bi4dynamics
Transforming your data into knowledge

Excel Pivot Tables

General instructions with exercises on BI4Dynamics data

1 CONNECTING TO DATA

Data is the base of every analysis, we will use Excel to connect to the Tabular model, where the data is stored and prepared for the business user.

The tabular model resides on the SQL Analysis Services Server, so to get to the data, we first need to connect to the server.

1.1 Creating a new Connection

Procedure for connecting to Tabular model on Analysis Services is as follows:

Go to: *Data >> Get External Data >> From Other Sources >> From Analysis Services*
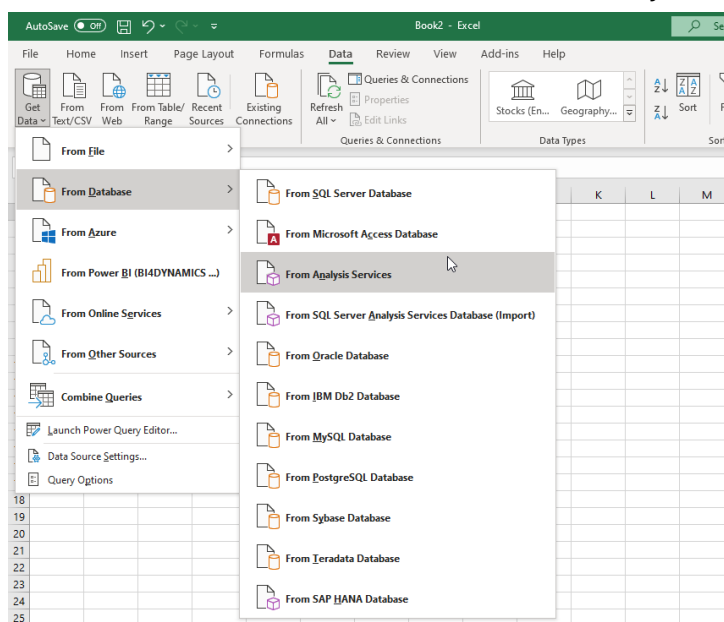
In Connect to Database Server window write your server's name. Choose Windows or User authentication. Press *Next*.

In Database and Table window choose your database and select designated cube. Press *Next*.

In Save Data Connection and Finish window choose the file name for your data connection. We recommend you also fill in *Description, Friendly Name* and *Search Keywords* fields. Press Finish.

As an optional last step, you can also select where and what you want to create based on this connection (*Pivot Table Report* – pivot table, *Pivot Chart and Pivot Table Report* – pivot chart and pivot table, *Only Create Connection* – Create connection, *Existing worksheet*, *New worksheet*)
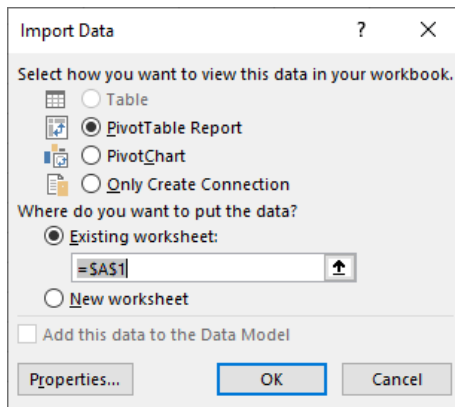
You are now left with a blank pivot table placeholder, pivot table field list and pivot table tools tabs. Also, a new connection file has been created on your file system (by default C:\Users\YOUR USERNAME\Documents\My Data Sources).
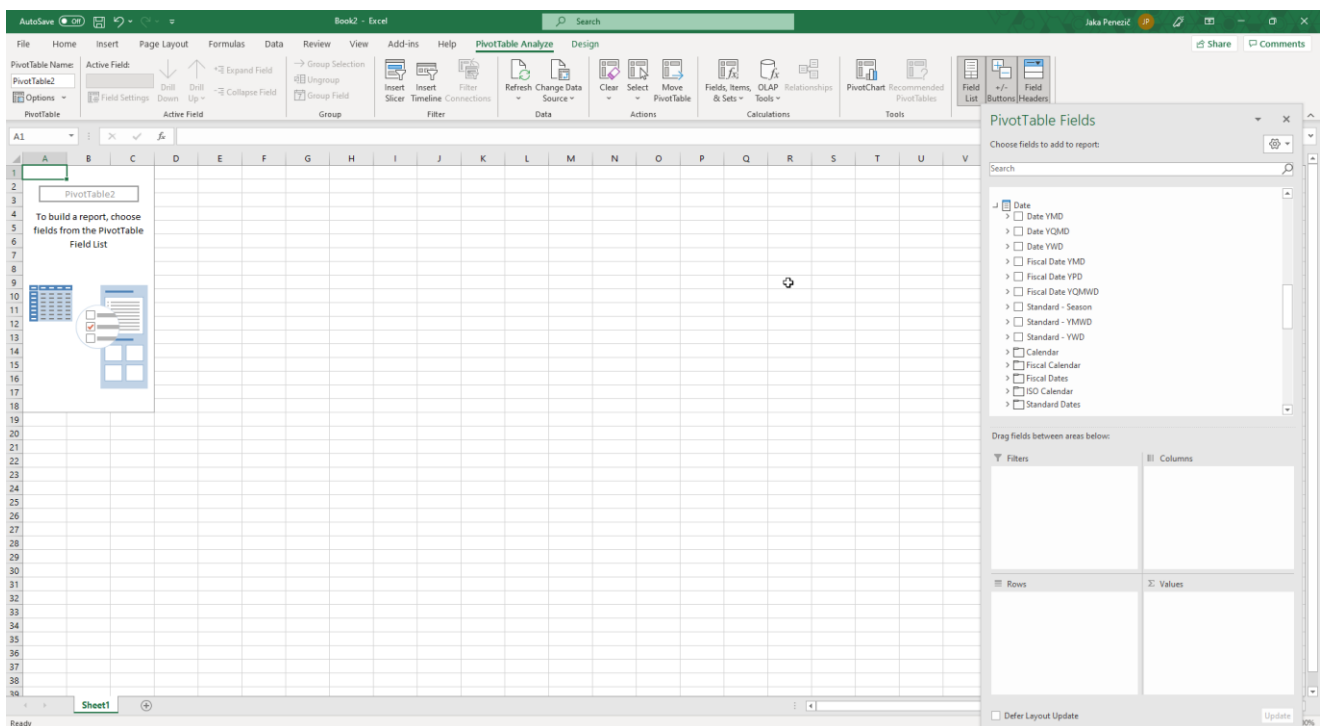
1.2 Using an existing connection

Whenever you create a new connection or receive a connection file from someone else, it is available for you to use, without having to go through the process in the previous step.

For example, your administrator could define the connection, save it on your network and you can use it create your reports.

Procedure for connecting to tabular model based on an existing connection:

Go to: *Data >> Existing Connections*
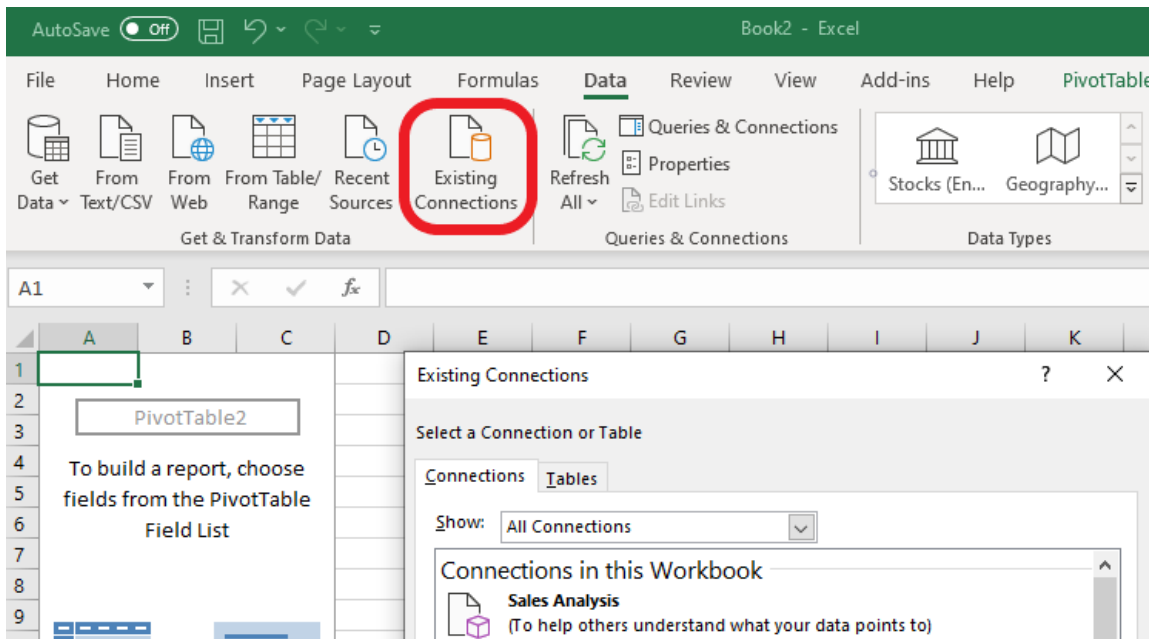
In the next windows you can choose which of the existing connection files you want to use.
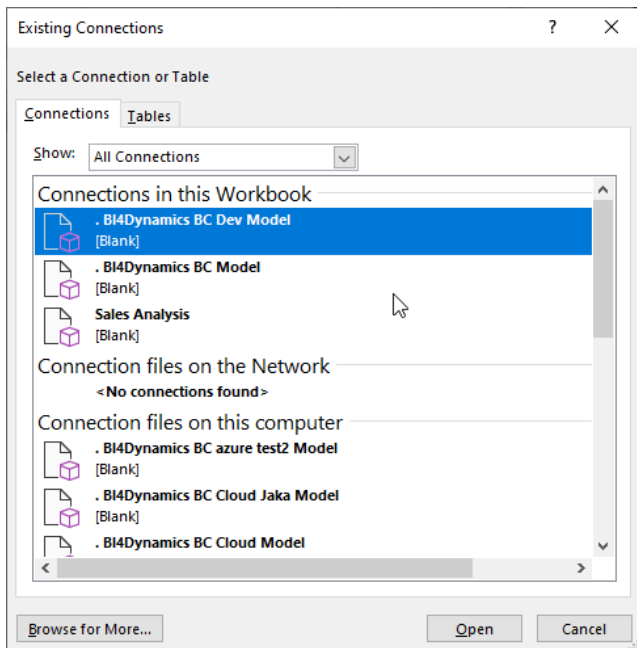
1.3 Changing an existing report connection

Once you create a pivot table that pivot table will be associated with a connection. You can always change the connection the pivot table uses.

Go to: *PivotTable Tools >> Change Data Source*
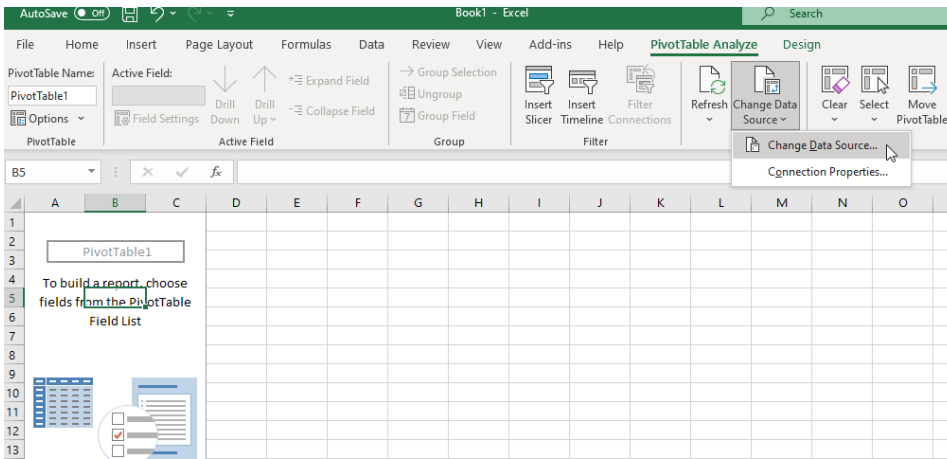
Then in the next window click Choose Connection and select the connection you want to use.
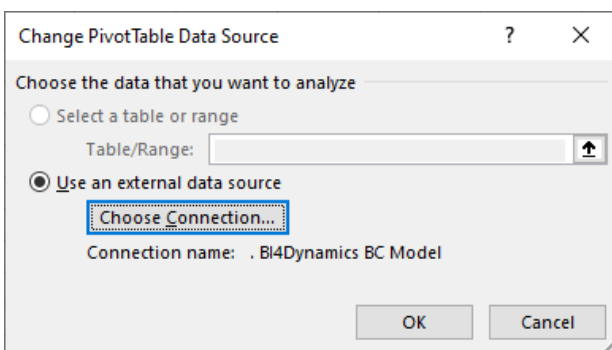
1.4 Refreshing a connection

To refresh the data, you need to refresh the connection which effectively connects to the OLAP cube and returns the latest data available.

One connection can only be linked to a single OLAP cube. You can however have several connections in a workbook, though each pivot table can only be based on a single connection.

You can refresh individual connections, or you can refresh all connections at once.

