups, placing the items belonging to a second field in a separate column rather than above (result looks more like a table) etc …

8.6.10 Various other options
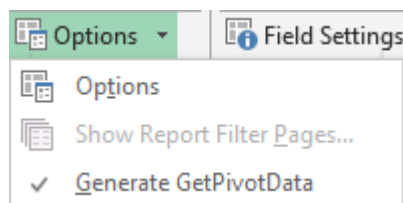
OPTIONS Tab – PIVOTTABLE Group

PivotTable Name	Up to you. Handy when there are several pivot tables created on the same source data.
	It is an internal name that appears nowhere else
Options	Drop-down list :

| Options	All the default settings for the functionality. A dialog box with a lot of tabs.
	Examples of some settings :
	▪ Should Excel automatically adjust the column width when updating the table ?
	▪ Should Excel maintain the cell format when updating the table ?
	▪ Should Excel display the row/column totals by default ?
	▪ Etc …
Show Report Filter Pages	If you have set a report filter by area, country … this option will give you the possibility to create a pivot table by area, country … *each table on a separate worksheet.*
Generate GetPivotData	Set if the function GETPIVOTDATA must be used when extracting data from the pivot table (when you type the = sign and click on a result in the pivot table).

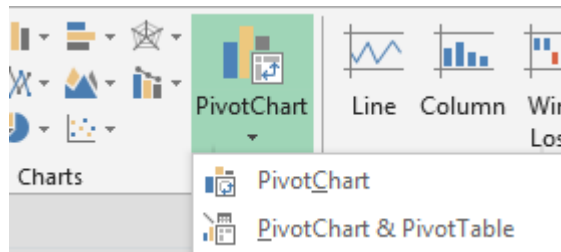### *8.6.11 Creating a pivot chart*

❶

Based on an existing pivot table : the TOOLS Group
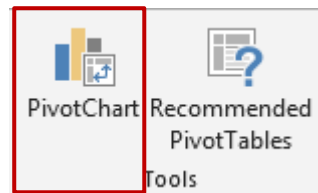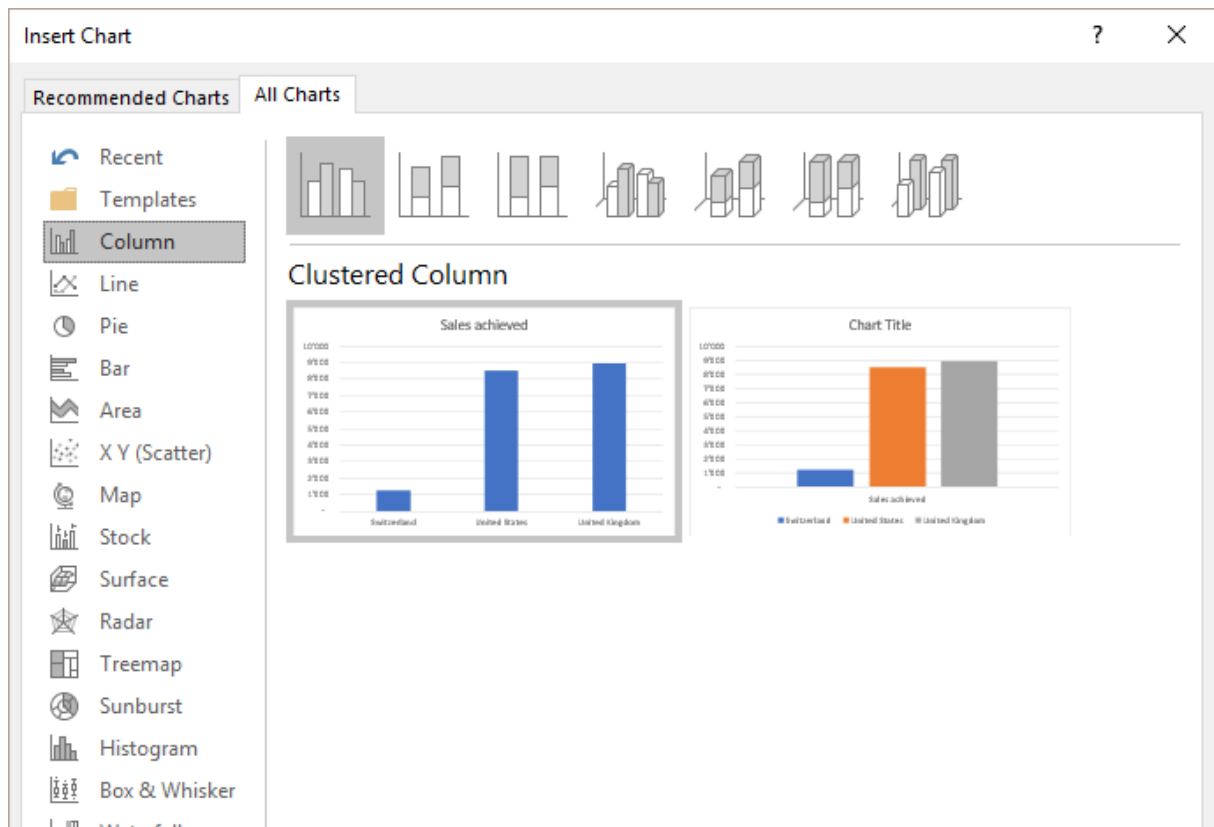

❷

From scratch : the pivot table will be automatically created

INSERT Tab – TABLES Group – Drop-down menu of the PIVOTTABLE Button

- *First method* : select the required chart type (usual chart dialog box)

- *Second method* : it works just like creating a pivot table but the pivot chart is created simultaneously. By default the chart is a column chart. You may change the type later on.
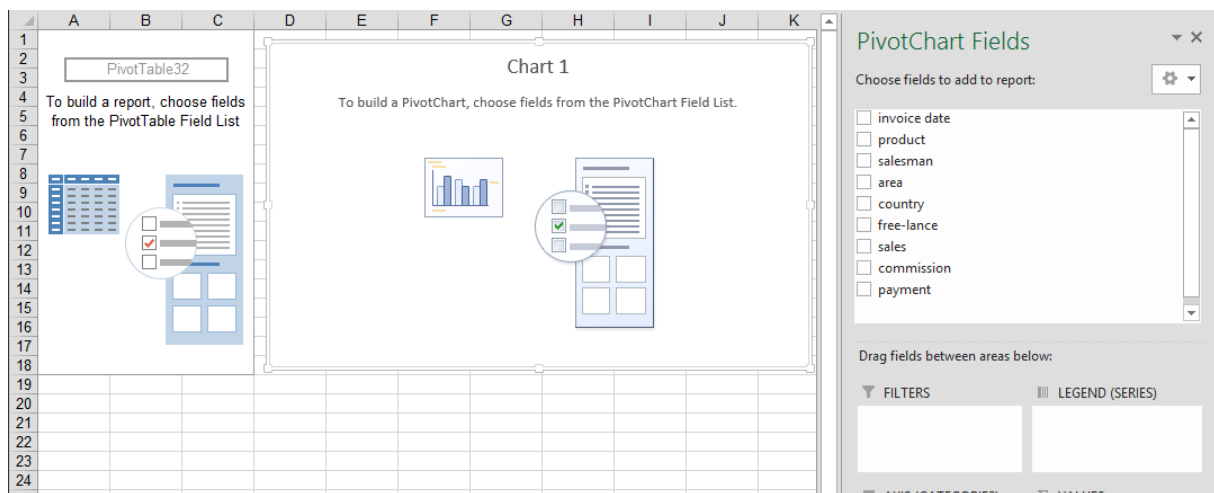
As the pivot table is linked to the source pivot table, it is not possible to change the chart structure. Changes must be done to the source data. Moreover, it is usually not advisable to build a chart based on a pivot table with several row/column fields.

## Manage : use the ANALYZE, DESIGN and FORMAT Tabs to manage the pivot table

Complex pivot tables (for instance more than one row / column labels). Do not hesitate to use the collapsing button ( )   to close levels and make sure that the pivot chart remains easy to read and understand.

9 Data base functions

These functions are now often replaced by the total row (*data table),* by multiple criteria (filter) or by creating a pivot table …

But it is important to know that these functions exist and that they could well prove to be very helpful if one day you cannot use a total row or filter or create a pivot table …

Type =D in a cell and automatically the list of functions will include – among others – the database functions (all starting with D)
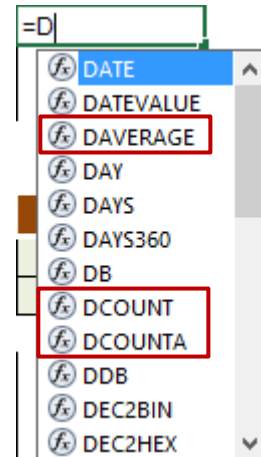
The syntax is the following:

=DSUM(data_base ;field ;criteria)

Data_base = the list (including the column labels)
Field = the column concerned by the function result
Criteria = the criteria zone with the column labels and below the required criteria

Here below the beginning of a list :

	A	B	C	D	E	F
1	Date	Salesman	Product	Qty	Price	Amount
2	28.10.2016	Small	M27	11	34.00	374.00
3	06.11.2016	Dickson	M27	23	34.00	782.00
4	15.11.2016	Graham	M27	25	34.00	850.00
5	24.11.2016	Greene	M27	1	34.00	34.00
6	03.12.2016	Pendergast	M27	2	34.00	68.00
7	12.12.2016	Pendergast	M27	12	34.00	408.00
8	21.12.2016	Ryan	M27	1	34.00	34.00
9	30.12.2016	Greene	M64	10	79.00	790.00
10	08.01.2017	Maskelene	M64	15	79.00	1'185.00
11	17.01.2017	Pendergast	M64	2	79.00	158.00
12	26.01.2017	Pendergast	M64	11	79.00	869.00
13	13.02.2017	Smithback	M72	1	91.00	91.00
14	22.02.2017	Smithback	M72	1	91.00	91.00
15	03.03.2017	Small	S09	25	44.00	1'100.00
16	21.03.2017	Greene	S09	22	44.00	968.00
17	30.03.2017	Pendergast	S09	5	44.00	220.00
18	08.04.2017	Pendergast	S09	14	44.00	616.00
19	17.04.2017	Smithback	S09	31	44.00	1'364.00
20	26.04.2017	Smithback	S09	10	44.00	440.00

Here below samples of criteria zones and the D functions below :

Date	Salesman	Product	Qty	Price	Amount
>=01.01.2017	Greene				

Sum of Amount	2'322.00	=DSUM($A$1:$F$129;$F$1;$I$1:$N$2)
Average of Amount	387.00	=DAVERAGE($A$1:$F$129;$F$1;$H$1:$M$2)
Number of Invoices (rows)	6	=DCOUNTA($A$1:$F$129;$F$1;$H$1:$M$2)
Sum of Qty	59	=DSUM($A$1:$F$129;$D$1;$H$1:$M$2)

=DSUM(**$A$1:$F$129**;**$F$1**;**$I$1:$N$2**)
                    The data base or list
                             The AMOUNT field (the column label is in F1)
                                 The criteria zone. ☛ labels **and** criteria below

The references are all absolute in order to be able to create the first function, copy down across cells and then simply change the name of the function.

For the *Number of Invoices* we could have used the DCOUNT function (counts only cells containing numbers) but the COUNTA function is larger and enables the user to write in the list a text information such as "unknown" or "pending" without affecting the total number of invoices.

When the criteria are in line, the logical link is AND

Date	Salesman	Product	Qty	Price	Amount
	Kelly				
	Dickson				

Sum of Amount	14'542.00
Average of Amount	765.37
Number of Invoices (rows)	19
Sum of Qty	274

When the criteria are in column, the logical link is OR (which we often translate with an AND when we speak …)

Date	Date	Salesman	Product	Qty	Price	Amount
>=01.01.2016	<=31.12.2016	Greene				

Sum of Amount	824.00
Average of Amount	412.00
Number of Invoices (rows)	2
Sum of Qty	11

When two criteria with an AND logical link are applied to the same field, you must copy the column label once more (to keep the criteria in line). Here the D functions only work on the year 2012 as the criteria set that it should be *after 1.1.2016 and before 31.12.2016*

POWER QUERY

1 What is Power Query

Power Query is a free add-in available since Office 2010 & 2013 releases and also for the Power BI Designer. It has been now natively integrated into the 2016 Office release.
It's an intuitive tool that lets you manipulate, transform, consolidate, enrich, merge and do much more with your data. It **Extracts** data from almost any data source, **Transforms** that data somehow and then **Loads** it somewhere – either Excel, Power Pivot or the Power BI Designer canvas.

Some of the Power Query commands are equivalent to using functions such as VLOOKUP, INDEX, MATCH, OFFSET, INDIRECT … but really, they prove far more intuitive and comfortable to use.

1 Options about how the program will work

DATA Tab – GET & TRANSFORM DATA Group
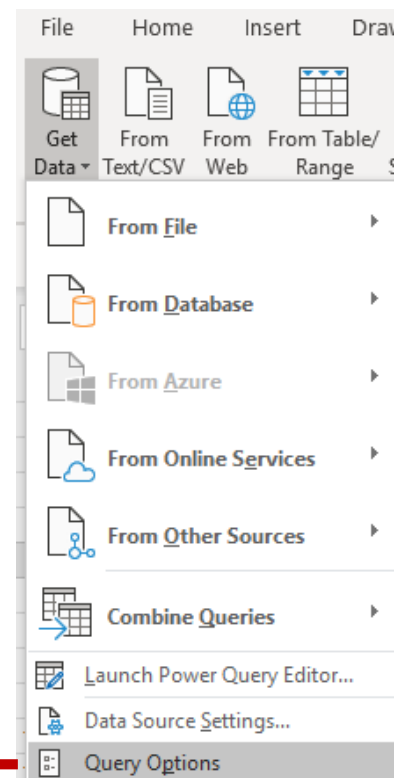
Also from the Query Editor : FILE – OPTIONS AND SETTINGS

2 Creating and managing a query

2.1 The source data

- DATA Tab - GET & TRANSFORM Group
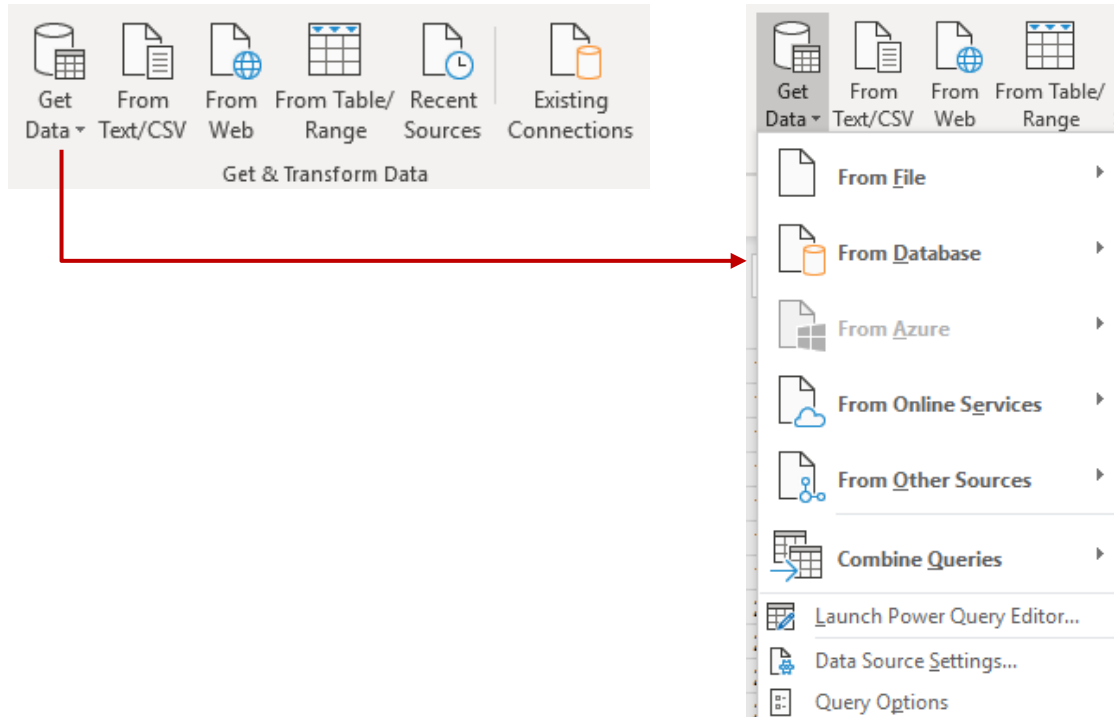
Here below a source table :