Go to: *Data >> Refresh All (or Refresh)*
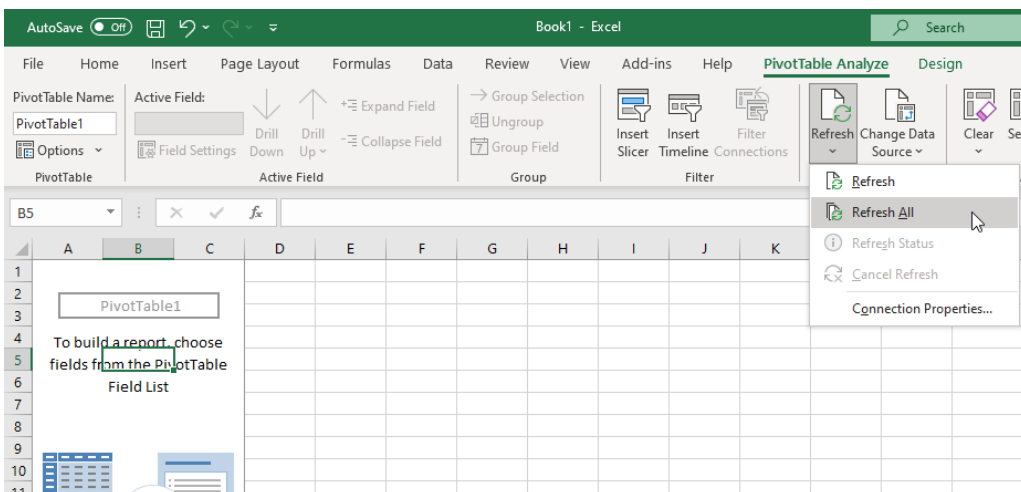
1.5 Connection properties

Each individual connection has several properties you can set. To view the list of all connections in a workbook go to *Data >> Connections,* which will bring up the Workbook Connections windows.
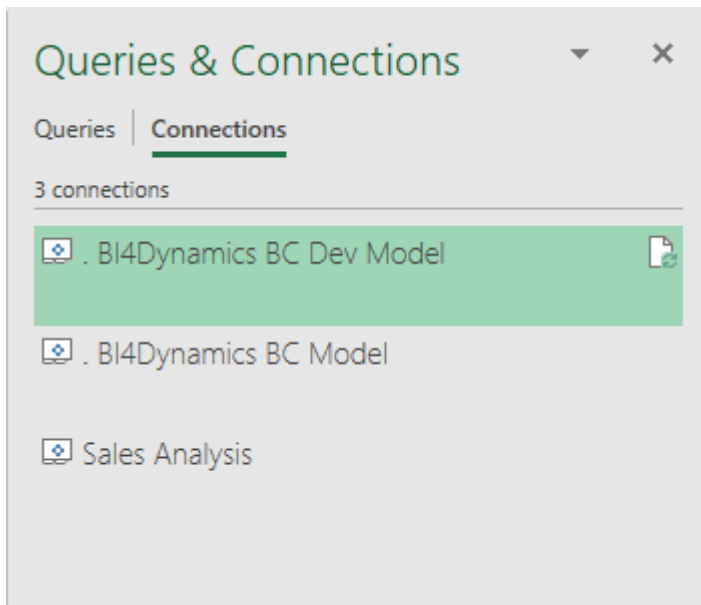
Besides having the option to also delete and refresh individual connections from this window, you can click on the properties button to bring out the properties of the chosen connection.

On the usage tab you can control:

1. The refresh rate of the connection:
   - Refresh every X minutes
   - Refresh data when opening the file
2. OLAP Server Formatting for numbers, fonts, and colors.
3. OLAP Drill Through which controls the number of records retrieved when performing drill though (seeing the numbers behind the number).
4. Language settings, which, when available, returns the names of dimensions and measures in the language of the MS Office.
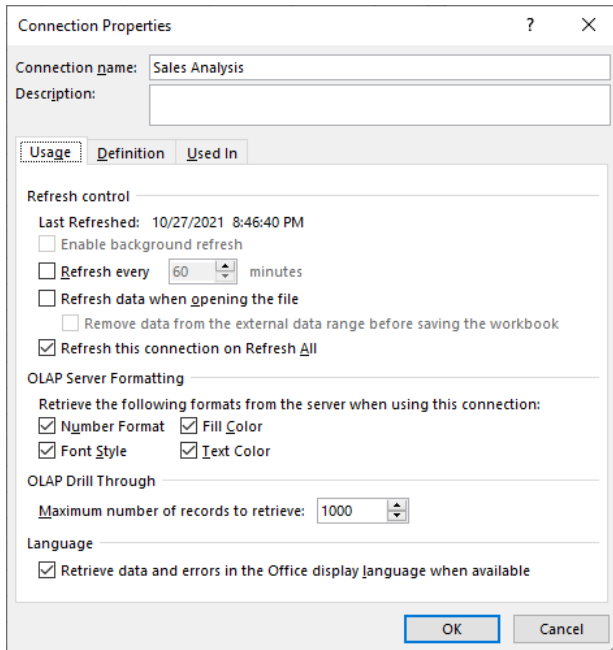
On the definition tab you can control:

1. The connection file used by the connection (which you can also change).
2. The connection string and command text (which you can also modify).
3. The Excel Services authentication settings which are important if you plan to use your Excel files with SharePoint Excel Services.
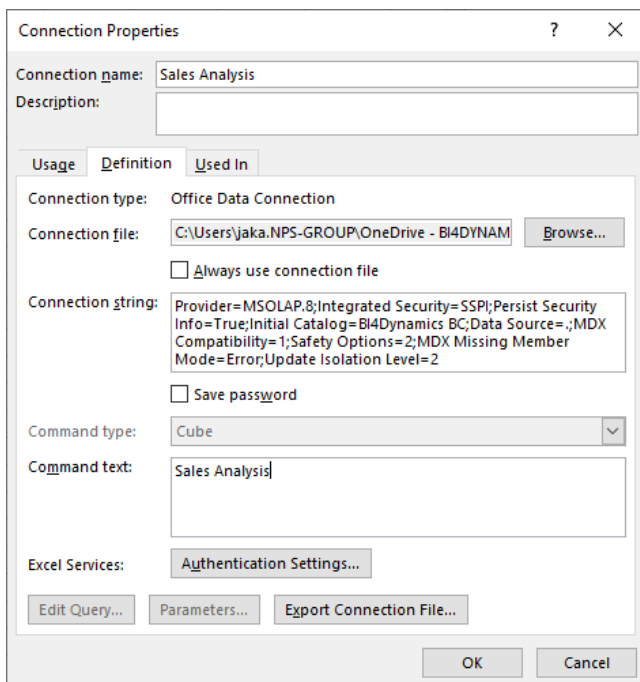
1.6 Exercises

Exercise 1 – Creating a new connection

Step 1: Select to create a new Analysis Services connection

Step 2: Connect to the server BI4NAV

Step 3: Select the BI4NAV database

Step 4: Select sales cube

Step 5: Rename you connection

Step 6: Select to create a pivot table report on the existing worksheet

Exercise 2 – Use an existing connection

Step 1: Select to use existing connection

Step 2: Select the connection you created in the previous exercise

Step 3: Select to create a pivot table report on the existing worksheet

2 PIVOT TABLE OVERVIEW

In Excel, a pivot table has 3 unique parts:

- Pivot table filed list, which shows the structure of the OLAP cube at the top and provides placeholders for the desired layout of your pivot table.
- Pivot table preview, where the pivot table will be created.
- PivotTable tools tabs in main menu, where you can find various options to modify your pivot table.
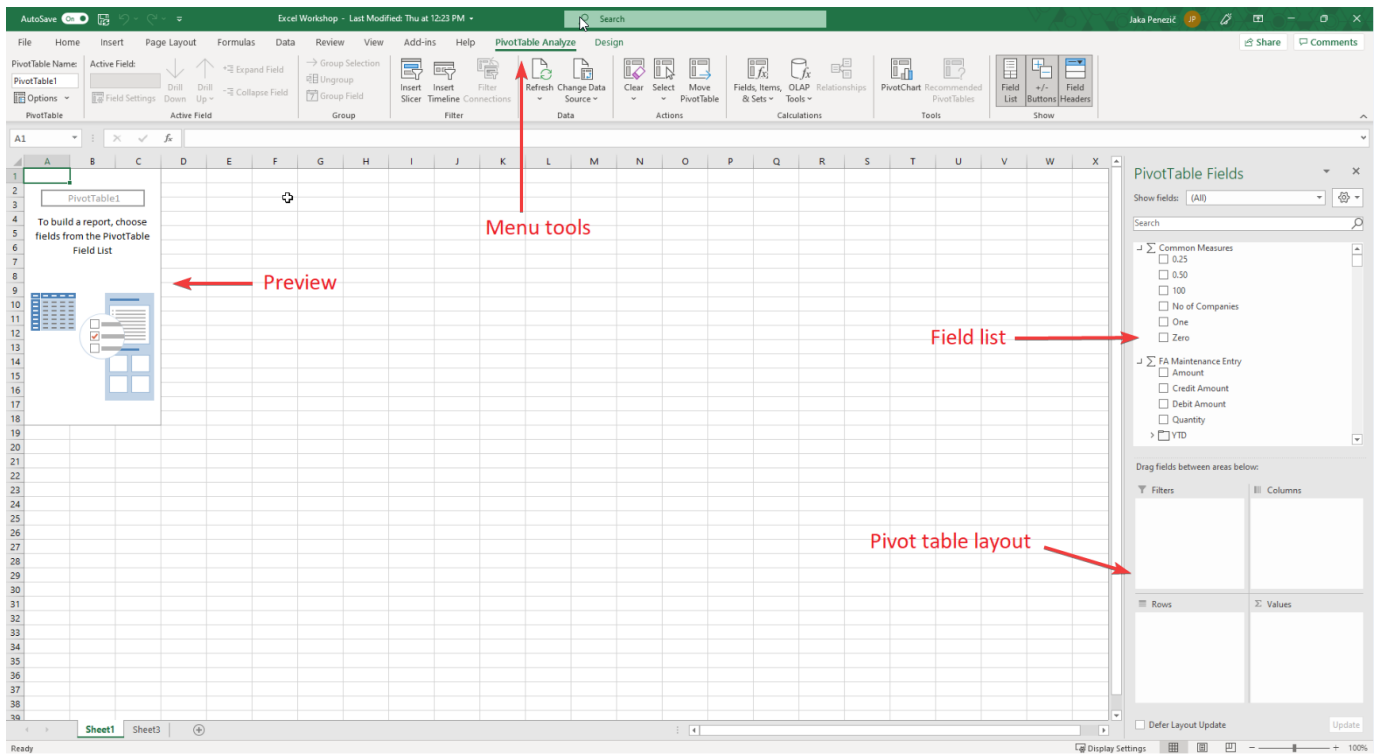
2.1 Pivot table field list

Pivot table field list contains dimension and measures.

By checking checkboxes, we filter the data cube.

Checked attributes are automatically positioned in pivot table rows and columns. This can be done manually by dragging and dropping the attribute into *Column Labels*, *Row Labels*, *and Values* in *Report Filters*.

For each dimension we can examine its hierarchy by clicking on the arrow on the side.

Filters can be added to reports in *Report Filter*.
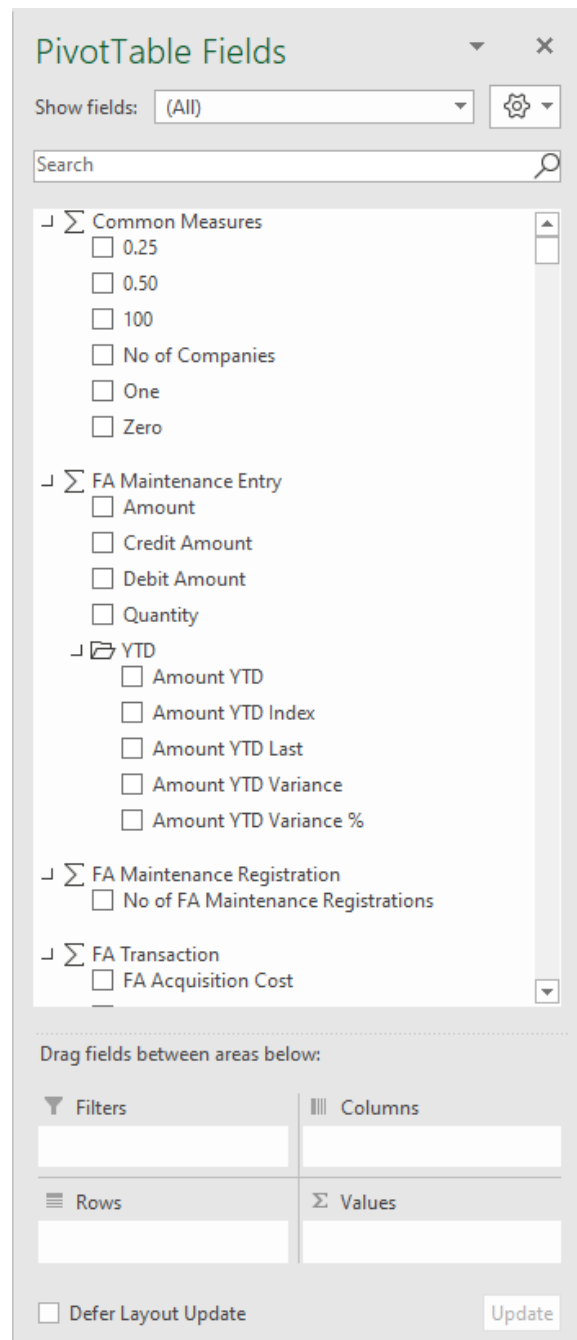
2.2 Pivot table preview

Pivot table preview is divided in data description (dimensions) part and data value part.

Data description part contains:

- Header filter (global data filter),
- Row filter (filter applied on rows) and
- Column filter (filter applied on columns).

Net Sales	Column Labels									
Row Labels	CHAIR - Office Chair	FURNITURE	HARDWARE	MEUBILAIR	MISC - Miscellaneous	N/A	SOFTWARE	SPORT	TABLE - Assorted Tables	Grand Total
2017		1,778,987.51	553,683.25	1,815,549.96		899,919.21	1,976,414.22	5,348,280.21		12,372,834.36
2018		2,293,561.06	614,741.08	2,339,006.56		1,289,767.53	2,425,017.38	5,247,501.95		14,209,595.56
2019		2,819,871.06	1,250,021.84	2,844,488.28		1,677,445.27	5,232,138.00	2,473,651.08		16,297,615.53
2020		3,257,082.72	3,553,095.94	3,284,530.08		1,799,722.85	7,049,693.72	3,991,093.42		22,935,218.73
2021						49,603.59				49,603.59
2022	4,315.95				7,607.33	76,200.94			1,122.20	89,246.42
Grand Total	4,315.95	10,149,502.35	5,971,542.11	10,283,574.88	7,607.33	5,792,659.39	16,683,263.32	17,060,526.66	1.122.20	65.954,114.19

2.3 Pivot Table tools tabs

PivotTable tools tabs are automatically shown when clicking on one or more pivot table cells.
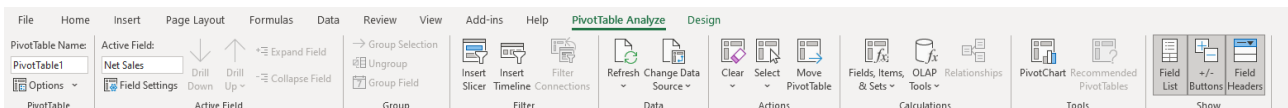
1. *Pivot Table Name* – name of pivot table.
2. *Options – changing pivot table options.*
3. *Active Field* – show active cell name.
4. *Field Settings – changing cell settings (sum, format cell...).*
5. *Drill Down – Shows the items children.*
6. *Drill Up – Shows the level above this item.*
7. *Expand Field – Expanding all items of the active field.*
8. *Collapse Field – Collapsing all items of the active field.*
9. *Group Selection* – Active on column and row header. Grouping data.
10. *Ungroup* – Active on column and row header. Ungrouping data.
11. *Group field* – Group numeric or date fields.
12. *Insert Slicer* – Inserting different slicers.
13. *Insert Timeline* – Inserting a timeline to filter dates interactively.
14. *Filter Connections – Manage which filters the Pivot Table is connected to.*
15. *Refresh* – Refreshing data from the data source.
16. *Change Data Source* – Choose a different data source.
17. *Clear* – Clear pivot table.
18. *Select* – Select parts of pivot table.
19. *Move Pivot Table* – Moving pivot table (into new sheet).
20. *Fields, Items, & Sets* – Defining additional groups.
21. *OLAP tools* – Working without a connection to OLAP cube and converting into formulas.
22. *Relationships* – Create or Edit relationships between tables.
23. *Pivot Chart* – Adding pivot chart.
24. Recommended Pivot Tables – Recommended Pivot Tables for your data.