|	A	B	C	D	E	F	G	H
1	Client	Employee	City	Country	Order Date	Order nr	Product	TotalPrice
2	Frankenversand	4	München	Germany	01.01.2017	10267	Raclette Courdavault	13'090.00 F
3	GROSELLA-Restaurante	8	Caracas	Venezuela	02.01.2017	10268	Thüringer Rostbratwurst	4'950.00 F
4	GROSELLA-Restaurante	8	Caracas	Venezuela	03.01.2017	10268	Mozzarella di Giovanni	556.00 F
5	White Clover Markets	5	Seattle	United States	04.01.2017	10269	Mozzarella di Giovanni	2'641.00 F
6	Rattlesnake Canyon Grocery	6	Albuquerque	United States	05.01.2017	10272	Sir Rodney's Marmalade	1'944.00 F
7	Rattlesnake Canyon Grocery	6	Albuquerque	United States	06.01.2017	10272	Mozzarella di Giovanni	3'336.00 F
8	QUICK-Stop	3	Cunewalde	Germany	07.01.2017	10273	Boston Crab Meat	4'189.50 F
9	QUICK-Stop	3	Cunewalde	Germany	08.01.2017	10273	Lakkalikööri	2'257.20 F
10	Vins et alcools Chevalier	6	Reims	France	09.01.2017	10274	Mozzarella di Giovanni	973.00 F
11	Magazzini Alimentari Riuniti	1	Bergamo	Italy	10.01.2017	10275	Raclette Courdavault	1'254.00 F
12	Tortuga Restaurante	8	México D.F.	Mexico	11.01.2017	10276	Konbu	240.00 F
13	Morgenstern Gesundkost	2	Leipzig	Germany	12.01.2017	10277	Rössle Sauerkraut	3'640.00 F
14	Morgenstern Gesundkost	2	Leipzig	Germany	13.01.2017	10277	Tarte au sucre	2'364.00 F
15	Berglunds snabbköp	8	Luleå	Sweden	14.01.2017	10278	Raclette Courdavault	3'300.00 F
16	Berglunds snabbköp	8	Luleå	Sweden	15.01.2017	10278	Vegie-spread	1'404.00 F
17	Berglunds snabbköp	8	Luleå	Sweden	16.01.2017	10278	Röd Kaviar	1'500.00 F
18	Lehmanns Marktstand	8	Frankfurt a.M.	Germany	17.01.2017	10279	Alice Mutton	1'755.00 F
19	Berglunds snabbköp	2	Luleå	Sweden	18.01.2017	10280	Pâté chinois	1'920.00 F
20	Berglunds snabbköp	2	Luleå	Sweden	19.01.2017	10280	Rhönbräu Klosterbier	930.00 F
21	Romero y tomillo	4	Madrid	Spain	20.01.2017	10281	Teatime Chocolate Biscuits	36.50 F
22	Romero y tomillo	4	Madrid	Spain	21.01.2017	10281	Steeleye Stout	288.00 F
23	Romero y tomillo	4	Madrid	Spain	22.01.2017	10282	Ravioli Angelo	156.00 F
24	Romero y tomillo	4	Madrid	Spain	23.01.2017	10282	Nord-Ost Matjeshering	621.00 F
25	LILA-Supermercado	3	Barquisimeto	Venezuela	24.01.2017	10283	Teatime Chocolate Biscuits	657.00 F
26	LILA-Supermercado	3	Barquisimeto	Venezuela	25.01.2017	10283	Camembert Pierrot	4'760.00 F
27	LILA-Supermercado	3	Barquisimeto	Venezuela	26.01.2017	10283	Mozzarella di Giovanni	1'000.00 F
28	Lehmanns Marktstand	4	Frankfurt a.M.	Germany	27.01.2017	10284	Schoggi Schokolade	1'974.37 F
29	Lehmanns Marktstand	4	Frankfurt a.M.	Germany	28.01.2017	10284	Camembert Pierrot	2'040.00 F

I chose FROM TABLE / RANGE (a standard table)
The Query Editor window is run and displayed
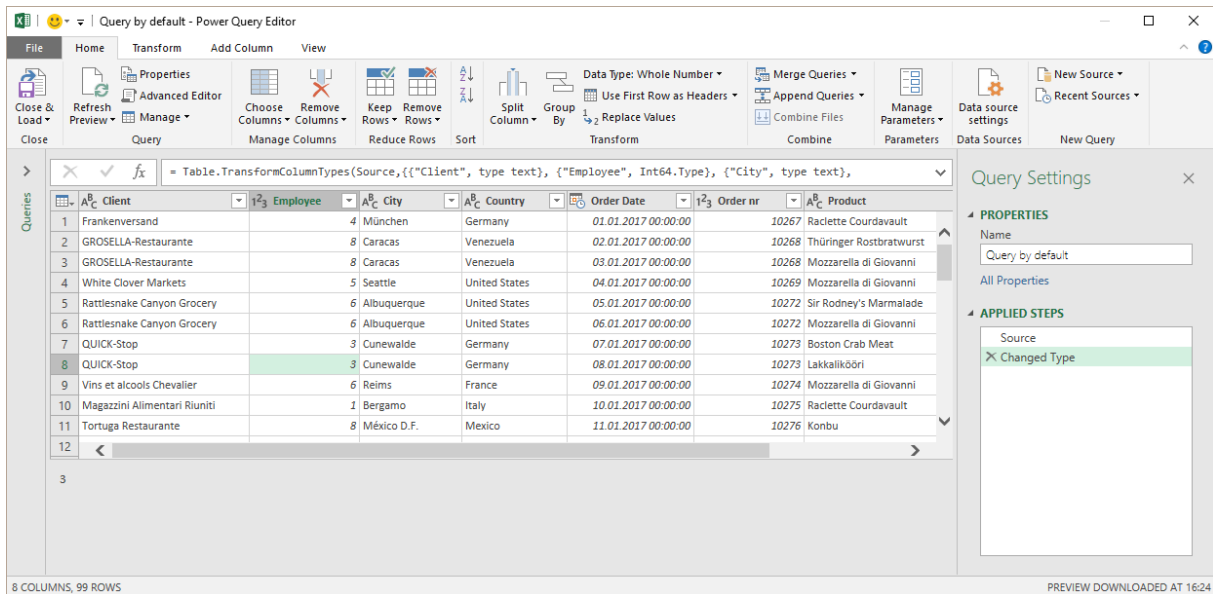
The source file columns are displayed. You can then work on them as necessary (developed in the next chapters)
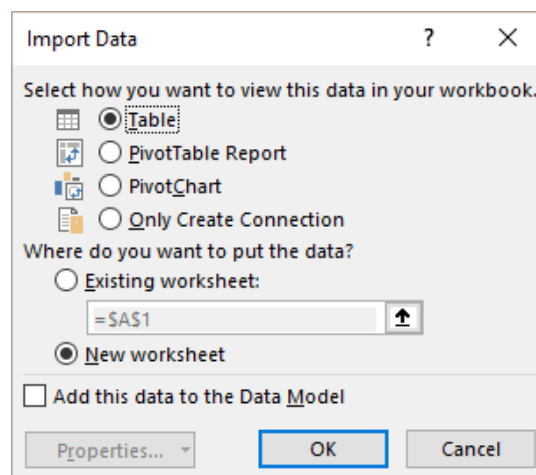
2.2   Close and Load

Once you have finished, simply click on the following button
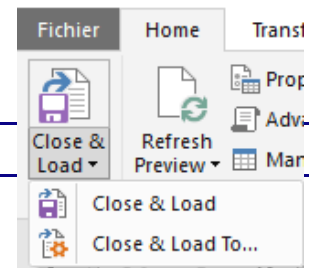
CLOSE & LOAD   The list is pasted on the active sheet and it is automatically formatted as a *table*

CLOSE & LOAD TO

Table
The *table* is created on the active sheet but you can select another sheet (you cannot select another *workbook*).

Pivot Table or Chart
No separate table is created on the active sheet, you directly get to the Pivot functionality

Only Create Connection
The table is not created on the active sheet. There is only a connection to the Query Editor. *Implication : if you later on want to create the table, you cannot simply click again on the LOAD button (the first option will do nothing and the second option will remain greyed out. You will have to go through EXISTING CONNECTIONS…*

Here below the result with a simple CLOSE & LOAD. A normal table :

	A	B	C	D	E	F	G	H
1	Client	Employee	City	Country	Order Date	Order nr	Product	TotalPrice
2	Frankenversand	4	München	Germany	01.01.2017 00:00	10267	Raclette Courdavault	13090
3	GROSELLA-Restaurante	8	Caracas	Venezuela	02.01.2017 00:00	10268	Thüringer Rostbratwurst	4950
4	GROSELLA-Restaurante	8	Caracas	Venezuela	03.01.2017 00:00	10268	Mozzarella di Giovanni	556
5	White Clover Markets	5	Seattle	United States	04.01.2017 00:00	10269	Mozzarella di Giovanni	2641
6	Rattlesnake Canyon Grocery	6	Albuquerque	United States	05.01.2017 00:00	10272	Sir Rodney's Marmalade	1944
7	Rattlesnake Canyon Grocery	6	Albuquerque	United States	06.01.2017 00:00	10272	Mozzarella di Giovanni	3336
8	QUICK-Stop	3	Cunewalde	Germany	07.01.2017 00:00	10273	Boston Crab Meat	4189.5
9	QUICK-Stop	3	Cunewalde	Germany	08.01.2017 00:00	10273	Lakkalikööri	2257.2
10	Vins et alcools Chevalier	6	Reims	France	09.01.2017 00:00	10274	Mozzarella di Giovanni	973
11	Magazzini Alimentari Riuniti	1	Bergamo	Italy	10.01.2017 00:00	10275	Raclette Courdavault	1254

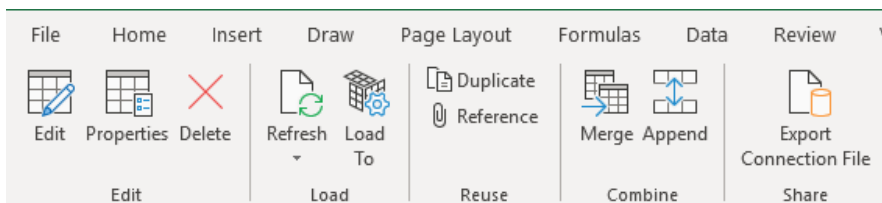## 2.3   Queries & Connections pane

It is automatically displayed (on the right) after you have *closed & loaded*

Right click for various options, including a RENAME command
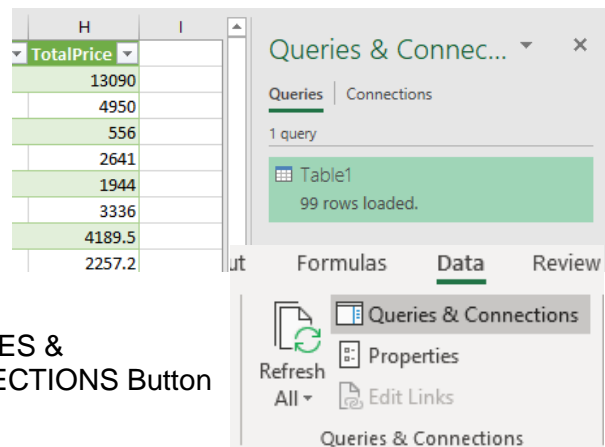
Display & Hide the pane : DATA Tab – QUERIES & CONNECTIONS Group – QUERIES & CONNECTIONS Button

A QUERY Tab is added on the ribbon with the following commands :

2.4   Link between the query and the generated table

Delete the table - the query remains   ➔ Edit the query and re-generate the table
Delete the query - the table remains   ➔ This link is removed – continue manually

2.5 Running the Query Editor again

❶ Whatever your cell position

DATA Tab – QUERIES & CONNECTIONS Group –
QUERIES & CONNECTIONS Button. It displays a pane
on the right, showing the various queries

<u>Point</u> a query to display a window that will summarize all
its properties and <u>double-click</u> to run the Query Editor
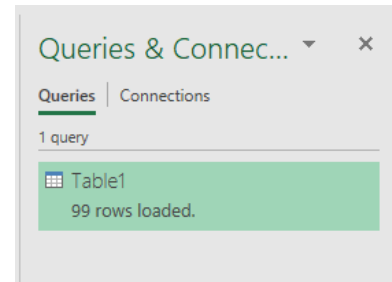
❷ When active in the query table : additional QUERY Tab on the Ribbon
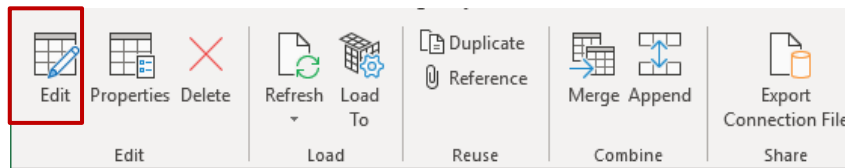
2.6 Refresh

There is a link between the source data and the query table.
If you modify a source cell, it is not automatically updated in the
query table, you need to refresh

DATA Tab – QUERIES & CONNECTIONS Group – REFRESH Button
QUERY Tab – LOAD Group – REFRESH Button

REFRESH   This query
REFRESH ALL   All queries
CONNECTIONS PROPERTIES   Various refresh options
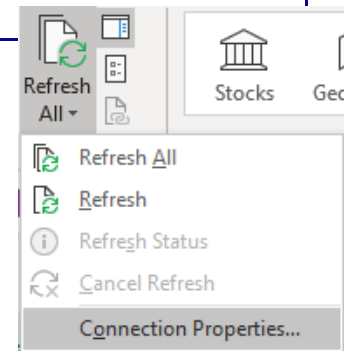
Note : when there is a modification
in the source data, the query shows
the following refresh icon in the
queries pane
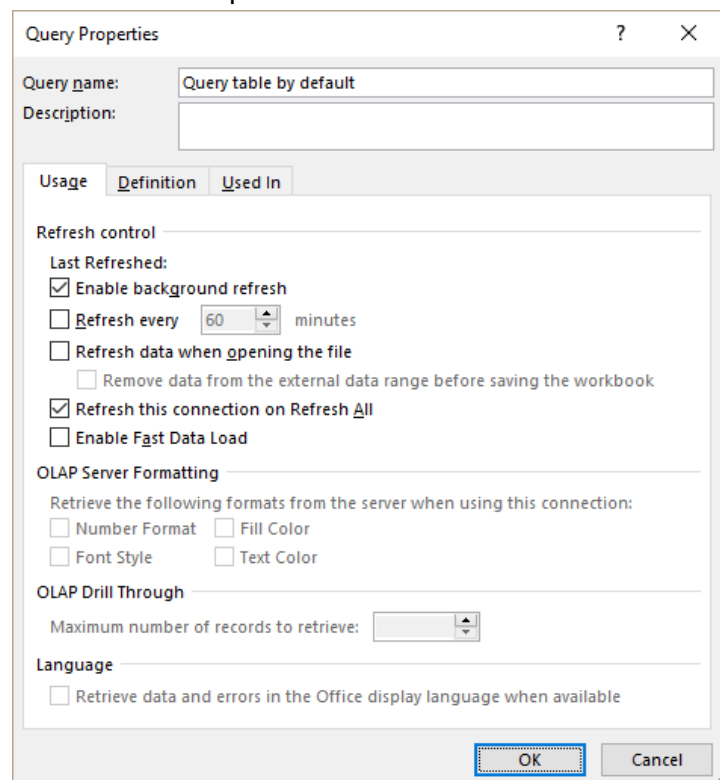
2.7 Query Properties

Through the PROPERTIES Button either on the DATA Tab or the QUERY Tab
Also right click on the query name in the queries pane

External Data Properties

Query

Name: Query table by default

Data formatting and layout
- ☐ Include row numbers   ☑ Preserve column sort/filter/layout
- ☑ Adjust column width   ☑ Preserve cell formatting

If the number of rows in the data range changes upon refresh:
- ⦿ Insert cells for new data, delete unused cells
- ○ Insert entire rows for new data, clear unused cells
- ○ Overwrite existing cells with new data, clear unused cells

OK   Cancel

3 The Query Editor window

3.1   Filtering

The usual filter commands
An interesting one : REMOVE EMPTY

In this list, people have added manual subtotals …

	Country	Salesman	Date	Product-1	Product-2	Product-3	Product-4
	France	Lucy	10.04.2019	25	14	26	
		John	11.04.2019	63	78	83	
		Kevin	12.04.2019	58	95	84	
		Peter	13.04.2019	78	51	75	
		Edna	14.04.2019	96	48	35	
		Frances	15.04.2019	45	95	75	
		Max	16.04.2019	12	63	85	
		Total		377	444	463	
	Switzerland	Luke	10.04.2019	25	14	26	
		Laurent	11.04.2019	63	78	83	
		Mark	12.04.2019				
		Arthur	13.04.2019				
		Jenna	14.04.2019				
		Vero	15.04.2019				
		Annie	16.04.2019				
		Total					
	Italy	Julia	10.04.2019				

= Table.FillDown(#"Changed Type",{"Count

	ABC Country	ABC Salesman	Date
1	F	Sort Ascending	
2	F	Sort Descending	
3	F	Clear Sort	
4	F	Clear Filter	
5	F	Remove Empty	
6	F		
7	F	Date/Time Filters	▸
8	F		
9	S	Search	
10	S	☑ (Select All)	
11	S	☑ (null)	