25. *Field List* – Turn on/off data field list.
26. *+/- Buttons* – Turn on/off entering dimension hierarchies.
27. *Field Headers* – Turn on/off pivot table header.
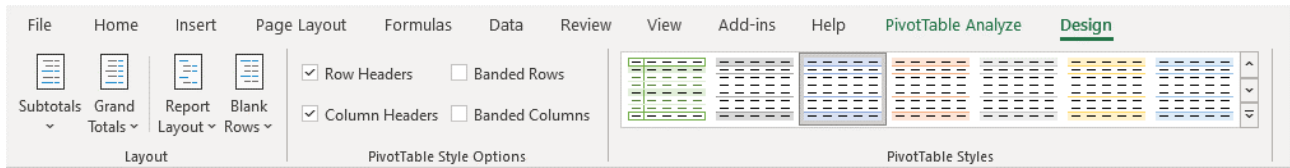
1. *Subtotals* – turn on/off sum, moving sum in the top or bottom of the table. Sum of selected dimension values.
2. *Grand Totals* – turn on/off sum total and preview the sum for either column or row values. Partial sum of all dimension values.
3. *Report Layout* – different report layouts.
4. *Blank Rows* – turn on/off blank rows in dimensions.
5. *Row Headers* – selecting row header color.
6. *Column Headers – selecting column header color.*
7. *Banded Rows – even rows in other color.*
8. *Banded Columns – even columns in other color.*
9. *Pivot Table Styles* – Setting pivot table appearance.

3 WORKING WITH PIVOT TABLES

3.1 Creating, modifying and deleting the pivot table layout

The first thing we need to do before designing our pivot table is to think about which dimensions and measures, we are going to need.

Once we have identified them, we can select or just drag & drop them to the desired location in our pivot table. The fields will be shown automatically in the pivot table preview.

We can rearrange, add or remove the fields from our pivot table at any time by dragging and dropping or by using the arrow buttons and selecting the action from the contextual menu that comes up.
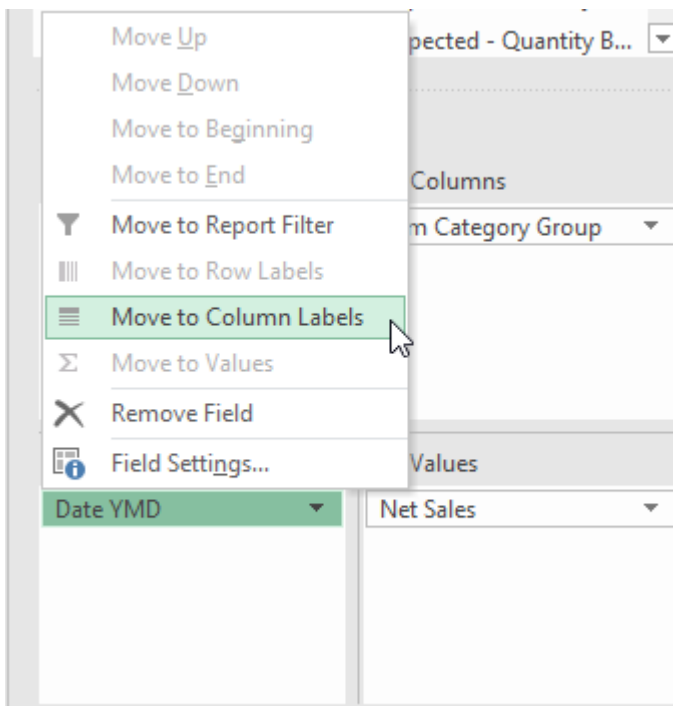
Click on the arrow next to *Date YMD* and select Move *to Column Labels*. Dimension *Date YMD will be moved from rows to columns*.

Move to Row Labels moves dimension from columns to rows. (Row is active only if data in the column was previously selected)

We can also use **Drag and drop**.

3.2 Nesting dimensions

When we set up multiple dimensions in columns/rows, we are talking about dimension nesting. This is very useful when we want to see related information from different dimensions grouped together.

In our example we want to see how well our salespeople did within the years. In the pivot table field list, we select the *Salesperson - Purchaser* dimension and drag it below the *Data YMD* dimension. The order in which dimensions appear is important because the order defines the grouping.

Adding dimension:

Result:

3.3 Exercises

Exercise 1 – Creating a new pivot table

We will create a report showing Net Sales by Customer by country over years

Step 1: Drag Customer by country to row labels

Step 2: Drag Date YQMD to columns labels

Step 3: Select Net Sales and see it being added to the Values

Net Sales	Column Labels						
Row Labels	⊞2017	⊞2018	⊞2019	⊞2020	⊞2021	⊞2022	Grand Total
Austria	1,256,869.70	1,477,322.52	753,886.20	1,163,887.78	3,528.40	13,732.60	4,669,227.20
Belgium	394,278.68	432,882.94	865,132.32	910,823.60	8,758.12	2,582.80	2,614,458.46
Canada	180,765.98	169,377.44	1,025,530.62	1,874,059.22			3,249,733.26
Czech Republic	212,094.78	265,640.01	455,287.44	707,484.30	27,105.17	1,602.90	1,669,214.60
Denmark	543,456.15	630,133.17	777,020.29	912,274.24			2,862,883.85
France	73,973.78	80,443.50	344,954.68	687,172.93			1,186,544.89
Germany	470,471.20	569,936.50	1,433,318.18	1,964,053.46		24,727.15	4,462,506.49
Great Britain					1,596.50	29,754.50	31,351.00
Iceland	357,384.77	442,621.19	1,060,271.80	1,062,065.20		2,901.53	2,925,244.49
Malaysia	881,756.68	964,270.66	526,028.32	897,395.20			3,269,450.86
Morocco	381,687.45	2,713,838.41	579,347.08	790,832.98			4,465,705.92
N/A	358,906.06	380,469.56	181,469.10	181,782.50			1,102,627.22
Netherlands	1,661,609.64	1,459,199.88	1,189,058.88	2,137,372.38	8,615.40		6,455,856.18
Norway	430,451.38	480,941.92	680,613.48	621,075.50		11,772.20	2,224,854.48
Slovenia	616,847.84	753,760.39	607,199.90	942,923.94			2,920,732.07
South Africa	141,374.88	278,372.84	241,963.80	420,494.73			1,082,206.25
Spain	1,758,016.72	433,127.44	921,061.93	1,289,740.85			4,401,946.94
Sweden	265,434.96	287,821.40	1,256,674.30	1,410,195.00		673.71	3,220,799.37
Switzerland	306,992.00	364,033.68	1,284,972.73	1,755,084.30			3,711,082.71
United Kingdom	2,010,245.27	1,849,852.47	1,396,711.20	1,994,456.06			7,251,265.00
USA	70,216.44	175,549.64	717,113.28	1,212,044.56		1,499.03	2,176,422.95
Grand Total	12,372,834.36	14,209,595.56	16,297,615.53	22,935,218.73	49,603.59	89,246.42	65,954,114.19

Exercise 2 – Modify layout

Use the report you created in exercise 1 (copy the existing report to a new sheet).

Step 1: Drag the date dimension in the filter.

Step 2: Select additional measures: Cost, Profit.

Step 3: Replace customer by country dimension with Bill to customer dimension in row label

Step 4: Which Bill to Customer was the most profitable? **HINT:** (Sort on Profit from biggest to smallest)

Date YQMD	All ▼		
Row Labels ↓	**Net Sales**	**Cost**	**Profit**
22 - John Haddock Insurance Co.	1.050.254,62	262.250,37	788.004,25
36 - Gagn & Gaman	1.399.592,68	632.582,64	767.010,04
68 - Möbel Siegfried	1.169.085,66	408.088,76	760.996,90
44 - Designstudio Gmunden	1.099.247,49	376.053,39	723.194,10
57 - CP Customer Template	1.102.627,22	386.133,66	716.493,56
52 - Blanemark Hifi Shops	1.069.196,13	372.413,84	696.782,29
10 - Progressive Home Furnishings	1.005.645,45	350.694,07	654.951,38
47 - Marsholm Karmstol	1.057.984,64	455.737,72	602.246,92
64 - Klubben	1.063.966,22	490.116,21	573.850,01
56 - The Device Shop	948.908,70	385.936,04	562.972,66
60 - Hotel Pferdesee	1.084.600,87	525.257,86	559.343,01
14 - Highlights Electronics Sdn Bhd	1.044.289,58	496.888,50	547.401,08
32 - Libros S.A.	1.573.490,95	1.084.307,07	489.183,88
41 - Sonnmatt Design	968.703,58	485.518,63	483.184,95
73 - Möbel Scherrer AG	857.570,74	381.178,65	476.392,09
70 - Candoxy Canada Inc.	925.547,15	460.564,16	464.982,99
37 - MEMA Ljubljana d.o.o.	871.410,24	411.609,98	459.800,26
26 - Nieuwe Zandpoort NV	717.917,29	318.816,00	399.101,29
72 - London Candoxy Storage Campus	584.770,14	214.365,06	370.405,08
24 - Meersen Meubelen	630.615,76	281.191,61	349.424,15
74 - J & V v.o.s.	721.241,01	371.916,61	349.324,40
77 - Ravel Mřbler	669.068,72	326.494,76	342.573,96
46 - Candoxy Kontor A/S	655.344,68	314.157,89	341.186,79
65 - Englunds Kontorsmöbler AB	532.760,33	207.140,42	325.619,91
67 - Afrifield Corporation	610.319,63	287.197,04	323.122,59
59 - Cronus Cardoxy Procurement	567.357,62	250.841,34	316.516,28
40 - Parmentier Boutique	533.121,47	226.540,83	306.580,64
39 - Centromerkur d.o.o.	536.182,89	237.120,96	299.061,93
28 - Lovaina Contractors	521.926,19	231.951,10	289.975,09
49 - Beef House	472.637,62	191.758,45	280.879,17

Exercise 3 – Nesting dimensions

Use the report you created in exercise 1 (copy the existing report to a new sheet).

Step 1: Remove the Customer by Country from the report.

Step 2: Drag Item by Category to rows.

Step 3: Drag Salesperson-Purchaser below Item by Category in rows.

Net Sales	Column Labels				
Row Labels	⊞ 2008	⊞ 2009	⊞ 2010	⊞ 2011	Grand Total
⊞ FURNITURE	1.815.549,96	2.339.006,56	2.844.488,28	3.284.530,08	10.283.574,88
AH - Annette Hill				57,84	57,84
BD - Bart Duncan	430.628,89	531.439,80	702.480,45	794.636,10	2.459.185,24
JR - John Roberts	495.546,38	581.207,24	637.882,51	798.293,67	2.512.929,80
LM - Linda Martin		137.610,00			137.610,00
MD - Mary A. Dempsey	475.671,70	592.749,70	720.612,30	680.504,26	2.469.537,96
N/A				10.975,93	10.975,93
PK - Peter Kozina				1.082,00	1.082,00
PS - Peter Saddow	27.746,72	35.621,79		8.302,00	71.670,51
RL - Richard Lum	385.956,27	460.378,03	783.513,02	990.678,28	2.620.525,60
⊞ HARDWARE	279.703,81	313.911,89	627.680,37	1.743.977,50	2.965.273,57
AH - Annette Hill				337.968,20	337.968,20
BD - Bart Duncan	65.606,16	78.991,61	139.566,40	139.941,26	424.105,43
JR - John Roberts	99.565,89	94.367,93	159.080,92	364.407,48	717.422,22
LM - Linda Martin				234.562,83	234.562,83
MD - Mary A. Dempsey	51.335,69	63.329,17	167.823,70	197.334,24	479.822,80
N/A				378,00	378,00
PS - Peter Saddow	985,80			255.329,40	256.315,20
RL - Richard Lum	62.210,27	77.223,18	161.209,35	214.056,09	514.698,89

4   DATA DISPLAY OPTIONS

4.1 Dimension browsing (hierarchies)

Dimension browsing is one of the most interesting pivot table features. Each dimension usually has at least one hierarchy defined. By browsing a specific dimension hierarchy, we can access more detailed data in a very simple and effective way just by clicking on + next to the dimension.

The result is shown in the next picture. The procedure can be repeated until we reach the lowest hierarchy level (In our example the lowest level is day).

Net Sales	Column Labels ▾		
Row Labels ▾	Austria	Belgium	
⊟ 2017			
⊞ 2017 - Jan	7,511.52	3,227.99	
⊞ 2017 - Feb	168,350.66	19,383.84	
⊞ 2017 - Mar	15,742.12	6,359.00	
⊞ 2017 - Apr		5,432.72	
⊞ 2017 - May	181,034.22	70,430.34	
⊞ 2017 - Jun	78,472.44	12,597.80	
⊞ 2017 - Jul	556,995.58	62,900.60	
⊞ 2017 - Aug	124,445.70	63,596.82	
⊞ 2017 - Sep	28,963.60	37,010.14	
⊞ 2017 - Oct	20,400.70	28,804.87	
⊞ 2017 - Nov	24,300.32	55,853.22	
⊞ 2017 - Dec	50,652.84	28,681.34	
⊞ 2018	1,477,322.52	432,882.94	
⊞ 2019	753,886.20	865,132.32	
⊞ 2020	1,163,887.78	910,823.60	
⊞ 2021	3,528.40	8,758.12	
⊞ 2022	13,732.60	2,582.80	
Grand Total	4,669,227.20	2,614,458.46	

Net Sales	Column Labels ▾		
Row Labels ▾	Austria	Belgium	Canada
⊟ 2017			
⊟ 2017 - Jan			
01.01.2017		3,227.99	
02.01.2017			
03.01.2017			
04.01.2017			
07.01.2017			
10.01.2017	9,992.40		
12.01.2017			
13.01.2017			
15.01.2017			
16.01.2017	-1,042.00		
18.01.2017			
19.01.2017			
22.01.2017			1,627.76
23.01.2017			
28.01.2017			
31.01.2017	-1,438.88		

4.2 Sorting data

Sorting can be performed with standard Excel functionality. In pivot tables we can sort by dimensions and measures. Sorting in ascending or descending order is always possible. The more advanced options are context based and depend on whether we want to sort dimensions or measures. By right clicking a field and selecting *Sort >> More Sort options* we will be presented with the relevant possibilities.