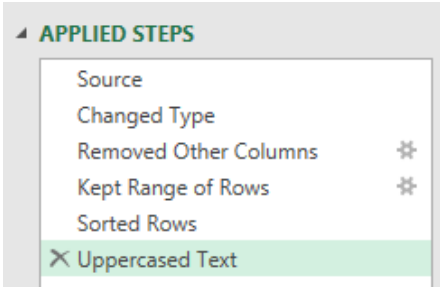Select one column showing the empty cells (from the Date – Product-1, 2 …)
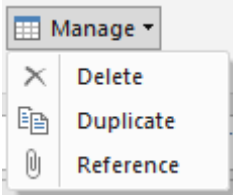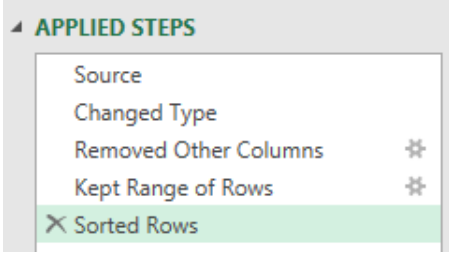
They are all removed !!!
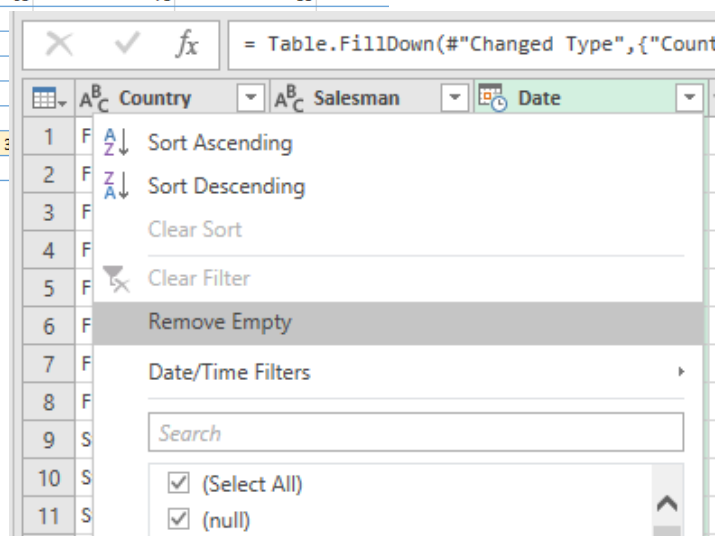
3.2 HOME TAB

### 3.2.1 *Managing the query*

REFRESH PREVIEW	It is usually automatic. Should this not be the case, you can click on this button
PROPERTIES	A dialog box to rename the query and add a description You can also tick a box called FAST DATA LOAD (to boost up the query load) but Microsoft warns that Excel might become more unresponsive
ADVANCED EDITOR	Codes behind …
MANAGE Manage ▾ ✕ Delete ▤ Duplicate ▯ Reference	You can delete the Query – The table inserted onto the sheet will remain but dissociated from its source data (➔ no updating) Duplicate & Reference seem very similar. Here after the differences Query 1 shows what you have done ◢ **APPLIED STEPS** Source Changed Type Removed Other Columns ✳ Kept Range of Rows ✳ ✕ Sorted Rows Query 2 is a duplicate (the steps remain and you add something new) ◢ **APPLIED STEPS** Source Changed Type Removed Other Columns ✳ Kept Range of Rows ✳ Sorted Rows ✕ Uppercased Text

	Query 3 is a reference. It starts from query 2 and does not display the previous steps, starts fresh …
	APPLIED STEPS Source ✕ Reordered Columns Finished ? click on CLOSE AND LOAD, a new sheet will be automatically created for every added query. If you simply close the Editor window, you are prompted to save or discard the changes. If you keep them, a new sheet is automatically created.

3.2.2   *Each step is memorized and can be deleted*

Point the step to remove and click on the cross
There is no UNDO command

3.2.3   *Choose Columns / Rows – Keep Columns / Rows*
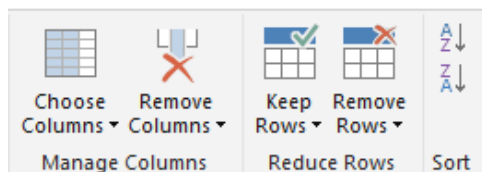
CHOOSE COLUMNS	*CHOOSE COLUMNS* A dialog box lists all columns labels Select what you need to keep *GO TO COLUMN* To navigate to a given label
REMOVE COLUMNS	*REMOVE COLUMNS* A dialog box lists all columns labels Select what you want to remove *REMOVE OTHER COLUMNS* To remove all columns but the active one
KEEP ROWS	Choose what you need to keep (how many rows at the top, at the bottom, a given range of rows etc …)
REMOVE ROWS	Choose what to remove (alternate, duplicates, blank etc …)
SORT	As usual

3.2.4   Split Column

Very similar to the well-know TEXT TO COLUMNS …

Example : a column showing a full address – items separated by a comma
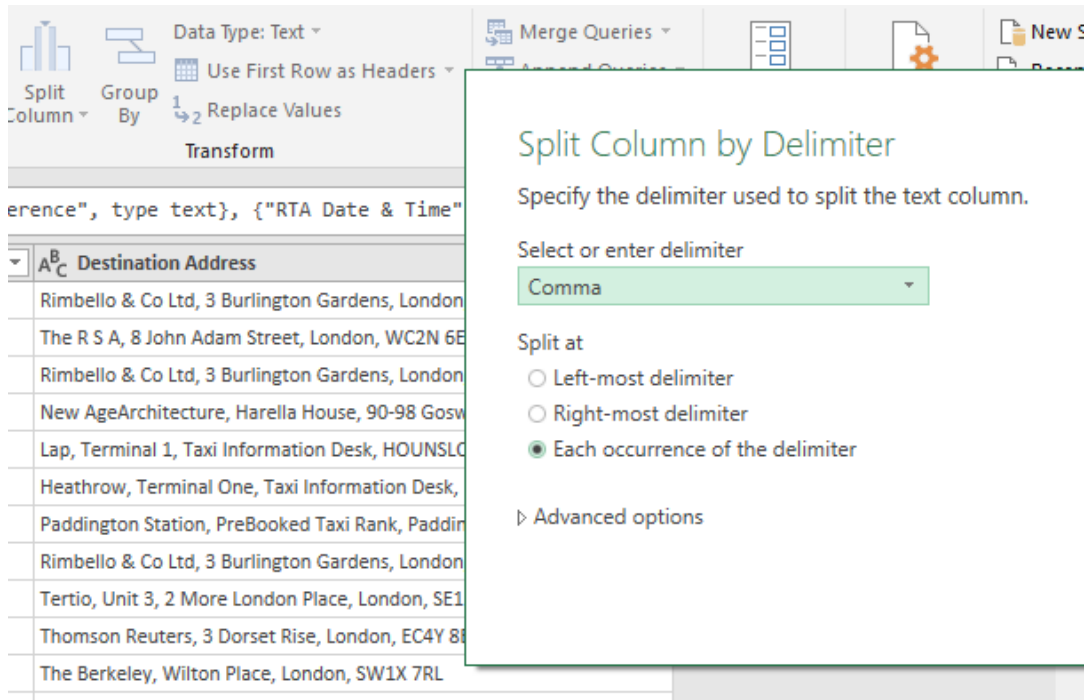
3.2.5   Group By
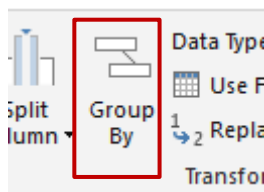
You can create a sort of pivot table (although it is still a standard table)

3.2.6 Data Type

The header row indicates for each column its type of data et this can be changed
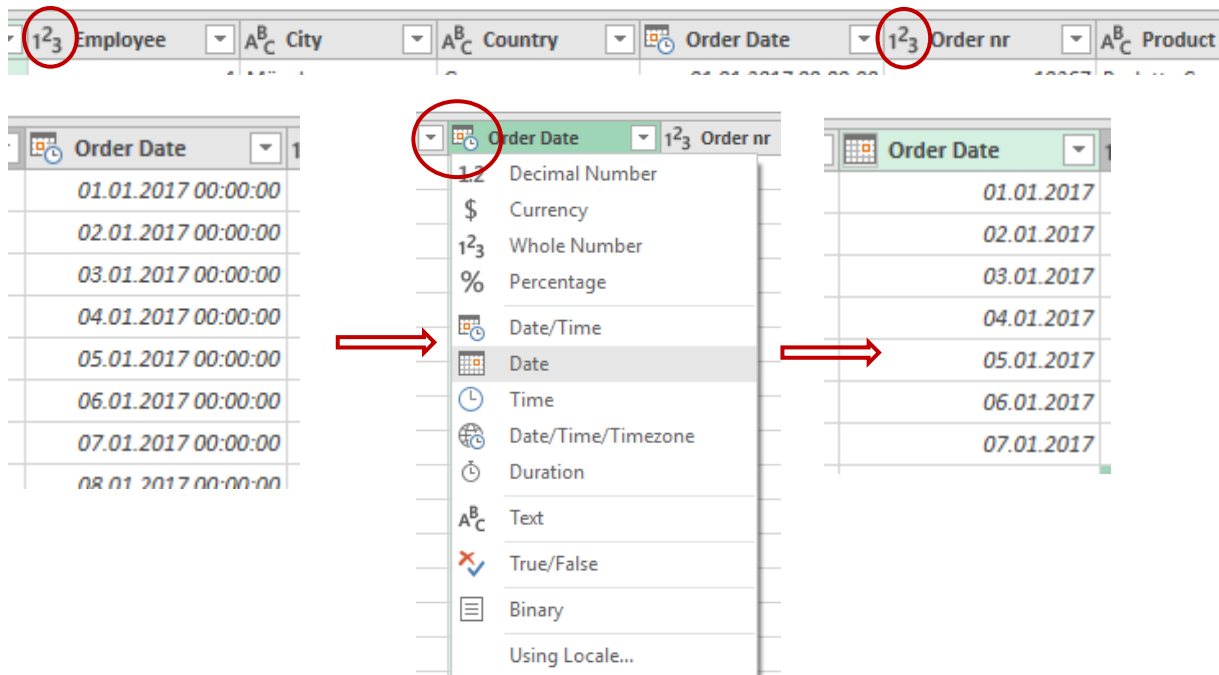
You are prompted whether to modify without adding a new step or by creating a new step

3.2.7   Use First Row as Headers – Replace Values
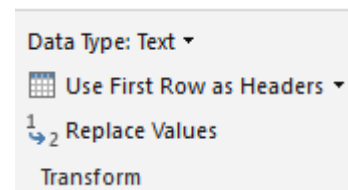
DATA TYPE	You can change the type of data for the selected column (but no real format options)
USE FIRST ROW …	1 Row = Headers or Headers = 1 Row
REPLACE VALUES	To replace one given value with another one - Because you cannot type into this window - Caution : it is not a global replace

3.2.8 _Special and advanced_
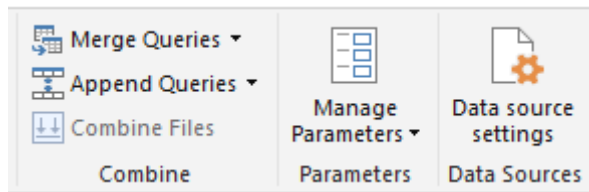
Some of the above commands are explained at the end of this doc

3.2.9 _New query_
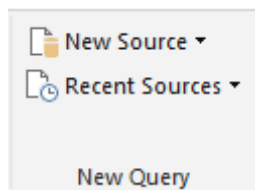
Equivalent to the creating buttons from the DATA Tab

3.3 TRANSFORM TAB

Some buttons are in more than one tab

3.3.1 _Group By , Headers, Transpose, Reverse Rows, Count Rows, Data Type, Detect Data Type, Rename_
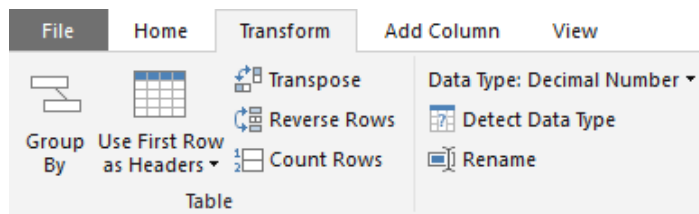
GROUP BY USE FIRST ROW…	As in the HOME Tab
TRANSPOSE	As in the COPY-PASTE SPECIAL command
REVERSE ROWS	Last rows become first
COUNT ROWS	Returns how many rows in the table Caution : this last step removes the result of all previous commands
DATA TYPE	As in the HOME Tab
DETECT DATA TYPE	Usually not an issue with an Excel file but more with export from external data sources
RENAME	Important as you cannot type directly
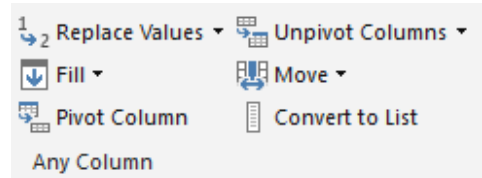
REPLACE VALUES	As in the HOME Tab
FILL ** Test with various VAT percentages but it did not work. More for text labels …*	When the source data has "wholes" ! You could click and drag but Power Query can fill without overwriting …

PIVOT COLUMN

Pivot and Unpivot Columns will help you restructure correctly the data. It is a bit like a partial and internal "transpose"

Source table

3 infos for each Invoice nr ….

A bad presentation !

Solution 1 : a pivot table

Sum of Amount	Column Labels		
Row Labels	Shipping	Tax	Production
1234	10	32	333
3698	20	24	256
5687	10	50	250
8794	60	89	1256
Grand Total	100	195	2095

▼ Filters		⏸ Columns	
		Category ▼	
☰ Rows		Σ Values	
Invoice nr ▼		Sum of Amount ▼	

A quick and easy tool but the source data remains unclear …

Solution 2 : Power Query and the PIVOT COLUMN command

= Table.TransformColumnTypes(Source,{{"Invoice nr", Int64.Type}, {"Category", type text}, {"

123 Invoice nr	ABC Category	123 Amount
1	1234 Production	333
2	1234 Tax	32
3	1234 Shipping	
4	3698 Production	
5	3698 Tax	
6	3698 Shipping	
7	8794 Production	
8	8794 Tax	
9	8794 Shipping	
10	5687 Production	
11	5687 Tax	
12	5687 Shipping	

Pivot Column

Use the names in column "Category" to create new columns.

Values Column ⓘ

Amount ▼

▷ Advanced options

Learn more about Pivot Column

First select the CATEGORY column
Reasoning : the Category column should be reorganized with the Amount column
Advanced options : what function do you want ? Here none

= Table.Pivot(#"Changed Type", List.Distinct(#"Changed T

123 Invoice nr	123 Production	123 Tax	123 Shipping
1	1234	333	32	10
2	3698	256	24	20
3	5687	250	50	10
4	8794	1256	89	60

Invoice nr	Production	Tax	Shipping
1234	333	32	10
3698	256	24	20
5687	250	50	10
8794	1256	89	60

UNPIVOT COLUMNS

It is the opposite problem …

	A	B	C	D	E	F	G	H	I
1	Order Date	Received Date	PO#	Vendor	Apples	Pears	Oranges	Coffee	Tea
2	15.01.2019	27.01.2019	100203	Vend A	10	94	49		
3	17.01.2019	25.01.2019	100204	Vend A	49	100	60		
4	18.01.2019	26.01.2019	100205	Vend B				37	
5	19.01.2019	01.02.2019	100206	Vend C					58
6	20.01.2019	28.01.2019	100207	Vend B				69	
7	21.01.2019	30.01.2019	100208	Vend B				77	
8	23.01.2019	29.01.2019	100209	Vend C					84
9	24.01.2019	01.02.2019	100210	Vend A	20	78			
10	25.01.2019	05.02.2019	100211	Vend B				16	
11	26.01.2019	07.02.2019	100212	Vend A	49		73		
12	28.01.2019	08.02.2019	100213	Vend C					59
13	30.01.2019	11.02.2019	100214	Vend A	82	31	87		
14									