Dimension Sort options: Measures Sort Options:

Sort (Name) ? ✕

Sort options

○ Data source order
○ Manual (you can drag items to rearrange them)
◉ Ascending (A to Z) by:
   [Name ▾]
○ Descending (Z to A) by:
   [Name ▾]

Summary

Sort Name in ascending order

[More Options...] [OK] [Cancel]

Sort By Value ? ✕

Sort options   Sort direction
◉ Smallest to Largest   ◉ Top to Bottom
○ Largest to Smallest   ○ Left to Right

Summary

Sort Name by GL Net Change in ascending order using values in this column:
Grand Total

[OK] [Cancel]

4.3 Filtering data

Filtering allows us to limit the data presented to us based on certain conditions. Like with sorting, we can filter on dimensions and measures and for that we have two types of filters plus a special Top filter option:

- Label filters
- Value filters
- Top filter

Any pivot table can also contain a report filter, which is a dimension filter applied to the entire report.

Label filters

Label filters are based on dimension values.

In our example we wish to display only gross sales in Canada, therefore it is necessary to setup a filter on *Customer by Country* dimension. This is done by clicking on icon ⎘ and choosing a filter value. We can also filter by multiple values. For more options on setting Label filters, you can also select *Filter >> Label Filters...*
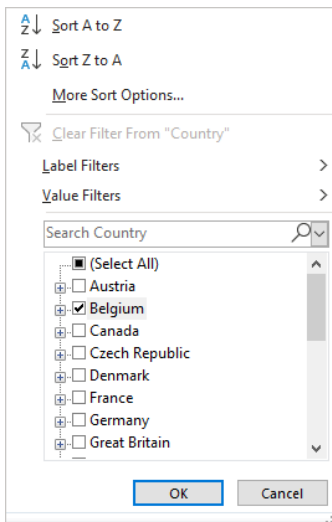
We can have filters set on rows and columns at the same time for any dimension present. We will set up the filter for our date dimension on years 2016 and 2017.
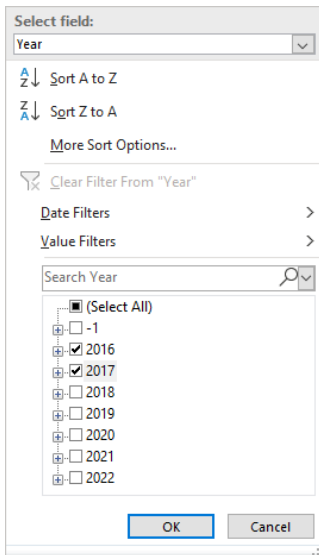
If we wish to remove filter, we right click on a dimension value and select *Filter >> Clear Filter From ...* in drop down menu.

Top 10 filters

We can filter our data to display top X customers, vendors ... To set a Top filter we right click on one of the countries in our rows and select *Filter >> Top 10...* from the drop-down menu.

In the Top 10 Filter window we control whether we want to select top or bottom members, the number of members, whether we want to count them as individual items or percentages and by which measure, we want our filter to display. Please note that you can choose any measure in the OLAP cube, even if it not present in the pivot table.
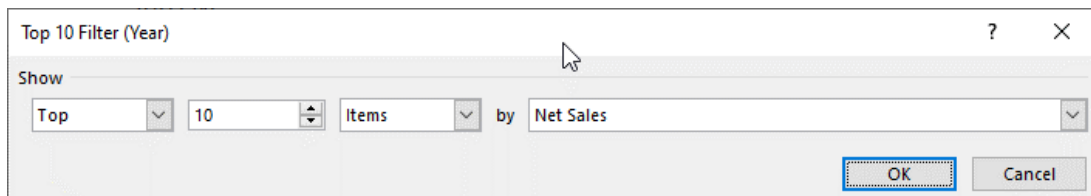
Value filters

Value filters are based on the measure values and are set up by right clicking and choosing *Filter >> Value Filters...* from the drop-down menu.

In the Value Filter window, we select the measure on which we want to base our filter on, and the condition for the filter.
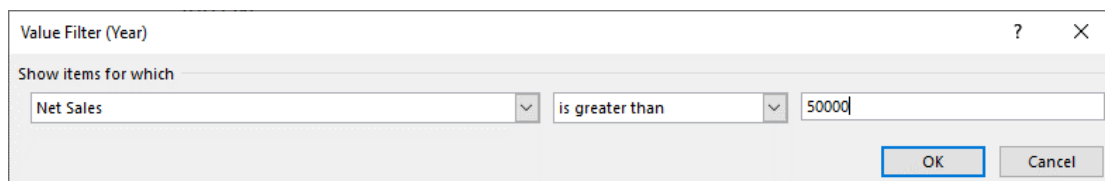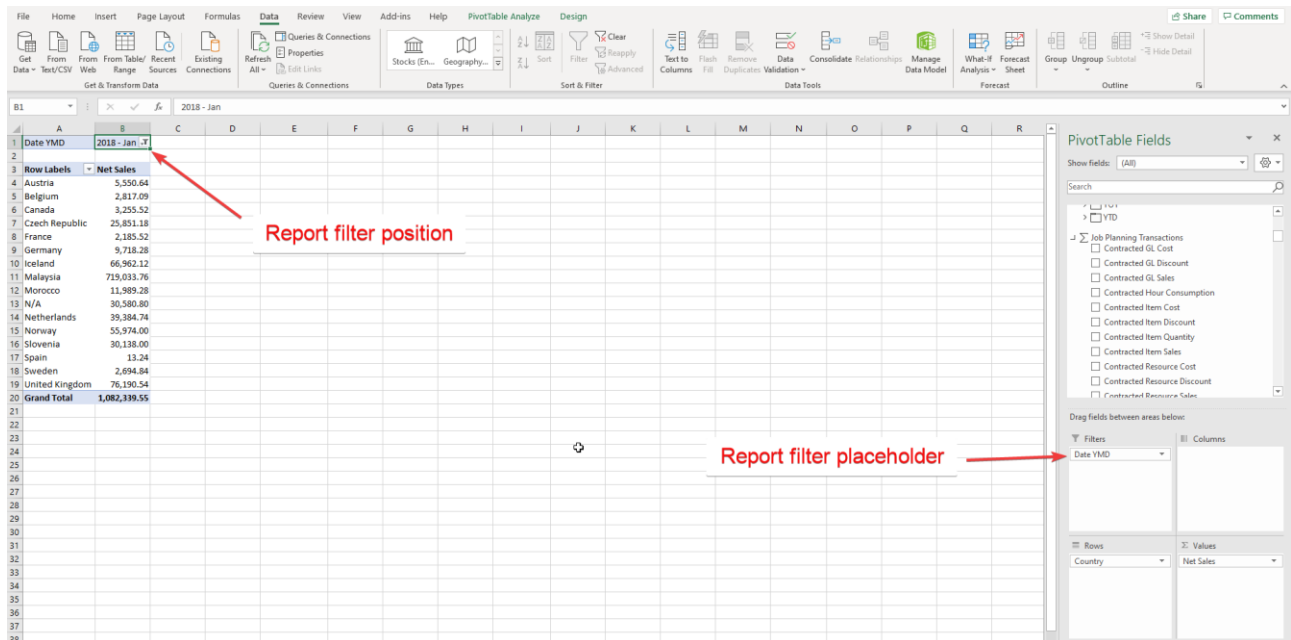
Report filters

Report filter is a separate placeholder in the pivot table layout. Only dimensions can be a part of the report filter. By setting report filter you are filtering all the other measures and dimensions in the pivot table (in rows, columns and measures).

Report filters appear above the pivot table and you can set a value by clicking on the ▼ icon next to the name.

4.4 Slicers

A special kind of report filters Excel are Slicers. Slicers offer several advantages over standard report filters:

- They are a much more visual way to present your filters and you can quickly see what you have filtered on and even indicate where there is no data.
- They can be tied to more than one pivot table (if they use the same connection)
- They can be formatted, customized and rearranged.

To create a Slicer, you can select the pivot table and click *Options >> Insert Slicer*. This brings up a window where you can select individual hierarchy levels of dimensions to create desired slicers. Each level will create a separate slicer.

There is a new Slicer Tools tab available when you select a slicer. This gives you several option to customize the appearance and behavior of your Slicer.
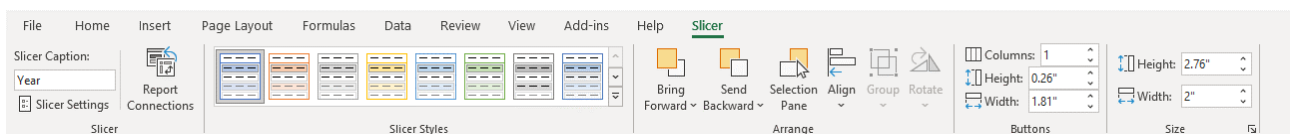
1. *Slicer Caption* – name of the slicer.
2. *Pivot Table Connections* – connection between slicer and pivot table.

3. *Slicer Styles* – slicer style.
4. *Bring Forward* – position of the slicer.
5. *Send Backward* – position of the slicer.
6. *Selection Pane* – turns on the ribbon with all slicers.
7. *Align* – position of the slicers.
8. *Group* – slicers grouping.
9. *Rotate* – rotates the slicer.
10. *Buttons* – defining option buttons in the slicer.
11. *Size* – defining slicer width and height.

4.5 Search

Another powerful feature of Excel is the Search.

By clicking on the icon ![icon] you will see the Search box in the dropdown menu. Based on the selected field of the dimension hierarchy you can search for members by typing in the box. The results are filtered on-the-fly as you start typing. This is very useful when you want to find a specific member in a large dimension (for example a specific customer from the customer dimension, or all documents that start with 011...).
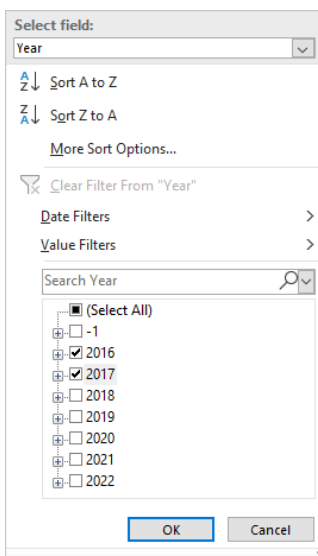
4.6 Subtotals, dimension levels display and grouping

Subtotals

By default, your pivot table will show Subtotals for various dimension hierarchy levels when you drill down. We can turn it off by removing the thick in front of Subtotal option in the right-click drop down menu.

Dimension levels display

Row Labels	Net Sales
⊞ 2017	12,372,834.36
⊟ 2018	14,209,595.56
2018 - Jan	1,082,339.55
2018 - Feb	1,133,063.15
2018 - Mar	1,234,927.38
2018 - Apr	1,318,365.45
2018 - May	1,447,895.58
2018 - Jun	907,076.94
2018 - Jul	2,122,209.96
2018 - Aug	990,989.39
2018 - Sep	1,013,039.74
2018 - Oct	1,054,608.36
2018 - Nov	942,636.77
2018 - Dec	962,443.29
⊞ 2019	16,297,615.53
⊞ 2020	22,935,218.73
⊞ 2021	49,603.59
⊞ 2022	89,246.42
Grand Total	65,954,114.19

When browsing dimensions, many times pivot tables become too big. In the example above we browsed to the deepest level of *Date YQMD* dimension.

We can hide individual level from the hierarchy by right clicking on the field and select *Show/Hide Fields*. This can help us in keeping our pivot tables easier to read and understand. In the below example we hid the quarter and day level of the Date YQMD dimension.

4.7 Exercises

Exercise 1 – Filters, Search and Sort

Step 1: Create a new report with Bill-to-Customer in rows, Item by Category in report filters and Net Sales and Profit % as measures.

Step 2: Set the report filter to Disk Product Group by Searching for "DISK" (remember to set the Product Group Level!)

Step 3: Set a TOP 10 display filter by Net Sales

Step 4: Sort the pivot table descending by Profit%

Item by Category by Product Group	DISK	
Row Labels	**Net Sales**	**Profit %**
68 - Möbel Siegfried	10.032,80	75,05%
72 - London Candoxy Storage Campus	8.083,10	74,58%
52 - Blanemark Hifi Shops	8.257,40	67,76%
60 - Hotel Pferdesee	8.198,20	66,31%
22 - John Haddock Insurance Co.	8.982,07	63,24%
36 - Gagn & Gaman	14.669,30	62,47%
34 - Helguera industrial	8.165,18	55,65%
56 - The Device Shop	8.741,40	54,72%
49 - Beef House	10.338,10	41,57%
64 - Klubben	13.088,00	24,53%
Grand Total	**98.555,55**	**57,10%**

Exercise 2 – Slicers

Use the report created in the previous exercise.

Step 2: Click on the pivot table and click Insert Slicer

Step 3: Select Date YMD Year and under More Fields Month for the Slicers and click OK.

Step 4: Resize the Month slicer and increase the number of columns to fit all the members.

Step 5: Filter on Year 2010 and Month of June

Item by Category by Product Group	DISK	

Row Labels	Net Sales	Profit %
37 - MEMA Ljubljana d.o.o.	580,00	60,30%
68 - Möbel Siegfried	498,40	55,88%
65 - Englunds Kontorsmöbler AB	610,50	50,09%
56 - The Device Shop	559,40	46,37%
67 - Afrifield Corporation	253,40	45,99%
59 - Cronus Cardoxy Procurement	628,20	45,72%
22 - John Haddock Insurance Co.	189,00	45,58%
10 - Progressive Home Furnishings	589,00	45,50%
36 - Gagn & Gaman	488,60	45,49%
16 - Somadis	634,70	37,11%
Grand Total	**5.031,20**	**47,88%**

Year

2008
2009
2010
2011
N/A

Month

January	February
March	April
May	June
July	August
September	October
November	December
N/A	

5   FORMATTING

5.1 Pivot table formatting

For pivot table formatting we can use all common Excel formatting functions. We can change font size, colors, cell size, cell color...