Columns E to I should be like this :
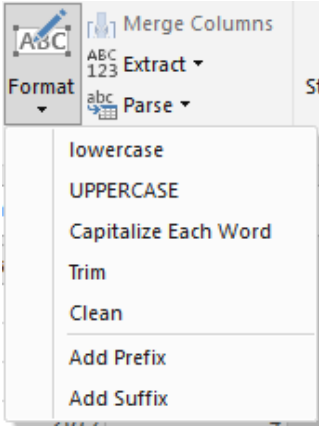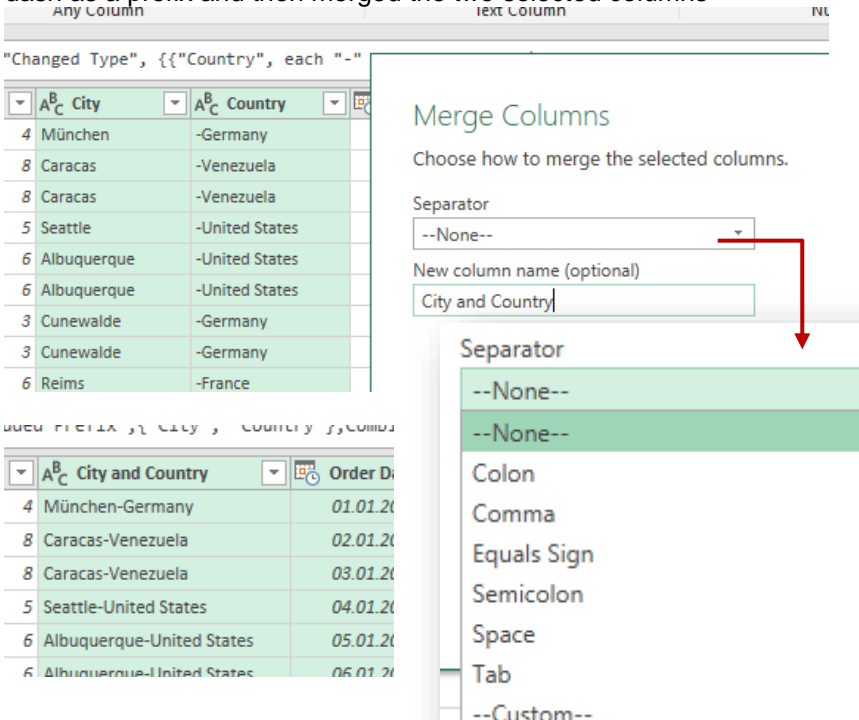
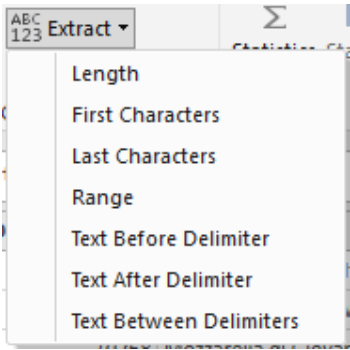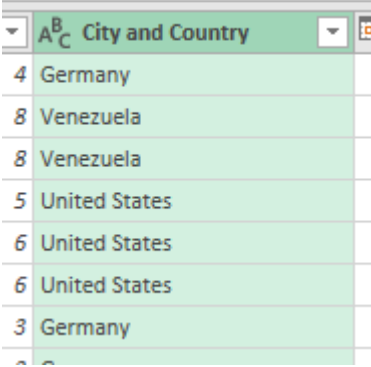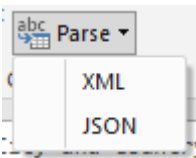|	K	L	M	N	O	P
	Order Date	Received Date	PO#	Vendor	Product	Qty
	15.01.2019	27.01.2019	100203	Vend A	Apples	10
	15.01.2019	27.01.2019	100203	Vend A	Pears	94
	15.01.2019	27.01.2019	100203	Vend A	Oranges	49
	17.01.2019	25.01.2019	100204	Vend A	Apples	49
	17.01.2019	25.01.2019	100204	Vend A	Pears	100
	17.01.2019	25.01.2019	100204	Vend A	Oranges	60
	18.01.2019	26.01.2019	100205	Vend B	Coffee	37
	19.01.2019	01.02.2019	100206	Vend C	Tea	58
	20.01.2019	28.01.2019	100207	Vend B	Coffee	69
	21.01.2019	30.01.2019	100208	Vend B	Coffee	77
	23.01.2019	29.01.2019	100209	Vend C	Tea	84
	24.01.2019	01.02.2019	100210	Vend A	Apples	20
	24.01.2019	01.02.2019	100210	Vend A	Pears	78

Select the columns from E to I and click on the UNPIVOT COLUMNS Button : automatically done !

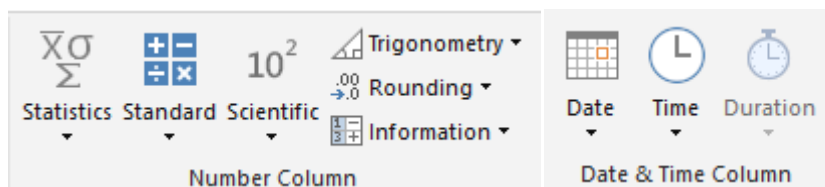| MOVE	Choose from the list But you can also simply click and drag the column label
CONVERT TO LIST	The selected column is isolated and this new query can be pasted into the workbook
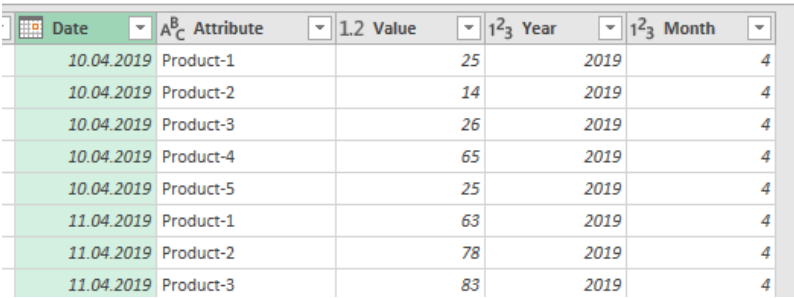
| SPLIT COLUMN	As in the HOME Tab
FORMAT	Not number formatting …
	But working on the text
	- Case
	- Trim = remove all spaces but not between words
	- Clean = remove all non printable characters
	- Add Prefix / Suffix = add a code in front or at the end
MERGE COLUMNS	Example :
	The choices for the separator do not include _dash,_ so I first added the dash as a prefix and then merged the two selected columns

EXTRACT	To extract and avoid the old long functions LEFT, RIGHT … !
	(Text Before Delimiter ➔ a dialog box pops up to indicate which character)
	Here below the Country extracted from the previously merged column :
PARSE	To extract text from special formatted text

3.3.4 Number Column (Functions) Date & Time Column (Extraction)
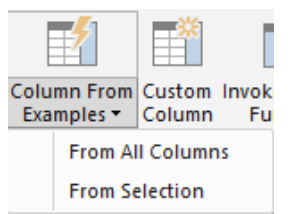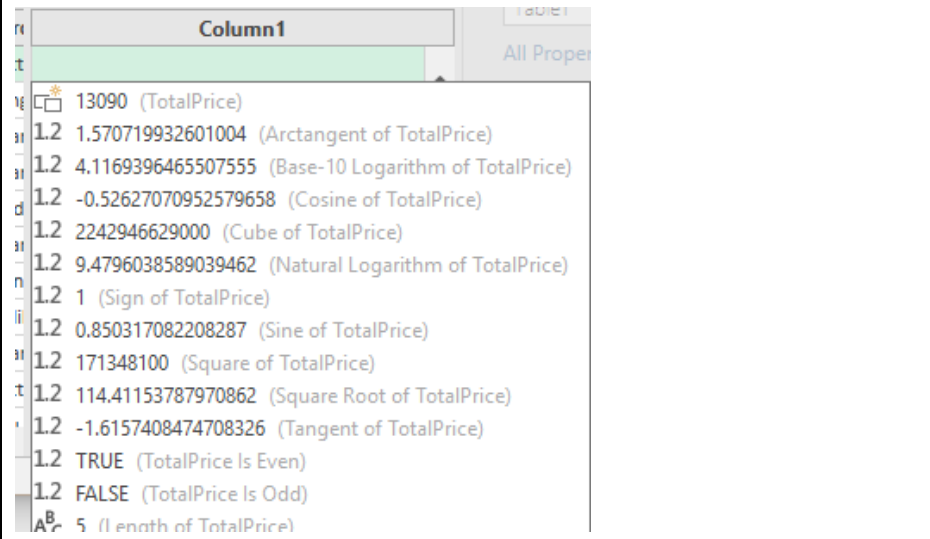
NUMBER COLUMN	Set of functions you can apply to the selected column
DATE & TIME COLUMN	Each time a new column is added at the right end showing what you have extracted.
Here below the year and month from the date column
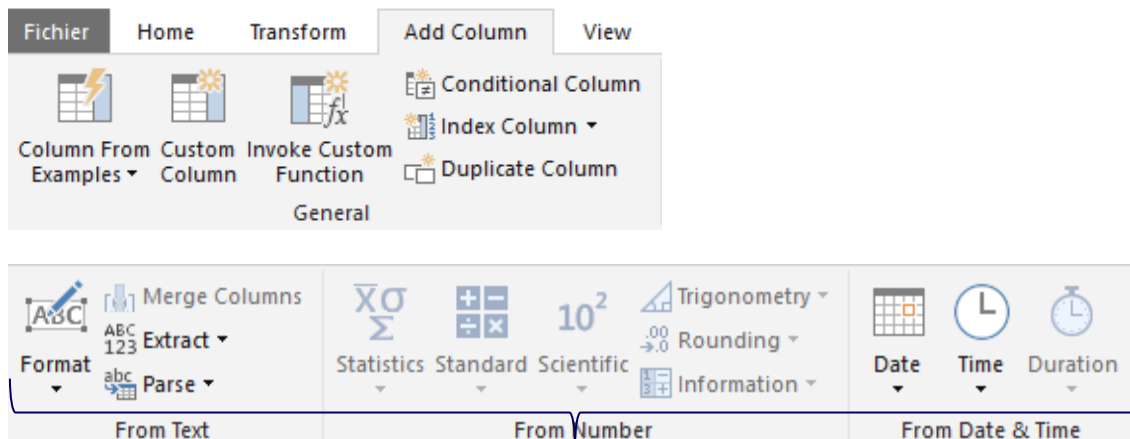
Same buttons as on the other tabs

3.4.1 *Column From Examples, Custom Column, Invoke Custom Function, Duplicate Column*

COLUMN FROM EXAMPLES 	Samples of information that can be extracted for a new column Example : Source data has a column with prices Click on the COLUMN FROM EXAMPLES Button Select FROM SELECTION A new column is created at the end Double-click on the first empty cell Various infos are listed :

	I have chosen TRUE (TotalPrice is Even)
CUSTOM COLUMN	Similar to creating a calculated field in pivot tables.
	But a main difference : you cannot type a real figure (such as a VAT percentage). You can only mix columns into a calculation
	Click on the button and a new column is created
	The following box will be displayed
CUSTOM FUNCTION	If you have created a custom function inside this file ….
	(super advanced)

CONDITIONAL COLUMN	A good old IF …. Click on the button, a new column is created, and the following dialog box is displayed

Add Conditional Column

Add a conditional column that is computed from the other columns or values.

New column name

Conditional function

	Column Name	Operator	Value ⓘ		Output ⓘ	
If	Tax on Price ▾	is greater than or... ▾	ABC 123 ▾ 200	Then	ABC 123 ▾ Above limit	•••

Add rule

Otherwise ⓘ

ABC 123 ▾

OK   Cancel

(no need for quotes as in Excel)

1.2 Tax on Price ▾	ABC 123 Conditional function ▾
1047.2	Above limit
396	Above limit
33.36	null
158.46	null
155.52	null
200.16	Above limit
335.16	Above limit

INDEX COLUMN
 	
🔢 Index Column ▾
   From 0
   From 1
   Custom...
	Simply a new column numbering the rows
	Either from 0 or 1 or any special number
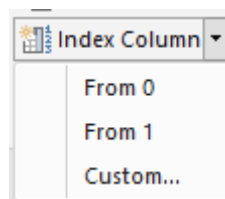
DUPLICATE COLUMN	The selected column is duplicated and added at the right end

4 The Query Tab

Displayed as soon as a query has generated a table
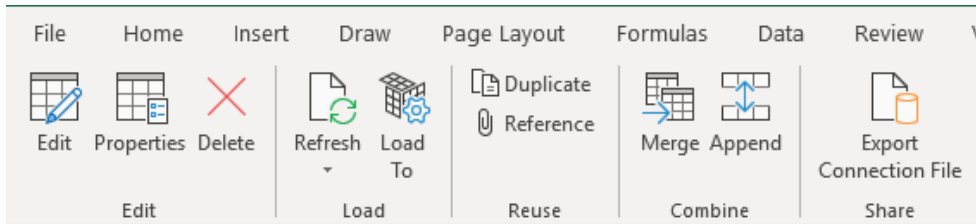
All buttons can be found either in the DATA Tab or in the QUERY EDITOR

5 When create only a connection

When you create only a connection to the source data, there is no table pasted into the active sheet.

But you can create pivot tables from the query very easily and that can be very comfortable
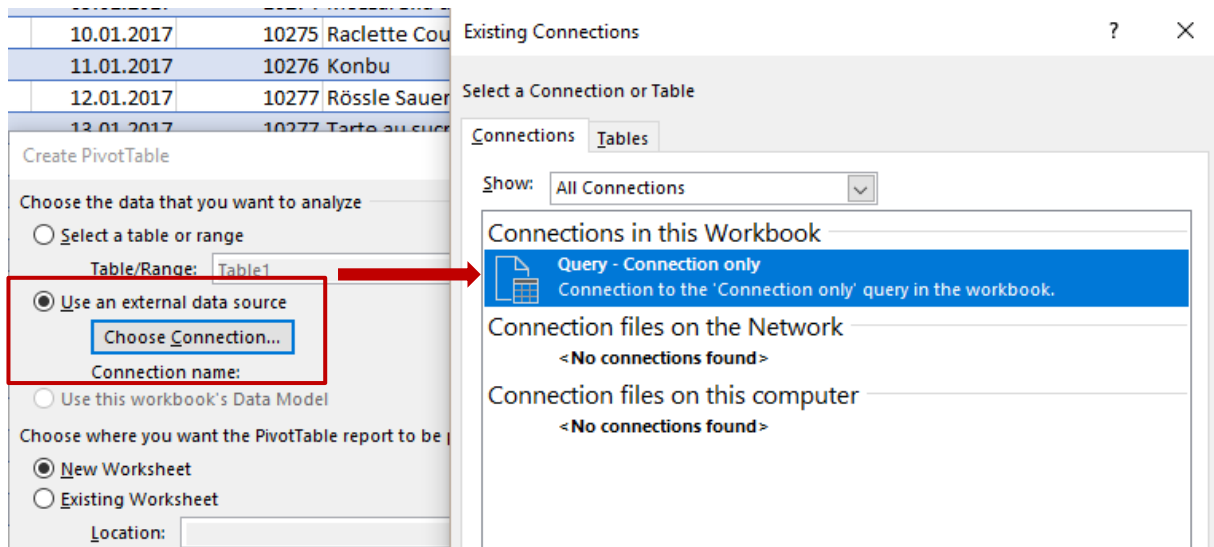
1   Source data

	A	B	C	D	E	F	G	H	I
1	Client	Employee	City	Country	Order Date	Order nr	Product	TotalPrice	Tax
2	Frankenversand	4	München	Germany	01.01.2017	10267	Raclette Courdavault	13'090.00 F	8%
3	GROSELLA-Restaurante	8	Caracas	Venezuela	02.01.2017	10268	Thüringer Rostbratwurst	4'950.00 F	8%
4	GROSELLA-Restaurante	8	Caracas	Venezuela	03.01.2017	10268	Mozzarella di Giovanni	556.00 F	6%
5	White Clover Markets	5	Seattle	United States	04.01.2017	10269	Mozzarella di Giovanni	2'641.00 F	6%
6	Rattlesnake Canyon Grocery	6	Albuquerque	United States	05.01.2017	10272	Sir Rodney's Marmalade	1'944.00 F	8%
7	Rattlesnake Canyon Grocery	6	Albuquerque	United States	06.01.2017	10272	Mozzarella di Giovanni	3'336.00 F	6%
8	QUICK-Stop	3	Cunewalde	Germany	07.01.2017	10273	Boston Crab Meat	4'189.50 F	8%
9	QUICK-Stop	3	Cunewalde	Germany	08.01.2017	10273	Lakkalikööri	2'257.20 F	8%
10	Vins et alcools Chevalier	6	Reims	France	09.01.2017	10274	Mozzarella di Giovanni	973.00 F	6%
11	Magazzini Alimentari Riuniti	1	Bergamo	Italy	10.01.2017	10275	Raclette Courdavault	1'254.00 F	8%
12	Tortuga Restaurante	8	México D.F.	Mexico	11.01.2017	10276	Konbu	240.00 F	8%
13	Morgenstern Gesundkost	2	Leipzig	Germany	12.01.2017	10277	Rössle Sauerkraut	3'640.00 F	8%

2   Create the query as usual and make necessary modifications
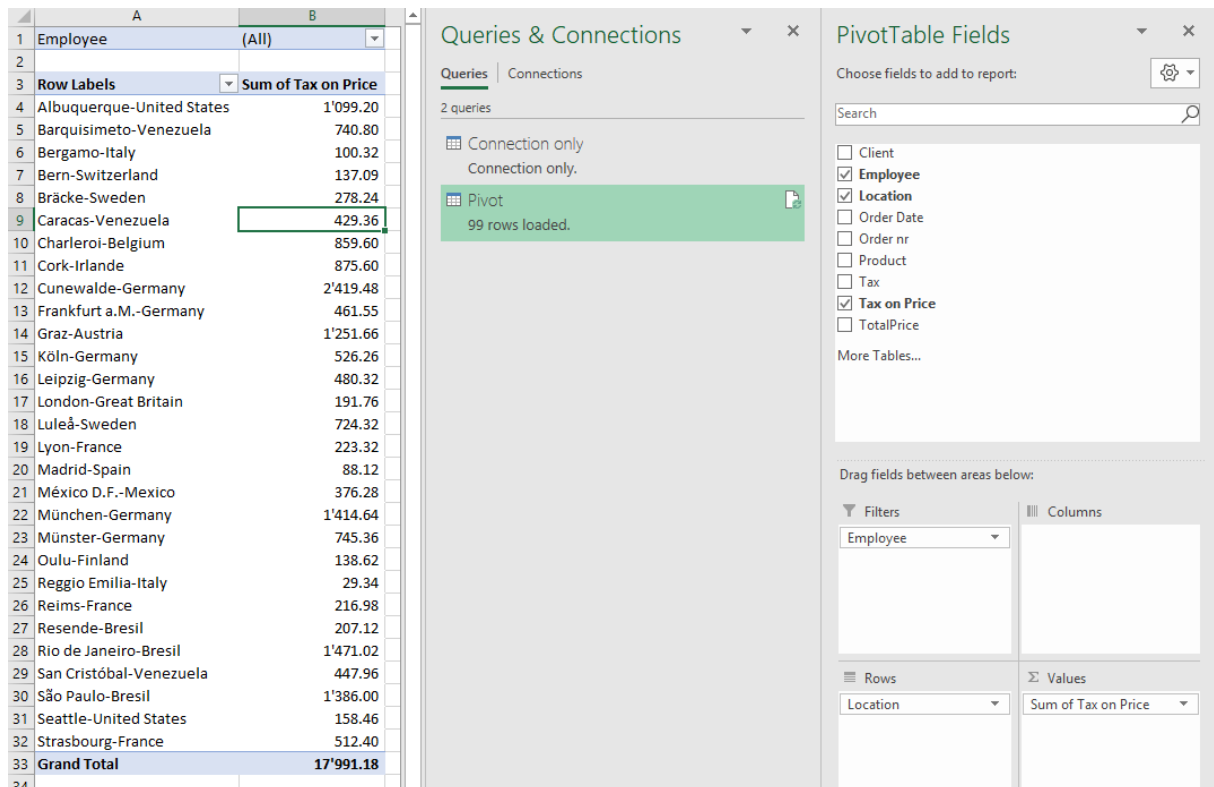   (one merged column *Location* – a new column *Tax on Price*)

3   INSERT – PIVOT TABLE

The PivotTable Fields displays all fields including the new ones …
The pivot corresponds to another query in Queries & Connections (it has been named Pivot)
Create the pivot as usual

6 Special : MERGE vs APPEND QUERIES

6.1 APPEND

It is mainly a matter of CONSOLIDATION
The objective is to avoid fastidious copy-paste to "join" two tables
The tables must have the same structure, same labels
Some columns can be in one table and not the other one

Example :

Year 2017

Order date	Order number	Product	Code	Branch	Client	City	Country	Total Price
04.08.2017	10248	Almonds	Al	Carouge	Vins et alcools Chevalier	Reims	France	490.00
04.08.2017	10248	Cashew nuts	Ca	Meyrin	Vins et alcools Chevalier	Reims	France	870.00
04.08.2017	10248	Grilled nuts	Gr	Lausanne	Vins et alcools Chevalier	Reims	France	840.00
05.08.2017	10249	Assorted biscuits	As	Montreux	Toms Spezialitäten	Münster	Germany	837.00
05.08.2017	10249	Grany bars	Gr	Sierre	Toms Spezialitäten	Münster	Germany	8'480.00
08.08.2017	10250	Grany bars	Gr	Neuchatel	Hanari Carnes	Rio de Janeiro	Brasil	385.00
08.08.2017	10250	Cookies	Co	Meyrin	Hanari Carnes	Rio de Janeiro	Brasil	6'307.00
08.08.2017	10250	Cookies	Co	Lausanne	Hanari Carnes	Rio de Janeiro	Brasil	1'071.00
08.08.2017	10251	Baked cake	Ba	Neuchatel	Victuailles en stock	Lyon	France	1'111.50
08.08.2017	10251	Doo Wap	Do	Montreux	Victuailles en stock	Lyon	France	1'680.00
09.08.2017	10252	St-Michel biscuits	St	Sierre	Suprêmes délices	Charleroi	Belgium	5'440.00
09.08.2017	10252	St-Michel biscuits	St	Sion	Suprêmes délices	Charleroi	Belgium	12'312.00

Year 2018

Order date	Order number	Salesman	Product	Client	City	Country	Total Price
09.09.2018	10277	John	Bread	Morgenstern Gesundkost	Leipzig	Germany	3'640.00
09.09.2018	10277	Luke	Butter	Morgenstern Gesundkost	Leipzig	Germany	2'364.00
12.09.2018	10278	Claris	Fruit delight	Berglunds snabbköp	Luleå	Sweden	3'300.00
12.09.2018	10278	Lucy	Butter	Berglunds snabbköp	Luleå	Sweden	1'404.00
12.09.2018	10278	Peter	Butter	Berglunds snabbköp	Luleå	Sweden	1'500.00
13.09.2018	10279	Jane	Tomatoes	Lehmanns Marktstand	Frankfurt a.M.	Germany	1'755.00
14.09.2018	10280	Kevin	Butter	Berglunds snabbköp	Luleå	Sweden	1'920.00
14.09.2018	10280	Luke	Eggs	Berglunds snabbköp	Luleå	Sweden	930.00
14.09.2018	10281	Claris	Yogurts	Romero y tomillo	Barcelona	Spain	36.50
14.09.2018	10281	John	Emmental	Romero y tomillo	Barcelona	Spain	288.00
15.09.2018	10282	Lucy	Milk	Romero y tomillo	Barcelona	Spain	156.00
15.09.2018	10282	Luke	Milk	Romero y tomillo	Barcelona	Spain	621.00

- Create a query for each table
- From the query table that should start the new appended list or table :

  QUERY Tab - EDIT Button
  Display the QUERIES & CONNECTIONS Pane - Double-click on the corresponding query
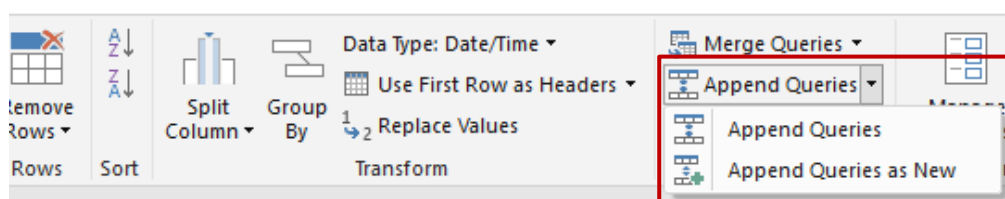
---

- APPEND QUERIES AS NEW

Power Query is displayed again, showing the merged lists. For the columns that were only in one table and not in the other you will get a series of *null*

- Generate the table as usual
- Now you can use this new table to create a pivot table

What is the difference between APPENDING TABLES and LINKING TABLES ????

Append ==> it is to avoid a long COPY-PASTE to merge 2 or more tables that have a similar but not identical structure

Link ==> it is not a matter of merging lists, it is to make a link to a TABLE OF CORRESPONDENCES in order to populate columns related to the source table and create pivot tables

- Here below two tables

	A	B	C
1	Name	Employee I	Status
2	Puneet	B1	Full Time
3	Graham	B13	Full Time
4	Avril	B26	Full Time
5	Ty	B4	Part Time
6	Mitsuru	B5	Full Time
7	Lawrence	F2	Full Time
8	Linda	F9	Part Time
9	Moses	G19	Part Time
10	Angel	K2	Temp
11	Davide	K7	Temp
12	Rhonda	L14	Full Time
13	Mel	M3	Temp
14	Erin	M5	Full Time

	A	B	C
1	Extensi	Emp ID	Office
2	184	B1	North
3	125	B26	East
4	259	G19	Central
5	362	D7	North
6	456	K2	Central
7	789	K7	Central
8	963	L14	North
9	852	M3	East
10	741	T20	Central
11	654	F2	North

There is one common column to both tables : Employee ID and Emp ID
(If the column label is different no problem – The data must be the same)

There are info on both sides of this common column
We want to merge the two tables

- Create 2 queries from the 2 tables
- Start from Query 1
- QUERY Tab – COMBINE Group – MERGE Button
  (also from Query Editor window : HOME Tab – COMBINE Group

- Select Query 2 to merge

- Select the common column in both tables
  This is why a difference in labels is not a problem

- **Select the kind of merge you want**
  That is the whole issue about the merge command !!!
  To help : here a drawing showing the various choices more clearly

Join Types – Power Query Merge

Left Outer

Right Outer

Full Outer

Inner

Left Anti

Right Anti
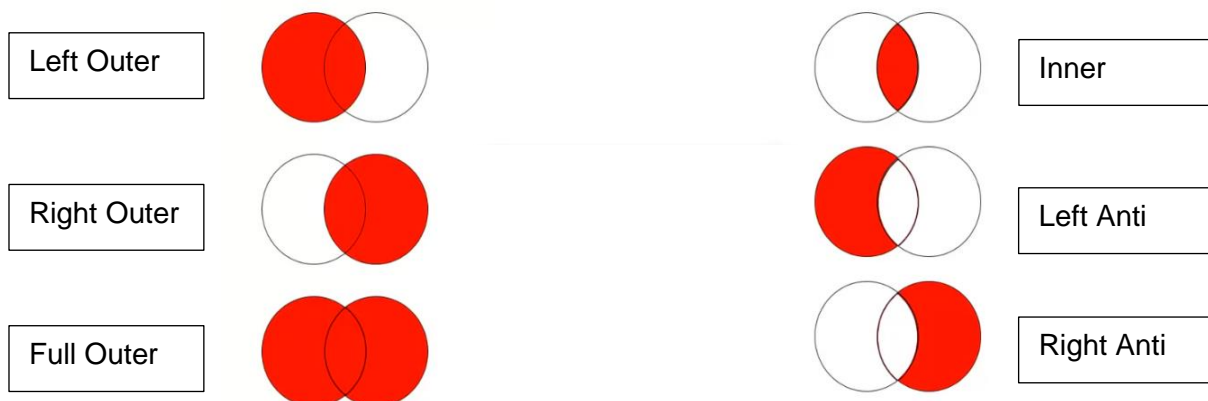
Merge

Select tables and matching columns to create a merged ta

Query 1

Name	Employee ID	Status
Puneet	B1	Full Time
Graham	B13	Full Time
Avril	B26	Full Time
Ty	B4	Part Time
Mitsuru	B5	Full Time

Query 2

Extension	Emp ID	Office
184	B1	North
125	B26	East
259	G19	Central
362	D7	North
456	K2	Central

Join Kind

Left Outer (all from first, matching from second) ▼

Left Outer (all from first, matching from second)
Right Outer (all from second, matching from first)
Full Outer (all rows from both)
Inner (only matching rows)
Left Anti (rows only in first)
Right Anti (rows only in second)

Join Kind

Left Outer (all from first, matching from second) ▼

ⓘ The selection has matched 8 out of the first 13 rows.

- The result in the Query Editor
- Click on the icon located at the right of the TABLE2 to expand it content

fx = Table.NestedJoin(Table3,{"Employee ID"},Table2,{"Em

	Employee ID	Name	Status	Table2
1	B1	Puneet	Full Time	Table
2	B13	Graham	Full Time	Table
3	B26	Avril	Full Time	Table
4	B4	Ty	Part Time	Table
5	B5	Mitsuru	Full Time	Table
6	F2	Lawrence	Full Time	Table
7	F9	Linda	Part Time	Table
8	G19	Moses	Part Time	Table
9	K2	Angel	Temp	Table
10	K7	Davide	Temp	Table
11	L14	Rhonda	Full Time	Table
12	M3	Mel	Temp	Table
13	M5	Erin	Full Time	Table

- Select what you want to keep. It is logical to tick off the common column
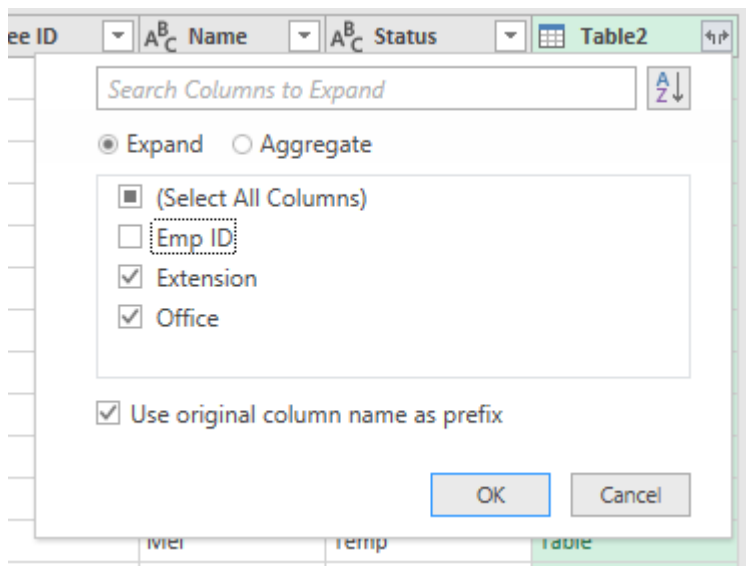
- The result in the Query Editor

	Employee ID	Name	Status	Table2.Extension	Table2.Office
1	B1	Puneet	Full Time	184	North
2	B13	Graham	Full Time	null	null
3	B26	Avril	Full Time	125	East
4	G19	Moses	Part Time	259	Central
5	B4	Ty	Part Time	null	null
6	B5	Mitsuru	Full Time	null	null
7	K2	Angel	Temp	456	Central
8	F2	Lawrence	Full Time	654	North
9	K7	Davide	Temp	789	Central
10	F9	Linda	Part Time	null	null
11	L14	Rhonda	Full Time	963	North
12	M3	Mel	Temp	852	Esas
13	M5	Erin	Full Time	null	null

The various results

LEFT OUTER

Name	Employee ID	Status	Table2.Extension	Table2.Office
Puneet	B1	Full Time	184	North
Graham	B13	Full Time		
Avril	B26	Full Time	125	East
Moses	G19	Part Time	259	Central
Ty	B4	Part Time		
Mitsuru	B5	Full Time		
Angel	K2	Temp	456	Central
Lawrence	F2	Full Time	654	North
Davide	K7	Temp	789	Central
Linda	F9	Part Time		
Rhonda	L14	Full Time	963	North
Mel	M3	Temp	852	East
Erin	M5	Full Time		

RIGHT OUTER

Name	Employee ID	Status	Query 2.Extension	Query 2.Office
Puneet	B1	Full Time	184	North
Avril	B26	Full Time	125	East
Moses	G19	Part Time	259	Central
Angel	K2	Temp	456	Central
Lawrence	F2	Full Time	654	North
Davide	K7	Temp	789	Central
Rhonda	L14	Full Time	963	North
Mel	M3	Temp	852	East
			362	North
			741	Central

FULL OUTER

Name	Employee ID	Status	Query 2.Extension	Query 2.Office
Puneet	B1	Full Time	184	North
Graham	B13	Full Time		
Avril	B26	Full Time	125	East
Moses	G19	Part Time	259	Central
Ty	B4	Part Time		
Mitsuru	B5	Full Time		
Angel	K2	Temp	456	Central
Lawrence	F2	Full Time	654	North
Davide	K7	Temp	789	Central
Linda	F9	Part Time		
Rhonda	L14	Full Time	963	North
Mel	M3	Temp	852	East
Erin	M5	Full Time		
			362	North
			741	Central

INNER

Name	Employee ID	Status	Query 2.Extension	Query 2.Office
Puneet	B1	Full Time	184	North
Avril	B26	Full Time	125	East
Moses	G19	Part Time	259	Central
Angel	K2	Temp	456	Central
Lawrence	F2	Full Time	654	North
Davide	K7	Temp	789	Central
Rhonda	L14	Full Time	963	North
Mel	M3	Temp	852	East

LEFT ANTI

Name	Employee ID	Status	Query 2.Extension	Query 2.Office
Graham	B13	Full Time		
Ty	B4	Part Time		
Mitsuru	B5	Full Time		
Linda	F9	Part Time		
Erin	M5	Full Time		

RIGHT ANTI

Name	Employee ID	Status	Query 2.Extension	Query 2.Office
			362	North
			741	Central

POWER PIVOT

1 What is Power Pivot

Power Pivot is an Excel add-in you can use to perform powerful data analysis and create sophisticated data models..

Power Pivot has 2 strong points

1. **Dealing with large complex data sets (Big Data)**

    a. Excel has a limit of 1'048'576 rows for each of its sheets. Power Pivot enables you to bypass this limitation and import massive data from practically any external source (it can be millions of rows)
    b. Power Pivot is particularly fast when managing this massive data.
    c. Power Pivot heavily compresses the data which in turn produces a rather manageable Excel final file.
    d. The data is saved inside the Excel workbook, which ensures its portability

2. **Data models with relationships**

    A standard pivot table usually relates to a list of records that can be a simple list or a table. But in real, the information that relates to the pivot table are scattered among lots of separate tables, some of which that can be very voluminous : *the table 1 provides information on the client and what has been ordered but it is the table 2 that contains the product code, color, price etc … and finally the table 3 that contains the category to which the product belongs*…

    In Power Pivot you can link the table 1 (usually the largest and longest one) with one or more of what we would call tables of correspondences. The set will be called a *data mode*l..