Style does not change when we nest dimensions, add new dimensions, refresh data...

We can find all formatting options in *Styles* toolbar. We can find it in *Microsoft Excel >> Home* tab. There is also separate PivotTable Styles section on the Design tab of the pivot table Tools group.
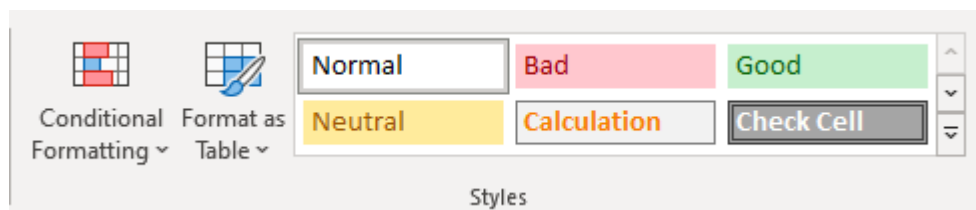
5.2 Displaying and formatting measures

We manage measures in the same way as dimensions. Usually, we wish to show measures in a specific format (numbers, percentage ...) and style (red for negative or based on certain condition).

 In our example we remove the *Sales-purchaser Person* dimension and we add the *Sales Discount Amount* measure. By doing this we are able to see by years what the discount amount was.

Show values as...

By default, measures are shown in the format defined in the OLAP cubes. But, for example, we are sometimes interested in percentage values rather than the actual values. In this way we can monitor changing measures throughout a period of time in a more descriptive way. In our example we will show *Net sales* in percentage.

We select the cells we want to format and right click. In the drop-down menu we select *Value Field Settings*. We can do this also by *PivotTable Analyze >> Active Field >> Field Settings*.

5.3 Conditional formatting

Conditional formatting enables us to visually indicate outliers based on the conditions we define. Including traffic lights into a pivot table is presented in this chapter. Traffic lights help managers to observe business indicators and take measures if necessary. There are however other types available as well:

- *Highlight Cells Rules* – highlight: greater than, lower than, equal to, between...
- *Top/Bottom Rules* – Displaying top 10, bottom 10, top 10 %, bottom 10 %, above average, below average...
- *Data Bars* – graphically displaying cell values.
- *Color Scales* – displaying cell color according to its value
- *Icon Sets* – displaying cell icons according to its value (arrows, traffic lights...).

First, we must select the cells we want to add traffic lights to. Then we go to *Microsoft Excel >> Home >> Conditional Formatting >> Icon Sets*.
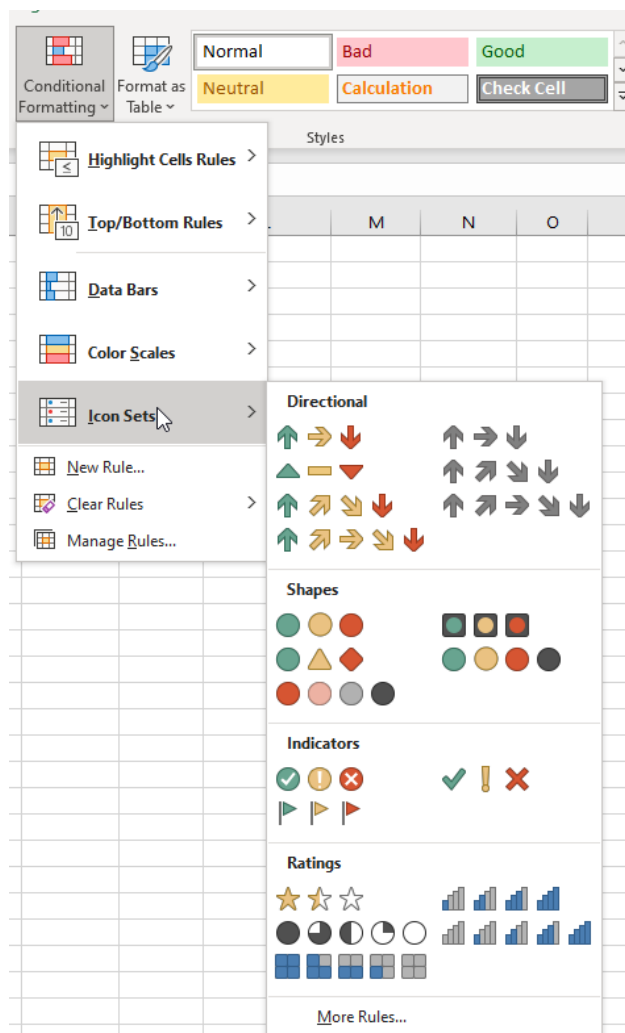
Selected traffic lights are automatically assigned to rows. By default, Excel selects a light according to the averages. If we wish to have our own rules, we click *More Rules...*

In *Apply Rule To –* we select the location of the traffic light cells. In *Select a Rule Type* we select a rule type. In our case the rule is determined by cell values. In *Edit the Rule Description we set up rules* for each light. We click *OK*.

5.4 Exercises

Exercise 1 - Formatting

Create report Sales by country in Dec 2019 over multiple measures.

Step 1: Connect to server to establish connection to Sales cube.

Step 2: Select Customer by country (Row label).

Step 3: Drag Net sales, Net sales YTD and Net sales YTD index in column label

Step 4: Which country has the biggest YTD index (sort)?

Step 5: Show net sales as % of Column Total.

Step 6: Format numbers to remove decimals.

Date YQMD	2019 - Dec		
Row Labels	**Net Sales**	**Net Sales YTD**	**Net Sales YTD Index**
Canada	5%	514,235	555%
Sweden	11%	628,095	427%
France	0%	189,965	422%
USA	3%	366,956	420%
Switzerland	2%	653,041	345%
Germany	13%	725,823	255%
Iceland	4%	538,716	244%
Spain	0%	473,424	218%
Belgium	4%	439,708	195%
Netherlands	0%	222,093	170%
Czech Republic	1%	227,644	146%
Norway	17%	346,795	144%
Denmark	7%	397,818	119%
South Africa	6%	122,205	87%
Slovenia	9%	316,449	82%
United Kingdom	16%	1,192,103	68%
Malaysia	1%	268,251	55%
Austria	3%	386,339	51%
Morocco	-1%	275,909	20%
Grand Total	**100%**	**8,285,571**	**114%**

Exercise 2

Bill to sell to ship to over net sales

Step 1: Copy existing report you created in exercise 1 on same sheet.

 Step 2: Remove all measures except net sales.

Step 3: Filter year 2017 in the background.

Step 4: Filter country United Kingdom in the background.

Step 5: Add Ship to Name and Sell to Customer - Customer dimension in row label.

Step 4: Add additional measures Sales Shipped Quantity, Shipped Invoiced Quantity Variance in column labels.

Step 5: Format measures (no decimals)

End result

Date YQMD	2017		
Country	United Kingdom		
Row Labels	Net Sales	Sales Shipped Quantity	Shipped Invoiced Quantity Variance
Antarcticopy	100%	6,226	-2,804
11 - The Cannon Group PLC	21%	390	-1,274
12 - Selangorian Ltd.	17%	1,033	-228
22 - John Haddock Insurance Co.	16%	676	-265
51 - Guildford Water Department	0%	-12	-41
52 - Blanemark Hifi Shops	12%	913	-76
53 - Blanemark Hifi Center NE	0%	1	-22
54 - Blanemark Hifi Center SW	0%	1	-33
55 - Fairway Sound	0%	-1	47
56 - The Device Shop	9%	1,141	-135
57 - Otis McAllister	19%	993	-126
66 - London Light Company	1%	-4	-548
67 - Afrifield Corporation	4%	1,093	-103
80 - Deerfield Graphics Company	0%	2	
Bilabankinn	100%	6,226	-2,804
11 - The Cannon Group PLC	21%	390	-1,274
12 - Selangorian Ltd.	17%	1,033	-228
22 - John Haddock Insurance Co.	16%	676	-265

Exercise 3

Sales/purchaser over multiple measures over customer by country and year 2019 Dec.

Step 1: Create new report on the same sheet.

Step 2: Select Salesperson: Salesperson - Purchaser dimension and drag it to row label.

Step 3: Drag Net sales, profit, Net sales YTD Last ... to Values label.

Step 4: Put Date dimension in the report filter and set filter 2019 – Dec.

Step 5: Put Customer by country dimension in report filter and set it for Switzerland.

Step 6: Format numbers.

Date YQMD	2019 - Dec				
Country	Switzerland				
Row Labels	Net Sales	Profit	Net Sales YTD Last	Net Sales YTD	Net Sales YTD Index
BD - Bart Duncan	11,533	3,362	39,460	121,679	308%
JR - John Roberts	2,834	1,753	62,459	154,421	247%
MD - Mary A. Dempsey			67,976	138,929	204%
RL - Richard Lum			19,214	238,013	1239%
Grand Total	14,366	5,114	189,109	653,041	345%

Exercise 4

Trend analysis: Net sales over quarters and years for GB by posting group.

Step 1: Create new report on the same sheet.

Step 2: Drag in Date dimension YMD in row label.

Step 3: Drag in Quarter (separate date dimension under Calendar) in column label.

Step 4: Set up Customer by country in background filter and set it for United Kingdom.

Step 5: Show net sales as percentage of row total (HINT: Select all measures > right click > value field settings).

Step 6: Format cells to get the similar result as in the picture.

Country	United Kingdom				
Net Sales	Column Labels				
Row Labels	Q1	Q2	Q3	Q4	Grand Total
⊞ 2017		38%	31%	21%	10%	100%
⊞ 2018		25%	22%	28%	25%	100%
⊞ 2019		22%	27%	21%	30%	100%
⊞ 2020		25%	21%	27%	27%	100%
Grand Total		28%	25%	24%	22%	100%

6 CHARTS

6.1 Pivot charts vs. Normal charts

Pivot charts are linked with the pivot table. Whatever changes you make in the pivot table are immediately reflected on the chart and vice versa. Everything in the pivot table is also present on the chart.

Normal charts on the other hand, must be manually defined and therefore any changes to the pivot table don't automatically reflect in the chart. Although this can be seen as a downside, it also gives you a lot more options in customizing your chart independently of the pivot table.

Pivot table and pivot chart commands comparison

Pivot table	Description	Pivot chart	Description
Values	Sum of numeric data	**Values**	Sum of numeric data
Row labels	Displaying fields on a margin of the report	**Axis fields (Categories)**	Displaying fields on chart axis
Column labels	Displaying fields in the top of the report	**Legend fields (Series) labels**	Displaying fields in chart legend
Report filter	It is used for filtering reports by selected criteria	**Report filter**	It is used for filtering reports by selected criteria

Pivot charts are dynamical structures because pivot tables have that characteristic. Inserting a pivot chart is very easy. We go to *Options >> Tools >> Pivot Chart* and *Insert Chart* window is displayed.
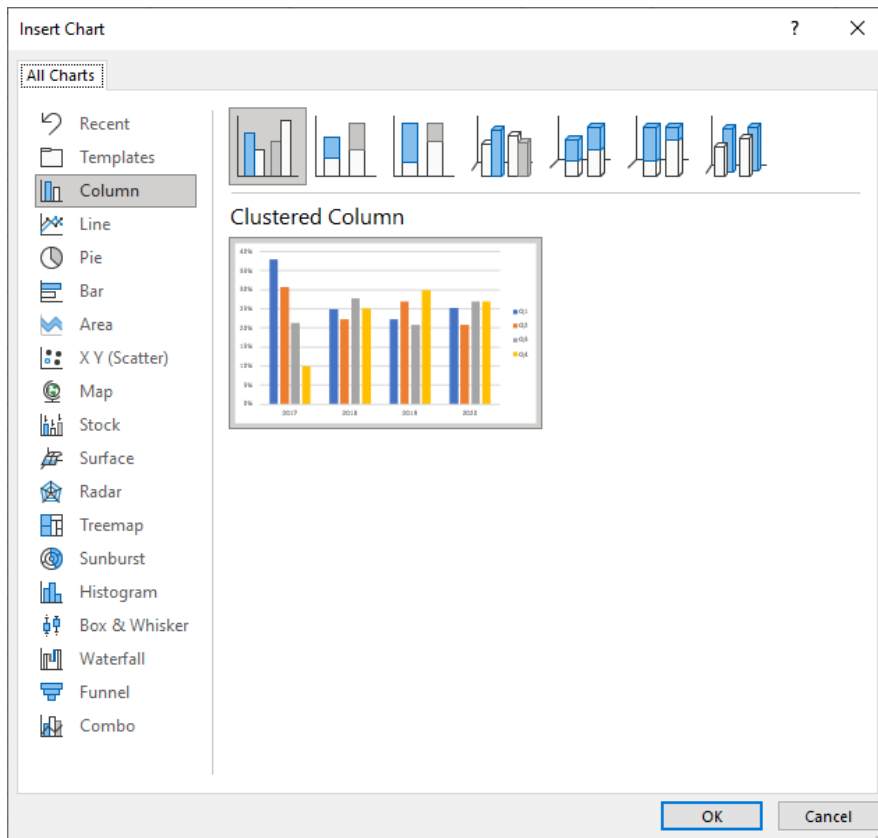
6.2 Chart design

When we click on the chart *Pivot Chart Tools* tab is displayed.

Here we have several tools for chart design.

1. *Add Chart Element* – Add axes, titles, labels, legend etc.
2. *Quick Layouts* – Change chart layout, legend, background etc.
3. *Change Colors* – Change colors of chart.
4. *Switch Row/Column* – Move values from rows to columns.
5. *Select Data* – Selecting chart data.
6. *Change Chart Styles* – Change chart template.
7. *Move Chart* – Moving chart to another sheet.

6.3 Chart Format
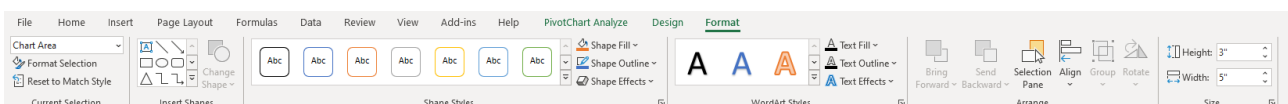
1. *Chart Area* – Displays current chart selection
2. *Format Selection* – Formatting selection (color, fill, font style, …).
3. *Reset to Match Style* – default style.
4. *Insert Shapes* – Insert different shapes.
5. *Shape Styles* – Edit chart border.
6. *WordArt Styles* – Edit text style/font.
7. *Arrange* – Edit chart position.
8. *Size* – Edit chart size.