    True to say, you could get the same result by using VLOOKUP function but this proves to be very long and fastidious. Moreover, the VLOOKUP function *counts* the columns which makes it rather "rigid" if you end up moving columns around in the source table.

And if you are *an expert in working with data models* (using DAX functions, SQL, SharePoint), Power Pivot offers a wide range of advanced modelling functionalities.

2 Where is Power Pivot

Excel 2010
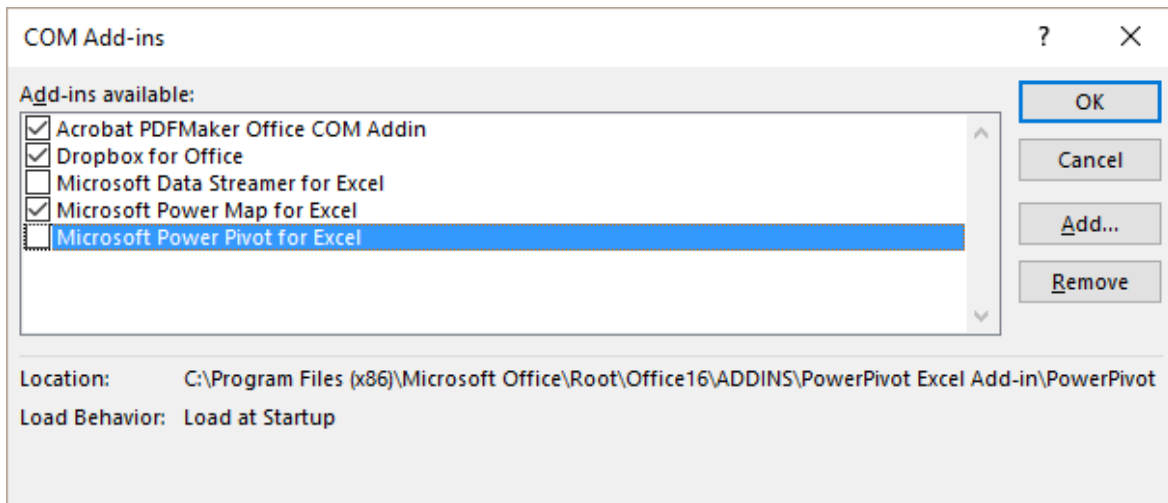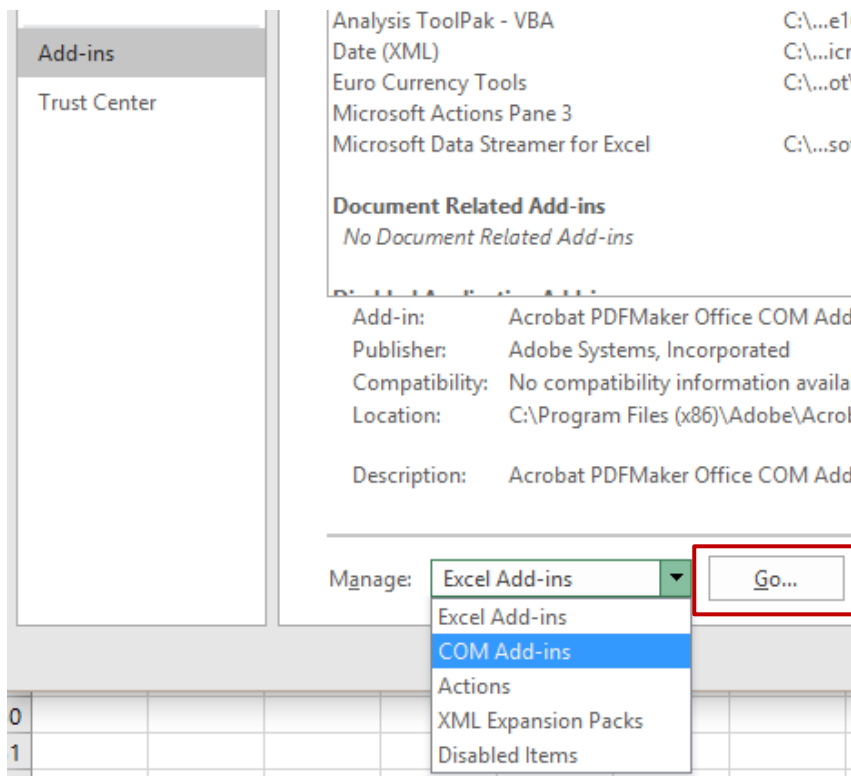You need to download and activate the Power Pivot add-in

Excel 2013 and 2016
It is *natively* installed but not activated
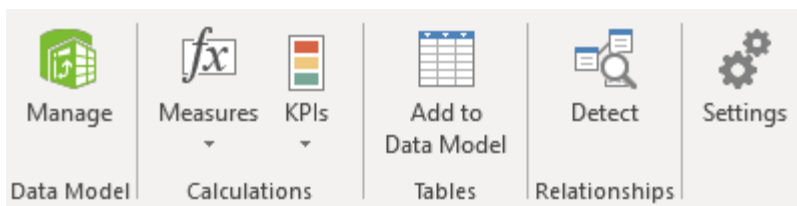Here after how to active it :
(check if you have the right to do so or if you need to go through your IT dpt)

FILE - OPTIONS – Section ADD-INS

Tick the option and re-run Excel
A POWER PIVOT Tab is added to the ribbon and displays the following commands :

3 Working with massive data

3.1   Importing data from an external source

I have used the following material : Microsoft freely provides an Access file with a set of tables, one of which has more than 2 millions rows (only in English)

ContosoSales.accdb	22.04.2019 09:53	Microsoft Access ...	309'548 Ko

Only Power Pivot can deal with such data …
- POWER PIVOT Tab – MANAGE Button
- The Power Pivot window is displayed
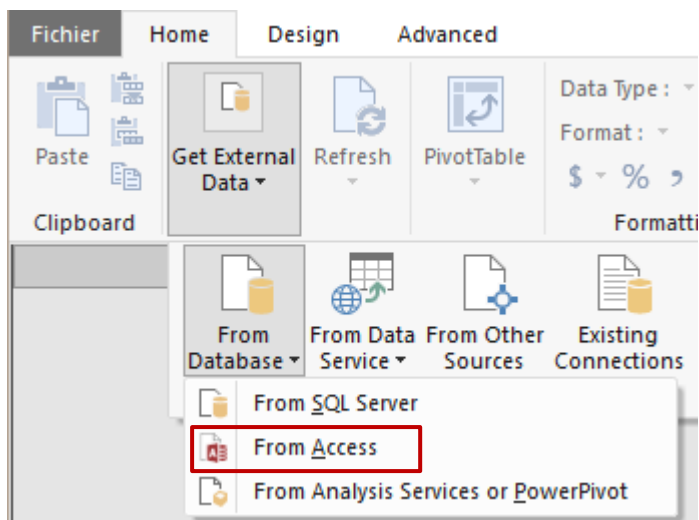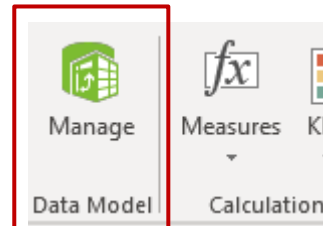
Comment : go round a little bit among the other possibilities and you will notice that the choice of external sources is large : SQL Server, SQL Azure, Oracle, Teradata, Sybase, IBM etc …

And for those who have worked a little bit with Power Query : the import options are rather similar.

- A dialog box will let you select the required Access file (if necessary with a user ID and password)

- A second dialog box will give you the opportunity to choose from a direct importation or one through an SQL query (advanced feature)
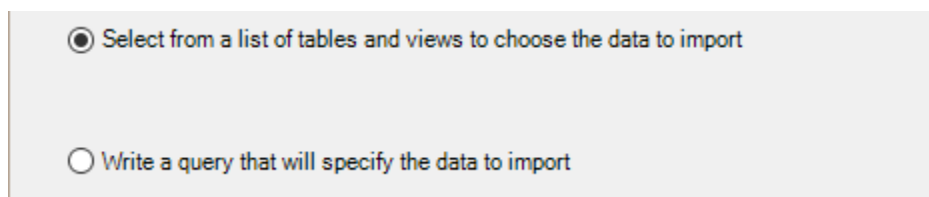
- You are then prompted to select the tables
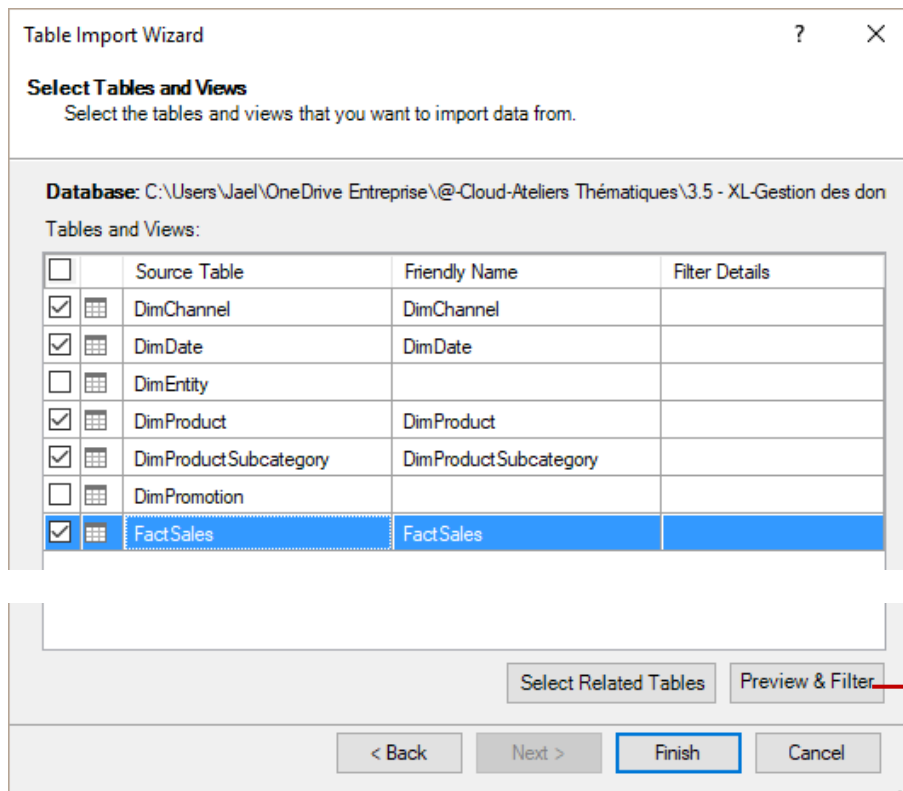
The source table displays its columns and you can tick on/off as required

Although the table is really long the import process is done very rapidly (indeed the FactSales table has more than 2 million rows)
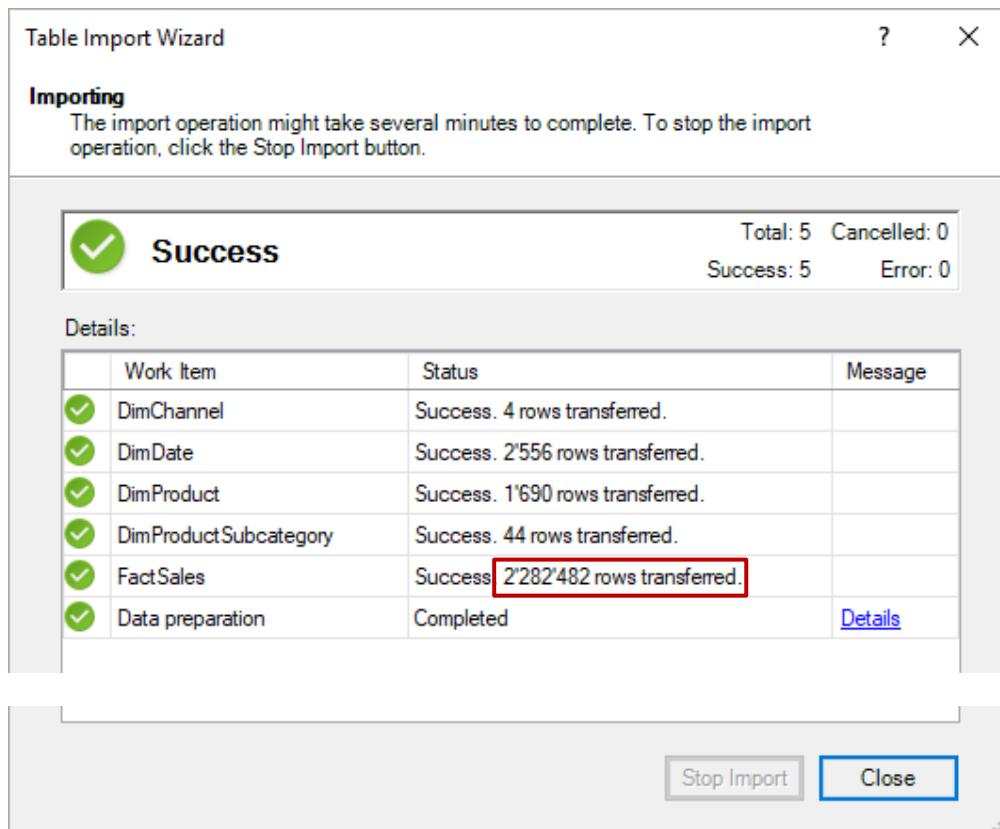
- The Power Pivot window displays all the tables. They "live" inside the Power Pivot add-in

- It you get out of this window, the Excel file shows an empty sheet. You can revert to the Power Pivot window any time to manage the tables. Simply click again on the MANAGE Button.

- What is the weight of the Excel file once you have saved it ?

ContosoSales.xlsx   22.04.2019 09:58   Feuille de calcul …   59'351 Ko

3.2 Working with the imported tables

The Power Pivot window provides a nice selection of commands to work the imported columns. A faire number of them are similar to the Power Query commands (but true to say Power Query has more commands)
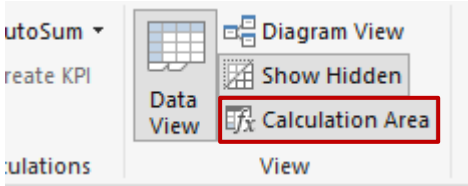
Here after a few interesting ones

HOME Tab

- **Sort and Filter** as in Excel (the triangle located at the right of the column label)

- **Refresh**
  Any modification done to the source file can generate the update of the data model

- **Type of column and column format**
  (for instance date without the time)
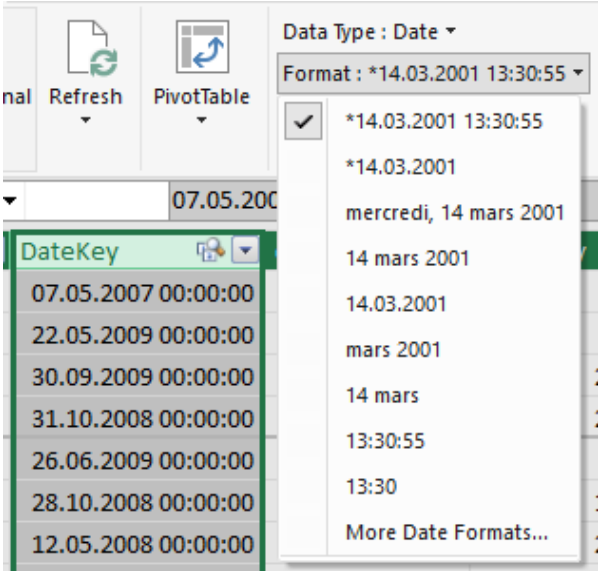
- Standard functions such as (SUM, AVERAGE, MAX, MIN etc…) that you can add to the bottom of a column and that will be displayed in the bottom section (point or enlarge the column for a full view)

- This bottom section can be displayed or hidden

DESIGN Tab

- **Add or delete** columns

- **Freeze**
  Moves the selected column(s) to the left as first position and sets them as frozen columns

- **Width**
  Can be manually set for the selected column

- **Standard calculations and Insert Function Button**
  You can add a column that will contain a standard calculation
  Type the = sigh and build the formula as you would in Excel with this special
  characteristic : you do not select a cell you select the whole column

You can also insert a function into the first cell of a new column as you would in Excel
(again select columns and not cells)
Note : functions are always in English

3.3 Adding an existing Excel list or a table to the data model

You can add to the data model any list or table that is inside the Excel workbook

- Active cell inside the list or the table
- POWER PIVOT Tab – TABLES Group – ADD TO DATA MODEL Button
- If it is only a list, you will be prompted to turn it into a table
- The table is added into the Power Pivot window and has its own tab

4 Data model and relationships

You can create various relationships between tables usually in order to create a pivot table

4.1 A sample of tables to connect

❶   The main list (exported food items) :

	A	B	C	D	E	F	G	H
1	Order date	Order numb	Product	Branch	Client	City	Country	Total Price
2	04.08.2017	10248	Almonds	Carouge	Vins et alcools Chevalier	Reims	France	490.00
3	04.08.2017	10248	Cashew nuts	Meyrin	Vins et alcools Chevalier	Reims	France	870.00
4	04.08.2017	10248	Grilled nuts	Lausanne	Vins et alcools Chevalier	Reims	France	840.00
5	05.08.2017	10249	Assorted biscuits	Montreux	Toms Spezialitäten	Münster	Germany	837.00
6	05.08.2017	10249	Grany bars	Sierre	Toms Spezialitäten	Münster	Germany	8'480.00
7	08.08.2017	10250	Grany bars	Neuchatel	Hanari Carnes	Rio de Janeiro	Brasil	385.00
8	08.08.2017	10250	Cookies	Meyrin	Hanari Carnes	Rio de Janeiro	Brasil	6'307.00
9	08.08.2017	10250	Cookies	Lausanne	Hanari Carnes	Rio de Janeiro	Brasil	1'071.00
10	08.08.2017	10251	Baked cake	Neuchatel	Victuailles en stock	Lyon	France	1'111.50
11	08.08.2017	10251	Doo Wap	Montreux	Victuailles en stock	Lyon	France	1'680.00
12	09.08.2017	10252	St-Michel biscuits	Sierre	Suprêmes délices	Charleroi	Belgium	5'440.00
13	09.08.2017	10252	St-Michel biscuits	Sion	Suprêmes délices	Charleroi	Belgium	12'312.00
14	10.08.2017	10253	Mikado	Meyrin	Hanari Carnes	Rio de Janeiro	Brasil	3'024.00
15	11.08.2017	10254	Mikado	Sierre	Chop-suey Chinese	Bern	Switzerland	1'713.60
16	15.08.2017	10256	Mikado	Martigny	Wellington Importadora	Resende	Brasil	1'965.00
17	15.08.2017	10256	Digestives	Martigny	Wellington Importadora	Resende	Brasil	624.00
18	16.08.2017	10257	Digestives	Carouge	HILARIÓN-Abastos	San Cristóbal	Venezuela	4'387.50
19	16.08.2017	10257	Strawberry Candy	Sion	HILARIÓN-Abastos	San Cristóbal	Venezuela	432.00
20	16.08.2017	10257	Strawberry Candy	Sierre	HILARIÓN-Abastos	San Cristóbal	Venezuela	780.00
21	17.08.2017	10258	Oasis juices	Montreux	Ernst Handel	Graz	Austria	3'040.00

❷ et ❸   Tables adding co-related information

	A	B
5	Branch	Canton
6	Carouge	GE
7	Meyrin	GE
8	Lausanne	VD
9	Montreux	VD
10	Sierre	VS
11	Neuchatel	NE
12	Sion	VS
13	Martigny	VS

|	A	B	C
5	Product	Category	Price / u
6	Almonds	Nuts	€ 1.75
7	Assorted biscuits	Bakery	€ 3.85
8	Avocado	Fruits and veg	€ 0.90
9	Baked cake	Biscuits	€ 2.91
10	Bread	Bakery	€ 1.50
11	Butter	Dairy	€ 1.36
12	Cashew nuts	Nuts	€ 2.38
13	Cheese	Dairy	€ 4.95

Important : each list has been defined as a *named data table* (Exportations – Branches – Products)

* **<u>Very important</u>**. Power Pivot can only create relationship in the following structure : 1 to several and nothing else. Consequently, the table of correspondences provides the **1** : Carouge corresponds to GE and it is a unique entry. Then, the connection with work for it **several** part for the Branch column in the first table as Carouge can well appear several times.
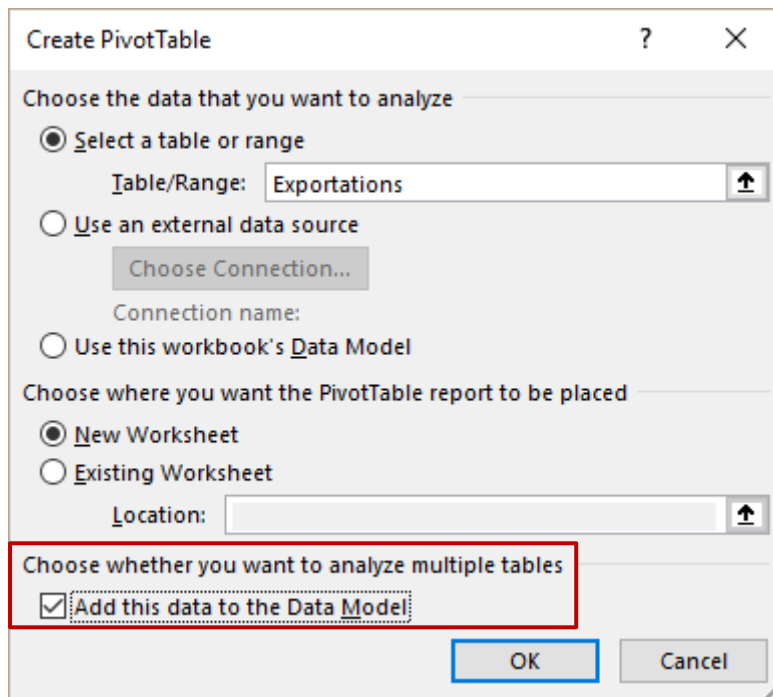
Important : tick this option to start straight away with separate tables. If you forget, you can do it later.
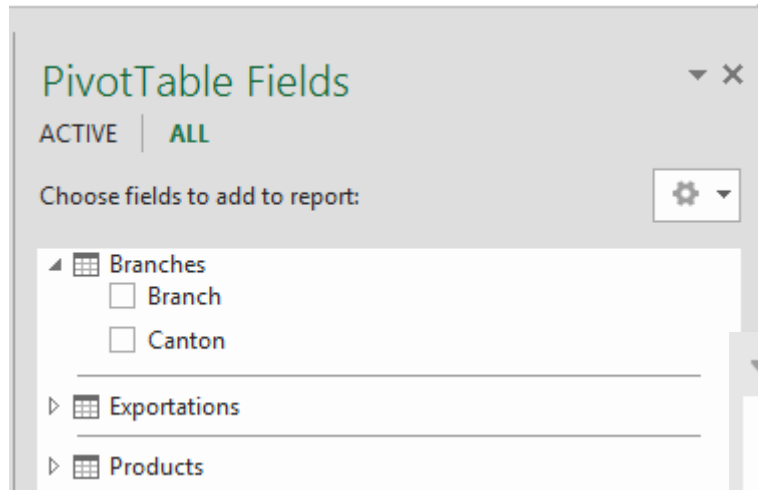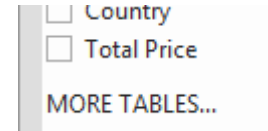
The FIELD LIST :
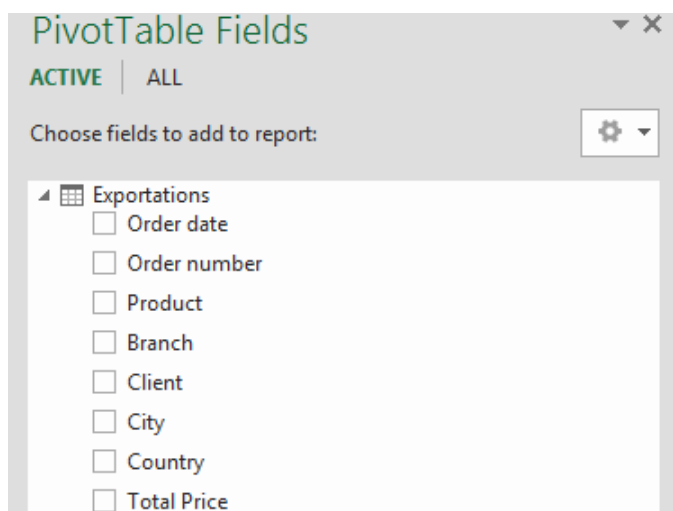
ACTIVE : the main list or main table. You cannot use the fields from the other tables to build a pivot table.

ALL : all tables are list with their fields but no real use at this stage (you may drag a field but no calculation will be done).

If you have forgotten to tick the ADD … option :
The field list shows the following option →
Caution : this automatically creates a new blank worksheet and you will need to delete the old one.

☐ Country
☐ Total Price

MORE TABLES…

PivotTable Fields ▼ ✕
ACTIVE | **ALL**

Choose fields to add to report: ⚙ ▼

▲ ⊞ Branches
　　☐ Branch
　　☐ Canton

▷ ⊞ Exportations

▷ ⊞ Products

* Excel has automatically retrieved the table name (it was a good idea as this helps reading !)
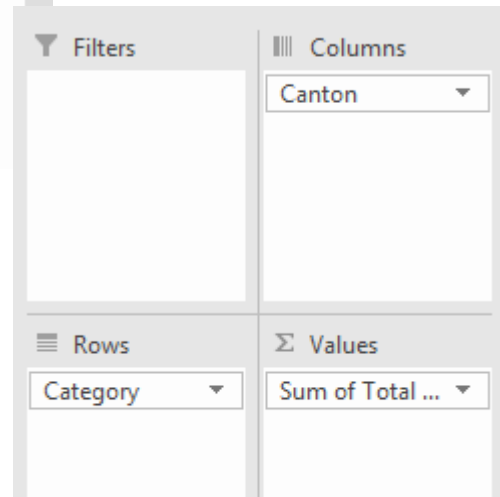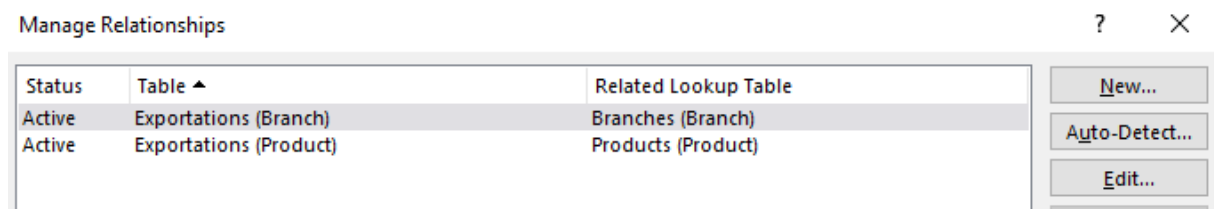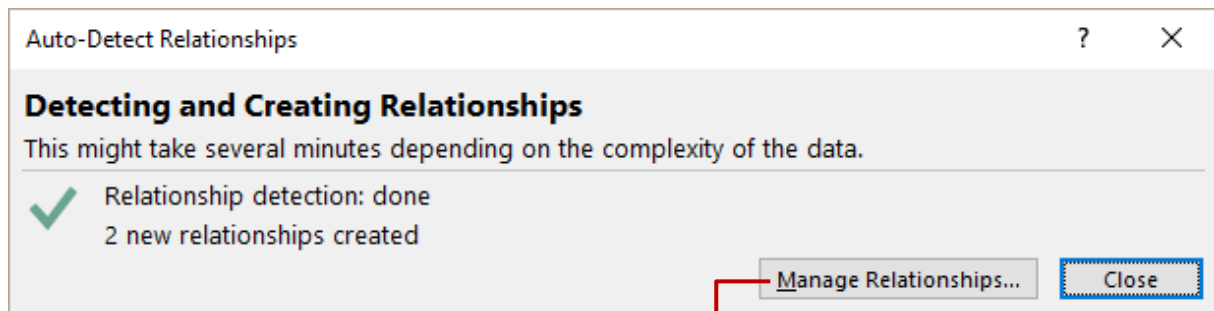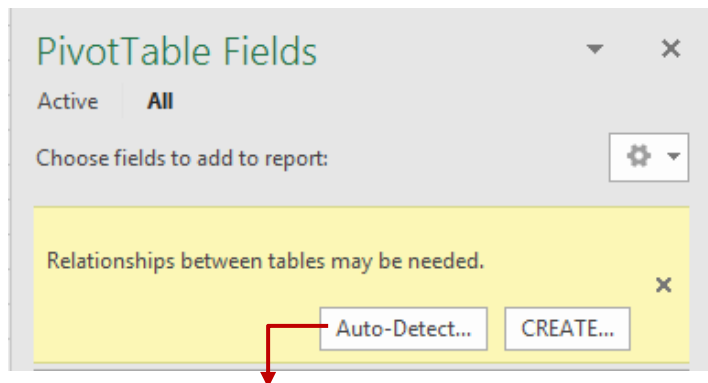
Here below the structure we want to generate :

▼ Filters

⫴ Columns
Canton ▼

≡ Rows
Category ▼

Σ Values
Sum of Total … ▼

Excel can show the pivot structure but there are no formulas behind !

Sum of Total Price	Column Labels ▼			
Row Labels ▼	GE	NE	VD	VS
Bakery	234695.64	234695.64	234695.64	23.
Beverages	234695.64	234695.64	234695.64	23.
Biscuits	234695.64	234695.64	234695.64	23.
Cheese	234695.64	234695.64	234695.64	23.
Dairy	234695.64	234695.64	234695.64	23.
Eggs	234695.64	234695.64	234695.64	23.
Fish	234695.64	234695.64	234695.64	23.
Flour	234695.64	234695.64	234695.64	23.
Fruits and veg	234695.64	234695.64	234695.64	23.

Consequently, the tables must be linked. Two possibilities : let Excel detect the links or create them manually.

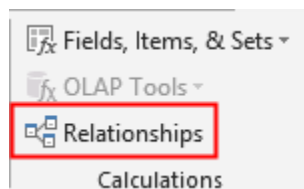Excel detects the links automatically (Power Pivot is invisible in the background)

Try to create the pivot table as if you could do it directly from the n sheets (in our example the 3 sheets). At one point in the process, Excel will automatically display the following message at the top of the *Field List :*
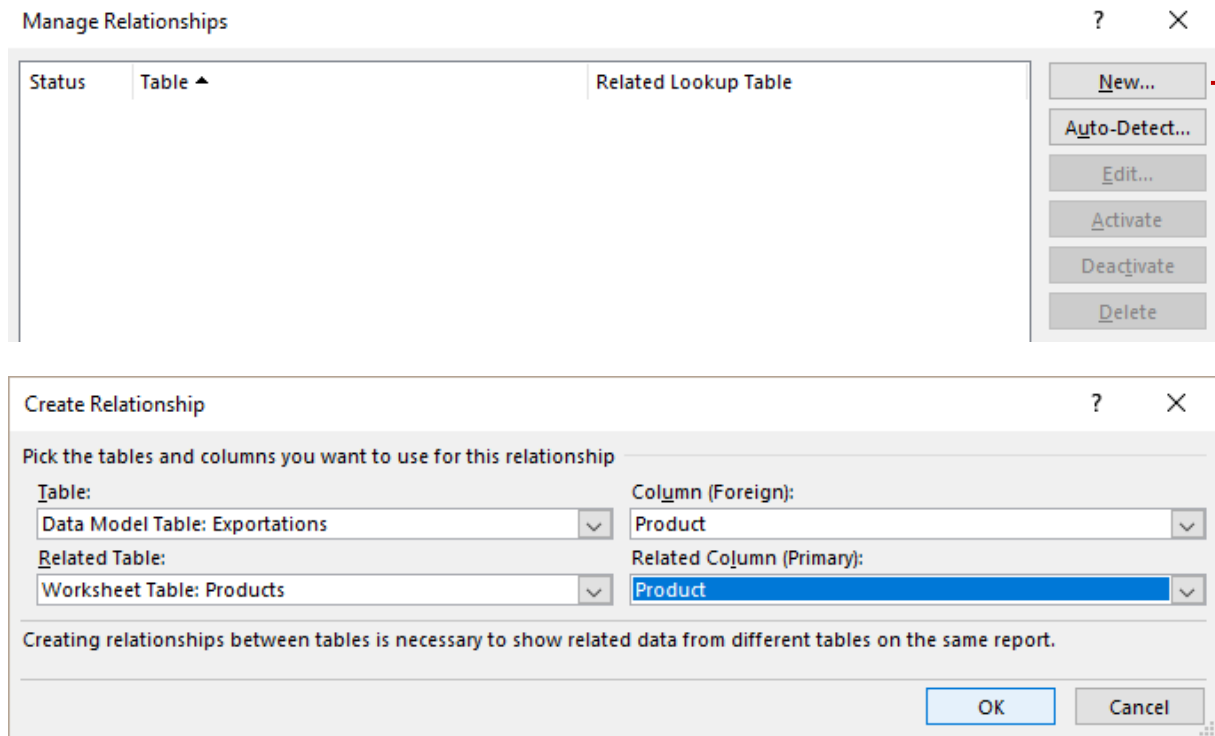

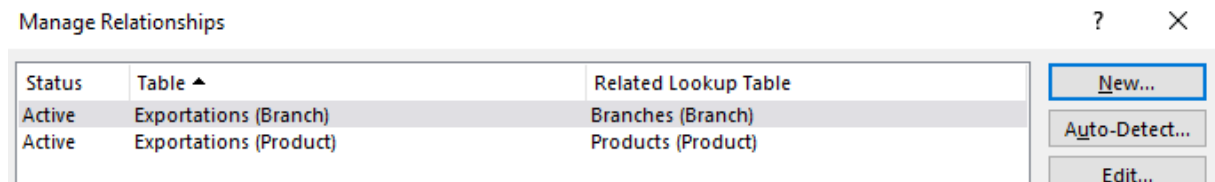You can check and edit if necessary the links

Manually

- ANALYZE Tab

Manage Relationships

Status	Table ▲	Related Lookup Table

Buttons: New... | Auto-Detect... | Edit... | Activate | Deactivate | Delete

Create Relationship

Pick the tables and columns you want to use for this relationship

Table:	Column (Foreign):
Data Model Table: Exportations	Product
Related Table:	**Related Column (Primary):**
Worksheet Table: Products	Product

Creating relationships between tables is necessary to show related data from different tables on the same report.