6.4 Analyze chart options
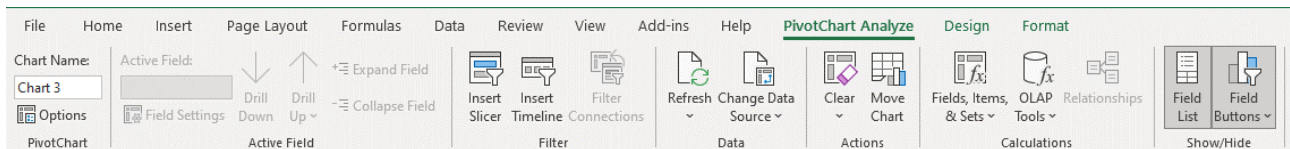
1. *Active field* - Editing chart analysis area.
2. *Insert Slicer* – Adding additional slicers.
3. *Insert Timeline* – Add additional date slicers.
4. *Refresh* – Refreshing data.
5. *Change Data Source* – Change source of the data.
6. *Clear* – Clear filters.
7. *Move Chart* – Move chart to another sheet or create own sheet.
8. *Fields, Items & Sets* – Calculated fields, items and creating and managing sets.
9. *OLAP tools* – MDX calculated measure, members etc.
10. *Field List* – Turn on of field list.
11. *Field Buttons – Turn on chart buttons.*

Data is refreshed by clicking *Refresh* icon in *Analyze* tab or by right clicking on a cell and selecting *Refresh* option in drop down menu.

6.5 Sparklines

Sparklines are a special in-cell chart type introduced in Excel 2010. They are great for showing trends over time. Because they are in-cell charts, they take very little space and are used to provide a general overview.

To insert a sparkline, select the data you want to chart and click on the type of sparkline you want to create on the Insert tab in the ribbon. The types available are:

- Line
- Column
- Win/Loss

You also must specify the location range, that is, the cells where the sparklines will appear. Note that you also must select a cell for each series of the sparkline. Multiple series will be grouped together by default, meaning they share the same characteristics. You can ungroup or group individual sparklines together as you wish later.
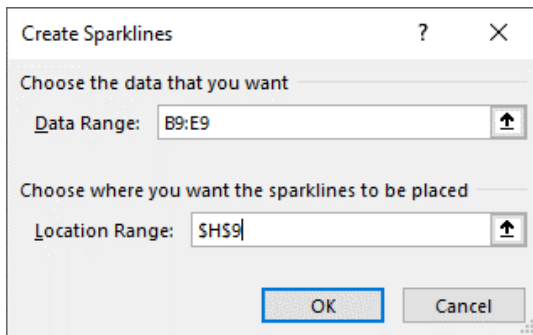
After you create the sparkline another tab with the options to customize your sparkline will be created in the ribbon.
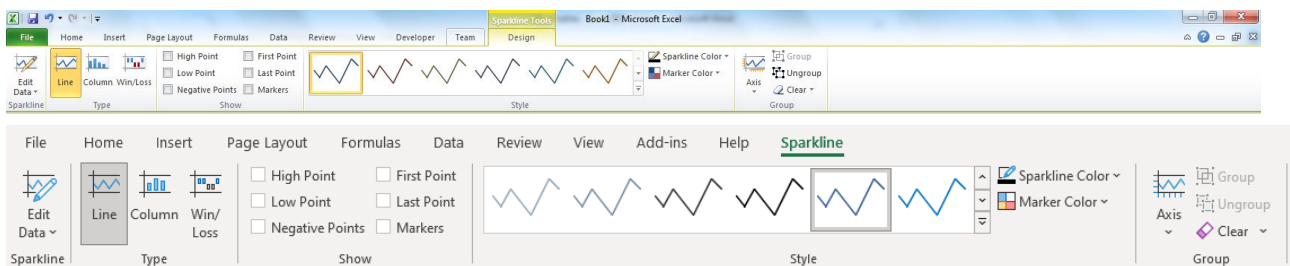
- Edit data – Allows you to change the data range used to plot the sparklines.
- Type – Change the type of the sparkline.
- Show – High and low points, first and last points, negative points or markers for individual data points.
- Style - Change the style of the sparklines.
- Sparkline color – Change the color and thickness of the sparklines.
- Marker color – Change the color of individual marker points.
- Axis – Customize axis settings.
- Group & Ungroup – Allows you to group or ungroup individual sparklines
- Clear – Clear grouping.

6.6 Exercises

6.6.1 Exercise 1 – Charting

Step 1: Create a report showing Net Sales and Profit % over Years

Step 2: Select the entire data range and Insert a column chart

Step 3: On the Format tab select the "Series Profit%" from the dropdown menu in current selection and then click format selection

Step 4: In the new window that open select to plot the series on the secondary axis. Note the change in you chart.

Step 5: While still having the series selected, right click on it in the chart and select to change the chart type to line chart.
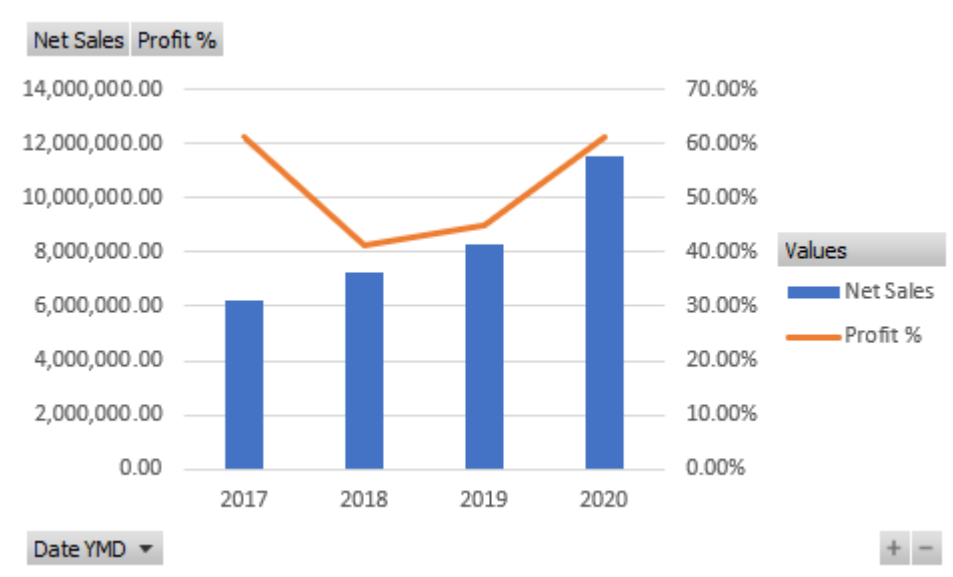
6.6.2 Exercise 2 - Sparklines

Step 1: Create a report showing Net Sales of your product categories over individual months

Step 2: Select the entire data range and insert Line sparkline

Step 3: Select the cells to the right of the pivot table as the location range for the sparklines and click OK

Step 4: Make sure all the sparklines use the same minimum and maximum for vertical axis

Step 5: Highlight the Last point with a red bullet

Net Sales	Column Labels												
Row Labels	January	February	March	April	May	June	July	August	September	October	November	December	Grand Total
FURNITURE	770,324.61	768,190.79	586,659.45	694,686.49	980,594.37	954,983.82	1,312,807.18	721,779.56	842,053.70	876,835.70	876,132.05	764,454.63	10,149,502.35
HARDWARE	229,433.90	129,666.70	130,953.21	165,543.46	133,883.15	170,862.27	207,007.19	327,645.51	165,411.37	183,085.70	291,761.20	871,014.88	3,006,268.54
N/A	273,468.52	216,109.52	239,274.00	266,212.42	344,863.60	309,015.44	340,659.23	263,312.12	280,335.60	299,703.40	305,479.65	328,140.61	3,466,574.11
SOFTWARE	519,737.69	604,535.32	556,467.90	732,660.57	644,629.74	659,847.81	749,707.48	654,238.37	552,582.46	761,335.09	593,935.53	1,309,042.31	8,338,720.27
SPORT	1,423,313.06	673,648.33	1,066,653.08	1,177,666.62	491,535.17	277,621.01	1,008,218.17	570,522.73	610,630.50	484,217.99	395,559.06	175,090.26	8,354,675.98
Grand Total	3,216,277.78	2,392,150.66	2,580,007.64	3,036,769.56	2,595,506.03	2,372,330.35	3,618,399.25	2,537,498.29	2,451,013.63	2,605,177.88	2,462,867.49	3,447,742.69	33,315,741.25

7 REPORTING EXERCISES

7.1 Sales cube

Exercise 1

Create new report: Sales YTD analysis

Measures: Net sales, Net sales YTD index
Dimensions: Date YQMD

NOTE (Format the chart and add data labels to match the picture)

Row Labels	Net Sales	Net Sales YTD Index
2017		
2017 - Q1	1,805,247	
2017 - Q2	1,289,976	
2017 - Q3	1,932,384	
2017 - Q4	1,215,453	
2018		
2018 - Q1	1,754,184	97%
2018 - Q2	1,872,960	117%
2018 - Q3	2,104,440	114%
2018 - Q4	1,504,772	116%
2019		
2019 - Q1	1,919,192	109%
2019 - Q2	2,119,034	111%
2019 - Q3	2,001,407	105%
2019 - Q4	2,245,938	114%
2020		
2020 - Q1	2,709,813	141%
2020 - Q2	2,722,636	135%
2020 - Q3	2,568,681	132%
2020 - Q4	3,549,625	139%
Grand Total	33,315,741.25	
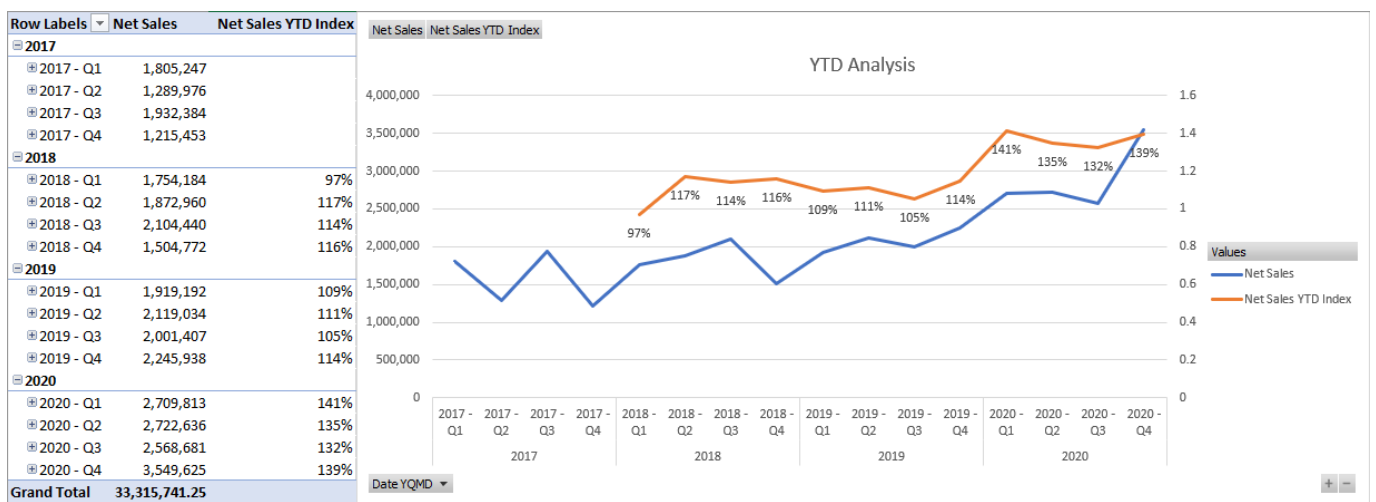
Exercise 2

Create new report: Date trend analysis

Measures: Date (YMD), Date Quarter (separate dimension)
Dimensions: Net sales (HINT: displayed as percentage)

NOTE (Format the chart and add data labels to match the picture)

Net Sales	Column Labels				
Row Labels	Q1	Q2	Q3	Q4	Grand Total
⊞ 2017	29%	21%	31%	19%	100%
⊞ 2018	24%	26%	29%	21%	100%
⊞ 2019	23%	26%	24%	27%	100%
⊞ 2020	23%	24%	22%	31%	100%
Grand Total	25%	24%	26%	26%	100%
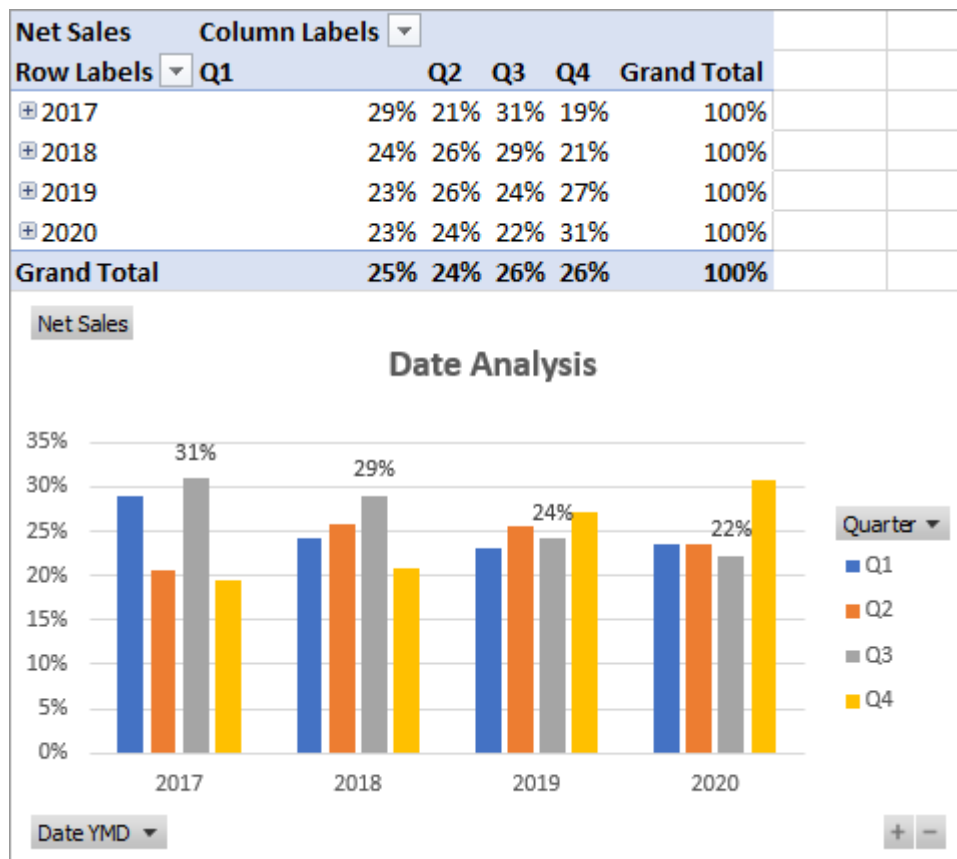
Exercise 3

Create new report: Top items by category group analysis

Measures: Net sales
Dimensions: Item by category product group, Item GL resource asset, Date

NOTE (Format cross table to match the picture)

Item GL Resource Asset	Item				
Net Sales	**Column Labels**				
Row Labels	⊞ **2006**	⊞ **2007**	⊞ **2008**	⊞ **2009**	**Grand Total**
⊞ FURNITURE - Office furniture	1.767.527	2.201.397	2.844.488	3.275.088	10.088.500
⊞ SW - Software	984.579	1.209.113	2.617.888	2.829.729	7.641.309
⊞ SPORT - Sport	1.093.321	1.206.552	1.270.096	1.842.612	5.412.582
⊞ HW - Hardware	114.566	144.150	336.032	535.835	1.130.583
⊞ MUSIC - Music hardware	129.986	159.103	286.306	345.570	920.965
⊞ PAINT - Paint	8.573	10.501	5.342	5.390	29.806
Grand Total	**4.098.553**	**4.930.815**	**7.360.153**	**8.834.224**	**25.223.745**

Exercise 4

Create new report: Top 80 % Items by Net sales over years
Measures: Net sales
Dimensions: Item, Type, Date

NOTE (Format cross table to match the picture)

Type	All				
Net Sales	**Column Labels**				
Row Labels	⊞ **2017**	⊞ **2018**	⊞ **2019**	⊞ **2020**	**Grand Total**
1000 - Bicycle	996,887.60	864,937.50	124,964.45	99,770.94	2,086,560.49
1001 - Touring Bicycle	1,524,096.70	1,595,400.00	826,270.80	1,370,259.75	5,316,027.25
1100 - Front Wheel	26,280.70	24,250.00	113,700.00	105,697.80	269,928.50
1150 - Front Hub	59,490.40	74,200.00	45,550.00	76,281.55	255,521.95
1896 - ATHENS Euro Chair	203,481.67	259,344.39	383,113.53	424,898.34	1,270,837.93
1900 - PARIS Guest Chair	53,895.60	183,033.80	92,636.51	109,600.08	439,165.99
1920 - CAPETOWN Leisure Chair	102,534.01	113,486.98	79,287.44	91,062.29	386,370.72
1930 - ST.MORITZ Storage Unit	35,942.14	42,369.07	82,685.56	90,964.38	251,961.15
1970 - GRENOBLE Whiteboard	90,396.70	85,831.14	176,243.84	222,636.42	575,108.10
1974 - SAPPORO Whiteboard	148,945.24	164,107.58	380,415.70	453,248.76	1,146,717.28
1984 - SARAJEVO Whiteboard	72,330.16	92,628.45	214,504.74	227,030.92	606,494.27
1990 - CALGARY Whiteboard	108,486.04	138,289.15	270,970.03	300,189.66	817,934.88
1992 - ALBERTVILLE Whiteboard	43,678.32	47,326.54	250,426.12	261,522.89	602,953.87
1996 - ATLANTA Whiteboard	193,966.80	256,641.44	229,530.74	288,016.53	968,155.51
2000 - BI4Dynamics NAV	679,348.37	815,318.28	1,785,741.93	1,944,814.99	5,225,223.57
2010 - BI4Dynamics AX	118,767.44	140,415.98	306,752.16	486,153.72	1,052,089.30
2020 - BI4Dynamics CRM	99,755.59	137,741.57	280,825.09	381,515.34	899,837.59
2071 - MS Dynamics CRM Lite	44,875.30	52,231.90	68,184.50	135,089.97	300,381.67
4012 - Team Work Computer	21,101.80	20,136.30	52,401.50	155,964.60	249,604.20
4013 - Enterprise Computer	15,927.70	11,137.50	43,867.75	212,546.98	283,479.93
7006 - Pedestal	104,332.34	125,596.54	46,149.60	68,949.24	345,027.72
N/A	534,333.98	817,538.01	1,027,340.77	1,087,361.35	466,574.11
Grand Total	**5,278,854.60**	**6,061,962.12**	**6,881,562.76**	**8,593,576.50**	**26,815,955.98**

Exercise 5

Create new report: Top 10 customers by net sales over years

Measures: Net sales
Dimensions: Type, Sell to customer - Customer, date

NOTE (Format cross table to match the picture)

Type	All				
Net Sales	**Column Labels**				
Row Labels	**2017**	**2018**	**2019**	**2020**	**Grand Total**
12 - Selangorian Ltd.	328,183.50	317,107.29	196,194.92	302,977.34	1,144,463.05
14 - Highlights Electronics Sdn Bhd	240,086.34	169,046.33	272,509.06	423,044.17	1,104,685.90
16 - Somadis	115,577.22	603,958.77	224,588.61	248,781.48	1,192,906.08
32 - Libros S.A.	808,167.44	114,462.84	282,222.43	330,317.98	1,535,170.69
36 - Gagn & Gaman	170,642.69	213,028.38	537,440.40	515,572.73	1,436,684.20
44 - Designstudio Gmunden	280,704.03	302,514.03	270,409.96	259,139.27	1,112,767.29
57 - Otis McAllister	358,906.06	380,469.56	194,548.30	181,782.50	1,115,706.42
60 - Hotel Pferdesee	91,016.92	112,097.77	425,493.29	454,614.17	1,083,222.15
64 - Klubben	215,225.69	240,470.96	333,818.90	274,262.97	1,063,778.52
68 - Möbel Siegfried	337,219.13	430,884.28	116,178.44	296,756.77	181,038.62
Grand Total	2,945,729.02	2,884,040.21	2,853,404.31	3,287,249.38	11,970,422.92

Sales Dashboard overview

Row Labels	Net Sales	Net Sales YTD Index
2017		
Q1	1,805,247	
Q2	1,289,976	
Q3	1,932,384	
Q4	1,215,453	
2018		
Q1	1,754,184	97%
Q2	1,872,960	117%
Q3	2,104,440	114%
Q4	1,504,772	116%
2019		
Q1	1,919,192	109%
Q2	2,119,034	111%
Q3	2,001,407	105%
Q4	2,245,938	114%
2020		
Q1	2,709,813	141%
Q2	2,722,636	135%
Q3	2,568,681	132%
Q4	3,549,625	139%
Grand Total	33,315,741	

YTD Analysis (chart)

Net Sales — Column Labels

Row Labels	Q1	Q2	Q3	Q4	Grand Total
2017	29%	21%	31%	19%	100%
2018	24%	26%	29%	21%	100%
2019	23%	26%	24%	27%	100%
2020	23%	24%	22%	31%	100%
Grand Total	25%	24%	26%	26%	100%

Date Analysis (chart)

Net Sales — Column Labels

Row Labels	GL Account	Item	Item Charges	Resource	Service Cost	Grand Total
2017	3%	92%	0%	6%	0%	100%
2018	4%	89%	0%	7%	0%	100%
2019	4%	88%	0%	8%	0%	100%
2020	3%	91%	0%	6%	0%	100%
Grand Total	4%	90%	0%	7%	0%	100%

Sales by Type (chart)

Type: All — Net Sales — Column Labels

Row Labels	2017	2018	2019	2020	Grand Total
FURNITURE	1,778,988	2,293,561	2,819,871	3,257,083	10,149,502
HARDWARE	273,979	300,829	622,341	1,809,118	3,006,269
N/A	534,334	817,538	1,027,341	1,087,361	3,466,574
SOFTWARE	986,679	1,211,853	2,612,462	3,527,726	8,338,720
SPORT	2,669,080	2,612,575	1,203,555	1,869,466	8,354,676
Grand Total	6,243,060	7,236,356	8,285,571	11,550,755	33,315,741

Type: All — Net Sales — Column Labels

Row Labels	2017	2018	2019	2020	Grand Total
12 - Selangorian Ltd.	328,184	317,107	196,195	302,977	1,144,463
14 - Highlights Electronics Sdn Bhd	240,086	169,046	272,509	423,044	1,104,686
16 - Somadis	115,577	603,959	224,589	248,781	1,192,906
32 - Libros S.A.	808,167	114,463	282,222	330,318	1,535,171
36 - Gagn & Gaman	170,643	213,028	537,440	515,573	1,436,684
44 - Designstudio Gmunden	280,704	302,514	270,410	259,139	1,112,767
57 - Otis McAllister	358,906	380,470	194,548	181,783	1,115,706
60 - Hotel Pferdesee	91,017	112,098	425,493	454,614	1,083,222
64 - Klubben	215,226	240,471	333,819	274,263	1,063,779
68 - Möbel Siegfried	337,219	430,884	116,178	296,757	1,181,039
Grand Total	2,945,729	2,884,040	2,853,404	3,287,249	11,970,423

Type: All — Net Sales — Column Labels

Row Labels	2017	2018	2019	2020	Grand Total
1000 - Bicycle	996,888	864,938	124,964	99,771	2,086,560
1001 - Touring Bicycle	1,524,097	1,595,400	826,271	1,370,260	5,316,027
1100 - Front Wheel	26,281	24,250	113,700	105,698	269,929
1150 - Front Hub	59,490	74,200	45,550	76,282	255,522
1896 - ATHENS Euro Chair	203,482	259,344	383,114	424,898	1,270,838
1900 - PARIS Guest Chair	53,896	183,034	92,637	109,600	439,166
1920 - CAPETOWN Leisure Chair	102,534	113,487	79,287	91,062	386,371
1930 - ST.MORITZ Storage Unit	35,942	42,369	82,686	90,964	251,961
1970 - GRENOBLE Whiteboard	90,397	85,831	176,244	222,636	575,108
1974 - SAPPORO Whiteboard	148,945	164,108	380,416	453,249	1,146,717
1984 - SARAJEVO Whiteboard	72,330	92,628	214,505	227,031	606,494
1990 - CALGARY Whiteboard	108,486	138,289	270,970	300,190	817,935
1992 - ALBERTVILLE Whiteboard	43,678	47,327	250,426	261,523	602,954
1996 - ATLANTA Whiteboard	193,967	256,641	229,531	288,017	968,156
2000 - BI4Dynamics NAV	679,348	815,318	1,785,742	1,944,815	5,225,224
2010 - BI4Dynamics AX	118,767	140,416	306,752	486,154	1,052,089
2020 - BI4Dynamics CRM	99,756	137,742	280,825	381,515	899,838
2071 - MS Dynamics CRM Lite	44,875	52,232	68,184	135,090	300,382
4012 - Team Work Computer	21,102	20,136	52,402	155,965	249,604
4013 - Enterprise Computer	15,928	11,138	43,868	212,547	283,480
7006 - Pedestal	104,332	125,597	46,150	68,949	345,028
N/A	534,334	817,538	1,027,341	1,087,361	3,466,574
Grand Total	5,278,855	6,061,962	6,881,563	8,593,577	26,815,956

7.2 Inventory cube

Exercise 1

Create new report: Inventory trend analysis

Measures: stock value, stock turnover days
Dimension: Date (YQMD), Company (UK 2009), Location (all), Insert line chart

NOTE (Format the chart and add data labels to match the picture)

| Company | UK 2009 |
| Location | All |

Row Labels	Stock Value	Stock Turnover Days
⊞ 2016		
Q4	155,000	
⊞ 2017		
Q1	2,678,381	334
Q2	2,684,790	571
Q3	2,293,080	370
Q4	2,988,842	578
⊞ 2018		
Q1	3,791,841	306
Q2	4,426,949	356
Q3	4,503,199	414
Q4	4,976,537	513
⊞ 2019		
Q1	4,544,764	427
Q2	4,001,813	308
Q3	3,552,558	359
Q4	3,323,616	296
⊞ 2020		
Q1	2,328,242	222
Q2	1,571,482	194
Q3	1,643,580	194
Q4	2,156,120	116
⊞ 2021		
Q1	2,156,120	
Q2	2,156,120	
Q3	2,156,120	
Q4	2,156,120	
Grand Total		405

Exercise 2

Create new report: Inventory trend over years by location

Filter: top 5 locations by stock value

Measures: Stock value
Dimensions: Company, Location, date

Conditional formatting: Data bars

NOTE (Format the chart and cross table to match the picture)

Company	UK 2009					
Stock Value	**Column Labels**					
Row Labels	⊞2016	⊞2017	⊞2018	⊞2019	⊞2020	⊞2021
LOC 1	155,000	1,312,696	1,703,675	1,158,697	1,646,729	1,646,729
LOC 2		0,454	2,167,910	1,515,488	444,955	444,955
LOC 3		655,692	1,104,952	649,431	64,436	64,436
Grand Total	155,000	2,988,842	4,976,537	3,323,616	2,156,120	2,156,120

Exercise 3

Inventory trend over Item by Vendor

Filter: Top 5 vendors by stock value

Measures: Stock value
Dimensions: Item by vendor, Date, Company

Insert bar chart

NOTE (Format the chart and cross table to match the picture)

Company	UK 2009				
Stock Value	**Column Labels**				
Row Labels	⊞2017	⊞2018	⊞2019	⊞2020	⊞2021
⊞11 - London Postmaster	1,101,459	1,859,174	1,275,339	672,374	672,374
⊞12 - AR Day Property Management	615,616	809,105	548,567	385,132	385,132
⊞21 - Custom Metals Incorporated	114,750	140,972	108,045	85,989	85,989
⊞23 - CoolWood Technologies	785,228	1,572,190	897,242	696,925	696,925
⊞29 - Groene Kater BVBA	17,618	20,155	15,862	24,663	24,663
⊞46 - Lyselette Lamper A/S	1,178	1,344	717	0	0
⊞47 - Kinnareds Träindustri AB	11,967	27,985	25,911	16,720	16,720
⊞52 - Grassblue Ltd.	66,877	91,381	90,730	39,041	39,041
⊞58 - BI4DYNAMICS Ltd.	271,264	452,704	360,561	235,207	235,207
⊞N/A	2,886	1,528	643	68	68
Grand Total	2,988,842	4,976,537	3,323,616	2,156,120	2,156,120

Exercise 4

Create new report: Inventory stock value over Item by vendor and over Location for year 2018

Filter: Top 5 Items by stock value

Measures: Stock value
Dimensions: Company, Date, Item by vendor, Location

NOTE (Format the chart and cross table to match the picture)

Date YMD	2018				
Company	UK 2009				
Stock Value	**Column Labels**				
Row Labels	**LOC 1**	**LOC 2**	**LOC 3**	**Grand Total**	
⊞ 11 - London Postmaster	568,748.45	868,759.37	421,666.31	1,859,174.13	
⊞ 23 - CoolWood Technologies	534,348.85	671,649.98	366,191.01	1,572,189.84	
⊞ 12 - AR Day Property Management	218,490.52	387,548.22	203,066.03	809,104.77	
⊞ 58 - BI4DYNAMICS Ltd.	236,115.38	142,204.27	74,384.69	452,704.34	
⊞ 21 - Custom Metals Incorporated	91,980.85	29,914.90	19,076.57	140,972.32	
Grand Total	**1,649,684.05**	**2,100,076.74**	**1,084,384.61**	**4,834,145.40**	

Exercise 5

Create new report: Item by vendor (London post master) by location (LOC 1) for year 2018 over stock value and stock rotation (days).