OK | Cancel

Read : in the main *Exportations* table*,* the *Product* column needs a link
This link is in the *Products* table where the *Product* can be found
(the link is set and all fields from the Products table are recognized)

You set the second link the same way. CLOSE. Excel displays the links :

Manage Relationships

Status	Table ▲	Related Lookup Table
Active	Exportations (Branch)	Branches (Branch)
Active	Exportations (Product)	Products (Product)

Buttons: New... | Auto-Detect... | Edit...

The two links you have created are exactly the same as when Excel did it …

And the result (figures have been rounded to the whole number)

Sum of Total Price Column Labels					
Row Labels	**GE**	**NE**	**VD**	**VS**	**Grand Total**
Bakery	15'918	6'308	2'517	31'987	56'729
Beverages		7'460			7'460
Biscuits	6'307	1'112	2'406	1'482	11'307
Cheese			288	186	474
Dairy	9'761	6'171	2'844	15'637	34'413
Eggs			14'630		14'630
Fish			7'200		7'200
Flour			3'773		3'773
Fruits and veg	14'099	6'735	11'033	23'541	55'407
Fruits et légumes	1'128		840	3'094	5'061
Household products				5'506	5'506
Meat	8'603	7'880	2'240	12'653	31'376
Nuts	1'360				1'360
Grand Total	**57'175**	**28'205**	**55'230**	**94'086**	**234'696**

COMMENTS

In this example, the two columns to link bear the same name. This is quite logical and makes the reading clear but it is not a compulsory rule. They can have different names and you simply link them.

MANAGE THE LINKS / THE DATA MODEL

REMOVE THE LINKS : button RELATIONSHIPS(ANALYZE Tab)

These links manage the calculations in the pivot table.
It you remove them, it does not affect the data model that links the sheets in the background

REMOVE THE DATA MODEL : button QUERIES & CONNECTIONS (DATA Tab)

If you remove all the sheets links in the dialog box, the data model is removed and also the pivot links (in the RELATIONSHIPS dialog box)


4.2   Using Power Pivot to link the tables

In the previous example the source tables were already in Excel and they are light … but how to connect tables when the source data is external or lost in a massive set ? Let us use the Microsoft Access data base again.

4.2.1   *Diagram View to display and create the relationships*

The Power Pivot displays visually the various connections between the tables if you click on the DIAGRAM VIEW button (HOME Tab)
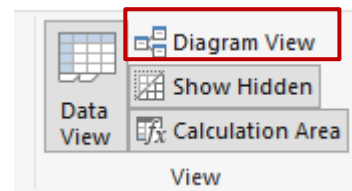
For any unknown reason, the left link has been deleted
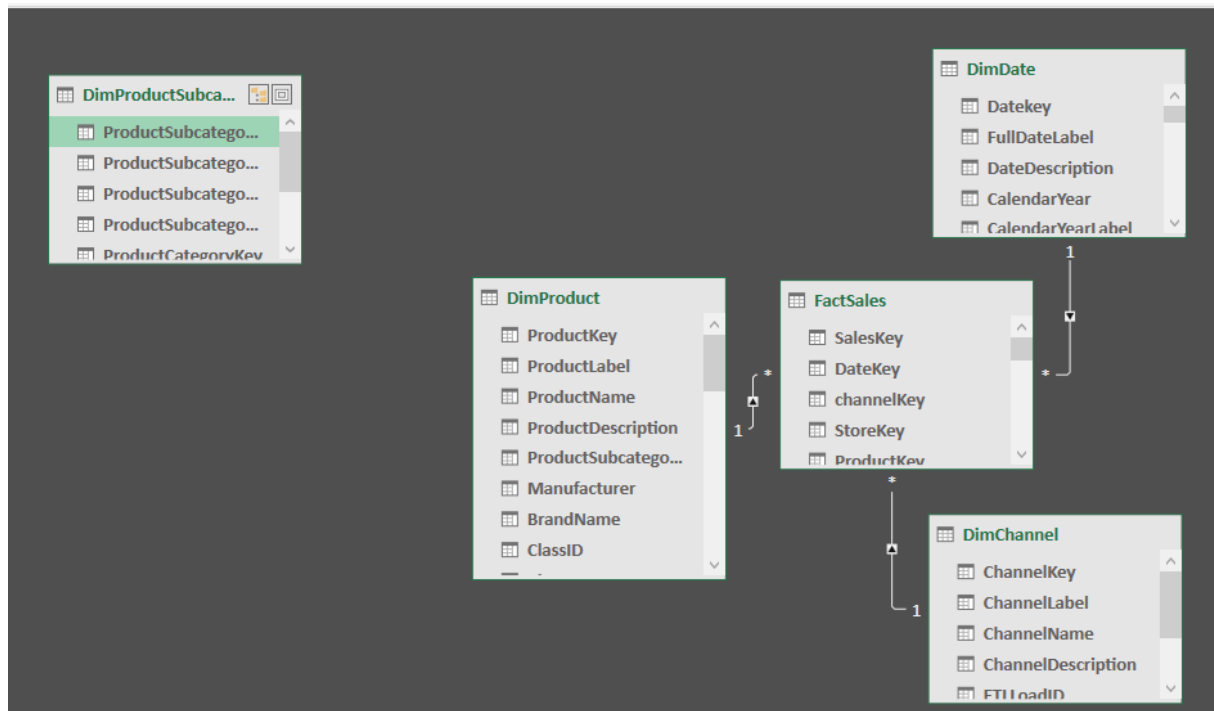
Activate one of the two tables and click on the CREATE RELATIONSHIP (DESIGN Tab) Button

Or

Right click one of the two tables and option CREATE RELATIONSHIP

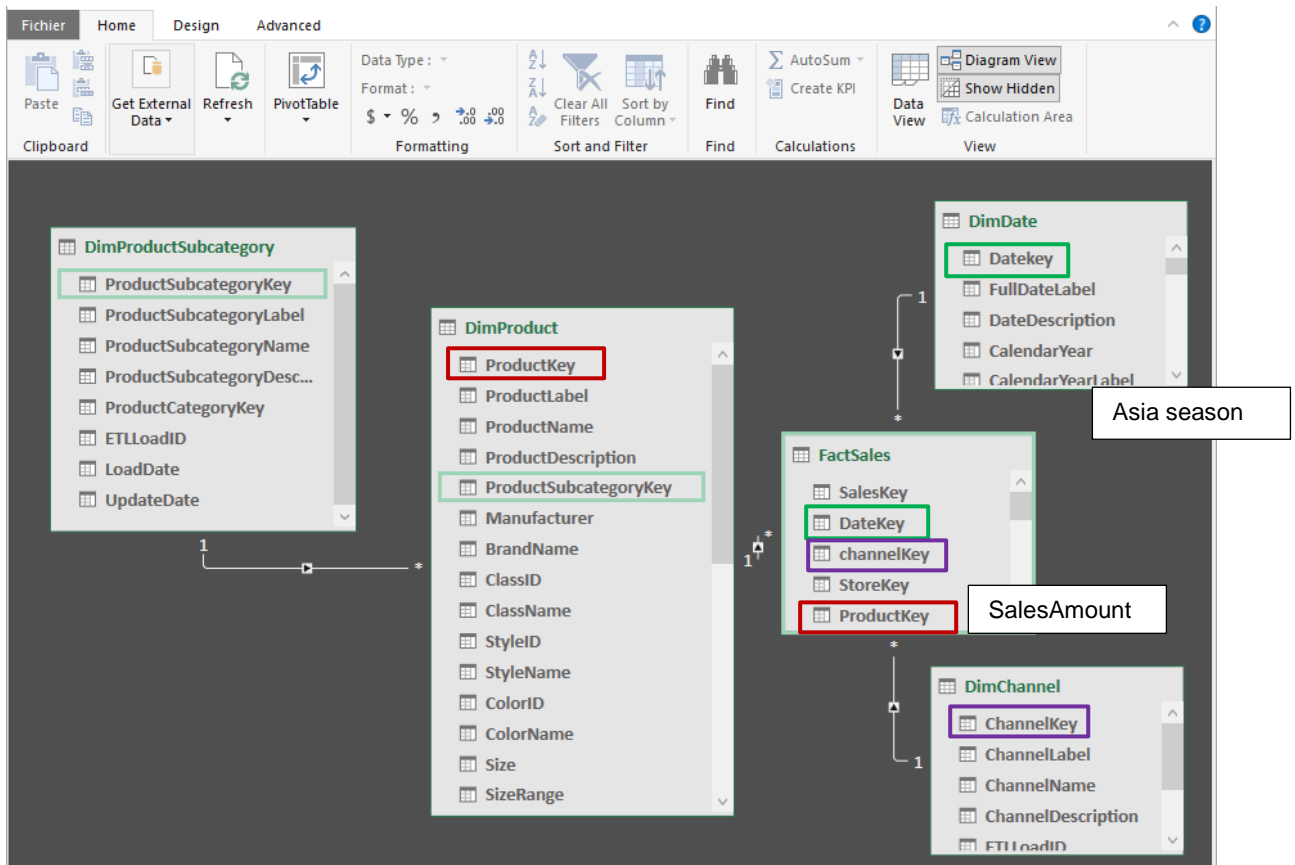The following dialog box is displayed :

Select each table and the required columns
The order has no importance
On the other hand, you must respect the 1 to several rune : here it is the first table that provides the correspondence

You can also simple click and drag the column to the other one by its label to create the relationship.

The relationship is created :

Simply click on the connection line and the connected columns are circled in green
You can revert to the normal view by clicking on the DATA VIEW Button

4.2.2 *Pivot table that you can create once the tables are linked*

| Row Labels	Sum of SalesAmount
⊟ **Catalog**	
Holiday	CHF 207'704'286.56
None	CHF 280'840'359.44
Spring/Back to School	CHF 154'358'610.90
Tax Time/Summer	CHF 53'001'698.85
⊟ **Online**	
Holiday	CHF 424'018'801.51
None	CHF 731'181'310.10
Spring/Back to School	CHF 380'880'793.87
Tax Time/Summer	CHF 149'990'204.41
⊟ **Reseller**	
Holiday	CHF 276'425'193.05
None	CHF 476'784'148.94
Spring/Back to School	CHF 255'772'226.35
Tax Time/Summer	CHF 95'567'132.53
⊟ **Store**	
Holiday	CHF 1'216'205'191.43
None	CHF 2'122'007'845.90
Spring/Back to School	CHF 1'071'489'972.33
Tax Time/Summer	CHF 444'996'588.66
Grand Total	**CHF 8'341'224'364.83**

The labels *AsiaSeason* and *ChannelDescription* are not in the same table as *SalesAmount*
➔ No link no pivot table

▼ Filters	|||| Columns

≡ Rows		Σ Values	
ChannelDescription	▼	Sum of SalesAmount	▼
AsiaSeason	▼		

To create the pivot table :

HOME Tab – PIVOT TABLE Button.

Some additional choices if you compare to what Excel offers. *Interesting :* you can create a pivot chart without having to create a pivot table first.
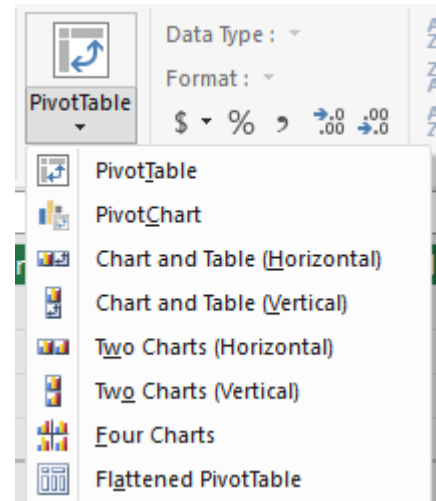
Pivot tables are always created in the Excel workbook and never in Power Pivot

4.3 The DAX language (Data Analysis Expression)

It is not a programming language but a function or formula language.
In Excel we use the words *functions or formulas, calculated column or field.* It is not wrong to use them in Power Pivot but the word associated with Power Pivot is rather *function or* DAX **mesure.**

Some characteristics :

- Building a DAX function is relatively similar to an Excel function. But some Excel functions are missing from the list of DAX functions such as VLOOKUP for instance. And vice and versa : some DAX functions have no correspondence in Excel

- The result of the mesure will be displayed inside a cell but it can be preceded by a label. The syntax to respect is the following : *Sales Total = SUM ….or Sales Total : = SUM …*

- When the required calculation needs a column that belongs to another table than the active one you cannot simply click the column to refer to it in the formula. You need to retrieve it through a DAX function called RELATED (in Excel you would use the VLOOKUP function)

- A mesure can be used when creating a pivot table

- As data models often contain several tables, some quite heavy and usually connected via relationships, DAX functions often enable an analysis that would simply be either impossible in Excel or too complicated to implement.

Here after an easy example to illustrate what we would do in Excel and what Power Pivot allows to do in the same situation.

Going beyond is far more complicated and would require a proper training on the subject …

4.3.1 In EXCEL : using VLOOKUP

How to calculate the total amount of sales for a client in table 1 when the product price unit is actually in table 2 ?

|	H		I		J	K	L	M
▼	Quantity ▼	Total	▼					
	35	=[@Quantity]*VLOOKUP([@Product];Products[#All];3;0)						
	65	154.7						
	45	63.9						

Characteristics :

1. No need to link the tables
2. Although you click on cells to build the formula, because you work with tables, the function automatically converts a E12 into a syntax showing the label of the column
3. No need to drag to fill the column, it is automatically filled in

4.3.2 In POWER PIVOT : using DAX RELATED

Here after an interesting DAX function that will replace the VLOOKUP (incidentally missing from the list of functions …)

- Active cell in the column to add (right end of the table)

- DESIGN Tab – CALCULATIONS Group

- Select the RELATED function. A drop-down list will automatically display the column of the connected table(s). Select the required column lable and then carry on as usually to multiply by the ordered quantity.
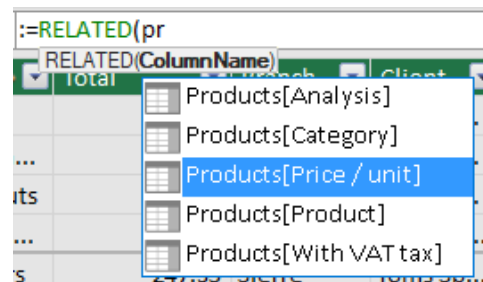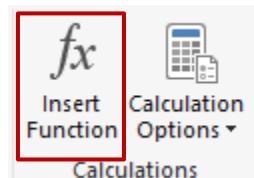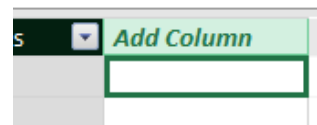
The formula is validated and the column is automatically filled

fx =RELATED(Products[Price / unit])*Exportations[Quantity]

Pro... ▼	T.. ▼	Branch ▼	Client ▼	City ▼	Country ▼	Quantity ▼	Total sales ▼	A
Almonds	61...	Carouge	Vins et ...	Reims	France	35	61.25	
Cashew n...	15...	Meyrin	Vins et ...	Reims	France	65	154.7	
Grilled nuts	63.9	Lausanne	Vins et ...	Reims	France	45	63.9	
Assorted ...	33...	Montreux	Toms Sp...	Münst...	Germany	87	334.95	
Grany bars	24	Sierre	Toms Sp	Münst	Germany	85	247.35	

You may use RELATED to simply retrieve a data that you would need to use VLOOKUP if you were in Excel instead of Power Pivot

Do not forget the last parenthesis. Power Pivot is not as "gracious" as Excel !
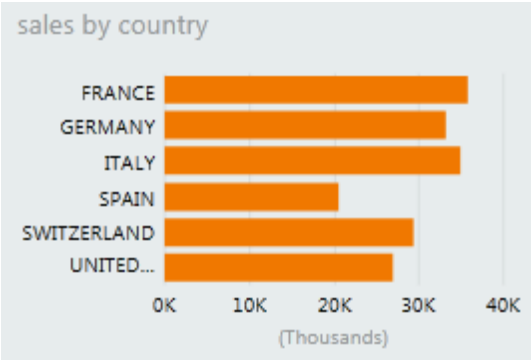
Only in Office 2016 Professional Plus : POWER VIEW

It is an add-in that goes with Power Query and Power Pivot because it is part of Microsoft Power BI. Its main interest is essentially to provide the creation of tables or charts with nice visual effects (partial – with segments – filtered …) or to use geolocated maps.

Each element is called a *view* and creating one is really very simple … Some examples :

Specific to POWER VIEW : geolocation to create *maps* :

Up to you to discover the rest …