Filter: top 5 items by Stock Turnover Days

Measures: Stock value, Stock Turnover Days
Dimensions: Date, Location, Item by vendor, Item

NOTE (Format the chart and cross table to match the picture)

Date YQMD	2018	
Location	LOC 1	
Item Vendor - Item	11 - London Postmaster	

Row Labels	Stock Value	Stock Turnover Days
1930 - ST.MORITZ Storage Unit	4,721.96	1,050
7005 - Lamp	6,904.03	774
7201 - Doorknob	414.60	597
4062 - Hard disk Drive 800 GB	1,195.79	524
7040 - Drawer	24,023.60	488
Grand Total	37,259.98	532

Inventory Dashboard overview

Company	UK 2009					
Stock Value	Column Labels					
Row Labels	2016	2017	2018	2019	2020	2021
LOC 1	155,000	1,312,696	1,703,675	1,158,697	1,646,729	1,646,729
LOC 2		1,020,454	2,167,910	1,515,488	444,955	444,955
LOC 3		655,692	1,104,952	649,431	64,436	64,436
Grand Total	155,000	2,988,842	4,976,537	3,323,616	2,156,120	2,156,120

Date YMD	2018
Company	UK 2009

Stock Value	Column Labels			
Row Labels	LOC 1	LOC 2	LOC 3	Grand Total
11 - London Postmaster	568,748.45	868,759.37	421,666.31	1,859,174.13
23 - CoolWood Technologies	534,348.85	671,649.98	366,191.01	1,572,189.84
12 - AR Day Property Management	218,490.52	387,548.22	203,066.03	809,104.77
58 - BI4DYNAMICS Ltd.	236,115.38	142,204.27	74,384.69	452,704.34
21 - Custom Metals Incorporated	91,980.85	29,914.90	19,076.57	140,972.32
Grand Total	1,649,684.05	2,100,076.74	1,084,384.61	4,834,145.40

Date YQMD	2018
Location	LOC 1
Item Vendor - Item	11 - London Postmaster

Row Labels	Stock Value	Stock Turnover Days
1930 - ST.MORITZ Storage Unit	4,721.96	1,050
7005 - Lamp	6,904.03	774
7201 - Doorknob	414.60	597
4062 - Hard disk Drive 800 GB	1,195.79	524
7040 - Drawer	24,023.60	488
Grand Total	37,259.98	532

Company	UK 2009				
Stock Value	Column Labels				
Row Labels	2017	2018	2019	2020	2021
11 - London Postmaster	1,101,459	1,859,174	1,275,339	672,374	672,374
12 - AR Day Property Management	615,616	809,105	548,567	385,132	385,132
21 - Custom Metals Incorporated	114,750	140,972	108,045	85,989	85,989
23 - CoolWood Technologies	785,228	1,572,190	897,242	696,925	696,925
29 - Groene Kater BVBA	17,618	20,155	15,862	24,663	24,663
46 - Lyselette Lamper A/S	1,178	1,344	717	0	0
47 - Kinnareds Träindustri AB	11,967	27,985	25,911	16,720	16,720
52 - Grassblue Ltd.	66,877	91,381	90,730	39,041	39,041
58 - BI4DYNAMICS Ltd.	271,264	452,704	360,561	235,207	235,207
N/A	2,886	1,528	643	68	68
Grand Total	2,988,842	4,976,537	3,323,616	2,156,120	2,156,120

Stock Value	Stock Turnover Days
155,000	
2,678,381	334
2,684,790	571
2,293,080	370
2,988,842	578
3,791,841	306
4,426,949	356
4,503,199	414
4,976,537	513
4,544,764	427
4,001,813	308
3,552,558	359
3,323,616	296
2,328,242	222
1,571,482	194
1,643,580	194
2,156,120	116
2,156,120	
2,156,120	
2,156,120	
	405

7.3 General ledger/Account schedules cube

Exercise 1

Create new report: Balance sheet by multiple measures for Budget v1, year 2019 and company UK 2009

Measures: GL Net change, GL Debit Amount, GL Credit Amount, GL Net Change YTD, GL Net change YTD Last, GL Net Change YTD Index
Dimensions: GL account by levels, Company, GL Budget, Date YMD

NOTE (Format cross table to match the picture)

Date YMD	2019					
GL Budget	BUDGET					
Company	UK 2009					
Row Labels	**GL Net Change**	**GL Debit Amount**	**GL Credit Amount**	**GL Net Change YTD**	**GL Net Change YTD Last**	**GL Net Change YTD Index**
⊟ **10 - BALANCE SHEET**	**1,051,960.92**	**31,036,241.53**	**29,984,280.61**	**1,051,960.92**	**1,823,521.77**	**57.69%**
⊟ **100 - ASSETS**	**-348,533.55**	**21,861,611.89**	**22,210,145.44**	**-348,533.55**	**4,626,076.95**	**-7.53%**
⊞ 1000 - Fixed Assets	-19,401.00		19,401.00	-19,401.00	60,285.00	-32.18%
⊞ 2000 - Current Assets	-329,132.55	21,861,611.89	22,190,744.44	-329,132.55	4,565,791.95	-7.21%
⊟ **300 - EQUITY AND LIABILITIES**	**1,400,494.47**	**9,174,629.64**	**7,774,135.17**	**1,400,494.47**	**-2,802,555.18**	**-49.97%**
⊞ 5000 - Liabilities	1,400,494.47	9,174,629.64	7,774,135.17	1,400,494.47	-2,802,555.18	-49.97%
⊟ **60 - INCOME STATEMENT**	**-1,051,960.92**	**25,567,505.59**	**26,619,466.51**	**-1,051,960.92**	**-1,823,521.77**	**57.69%**
⊟ **600 - REVENUE**	**-273,525.69**	**9,544,389.08**	**9,817,914.77**	**-273,525.69**	**-263,116.14**	**103.96%**
⊞ 6100 - Sales of Retail	-29,501.30	8,160,600.40	8,190,101.70	-29,501.30	-24,566.30	120.09%
⊞ 6200 - Sales of Raw Materials	4,296.10	205,692.00	201,395.90	4,296.10	14,175.30	30.31%
⊞ 6400 - Sales of Resources	-228,096.00	461,450.50	689,546.50	-228,096.00	-202,222.50	112.79%
⊞ 6700 - Sales of Service Fees	-22,631.00		22,631.00	-22,631.00	-44,271.00	51.12%
⊞ 6800 - Sales of Service Contracts	-41,660.00		41,660.00	-41,660.00	-39,580.00	105.26%
⊞ 6900 - Discounts	44,066.51	716,646.18	672,579.67	44,066.51	33,348.36	132.14%
⊟ **700 - COSTS**	**-772,418.07**	**15,421,537.84**	**16,193,955.91**	**-772,418.07**	**-1,705,611.38**	**45.29%**
⊞ 7000 - COGS	-13,363.01	14,185,457.97	14,198,820.98	-13,363.01	-1,364,823.74	0.98%
⊞ 8000 - OPERATING COSTS	-759,055.06	1,236,079.87	1,995,134.93	-759,055.06	-340,787.64	222.74%
⊟ **900 - FINANCIAL ITEMS**	**-6,017.16**	**601,578.67**	**607,595.83**	**-6,017.16**	**145,205.75**	**-4.14%**
⊞ 9000 - Interest, Gains & Losses	-6,017.16	601,578.67	607,595.83	-6,017.16	145,205.75	-4.14%
Grand Total	**0.00**	**56,603,747.12**	**56,603,747.12**	**.00**	**.00**	

Exercise 2

Create new report: GL account by level over multiple companies in year 2019

Measures: GL Net Change
Dimensions: GL by account, Company, GL budget, Date YMD

NOTE (Format cross table to match the picture)

Date YMD	2019	
GL Budget	BUDGET	

GL Net Change	Column Labels	
Row Labels	UK 2009	Grand Total
⊟60 - INCOME STATEMENT	-1,051,960.92	-1,051,960.92
⊟600 - REVENUE	-273,525.69	-273,525.69
⊞6100 - Sales of Retail	-29,501.30	-29,501.30
⊞6200 - Sales of Raw Materials	4,296.10	4,296.10
⊞6400 - Sales of Resources	-228,096.00	-228,096.00
⊞6700 - Sales of Service Fees	-22,631.00	-22,631.00
⊞6800 - Sales of Service Contracts	-41,660.00	-41,660.00
⊞6900 - Discounts	44,066.51	44,066.51
⊟700 - COSTS	-772,418.07	-772,418.07
⊟7000 - COGS	-13,363.01	-13,363.01
⊞7105 - Cost of Retail	-12,362.79	-12,362.79
⊞7205 - Cost of Raw Materials	-1,000.22	-1,000.22
⊞7705 - Cost of Capacities	0.00	0.00
⊟8000 - OPERATING COSTS	-759,055.06	-759,055.06
⊞8001 - Operating Expenses	0.00	0.00
⊞8700 - Personnel Expenses	0.00	0.00
⊞8800 - Depreciation of Fixed Assets	-759,055.06	-759,055.06
⊟900 - FINANCIAL ITEMS	-6,017.16	-6,017.16
⊞9000 - Interest, Gains & Losses	-6,017.16	-6,017.16
Grand Total	-1,051,960.92	-1,051,960.92

Exercise 3

Account Schedules

Create new report: Account schedules PL over Business group for UK 2009 in year 201 9

Measures: Net change
Dimensions: Account Schedule PL, Date YMD, Company, Dim Area, Business group

NOTE (Format cross table to match the picture)

Date YMD	2019						
Company	UK 2009						
Dim Area Hierarchy	All						
GL Net Change	Column Labels						
Row Labels	⊞ HOME	⊞ INDUSTRIAL	⊞ INTERCOMPANY	⊞ N/A	⊞ OFFICE	Grand Total	
101 - REVENUE (102..106)	25,634.17	96,415.02	48,672.33		102,804.17	273,525.69	
102 - ¤ Retail	-6,042.00	-2,053.00	13,631.30		23,965.00	29,501.30	
103 - ¤ Raw Materials	0.00	-536.40	261.20		-4,020.90	-4,296.10	
104 - ¤ Resources	24,158.00	101,789.00	32,213.00		69,936.00	228,096.00	
106 - ¤ Other	7,518.17	-2,784.58	2,566.83		12,924.07	20,224.49	
201 - COSTS OF GOODS SOLD (202..206)	-2,553.71	-5,580.51	-366.63	-1,592.05	-3,270.11	-13,363.01	
202 - ¤ Retail	-2,553.71	-5,345.45	-455.38	-1,427.00	-2,581.25	-12,362.79	
203 - ¤ Raw Materials	0.00	-235.06	88.75	-165.05	-688.86	-1,000.22	
206 - ¤ Capacities	0.00			0.00		0.00	
208 - GROSS INCOME	28,187.88	101,995.53	49,038.96	1,592.05	106,074.28	286,888.70	
300 - EXPENSES (301+307..309)		0.00		-759,055.06	0.00	-759,055.06	
301 - Operating expenses (302..306)		0.00			0.00	0.00	
302 - ¤ Building Maintenance					0.00	0.00	
303 - ¤ Administrative		0.00			0.00	0.00	
304 - ¤ Computer					0.00	0.00	
305 - ¤ Selling					0.00	0.00	
306 - ¤ Vehicle					0.00	0.00	
307 - Other Operating expences					0.00	0.00	
308 - Personnel					0.00	0.00	
309 - Fixed Asset Depreciation				-759,055.06		-759,055.06	
310 - Net income before operations	28,187.88	101,995.53	49,038.96	760,647.11	106,074.28	1,045,943.76	
400 - Financial items				0.00		0.00	
500 - NET INCOME	28,187.88	101,995.53	49,038.96	760,647.11	106,074.28	1,045,943.76	
Grand Total	442,941.75	1,654,148.43	272,027.28	-3,528,283.67	1,159,166.21	0.00	

Exercise 4

Account schedules over multiple companies in year 2019

Measures: Net change
Dimensions: Date, Company, Account schedules (COST)

NOTE: Format cross table to match the picture

Date YMD	2019		
GL Net Change	**Column Labels**		
Row Labels	**NL 2009**	**UK 2009**	**Grand Total**
REVENUE - Revenue		273,525.69	273,525.69
OC - Operating costs		-759,055.06	-759,055.06
COGS - COGS		-13,363.01	-13,363.01
C - Cost (OC + COGS)		-772,418.07	-772,418.07
F - Financial Items		-6,017.16	-6,017.16
TC - Total Cost		-778,435.23	-778,435.23
P - Profit		1,051,960.92	1,051,960.92
- Personnel exp./ Revenue		0.00	0.00
- Operating Costs / Revenue		-277.51	-277.51
- COGS / Revenue		-4.89	-4.89
- Costs / Revenue		-282.39	-282.39
- Financial Items / Revenue		-2.20	-2.20
- Total Cost/Revenue		-284.59	-284.59
801 - Building Maintenance		0.00	0.00
802 - Administrative		0.00	0.00
803 - Computer		0.00	0.00
804 - Selling		0.00	0.00
805 - Vehicle		0.00	0.00
806 - Other Operating		0.00	0.00
807 - Personnel		0.00	0.00
808 - Fixed Asset Depreciation		-759,055.06	-759,055.06
- Building Maintenance/ Operating costs		0.00	0.00
- Administrative/ Operating costs		0.00	0.00
- Computer/ Operating costs		0.00	0.00
- Selling/ Operating costs		0.00	0.00
- Vehicle/ Operating costs		0.00	0.00
- Other Operating/ Operating costs		0.00	0.00
- Personnel exp./ Operating costs		0.00	0.00
- Fixed Asset Depreciation/ Operating costs		100.00	100.00
Grand Total	**0.00**	**0.00**	**0.00**